

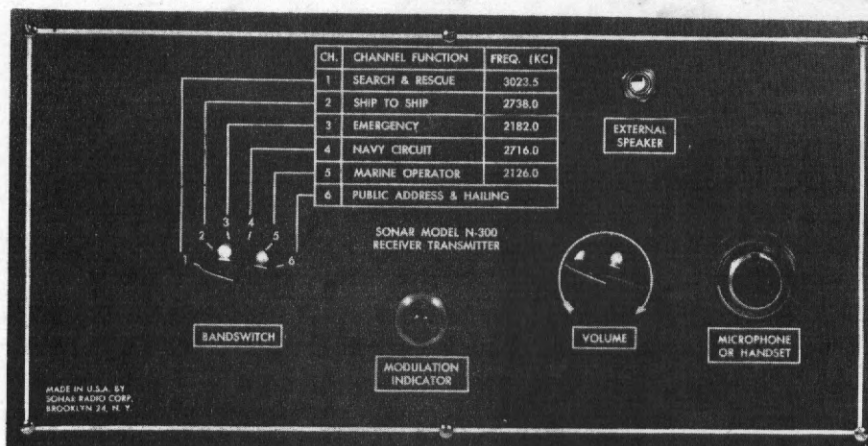
**OPERATING INSTRUCTIONS**

FOR THE

# **SONAR**

**MARINE RADIO TELEPHONE**

## **MODEL N-300**



**Sonar** RADIO CORPORATION BROOKLYN 24, N.Y.

GENERAL INFORMATION

The N-300 is a complete 35 watt, five channel, marine radio telephone, crystal controlled, combined with a sensitive super-hetrodyne receiver, employing the latest technique in design and manufacture.

The N-300 measures 12" high, 7" deep, and 11 3/4" long. It weighs about 30 lbs. with the battery. The battery is a 6 volt, wet cell, rechargeable, non-spill, Willard storage battery.

The modulator and final amplifier employs high level speech clipping and high level plate and screen modulation. The N-300 may be used aboard any boat, regardless of size and construction, operating on its own power, being completely independent of any other power source. If power is aboard the boat, the portable may be interconnected to the boat battery, regardless of voltage, by tapping 6 volts from the boat battery. It can be charged in this manner, or from any standard six volt battery charger, operating on 117 volt 60 cycle. ALWAYS MAKE SURE TO OBSERVE POLARITY. Do not charge from garage hot shot battery charger.

The Class B modulators may also be employed as a 17 watt public address system, by merely selecting its mode of operation from the control panel and using the same push to talk microphone that is normally employed for transmitting.

The N-300 in the "receive" position draws approximately 2 1/2 Amps. from the battery and approximately 15 Amps. in the "transmit" position.

The vibrator power supply is capable of delivering 60 watts of power (300 volts at 200 mills).

CIRCUIT DESCRIPTION FOR THE N300 MARINE RADIO TRANSMITTER

Both receiver and transmitter can be switched simultaneously to any of the five channels within the spectrum of 2-3.5 Mc., at which time the push to talk relays are out of the circuit.

The receiver operation of the N300 employs a 1U4 tube which functions as an RF amplifier, having a tuned grid and tuned plate, feeding a 1R5 crystal controlled mixer. The mixer feeds a 1U4 first IF amplifier, which in turn feeds another 1U4 IF amplifier, operating at 455 Kc. A 1U5 tube functions as a second detector, AVC and first stage of audio. The germanium diode is used as a shunt type automatic noise limiter. The 6C4 and 12AX7 tubes furnish audio power to the built-in 4" PM speaker, which is waterproof, or the ear piece in a telephone hand set and modulation for the transmitter.

Since three individually tuned circuits for each channel are employed in the RF grid, plate and mixer stages, extremely high image ratio is obtained plus outstanding sensitivity. The volume control actually controls the overall sensitivity through the screened circuits so that an extremely strong signal will not block the receiver and distort the audio.

The transmitter employs a 6C4 crystal controlled oscillator, which is capacity coupled to a pair of 6AQ5's in parallel and functions as RF power amplifier, which is plate and screen modulated.

A carbon microphone or a telephone type hand set is transformer coupled to a 6C4 tube which drives a pair of 12AX7 tubes in Class B. A three section PI network is employed plus individual air padders for obtaining peak power output. This gives flexibility in antenna loading plus a high degree of harmonic attenuation. High level speech clipping is employed in the Class B modulator plate circuits which result in a high degree of audio level and prevents over-modulation, which is known to cause splatter and interference to other services. All component parts and soldered connections are sprayed to prevent corrosion and fungus.

The power supply consists of a full wave selenium bridge rectifier and incorporates a four pin heavy duty six volt vibrator which develops the necessary B voltage for both receiver and transmitter.

#### INSTALLATION

Two crystals are required for each channel of operation. The 2182 Kc. crystals are wired in. Crystals are available from Sonar Radio Corporation.

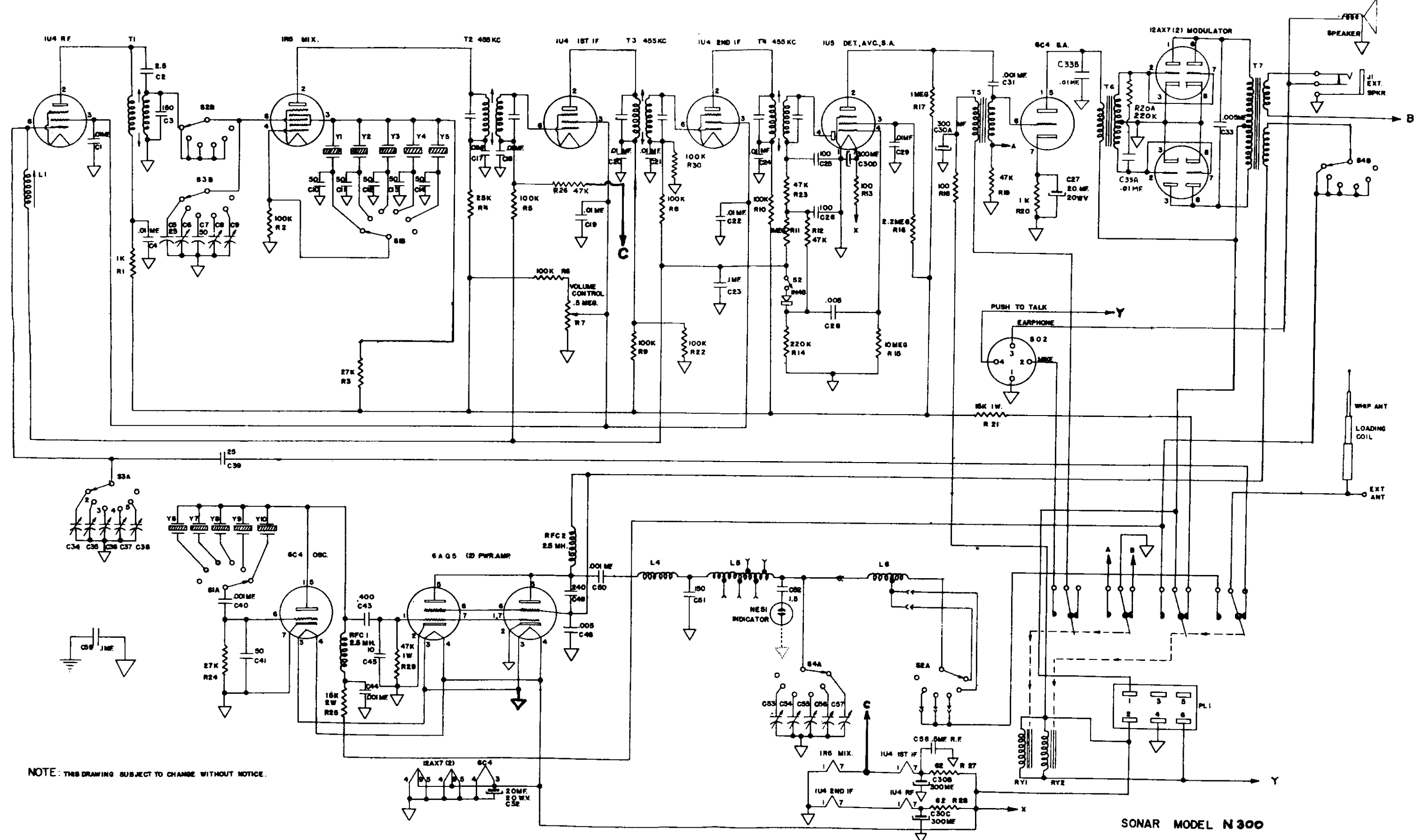
The receiver crystal oscillator is placed on the high side of the incoming signal. Example: incoming signal 2738 Kc. plus the IF frequency of 455 Kc. calls for 3193 Kc. crystal. For optimum performance, the following frequencies are recommended for the five channels. Channels 1 and 2 should be used between 3,500 and 2,300 Kc.; Channel 3 is emergency and Channels 4 and 5 should be used from 2,300 to 2,000 Kc.

The N300 is tested and pre-set at the factory to the following frequencies: Channel 1, 3823.5 Kc. Channel 2, 2738 Kc. Channel 3, 2182 Kc. Channel 4, 2716 Kc. Channel 5, 2126 Kc. When inserting crystals, make sure to follow the crystal lay-out as shown in Figure 1. A good ground connection is recommended for good marine telephone communication. If the hull is not metal, it is recommended that a ground plate measuring approximately 2' wide by 6' long, approximately 30 gauge of either copper, brass or stainless steel be used. This plate should be mounted to one side of the keel under the boat and connected with a #10 or #12 solid copper wire which should be as short as possible to the N300 ground connection. When using the N300 aboard an outboard motor type of craft, the ground connection can be made to the transom bolts which secure the motor to the boat. It should be remembered, however, that the larger surface area that is employed for the ground, which should be submerged in the water, will render best results. In the event that the N300 is used on a boat having a metallic hull, an effective radio ground to the hull should be used. The center-loaded antenna furnished only with the portable N300, when fully extended will be approximately 120 inches. The built-in antenna will render good communication depending on atmospheric conditions and surrounding objects.

The channel inductor clips are pre-set at the factory for the above mentioned frequencies for the portable N300. An external antenna may be used with a Fahnestock clip mounted on the side skirt of the N300 case. When using an external antenna, it is recommended that the portable antenna be removed and the following procedure be closely followed so that optimum RF output can be put into the antenna. This procedure applies to all N300 units. Place an 0-1 Amp. RF meter with an internal Thermocouple in series with the antenna lead. Connect a

good ground to the ground connection as shown in Fig. 2. (It is recommended that condensers C-57, C-56, C-55, C-54 and C-53, be so adjusted that they are approximately 25% meshed). Step # 1-- Set channel selector switch to #1, making sure that the unit is equipped with the proper crystals. Remove inductor clip-brown wire. Step # 2 -- Permit the unit to warm up for approximately 30 seconds, set the "PA" "TRANS" switch to the "TRANS" position. This puts the filaments on in the transmitter. Press the push-to-talk button on the microphone or the telephone hand set and slide the brown lead (Channel 1) starting from top nearest panel of coil L5 until the RF/MOD indicator mounted on the control panel is illuminated. Now, slide inductor clip for maximum meter reading. Secure the inductor clip to L5. Adjust condenser C-57 using a small screw driver as noted in Fig. 1, for maximum meter reading on 0 to 1 RF ammeter. Step # 3 -- Set channel selector switch to Position #2, and follow the same procedure as outlined in Step # 2, but this time using the Red lead equipped with the inductor clip. Step # 4 -- Set channel selector switch to position #3, and follow the same procedure as outlined in Step # 2, but this time using the orange lead equipped with the inductor clip and starting from coil L6. Step # 5, -- Set channel selector switch to position #4, and follow the same procedure as outlined in Step #2 and #4, but this time using the yellow lead equipped with the inductor clip. Step #6 -- Set channel selector switch to position #5, and follow steps #2 and #4, but using the green lead.

Condenser C-57 represents Channel 1; C-56 represents Channel #2; C-55 represents Channel 3; C-54 represents Channel 4; C-53 represents Channel 5.



NOTE: THIS DRAWING SUBJECT TO CHANGE WITHOUT NOTICE.

NOTES: FOR 12V OPERATION QUADRUPLE THE VALUE OF R27 & R28. THE FILAMENTS OF THE TWO 6C4'S ARE CONNECTED IN SERIES. DOUBLE THE VALUE OF R13

SONAR RADIO CORPORATION

When operating the N300 as a portable unit, as it is shipped from the factory, it is then necessary to extend the five section whip antenna to its full length, connect a good ground to the ground terminal, and adjust the corresponding air trimmer condensers C-57 through C-53 for maximum brilliance as noted by the RF/MOD indicator lamp when the push-to-talk button is depressed. Once each channel is so adjusted, these adjustments need never be touched unless different crystals of different frequencies are inserted or if a different type of ground is employed.

To service the N300, such as changing crystals, tubes or adjustments, open up each side of the case, which will then expose the top and bottom of the chassis. In the fixed model, lift up the top lid.

#### OPERATION

To obtain peak performance, extend the antenna to its maximum height, connect the ground wire under the wing nut, and keep the antenna away from surrounding objects or near-by passengers, so as not to obstruct or shield the antenna. Turn the channel switch to Channel # 1, assuming it has been equipped with the proper set of crystals. Make sure that the "TRANS" "PA" switch is in the "TRANS" position.

Push the toggle switch, which is located below the speaker on the battery compartment to the "ON" position. This puts the unit on. Allow approximately 30 seconds for warm-up time. Press the push button on the microphone or "hand set" and adjust the air trimmer C-57 to C-53 for maximum brilliancy as noted on the RF/MOD indicator bulb, mounted on the control panel of the N300. (Use a small knob screw driver). Do the same with the other five channels with the



corresponding trimmer, as shown in Fig. 1. The unit is now completely tuned and ready for operation. When receiving, adjust the volume control for the desired amount of level. If a "hand set" is used and the earphone is employed, the volume control will have to be retarded for comfortable listening. When transmitting, the RF/MOD indicator lamp will light, and will vary with intensity as the operator speaks into the microphone or hand set. Speak close and in a normal tone of voice. When the N300 is placed into operation and its antenna is fully extended, set channel selector switch to Channel #1, and as noted in Fig. 1, adjust condenser C-34 for maximum audio volume; Channel #2, adjust condensers C-35 and C-6 for maximum volume; Channel #3, adjust condenser C-36 for maximum volume; Channel #4, adjust condensers C-8 and C-38 for maximum volume; Channel #5, adjust condensers C-9 and C-38.

The noise limiter in the N300 is effective in eliminating ignition noise normally encountered with gasoline type marine engines. However, do not expect the noise limiter to be a cure-all since a fair amount of shielding may be required, depending on the type of motor and number of cylinders which are employed. Your dealer is well acquainted with the problem and will be able to advise the proper method and equipment necessary for shielding.

When placing a call to the Coast Guard on the 2182 Kc. emergency channel, the normal procedure is to press the button on the microphone or "hand set". Assuming a distress signal is to be made for help, the International Signal is "May Day". Repeat

the call several times, giving the name and call letters of your boat several times and then release the button which will immediately put the unit back into receive position, and adjust the volume control for the desired level from the station that is answering. Should ship-to-shore service be available in your territory and a phone call is to be placed, switch the N300 to the proper channel and call the Marine Operator several times, giving the name of your vessel or call letters. The operator will then place the call and it is of the utmost importance that, to talk or transmit, the microphone button must be pressed or released for reception.

"P.A." Operation. A toggle switch mounted on top of the N300 control panel is marked P.A. for public address as outlined earlier and TRANS for transmit. For normal radio communication, set the toggle switch to TRANS position. For public address operation, push the toggle switch to P.A. position. Press the push-to-talk button on the microphone and speak in a normal tone of voice. Always face the speaker away from the microphone to prevent an audio howl or feed back which may result. It is *COMPULSORY* that an external trumpet type speaker be used, when P.A. Operation is desired, since there is approximately 17 watts of audio which could damage the built-in speaker. The speaker should be mounted in a convenient position aboard ship so as not to create audio feed back. (The trumpet speaker selected should be one that could handle at least 15 watts of audio).

The closed circuit type jack, mounted under the speaker, takes a standard type plug PL-55. Connect a good grade of plastic covered

two conductor wire to the external speaker and connect the PL-55 type plug to the other end. When the phone plug is inserted, the built-in speaker will be automatically disconnected. The external speaker should have a voice coil impedance of 4 to 8 ohms. The channel selector switch must be in any of the 1-5 channels for the P.A. to operate. The P.A. system or transmit will not function when the channel switch is in the broadcast band position. THE VOLUME CONTROL ON THE N300 WILL NOT CONTROL THE VOLUME WHEN USING P.A.

It is recommended that a 4-8 ohm L-PAD be inserted in the external speaker line. This will control the volume.

POWER SUPPLY: The power supply compartment contains a six volt plastic rechargeable Willard type battery. Always make sure to maintain some charge in it, especially when not in use for some time. A quick glance at the visible hydrometer will indicate the condition of the battery.

ANTENNA: When installing the antenna for the N300 for fixed installation, we recommend a good center loaded antenna, such as the SONAR. The N300 can be connected to a permanent antenna if so desired.

#### SERVICE AND MAINTENANCE

The primary source of power for the N300 is a Willard non-spill type plastic rechargeable storage battery. This battery furnishes both filament voltage for all tubes and power for the Sonapack vibrator supply. The Sonapack vibrator power supply delivers the necessary B+ voltage for both receiver and transmitter.

The battery terminals have been coated with a film of vaseline to prevent corrosion that would ordinarily result. The Electrolite solution should always be kept approximately 1/8" above the level line, as viewed through the side of the battery case, exposing the three different colored balls in each cell. These three balls which make up the hydrometer of each cell will immediately indicate the condition of charge of the battery. The built-in battery will render seven hours of continuous reception on any of the five channels or broadcast band, or approximately three hours of continuous receive and transmit. Never permit the N300 to operate without recharging the battery once the blue and white balls have fallen to the bottom. This will result in longer battery life with the least amount of heating caused by charging. The charging rate is 2 to 4 amps. at approximately 6 to 8 volts. Any standard six volt battery charger may be employed, or, as outlined above, the automobile charger system may be used. Floating the battery in the N300, across the battery in the boat, will insure a fully charged battery at all times. After continuous use, the Electrolite solution will fall below the level mark, distilled water should be added to the battery by opening the four locks (2 on each side of the case), removing the power plug which interconnects the chassis and power supply, and unscrew the three red buttons on the top of the battery. Be careful not to over-fill the battery so that the solution would come pouring out of the vent tube, should the unit be tilted or turned upside down. Always make sure that the plastic vent tube is properly connected between the battery and vent opening in the case, to prevent hydrogen fumes from accumulating within the interior, which will cause severe damage to the unit.

When the N300 is not in use for a period of approximately thirty days, the unit should be put in charge to maintain the battery in a fully charged condition to prevent deterioration in the plates of the battery. Polarity of charging plug should always be observed.

All metal fittings on the case are solid brass, chrome plated, and should be kept clean by wiping with a piece of cheese cloth. The antenna section should also be wiped clean and it is recommended that periodically a thin film of vaseline be placed on the antenna and all metal hardware.

#### FILLING THE BATTERY WITH ACID

REMOVE the upper half of the portable and unscrew the red caps. Using a plastic funnel, pour the acid slowly in each cell until you reach the level line. Permit the battery to stand for three hours, with the red caps off. Tap each basket with the end of the screw driver, to free the balls, so that they float to the level line.

After three hours, replace the three red caps and begin to charge the battery for 20 hours, at a rate not in excess of four amps.

After 20 hours, shut the charger and permit the battery to stand for one hour. If the acid is not to the level line, add enough to reach the level line. The set is now ready for use.

# PARTS LIST FOR SONARFONE MODEL N-300

Diagram Part #	SONAR Part #	Description
C1	MS100	.01 ceramic 1000 VW
C2	MS101	1MMF
C3	MS102	25MMF
C4	MS103	.01 ceramic 1000 VW
C6	MS104	3-10 MMF trimmer
C7	MS105	25MMF
C8	MS106	8-50 MMF trimmer
C9	MS107	8-50 MMF trimmer
C10	MS108	50 MMF silver-mica 300 VW
C11	MS109	50 MMF silver-mica 300 VW
C12	MS110	50 MMF silver-mica 300 VW
C13	MS111	50 MMF silver-mica 300 VW
C14	MS112	50MMF silver-mica 300 VW
C16	MS113	100 MMF ceramic 2KV
C17	MS114	.01 ceramic 1000 VW
C18	MS115	.01 ceramic 1000 VW
C20	MS116	.01 ceramic 1000 VW
C21	MS117	.01 ceramic 1000 VW
	MS118	.1 paper 200 VW
C23	MS119	.1 paper 200 VW
C24	MS120	.01 ceramic 1000 VW
C25	MS121	100 MMF ceramic 2 KV
C26	MS122	100 MMF ceramic 2 KV
C27 + 27A	MS123	2 x 20 MFD 25 VW electrolytic
C28	MS124	.005 ceramic 1000 VW
C29	MS125	.01 ceramic 1000 VW

Diagram Part #	SONAR Part #	Description
C30 ABCD	MS126	4X 300 MFD 6 VW can
C31	MS127	.001 ceramic 1000 VW
C33	MS128	.005 ceramic 1000 VW
C34	MS129	3-10 MMF trimmer
C35	MS130	3-10 MMF trimmer
C36	MS131	8-50 MMF trimmer
C37	MS132	8-50 MMF trimmer
C38	MS133	8-50 MMF trimmer
C39	MS134	25 MMF ceramic 600 VW
C40	MS135	.001 ceramic 1000 VW
C41	MS136	50 MMF silver-mica 300 VW
C42	MS137	.001 ceramic 1000VW
C43	MS138	100 MMF 2 KV
C44	MS139	.01 ceramic 1000 VW
C48	MS140	.005 ceramic 1000 VW
C49	MS141	250 MMF ceramic 2 KV
C50	MS142	.001 ceramic 1000 VW
C51	MS143	100 MMF ceramic 2 KV
C52	MS144	5 MMF gimmic
C53	MS145	75 MMF air condenser
C54	MS146	100 MMF air condenser
C55	MS147	100 MMF air condenser
<del>C55x</del>	MS148	30 MFD x 10 MFD 450 VW
	MS149	.001 MFD ceramic 1000 VW
	MS150	.001 MFD ceramic 1000 VW
C56	MS151	100 MMF air condenser
C57	MS152	100 MMF air condenser

Diagram Part #	SONAR Part #	Description
C58	MS153	.5 MFD 50 VW RF By Pass
C59	MS154	.1 Paper 200 VW
R1	MS155	1K 1/2 W 10%
R2	MS156	100 K 1/2 W 10%
R3	MS157	27 K 1/2 W 10%
R4	MS158	27 K 1/2 W 10%
R5	MS159	100 K 1/2 W 10%
R6	MS160	100 K 1/2 W 10%
R7	MS161	.5M volume control
R8	MS162	100K 1/2 W 10%
R9	MS163	100 K 1/2 W 10%
R10	MS164	100 K 1/2 W 10%
R11	MS165	1 Meg. 1/2 W 10%
	MS166	1 Meg. 1/2 W 10%
R12	MS167	47K 1/2 W 10%
	MS168	100 K 1/2 W 10%
R13	MS169	100 ohm 1/2 W 10%
R14	MS170	220 K 1/2 W 10%
R15	MS171	10 Meg. 1/2 W 10%
R16	MS172	2.2 meg. 1/2 W 10%
R17	MS173	1 meg. 1/2 W. 10%
R18	MS174	100 ohm 1/2 W 10%
R19	MS175	47K 1/2 W 10%
R20	MS176	1K 1/2 W 10%
R21	MS177	15 K 1 W 10%
R22	MS178	100 K 1/2 W 10%
R23	MS179	47 K 1/2 W 10%

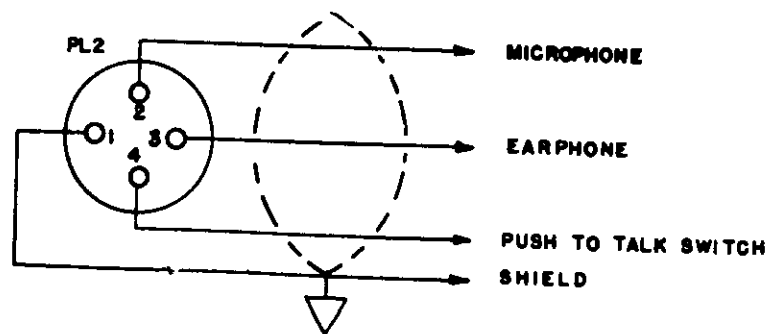
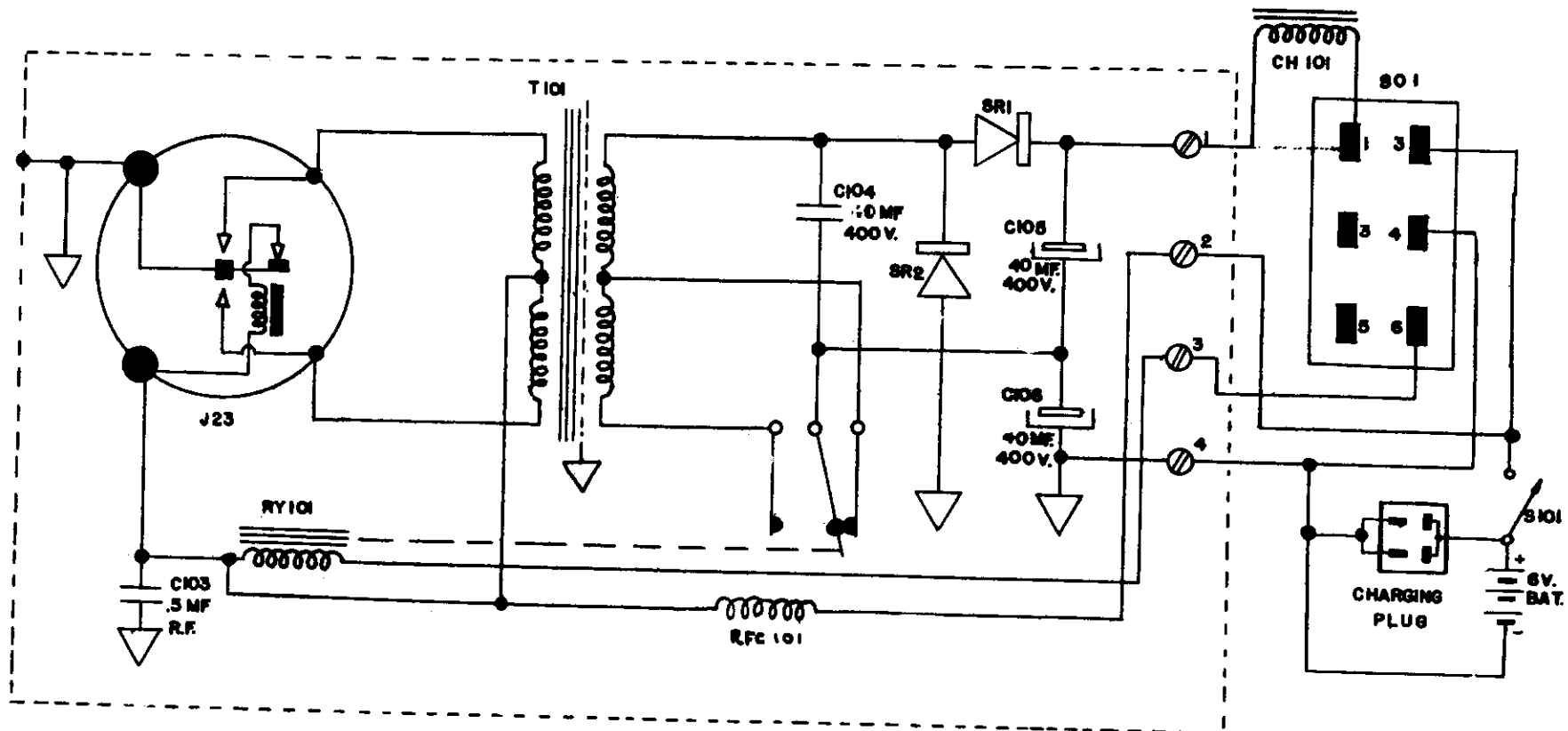


Diagram Part #	SONAR Part #	Description
R24	MS180	47 K 1/2 W 10%
R25	MS181	15 K 2 W 10%
R27	MS182	62 ohm 1/2 W 5%
R28	MS183	62 Ohm 1/2 W 5%
R29	MS184	47 K 1 W 10%
R30	MS185	100K 1/2 W 10%
RY1	MS186	DPDT relay
RY2	MS187	DPDT relay
T1	MS188	Marine RF coil input NS302147K
T2	MS189	455 KC IF 1655 input
T3	MS190	455 KC IF 1655 input
T4	MS191	455 KC IF 1655 input
T5	MS192	Mike input transformer 2194
T6	MS193	Class B input driver transformer 2260
T7	MS194	Modulation & Output transformer 2419
S02	MS195	4 Prong female mike connector
S1-4	MS196	6 position channel switch
L1	MS197	Marine antenna coil input
L4	MS198	Final amplifier tank
L5	MS199	Final amplifier tank for clips
L6	MS200	" " " for loading
9	MS201	Tube sockets & shields 7 pin
2	MS202	Tube sockets & shields 9 pin
3	MS203	Knobs
1	MS204	1N87A crystal diode
1	MS205	2637 KC crystal

Diagram Part#	SONAR Part #	Description
RFC1	MS206	choke 2.5 MH
RFC2	MS207	choke 2.5 MH
1	MS208	2182 KC crystal
4	MS209	double crystal sockets
1	MS210	Neon light assembly & bulb
1	MS211	Vertical antenna & loading coil
1	MS212	antenna & feed through
1	MS213	Panel
1	MS214	Cabinet - metal with doors
1	MS215	aluminum chassis
3	MS216	1U4 tubes
1	MS217	1R5 tubes
1	MS218	1U5 tubes
2	MS219	6C4 tubes
2	MS220	12AX7 tubes
2	MS221	6AQ5
1	MS222	4" Water Proof Speaker
1	MS223	Closed circuit jack
2	MS224	antenna mounts

## POWER SUPPLY PARTS LIST

Diagram Part #	SONAR Part #	Description
1	MS228	Sub=chassis aluminum
V101	MS229	Vibrator 1514
T101	MS230	Transformer 2261
SR1	MS231	Rectifier selenium
TM101	MS232	Terminal strip
RY101	MS233	DPDT Relay 6VDC
PL101	MS234	Jones Charger plug 304 AB
S101	MS235	Switch DPDT Toggle
CH101	MS236	"A" Choke
CH 102	MS 237	Filter Choke
C101	MS238	.5 MFD RF By Pass
C102	MS239	.15 MFD 400 VW
C103 C104	MS240	40 MFD 450 VW
1	MS241	Socket vibrator 4 prong
1	MS242	Ring Retaining vibrator
<u>MISCELLANEOUS</u>		
1	MS243	Canvas bag
1	MS244	Carrying strap
1	MS245	Jones plug 304 cct & Screw driver and allen wrenches
1	MS246	6V Battery ER 15-6
1	MS247	Qt. Bottle acid
1	MS248	Mike & Cable with connector
1	MS249	Instruction book



REV. MAY 1, 1956 JS

N 300 'SONAPACK'	
POWER SUPPLY	
DESIGNED:	J. BADKES JS
DRAWN:	T. WEBB
DATE:	Sept 8/56
SONAR RADIO CORPORATION BROOKLYN, N.Y.	

ADJUST TRIMMERS OF EACH CHANNEL (WITH TRANSMITTER ON) FOR MAXIMUM BRILLIANCE OF INDICATOR LAMP.

BROADCAST ANTENNA

SPEECH AMP.

MODULATORS & AUDIO

DET., S.A., AVC.

2ND I.F.

1ST I.F.

MIX.

R.F.

MIXER-8RD TRIMMING CHANNEL

ANTENNA TRIMMING CHANNEL

BROADCAST OSCILLATOR

R.F. POWER AMP

OSC.

TRANSMITTER CRYSTALS

CHAN.5	CHAN.4	CHAN.2	CHAN.1
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CHAN.5	CHAN.4	CHAN.2	CHAN.1
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RECEIVER

CRYSTALS

R.F.

