NAVSHIPS 900,719

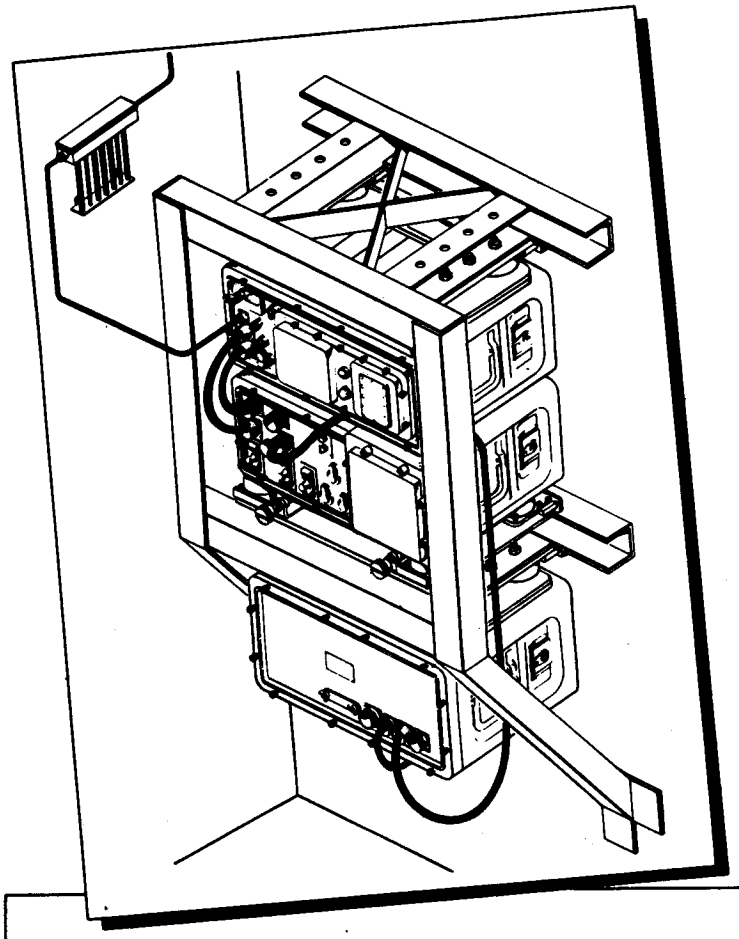
INSTALLATION AND INITIAL ADJUSTMENTS

SECTION 3

M-A-R

RADIO TRANSMITTING AND RECEIVING EQUIPMENT

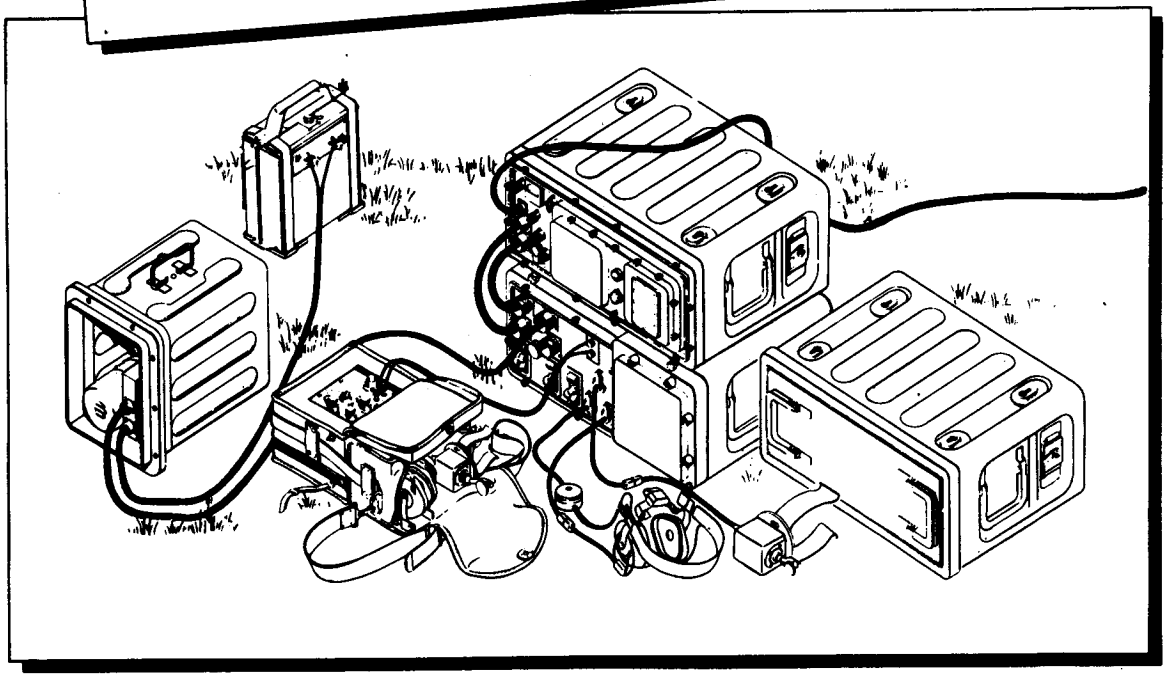
RESTRICTED



TYPICAL MAR INSTALLATIONS

◀ ON SHIPBOARD

▼ IN THE FIELD



INSTALLATION OF MAR EQUIPMENT

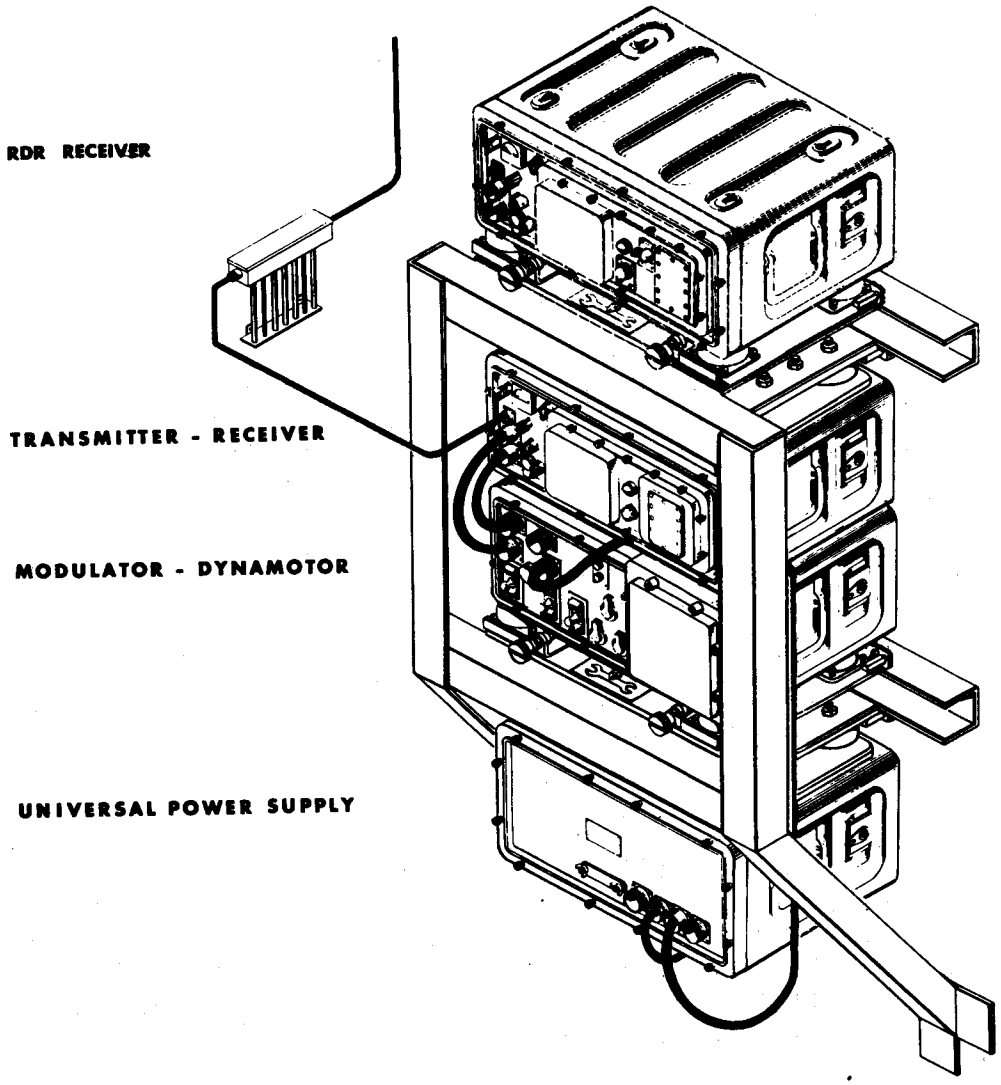
The MAR equipment may be grouped to form a number of combinations of the radio units to meet practically any condition of service. However, but two basic groupings will be considered, which, with slight modifications, will meet the requirements of most radio installations.

Two kits are utilized to make these assemblies, a Shipboard Installation Kit for permanent installations and a Field Application Kit for field or mobile installations. The keyhole slots in the cases of the various units allow of stacking the case in various groupings in field applications. For permanent installations, shockmount assemblies are used to support or suspend the equipment as found most desirable.

On the opposite page are illustrated the two general us s to which the equipment will be put: shipboard and field application. The shipboard installation, utilizing shockmounts and a mounting shelf similar to that suggested in the illustration, will provide for the addition of a companion radio receiver, the RDR, on top of the equipment and powered from the same power supply as the MAR basic equipment.

The field application makes use of cabinet fasteners to clamp the units together when placed on the ground. For isolated positions, where power is not available, a gas engine-driven unit is employed to furnish the 13-volt, direct current on which the equipment operates. Auxiliary storage batteries are to be used with this application where transportation facilities permit. The batteries assure continued operation of the equipment in the event it is necessary to shut down the engine unit for repair or adjustment.

Two standard lengths of antenna transmission cable are furnished with the field kits to simplify the erection or removal of the antenna. Necessary cabling is also included for connection to the gas engine unit and battery case. The individual kits are considered in detail in the following pages.



SHIPBOARD INSTALLATION KIT

The purpose of the Shipboard Installation Kit is to adapt the basic MAR receiver-transmitter and modulator-dynamotor equipment for use on surface craft as permanent equipment. Provision is also made for the installation of the RDR receiver by including an additional shockmount. The Shipboard Kit includes only the material needed to install the units on a permanent mounting frame which must be constructed to fit existing conditions on board ship. The kit components and accessories are as follows:

COMPONENTS OF SHIPBOARD INSTALLATION KIT

UNCRATED

QUAN.	NAVY TYPE NO.	UNIT	WIDTH INCHES	DEPTH INCHES	HEIGHT INCHES	WEIGHT POUNDS
1	CRV-10507	*Shockmount Assembly for MAR Modulator-Dynamotor	19-3/4	14-7/8	3-5/16	32
2	CRV-10508	*Shockmount Assembly for MAR Transmitter-Receiver and RDR Receiver	19-3/4	14-7/8	3-5/16	32
1	CRV-10592	*Shockmount Assembly for Universal Power Supply	19-3/4	14-7/8	3-5/16	
2	CRV-62250	Junction Boxes and Accessories	8	4-15/16	10-1/8	7

* Includes complete set of hardware for attaching to equipment cases

KIT ACCESSORIES

1	5-ft phone cord and plug (PL-55)
1	5-ft microphone cord and plug (PL-58)
1	type UG-23/U jack
2	type UG-167/U reducing connectors
1	type UG-29/U adapter
1	type UG-21/U plug
1	pin for type UG-21/U plug

The shockmount assemblies are designed so that they may be bolted to the equipment cases by means of the keyhole slots found on both top and bottom of the cases. The spacing of these slots, which is identical on all units, allows the equipment to be arranged in any desired grouping. Thus, by properly attaching the shockmounts, a given unit may either be suspended from a supporting member or supported above it. In all cases, for ease of inspection and servicing, the units and their shockmount assemblies may be slid on and off the slide members which are bolted or welded to the mounting frame.

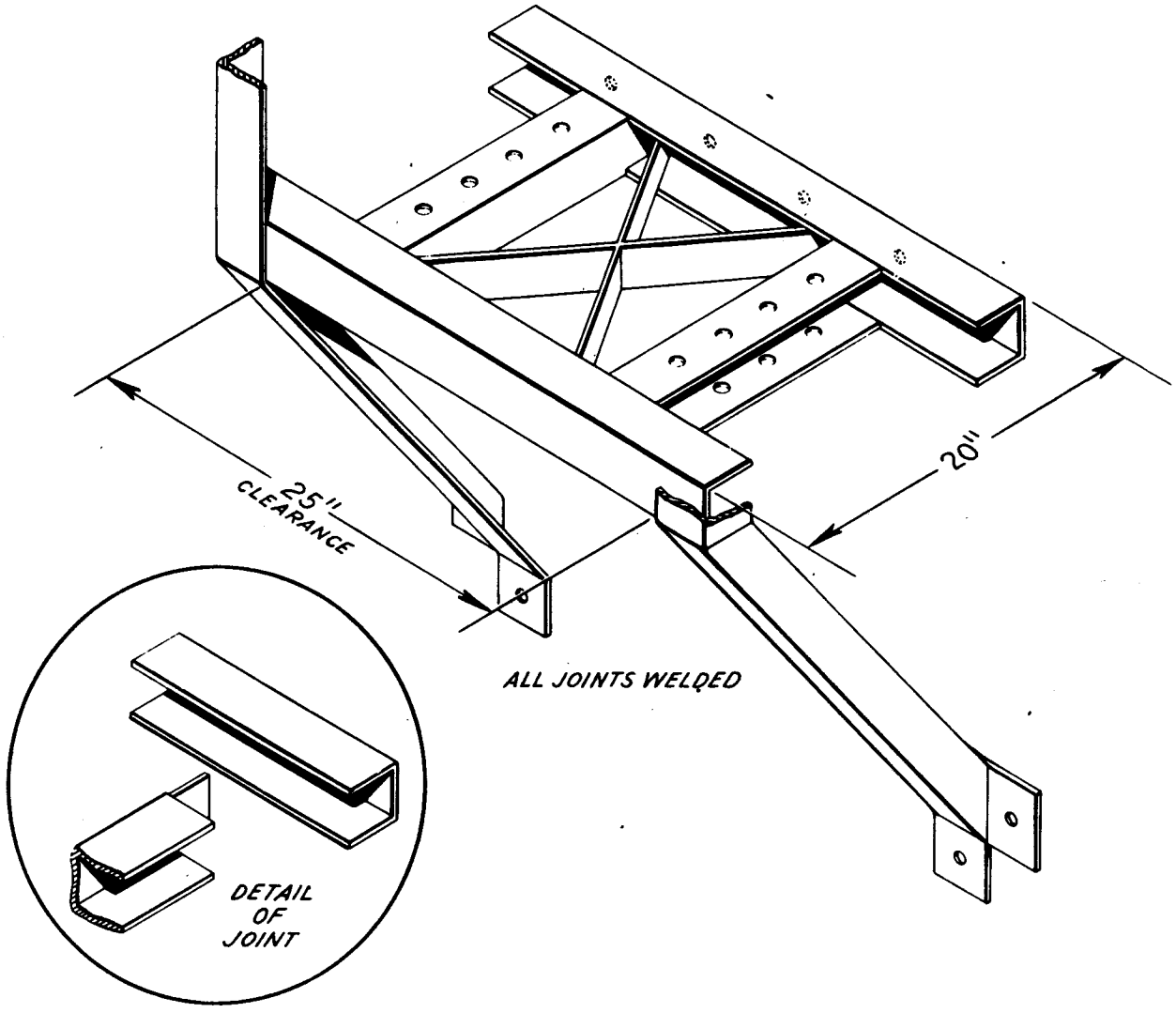
Th construction of a permanent mount for the MAR and relat d equipment is largely a matter of adapting or utilizing existing material and facilities. The number of equipment units and the space available will also determine the manner in which the units are to be stacked or grouped. The mounting suggested, therefore, is intended to serve only as guide as to constructional details of a suitable mounting frame for use on shipboard. Deviations in materials and all dimensions except minimum dimensions may be made to suit existing conditions.

BASIC MAR EQUIPMENT

USED WITH SHIPBOARD KIT

Dimensions and Weight Uncrated.

QUAN.	NAVY TYPE NO.	UNIT	WIDTH INCHES	DEPTH INCHES	HEIGHT INCHES	WEIGHT POUNDS
1	CRV-43067	Transmitter-Receiver	21-1/4	16-1/4	9-1/2	45
1	CRV-50248	Modulator-Dynamotor	21-1/4	16-1/4	9-1/2	45
1	CLG-20379	Universal Power Supply	21-1/4	16-1/4	10-7/8	100
1	CRV-66147	Antenna		25	22	3-1/2



SHIPBOARD MOUNTING

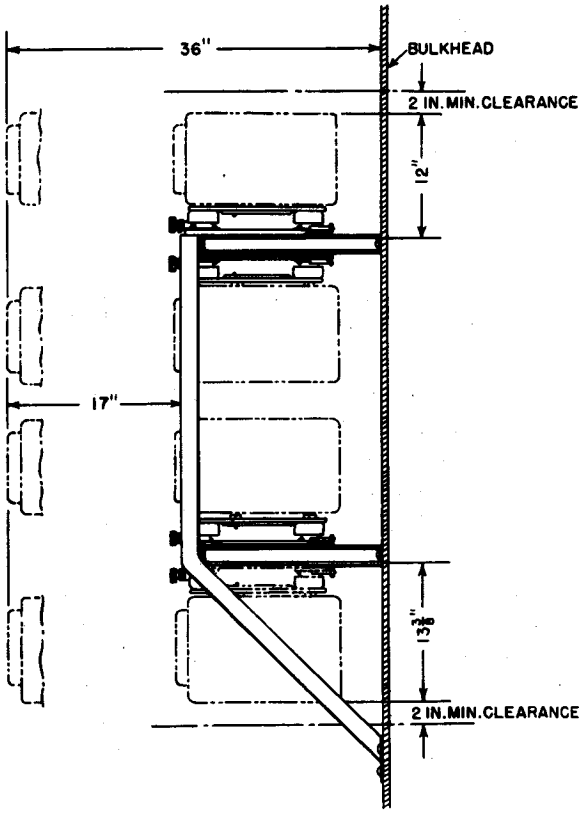
A suggested shelf-type mount, which is simple and requires little material and labor for its construction, is shown in the illustration. Since the shockmounts are designed so that units may be fastened to a base or suspended, this shelf mount will support both the Receiver-Transmitter and Modulator-Dynamotor Units. If the Universal Power Unit is part of the equipment, it may be fastened to the deck by mounting its shockmount base on two pieces of channel iron bolted to the deck. An alternate arrangement to provide for the Universal Power Unit and the RDR receiver, if it is als to be part of the grouping, is to construct two shelves, mounting one above the other or installing them side by side.

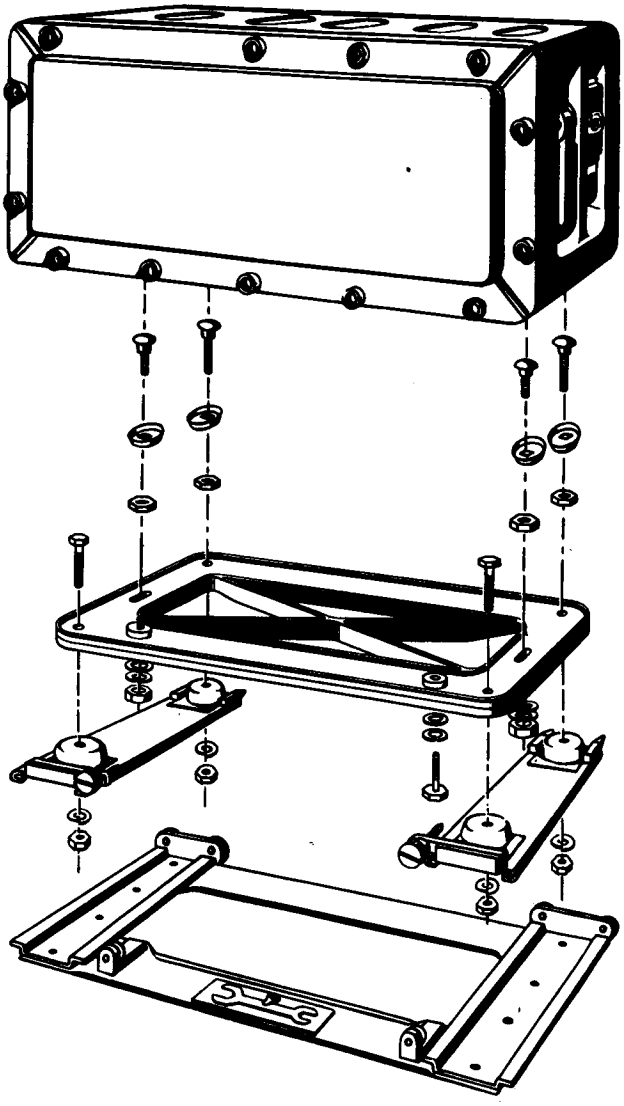
Th illustrated mount, constructed of three-inch channel and reinforced as shown, is designed for bolting or welding to a bulkhead. If one shelf is mounted above the other, vertical braces should tie them together. Three-inch angle brackets extend from the shelf to the bulkhead as shown. For additional rigidity, vertical braces may be extended from the shelf to an overhead support.

All installations should provide a two-inch minimum free space above and below equipment for ease of handling. Also, 17" minimum clearance should be maintained in front of equipment panels in order that units may be slid out for servicing and inspection. The illustration depicts the clearances necessary.

In any installation, it is emphasized that the mount used must be completely rigid and free from movement of any kind under the stresses and vibration likely to be encountered. Support should be provided equal to ten times the weight of the equipment. Also, under any conditions of shock or strain, units must never be bolted together but should be mounted on individual shockmounts.

Having determined the manner of mounting the units, whether supported from below or suspended, the shockmount furnished for each unit is carefully selected by reference to the Navy type number and attached to its respective unit in accordance with the following directions.





MOUNTING HARDWARE FOR SHOCKMOUNT ASSEMBLY

2	Carriage bolts 5/16 - 24 x 1-1/4"
2	Carriage bolts 5/16 - 24 x 2-5/16"
4	Saddles
6	Lockwashers 5/16
4	Nuts 5/16 - 24, counter-bored
4	Nuts 5/16 - 24
2	Washers 5/16

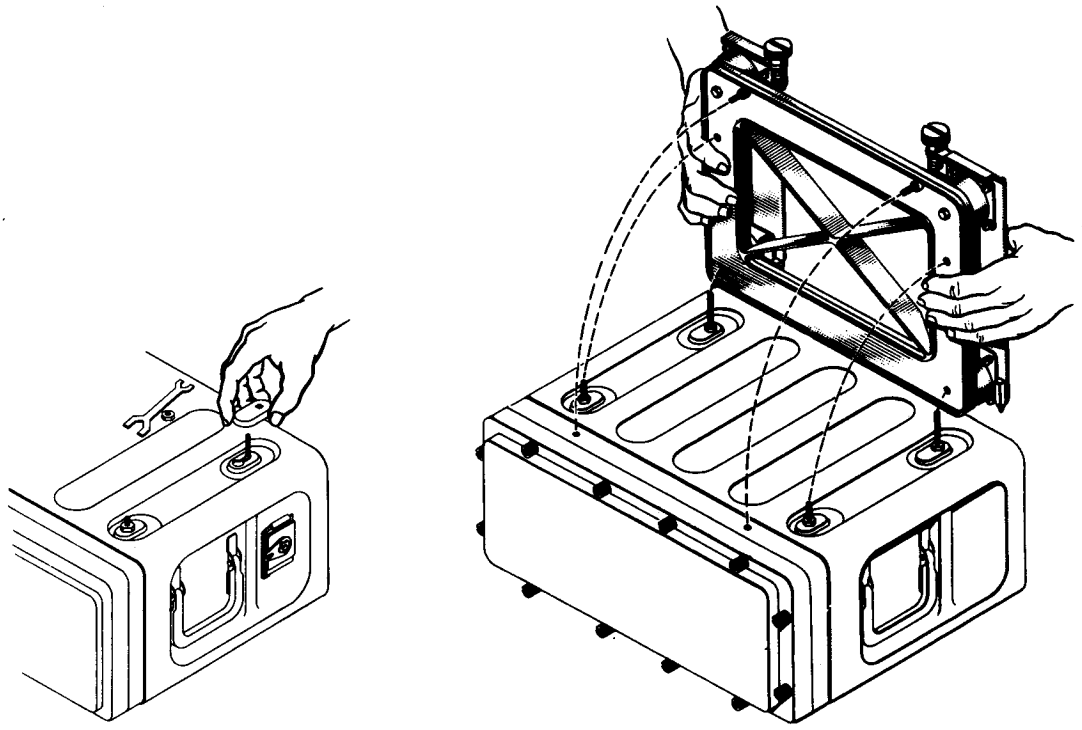
In Canvas Bag

2	Screws 1/4 - 24 x 1-1/4
2	Washers 1/4
2	Lockwashers 1/4

ATTACHING SHOCKMOUNTS

To attach the shockmounts to the cases, it will be necessary to dismantle the mount to the point where the two slide members are attached to the flat frame member only by the two hex-head bolts that pass through the frame and shock-mounts at the front end of the slides. To do this, first loosen the knurled clamping nuts on the front edge of the shockmount and slide the frame and slides off the base member. The four carriage bolts and saddles are then rem ved, which leaves the slides attached to frame only at the front ends.

The case is then prepared for receiving the mount by fasten-ing the carriage bolts into the keyhole slots on the side of the case to which the mount is to be attached. Thus, the bolts are put in the top of the case when the unit is to be suspended. The case should have the bolts placed in the bottom when the equipment is to be mounted on top of its support.



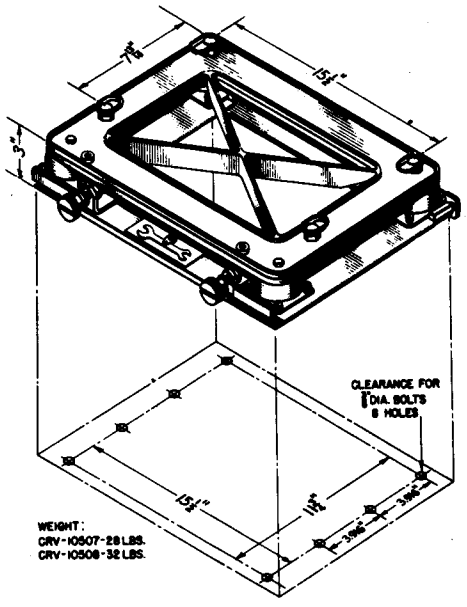
Two short and two long carriage bolts are provided for each shockmount. To attach the bolts, lay the case on its side, insert the head of a short carriage bolt in the keyhole slot nearest the cover of the equipment, and slide the bolt to the end of the square slot. Drop one of the saddles provided over the bolt shank with flanges down and screw a large nut, with the counterbored side down, onto the bolt thre ds. Tighten the nuts with open end wrench attached to th base of the shockmount.

Follow the same procedure, as shown in the illustration, in attaching the long carriage bolts in the keyhole slots near the back of the case.

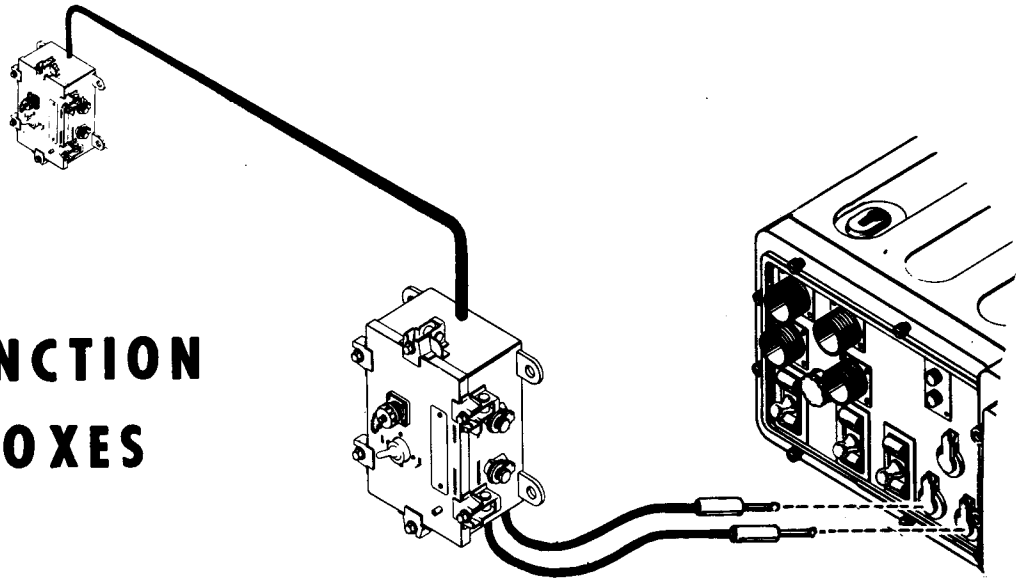
To install the frame and slides, insert the two hex-head bolts with washers and lockwashers, that are in the canvas bag tied to the shockmount, into the two holes in front edge of frame. Grip slides and frame as shown in the illustration, holding holes in shockmounts in line with holes in frame, and place on top of bolt ends, entering bolts into holes as indicated. Lockwashers are placed on the bolts and the nuts start d on the bolt threads. Enter the threads of the cap-screws into the tapped holes in the front rim of the case. All six nuts and the two capscrews may now be tightened with the wrench. This completes the attaching of the shockmounts to the ses, and the unit is ready for installation.

The base of th shockmount assembly is attach d directly to the shelf support by bolts through, or capscrews thr aded into tapped holes drilled in the channel framework. A drilling pattern for laying out the holes in the channel is given in the illustration, a clearance drill for three-eights inch bolts being used to drill the holes when the base is to be attached with through bolts. Bolts of the proper length to pass through the channel and shockmount base are used to hold the base in place. Shockmount bases may be welded to top or bottom of the channel shelf if preferred. Since installation details will vary, no bolts for the base are furnished with the shockmounts.

The equipment can then be slid into place on the base, the thumbscrews at the front end of the slides being tighten d into the tapped lugs on the base to clamp the assembly rigidly into place.



JUNCTION BOXES



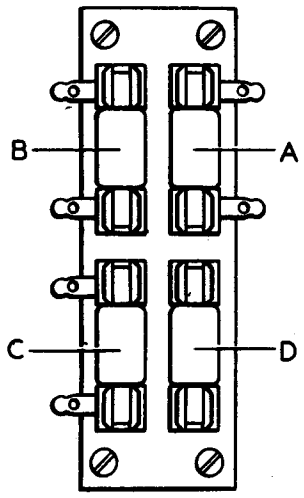
The two junction boxes furnished with the kit are for extending the output and voice control of the equipment to some remote point. The boxes consist of a rectangular metal enclosure fitted with a removable cover. The interior of the box is fitted with two terminal boards for the connection of necessary multiple-conductor cables and the leads from the connectors and jacks mounted on the box.

The junction boxes are utilized in the following manner. One box is drilled and fitted with the two phone cords, connections being made to the terminal board. This box is mounted close to th MAR equipment and connected through a five-conductor c ble to the other junction box that may be mounted at any other point in the ship. .

When remote control of the equipment is desired, the plugs on the extension cords on the operator's headset and microphone are withdrawn from the jacks in the modulator panel. The plugs on the cords attached to the junction box, adjacent to the radio equipment, are plugged into the jacks on the modulator panel as indicated by the dotted lines in the illustration. The voice input and output circuits of the radio equipment are thus extended to the junction box circuits.

The plugs on the operator's headset and microphone cords may be inserted in the jacks on the side of the junction box near the radio equipment for local operation.

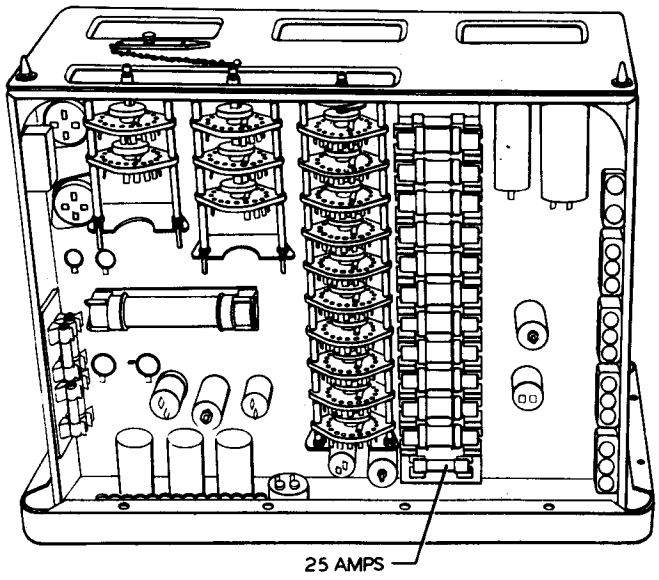
A microphone and headset may be plugged into the jacks at the remote junction box after which transmission and reception may be carried on from this point. Selection of the operating frequency channel or changeover to MCW is not possible at the remote junct i n box.



115 VOLTS AC
A - 10 AMPS
B - 10 AMPS
115 VOLTS DC
A - 10 AMPS
C - 10 AMPS

230 VOLTS AC
A - 10 AMPS
B - 5 AMPS
230 VOLTS DC
A - 10 AMPS
C - 5 AMPS

D - SPARE CLIP



UNIVERSAL POWER SUPPLY INSTALLATION

After attaching the proper shockmount (Navy Type No. CRV-10592) to the universal power supply and slipping it into place on the supporting frame it will be necessary to adjust the switches and install the proper fuses to adapt the unit to the characteristics of the available power supply. Remove the outer cover of the unit by loosening the thumbscrews around the edge of the cover by means of wrench or screwdriver clipped to the ends of the case.

Determine the voltage and characteristic of the power s urce, paying particular attention to the voltage of the power supply lines. Loosen the clamping thumbscrews on the front panel and pull the power unit chassis forward to the point where latches prevent its further removal. Then, pressing thumb of both hands against bar showing in the holes on the sides of the case, release latches and withdraw chassis from case. Stand the unit on one end.

The fuses are located in two positions beneath the chassis of the power unit and care should be taken to see that they are installed properly to provide adequate protection for the unit.

One large 25-ampere fuse for 26 volts D.C. is located underneath the chassis on the front end of the center resistor panel. The position is plainly marked "25 AMP." and since this fuse is larger than the others it cannot be accidentally exchanged. If the power source is 26-volts D.C., the only check necessary is to see that this fuse is securely in pl ce.

Four smaller fuses are also located under the chassis on a separate small panel indicated in the illustration. These fuses provide protection for all other input voltages and because some interchanging is necessary when changing power sources, it is vital to be absolutely certain that the correct fuse is in the proper position. Incorrect installation of these fuses can cause burnout or damage to the unit by passing too high current in case of trouble developing in the unit. Repeated fuse burnouts may also result from installing a lower value fuse where one of higher rating is required. In the latter case, only inconvenience will result.

Referring to the illustration, of the four fuses furnished, three are 10-ampere and one is 5-ampere. One 10-ampere fuse is always in position A as a common fuse, regardless of whether the incoming source is A.C. or D.C., 115 or 230 volts. This fuse is never moved. Another 10-ampere fuse is furnished as a spare and placed at D, so it need be moved only when required for replacement of a blown fuse of equal rating. The other two fuses, one 5-ampere and one 10-ampere, are intended for 230-volts and 115 volts, respectively. The general rule to be followed is to use the 10-ampere fuse for 115 volts and the 5-ampere fuse for 230 volts, placing the fuse of the proper rating at B for A.C. supply and at C for D.C. supply. The spare fuse is then placed in the extra clips on the fuse board.

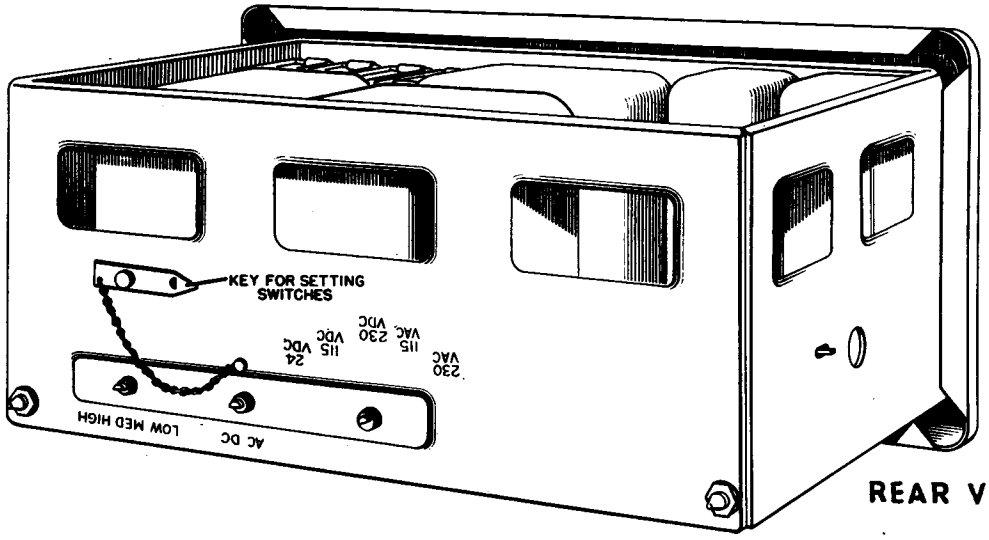
Only one of the lower pair of fuse clips is used at any given setting. Thus, clips at B are in use with A.C., and clips C with D.C. The changeover in the circuit is accomplished by the method of wiring the input cable plug to be described latter.

POWER SUPPLY SETTINGS

After installing the fuses properly, it is then necessary to set the three switches on the rear of the chassis, shown in the illustration on page 3-11.

Remove the switch lever from the back panel by releasing the thumbscrew and set in place on the extended shaft of the main power switch. This switch is clearly marked with the input voltages. Turn the switch lever until the handle of the wrench lines up with the voltage of the line on which the unit is to be used.

POWER SUPPLY UNIT



REAR VIEW

Move the switch lever to the shaft of the switch marked "AC-DC". Set this switch to correspond to the type of input current available.

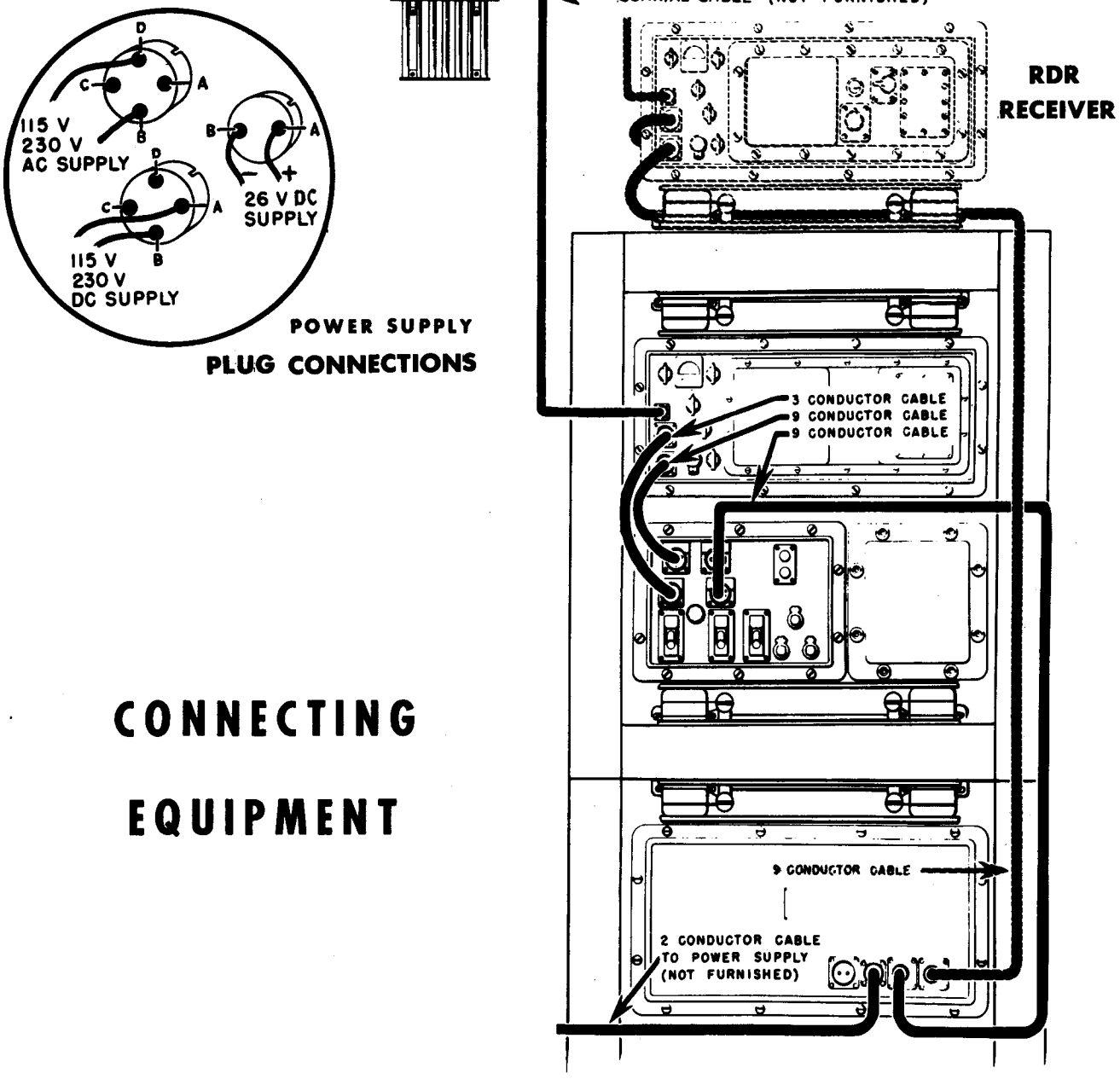
Move the switch lever to the shaft of the switch marked "Hi, Med, Low". Set the switch to the proper setting as indicated in the Input voltage variation chart.

INPUT VOLTAGE VARIATION CHART

Switch Setting	Input Voltage		
	26V DC	115V AC or DC	230V AC or DC
Hi	Above 27.3	Above 116	Above 232
Med	24.7 - 27.3	109 - 116	218 - 232
Low	Below 24.7	Below 109	Below 218

Replace wrench and clamp in place. Slide chassis back into case and tighten thumbscrews on panel. Remove knurled nuts over voltage indicating plate on unit panel and place plate with proper indication facing out and replace knurled nuts.

NOTE: When operated on a low capacity, direct current power supply line the power supply unit may fail to give full output voltage. To correct this, a 200 to 300 mfd capacitor must be c nnected across the input line. A kit to make this installation will be made available when required.



CONNECTING EQUIPMENT

With all the equipment units properly mounted and fastened in place, the outer waterproof covers may be removed by using the Allen wrench clipped to the right-hand end of the cases or the screwdriver clipped to the left-hand end of the cases.

The interconnecting of the units is accomplished by connecting the proper cables to receptacles on the panel of the units after unscrewing the chained caps. Cables and connectors to make the entire installation, with the exception f ntenna cable and power feeder cable, are furnished with the accessories.

To connect the transmitter-receiver and the modulator-dynamotor units together, two cables are furnished. These cabl s are two foot long and complete with plugs. One cable consists of three conductors, the other of nine conductors. These cables are plugged into the receptacles on the panels of the unit as shown in the illustration.

For connection to the universal power unit, an eight-foot long, nine conductor cable is provided. One end of this cable is plugged into the receptacle, marked FROM PU, on the modulator-dynamotor panel, the other end is connected to the receptacle, second from the right, marked MAR OUTPUT on the universal power unit panel.

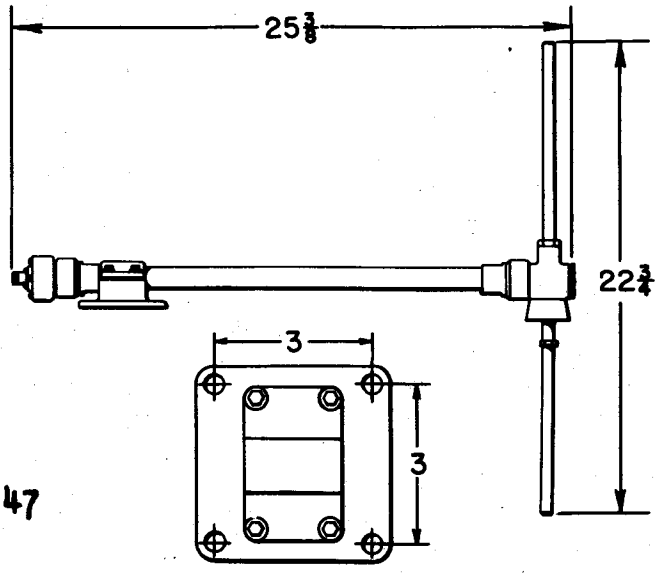
For operation on 26-volt direct current, the two-hole plug is connected to a section of No. 8 two-conductor cable. To connect the power supply unit to 115-230 volt input, the four terminal plug (AN-3106-24-9S) must be attached to a length of No. 12 or No. 10 two conductor cable. When the supply is alternating current the connections to the plug terminals differ from the connections used with direct current, as shown in the illustration insert on page 3-14. Connections to the plugs must be made exactly as shown or the equipment will not function. The other end of the cable should be connected to the nearest 115-230 volt power supply outlet. If the power supply line is separately fused, a 15 ampere fuse should be used for 115 volt supply; a 10 ampere fuse for 230 volt supply.

In some installations, an auxiliary receiver, the RDR, will also be included with the MAR equipment. This receiver, usually mounted above the MAR transmitter-receiver, is also connected to the universal power unit. The necessary nine-conductor cable for this connection will be furnished with the RDR receiver. The power supply unit has sufficient output capacity to power the MAR and the RDR units at the same time.

ANTENNA INSTALLATION

The antenna should be installed in a clear space as far as possible from all shielding objects or conducting masses. Should the height of nearby metallic objects approach or exceed that of the antenna, the dipole end of the antenna should be located at least four and one-half feet from the object.

A mounting clamp is provided with the antenna which is t be bolted to the support on which the antenna is to be mounted. The clamp, as shown in the illustration on page 3-16, consists of two separable sections that allow the ant nna to be attached to a horizontal or vertical surfac .



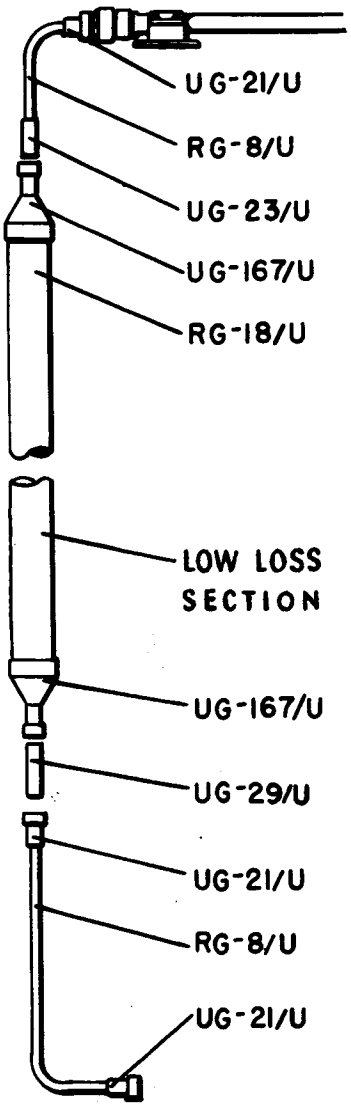
ANTENNA

Navy type CRV-66147

If it is desired to mount the antenna on a vertical surface, the clamp must be loosened and turned at right angles from the position shown. The mounting clamp must always be placed at the far end of the assembly, i.e., as far as possible from the dipole rods.

The dipole rods are removed from the antenna body for convenience in shipping and the first step in installing the antenna is to replace these rods. The rod with the coarse thread is the grounded rod and should be screwed into the one-half inch hole in the casting at the end of the tubular assembly. Screw rod in place, by inserting shank of antenna wrench in hole in rod, until it bottoms in the hole and tighten lock nut securely with open end of wrench. The rod with the smaller, finer thread should be screwed into the stud protruding from the insulator and tightened in the same manner, being careful not to strain or break insulator.

The clamp should be removed from the antenna for convenience in installing. Mount the clamp in the desired position with four three-eighth inch bolts in the holes provided. Lay the antenna in the bottom half of the clamp so that the dipole rods are vertical and the insulated rod points down. Place the top half of the clamp in position and fasten with the four screws. Make certain that the clamp is located as far s possible from the dipole rods.



TRANSMISSION LINE INSTALLATION

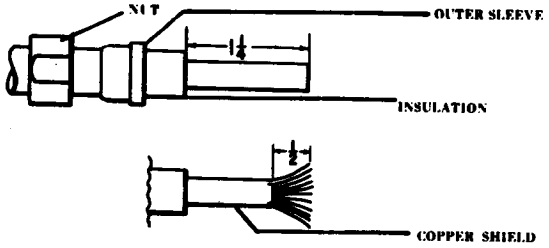
The transmission line is made up from stock coaxial cable in shipboard installation. Necessary plugs are furnished f r making the installation. Where the distance to the antenna is unusually great, connectors are included to permit the use of a low loss transmission line.

For installations where the transmission line is short, two UG 21/U plugs are provided with the basic equipment to be utilized with RG 8/U or RG 10/U coaxial cable.

To make the installation, a length of RG 8/U cable is cut from a stock supply to reach from the point of install tion of the antenna to that of the radio equipment. Plugs are then attached to the ends of the cable by the procedure shown in the illustration, page 3-18, which gives details of each step in connecting the plugs

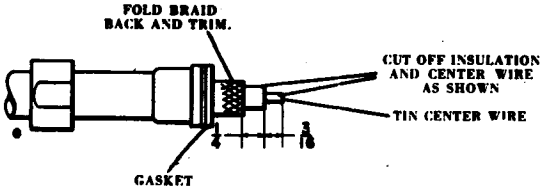
PROCEDURE FOR ATTACHING UG-21/U PLUGS

1 CUT INSULATION BACK



2 FLARE COPPER SHIELD OUT. CUT OFF CENTER WIRE AND INSULATION 1/8 FROM END. PURPOSE OF THIS IS TO LEAVE CLEAN CUT END.

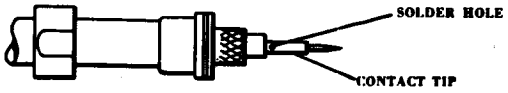
3 FORM COPPER SHIELD INTO CONE SHAPE AND SLIDE INNER SLEEVE OVER COPPER BRAID.



4 FOLD BACK COPPER SHIELD ON INNER SLEEVE AND TRIM.

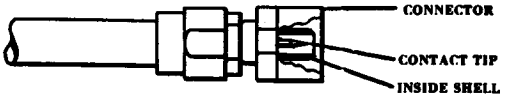
5 CUT INSULATION AND CENTER WIRE AS SHOWN.

6 TIN CENTER WIRE

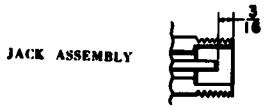


7 SOLDER CONTACT TIP IN PLACE. FILL HOLES WITH SOLDER. OUTSIDE SHALL BE FREE OF SOLDER.

8 SLIDE CABLE INTO CONNECTOR AND SCREW NUT TIGHTLY IN PLACE WITH A WRENCH. SEE NOTE



9 PLUG ASSEMBLY END OF CONTACT TIP MUST BE FLUSH WITHIN 1/64 WITH END OF INSIDE SHELL.



NOTE:

DO NOT TURN BODY WHILE TIGHTENING NUT AS THIS (1) TWISTS THE RUBBER WASHER MAKING THE CONNECTOR NON-WATERPROOF AND (2) MAY SHEAR OFF COPPER SHIELD MAKING A DISCONTINUITY OF GROUND

The cable is installed in position and rigidly attached to available supporting members by clips. In making connection t th antenna, the transmission line cable should be installed so that it runs at right angles to the dipole rods on the antenna, either directly away from the back connection of the antenna or off to the side of the assembly. If it is necessary to run the line parallel to the antenna rods at any point, the parallel section should be located at least four and one-half feet from the dipole.

A low-pass antenna filter, designed to minimize the possibility of harmonic output, is shown in the transmission line of the shipboard installation illustration. This filter is not a part of the MAR equipment but may be shipped with the equipment. The filter is connected into the transmission line by means of receptacles on the ends of the assembly to which are connected the coaxial cables by means of UG 21/U plugs.

When the distance from the equipment to the antenna is unusually long, additional plugs and jacks are provided for splicing in a section of RG 18/U low loss coaxial cable.

The additional fittings required are furnished with the shipboard installation kit and consist of the following:

Two UG 167/U	Reducing connectors
One UG 23/U	Jack
One UG 29/U	Adapter
One UG 21/U	Plug

To install the larger transmission line cable, it is first necessary to make up the two short cables indicated in the illustration at the ends of the larger cable from RG 8/U cable. The short cables provide flexibility at both ends of the transmission line and may be of any convenient length. In certain installations it may be possible to eliminate the short cable at the antenna and connect the heavier RG 18/U cable directly to the antenna jack and to the receptacles on the filter assembly.

The fittings are connected to the cable by the same procedure as used with the smaller cable and no difficulty will be encountered in attaching the UG 167/U reducing connectors to the RG 18/U cable. After plugs are fitted, the cables can be connected together by fitting the plugs into connectors provided, as shown in the illustration. Where the antenna low pass filter is installed with the equipment, the filter assembly will serve to connect the low loss cable plug to the plug of the RG 8/U cable adjacent to the equipment.

After the installation of the equipment has been completed, check over all cable connections and check the marker plate on the power supply unit against the power supply characteristics. When the preceding adjustments have been completed place the 1C—Operate switch on the modulator panel in the tune position.

When the preceding instructions have been complied with, power may be switched onto the equipment.

When power is applied to the equipment the pilot light should light. After a delay of ten seconds, power will be applied to the plates of the tubes.

Check the filament voltage by alternately placing the meter switch in positions 5 and 6 (13V d-c supply only) or 6 and 7. A meter reading of 7.5 should be obtained. Any deviation from this reading should be corrected by means of the filament control on the dynamotor-modulator panel.

The equipment should be watched carefully after being switched on for any signs of distress such as overheating of the cases, excessive noise, or humming. A rough check of the cir uits can be made from the following table which shows the meter reading that should b obtained at the vari us settings of the meter switch.

TYPICAL METER INDICATIONS

METER SWITCH POSITION	CIRCUITS INVOLVED	METER DEFLECTION	FULL SCALE READING
	RECEIVING CONDITION		
1	Total plate current of oscillator-doubler, 1st and 2nd Triplers (V502, V503, and V504)	5 to 7	75 ma
2	Grid current to 3rd tripler in receiver (V203)	4.1 min	1 ma
3	Total plate current of fixed oscillator and mixer (V501,V505)	5 to 7	10 ma
4	Plate current of 3rd I F amplifier in receiver (V202)	7	75 ma
5	D.C. Heater voltage, center lead to 13V lead	7.5	6.4 V
6	D.C. or A.C. Heater voltage, center lead to ground	7.5	6.4 V
7	A.C. Heater voltage, center lead to 13V lead	7.5	6.4 V
	TRANSMITTING CONDITION		
	IC-OPERATE SWITCH ON TUNE		
8	1st IPA plate current (V101)	4.5 to 7.5	200 ma
9	2nd IPA grid current (V102)	2.5 to 6	20 ma
10	2nd IPA plate current (V102)	1.5 to 3.5	100 ma
11	PA grid current (V103)	4 to 9	50 ma
	IC-OPERATE SWITCH ON OPERATE		
12	PA plate current (V103)	4.5	100 ma

A check should be made to see that the equipment is operating properly. Insert the extension cords, with headset and microphone connected, into the proper jacks on the modulator-dynamotor panel and plug key cord in jack.

SET MCW-Phone switch on Phone
IC-Operate switch on Operate
Silencer switch on OFF
Silencer level at 0
Output level at 0

Place meter switch on position 12. Close press-to-talk switch on microphone cord, meter should read 4.5. Release switch and move MCW-Phone switch to MCW. A reading of 4.5 should again be obtained on the meter, indicating that the transmitter is functioning in both cases. Return switch to phone position. Check operation of selector mechanism by moving Channel selector switch to various channels. Operation of mechanism can be heard and should take ten seconds or less for complete tuning cycle.

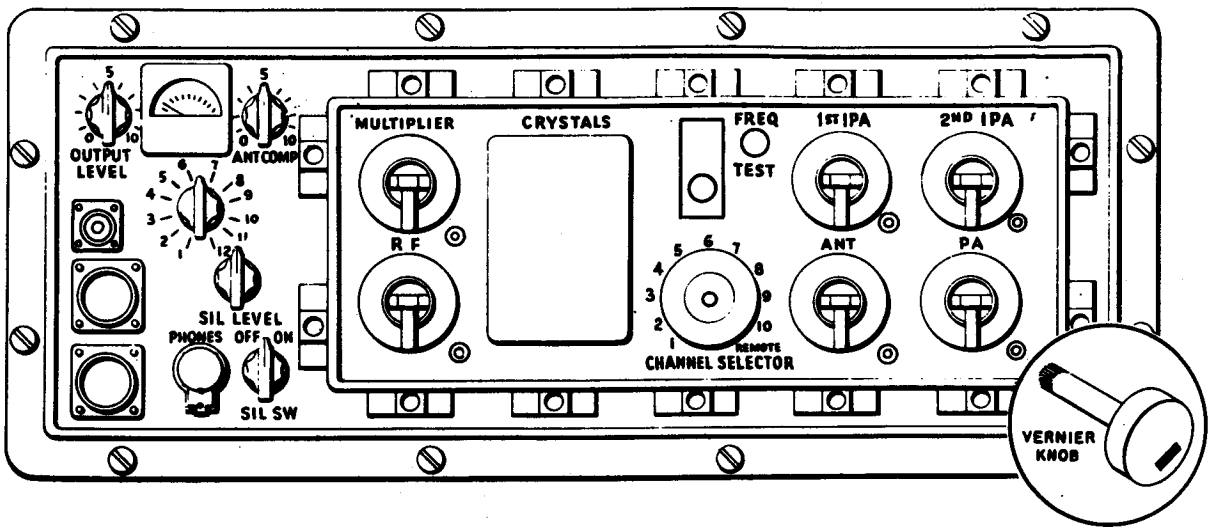
Receiver can be checked by rotating Output level knob to the right to increase background noise. Several channels should be checked in an attempt to pick up signals if other transmitters are known to be operating in the area.

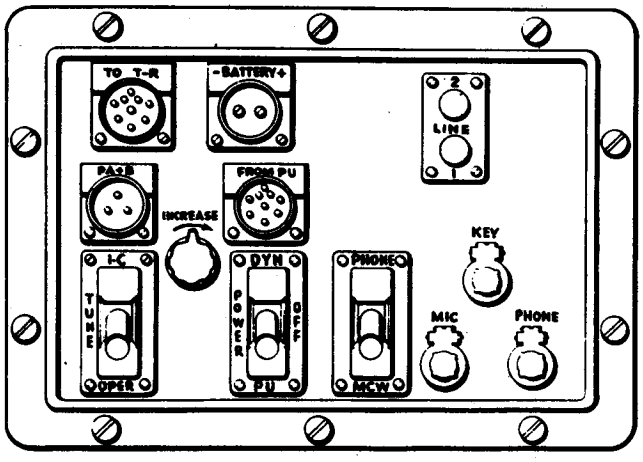
Switch on Silencer and rotate Silencer level knob to cut out noise as check on its operation.

After the preceding checks have been completed, the quip- may be placed in operation.

RADIO EQUIPMENT TUNING

The equipment is shipped with both receiver and transmitter tuned to the frequency channels determined by the crystals installed in the crystal oven. Ordinarily, there is no need to make tuning adjustments when installation is completed. The following information on receiver and transmitter adjustment apply where repairs or replacements have been made and resetting of the selectors has become necessary.





RECEIVER ADJUSTMENT

Place power switch in PU position and allow set to warm up for ten minutes.

Remov selector panel cover.

Insert headset plug into proper jack.

Set IC - Operate switch in Operate

Set MCW - Phone switch in Phone position.

Set Output level at 5 or 6

Set Silencer level at 0

Move Channel selector switch to position 1 and when selectors have come to rest, equipment is ready for tuning to 1st Channel frequency. A vernier tuning key is provided to adjust the dials. A slot in the knurled knob on the key allows the key to be used as a lever for unlocking and locking the selector dials. It is usually more convenient to adjust the receiving section first as the multiplier is common t both receiver and transmitter.

TUNING SEQUENCE

Set meter switch at position indicated before making adjustments.

METER SWITCH POSITION	ADJUSTMENT	APPROX. METER READING
1	Unlock Multiplier dial by raising lever straight out from dial. Insert vernier key in hole to lower right of dial and rotate Multiplier dial to obtain maximum reading on meter. Do not lock dial.	5 to 7
2	Readjust Multiplier dial slightly if necessary to obtain maximum reading on meter. Lock dial by depressing lever.	4.1 min
4	Unlock R F dial, insert vernier key and rotate R F dial to obtain minimum reading on meter. This will result in increased background noise in headset. Adjust for maximum noise and minimum meter reading. Lock dial.	7

The receiver is now tuned to the first channel frequency It is important that the selector settings are not disturbed while locking the dials.

TRANSMITTER ADJUSTMENT

Place IC-Operate switch in Tune position.

For making adjustments the transmitter is switched on by moving the MCW-Phone switch to the MCW position.

METER SWITCH POSITION	ADJUSTMENT	APPROX. METER READING
8	Unlock 1st IPA dial and rotate with vernier key with transmitter on until pronounced dip in meter reading indicates resonance of plate circuit. Do not lock dial. Check above adjustment by pressing Frequency Test switch located on the panel to right of panel light. This should result in increase in meter reading. Should there be no increase, retune 1st IPA dial for another current dip. Again check with Frequency Test switch and, if meter reading increases, lock dial.	4.5 to 7.5
9	Unlock 2nd IPA dial and adjust with vernier key for maximum reading on meter. Do not lock dial.	2.5 to 6
10	Readjust 2nd IPA dial slightly to lowest meter reading. Lock dial.	1.5 to 3.5
11	Unlock Power Amp. dial and adjust with vernier key for maximum reading on meter. Do not lock dial.	4 to 9
12	Unlock Ant. Coupling dial and set to zero. Move IC-Operate switch to Operate and adjust Ant. Coupling until meter reading of 4.5 is ob-	4.5

METER SWITCH POSITION	ADJUSTMENT	APPROX. METER READING
	tained. Readjust PA dial to reduce meter reading and then bring meter to 4.5 by adjusting Ant. Coupling. Leave dials unlocked.	
10	Unlock 2nd IPA dial and readjust for minimum reading and relock.	1.5 to 3.5
11	Adjust PA dial for maximum meter reading.	4 to 9
12	Adjust PA dial for minimum meter reading, then readjust Ant. Coupling to obtain reading of 4.5 on meter. Repeat the adjustments of PA dial and Ant. Coupling until a meter reading of 4.5 is obtained with the lowest meter reading that can be obtained by adjustment of the PA dial. Lock all dials.	4.5

This completes the tuning of both receiver and transmitter for one channel. The same procedure must be followed to pre-set the selectors for all ten frequencies available to the equipment.

The Frequency selector switch is moved to position 2 and all the selector dials will revolve automatically to a new position for the adjustment of the equipment to the second channel frequency. The tuning sequence given in the foregoing should be followed step by step in making adjustments for this and the remaining eight channel frequencies. The tuning of each channel will not effect any previous adjustments of the selectors if all dials are locked when the change is made from one frequency channel to the next.

When the tuning of all ten channels is completed and checked by actual operation of the equipment, the cover can be replaced over the selector dials and securely fastened in place by the screws provided. When the cover is replaced, the selector switch knob should be rotated slowly till the spring pin in the coupling plate on the switch engages in the hol in the plate attached to the control knob. The switch and knob will then operate in unison. The equipment should now be ready to go int service.

MOBILE INSTALLATIONS

The foregoing instructions, describing the details of a shipboard installation, apply in many respects to mobile installations in radio jeeps or reconnaissance cars. Shockmount assemblies must be used to mount the radio units in the car or truck to protect them from road shock and vibration.

The Universal Power Supply is used in the installation when the power available from the electrical system of the vehicle is 26 V d-c.

The equipment should then be connected as shown in the illustration, page 3-14, of the shipboard installation. The only difference will be in the connection of the power input to the Universal Power Supply. With a 26V input, the 5 foot 2 conductor cable (Navy type CPH-62223) furnished with the basic quipment should be plugged into the receptacle on the power unit marked 26V INPUT. The other end of the cable has clips for connecting to electrical system of the vehicle. The red sheathed clip must be connected to the ungrounded lead of the electrical system and the black sheathed clip to the grounded lead of the system.

When the radio equipment is installed in a vehicle with a 13V electrical system, the battery cable (Navy type CPH-62223) may be used to connect the modulator-dynamotor direct to the battery circuit on the car. However, the red sheathed clip must be connected to the positive lead of the electrical system and the black sheathed clip connected to the negative lead.

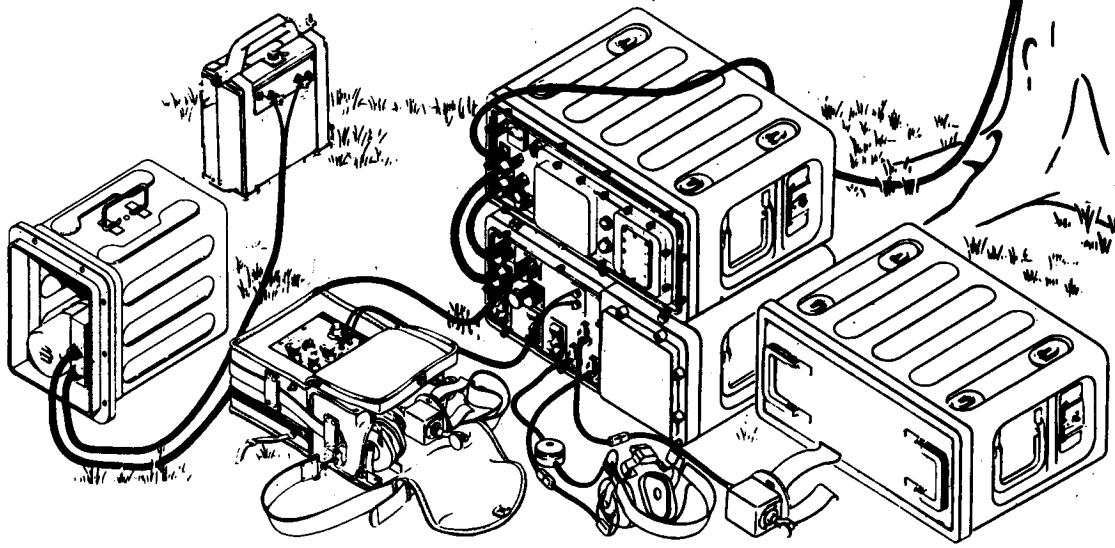
CAUTION: Do not install the equipment in a vehicle with a 13V system in which the positive side of the battery is grounded.

In making connections to the electrical system of mobile units, connect the clips directly to the battery terminals whenever possible. Should it be necessary to make connections at some other point in the system, make certain the leads from the battery to the point of connection is equivalent to a No. 4 AWG conductor or excessive voltage drop and heating of the leads will result.

FIELD APPLICATION

To facilitate transportation and operation of MAR radio equipment in the field, a Field Application Kit is furnished with certain basic MAR equipments. The kit consists of a group of heavy luggage type chests, providing space for the basic units and including extra accessories and equipment for field operation.

On the following page is listed, for reference, the components of the field application kit with the accessories furnished in the various chests. On this page is an illustration of a typical grouping of MAR basic units with the field kit equipment. For the sake of simplicity, only one battery is shown in this and following illustrations.



COMPONENTS OF FIELD APPLICATION KIT

Quan.	Navy Type No.	Description
1	CRF-10402-A	Shipping Chest, containing; 2 CRF-19017 Storage batteries (Government Furnished) 1 Filler Syringe
1	CAAQ-10522	Shipping Chest, containing; 1 CRV-10485 Accessory box 1 50' Antenna cable 12 Silica gel dryer assemblies 1 Battery interconnecting cable 1 CAQZ-10531 Telegraph key with knee clamp 4 CRV-10505 Cabinet fasteners
1	CAAQ-10523	Shipping Chest only for shipping AC-DC Power Supply
1	CAAQ-10524	Shipping Chest, containing; 1 CAVO-10486 Canvas case 1 CRV-23485 Remote Control Unit 1 CW-49507 Headset 1 CW-49534 Headset extension cord 1 CW-51071 Lip Microphone 1 CW-49561 Microphone extension cord 1 CAQZ-26022 Telegraph key knee clamp Space is provided for the following which must be obtained from basic MAR equipment 1 CRV-50248 Modulator-Dynamotor
1	CAAQ-10525	Shipping Chest, containing; 1 Antenna carrying case 1 Chain clamp 1 10' Antenna cable 1 Wrench 2 Rubber plugs 1 Cap assembly Space is provided for either one of the following which must be obtained from basic MAR or RDR equipment 1 CRV-43067 Transmitter-Receiver 1 CRV-46283 RDR Receiver

COMPONENTS OF FIELD APPLICATION KIT (Cont.)

Quan.	Navy Type No.	Description
1	CANR-10621	Shipping Chest, containing; 1 CBDV-10602 Metal case 1 CCW-73037 Gas Engine Generator 1 -----62251 2 conductor cable 1 Can, 1 qt, oil 1 Can, 1 gal, gasoline 1 Set operating spares and tools

FIELD APPLICATION KIT

Chest Dimensions and Weights (uncrated)

Quan.	Navy Type No.	Length Inches	Width Inches	Height Inches	*Weight Pounds
1	CRF-10402-A	23	16	14-3/4	108
1	CAAQ-10522	31-1/4	20-1/2	14-5/8	96
1	CAAQ-10523	31-1/4	20-1/2	14-5/8	61
1	CAAQ-10524	38-1/8	20-1/2	13-1/4	80
1	CAAQ-10525	37-1/4	30-3/4	13-1/4	106
1	CANR-10621	28-1/4	21-7/8	20	

*Weight Includes Chests and Contents

BASIC MAR EQUIPMENT

Required With Field Application Kit
For Field Operation

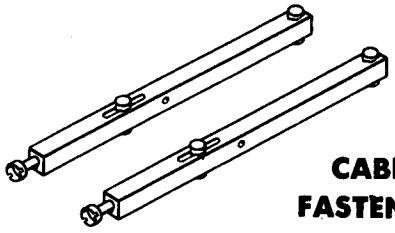
Quan.	Navy Type No.	Description	To be Placed in Shipping Chest
1	CRV-43067	*Transmitter-Receiver	CAAQ-10525
1	CRV-66147	Antenna	CAAQ-10525
1	CRV-50248	Modulator-Dynamotor	CAAQ-10524
1	CLG-20379	Universal Power Supply	CAAQ-10523

*NOTE: RDR receiver, Navy Type CRV-46283, may be shipped in place of MAR Transmitter-Receiver

EQUIPMENT REQUIRED - NOT FURNISHED

3 Flashlight cells (BA30 or Navy type C) for remote control box
Telephone wire (type W110-B) for line to remote control box

FIELD KIT ASSEMBLY

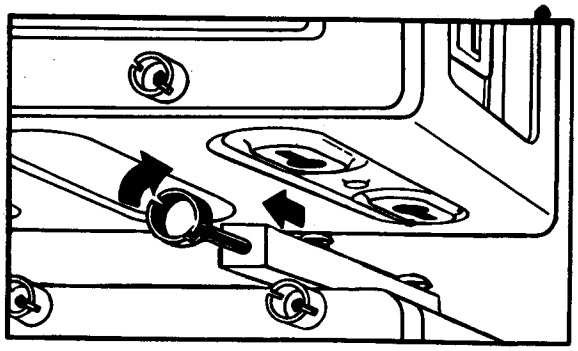


CABINET FASTENERS

When used in the field, the MAR radio units are usually clamped togeth r by means of the cabinet fasteners furnished and placed on the ground or other available support. They may also be stacked on top of the accessory case and clamped in plac by a second pair of fasteners. Where necessity for concealm nt requires a low silhouette, the cases may be placed flat on the ground, inverting the transmitter-receiver so the short interconnecting cables will reach the receptacles of both units.

After the equipment is removed from the luggage cases, the first step is to open the accessory case. Lay the case on its side and loosen the knurled screws holding the cover and drawer in the case. This will allow of access to the cables and other fittings for assembling the equipment.

To assemble the radio units, lay the modulator-dynamotor on its side in the position it is to occupy. Remove the cabinet fasteners from the accessory case and turn the knob on the end of the fastener to the left until the studs on the side of the fastener can be inserted into one pair of keyhole slots in the top of the case. When two fasteners are placed on the case, the transmitter-receiver is placed on top of the fasteners with the holes in the keyhole slots engaging the studs on the fasteners. Turn the knob on the fasteners to the right to draw the studs into the slots in the cases and clamp them rigidly together. The knobs on the fasteners are fitted with sliding stems and can be pulled out for convenience in tightening

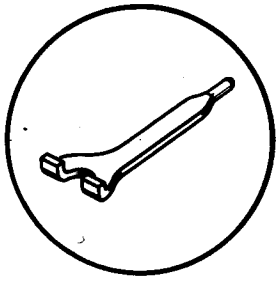


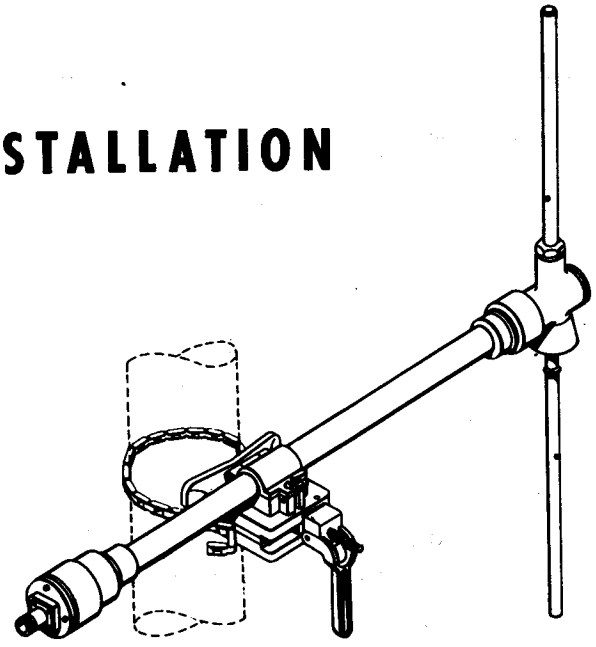
ATTACHING CABINET FASTENER

The watertight cov rs are then removed from the radio units and the accessory compartment of the modulator-dynamotor. The latter compartment contains the operating accessories: headset, microphone, extension cords and key with knee clamp. Cables to interconnect the radio units, one nine conductor, and one three conductor are in the accessory case.

Connect the two cables to the proper receptacles on the panels of the modulator-dynamotor and transmitter-receiver cases. The power supply cable, furnished with the gas engine generator assembly is to be connected to the modulator-dynamotor panel when the engine is set up. If operation is to be from the universal power supply, the nine conductor cable, eight foot long, is connected to modulator-dynamotor panel and to the universal power supply in the manner described for shipboard installation. The antenna should next be installed.

ANTENNA INSTALLATION





The antenna is dismantled for transportation and is packed in a carrying case with the chain antenna clamp, 10-foot antenna cable, and a wrench for assembling or dismantling the antenna.

In putting the antenna into service, the two short rods must be screwed into the holes at the end of the tubular body so they stand at right angles to the body. The rod with the coarse thread is screwed into the end casting until it bottoms in the hole. The small end of the wrench is inserted in the hole through the rod to tighten it. The nut is then pulled down against the body of the antenna to lock the rod in place. The second rod with the fine thr ad is mounted in the insulated stud in the same manner and tightened in place.

The ant nna is erected by use of th chain clamp. To attach the clamp to a tree or oth r upright, the chain on the clamp is fitted around the upright support and the free end of the chain slipped over the hook on the side of the clamp. The lever handle is then turned to pull the chain tight and hold the clamp in place.

The antenna is mounted by releasing the wing nut on the clamp body and raising the hinged cap on the side of the clamp, inserting the tubular body of the antenna into the groove and swinging the cap back into place. The pivoted bolt can be swung into the slot in the cap and the wingnut tightened to clamp the antenna securely. The insulated rod should be pointing down when the antenna is installed and the clamp at the end of the antenna body furthest away from the rods.

Connection to the antenna is by means of one of the two cables furnished with the kit. A ten-foot cable is included with the antenna; a fifty-foot cable is furnished with the accessories. The cable is attached to the antenna by inserting the plug on the cable into the receptacle on the end of the antenna and tightening the retaining ring on the plug. The antenna cable should be run from the antenna at right angles to the radiator rods if possible and not closer than four and one-half feet if it must be run parallel to the rods.

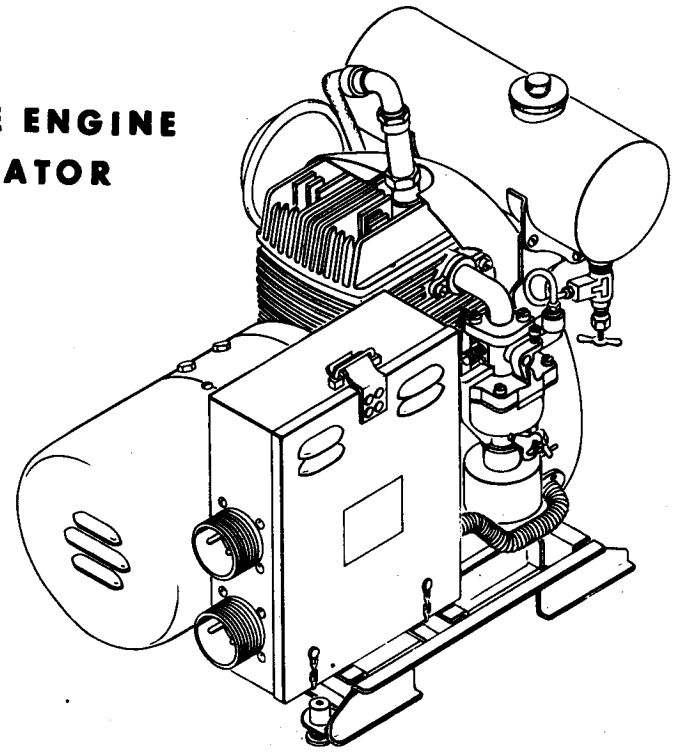
ENGINE DRIVEN GENERATOR

Remove the metal case containing engine driven unit from luggage type shipping case and loosen thumbscrews holding cover on case. Withdraw the unit completely from case and place on fairly level space within a 25 foot radius of the radio equipment.

The cable to connect generator unit to radio equipment is removed from luggage case. Connect one end of cable to one of the receptacles located on the control box next to the generator. The other end of the cable is plugged into the two connector receptacle on the panel of the modulator-dynamotor unit. This is the only connection necessary when storage batteries are not used. Make sure the power switch on the radio equipment is in the OFF position and the switch on the control box on the generator unit is in the RADIO position.

The engine should have all moisture-proofing removed. This is important to be sure all openings on carburetor, oil br ather, fuel tank v ent and generator ventilation will be free of obstruction.

GASOLINE ENGINE GENERATOR



The crankcase of the engine should be filled level with the filler plug located on the exhaust side of the engine, with the proper grade of engine oil. Refer to the gas engine lubrication chart at the end of Section 5 for full information as to type of oil to be used for the temperature conditions encountered.

The fuel tank is to be filled with clean gasoline, high test, if available. The engine will operate satisfactorily on gasolines having an octane rating from 68 to 100, either le ded or unleaded. Make sure the air cleaner on the carburetor is in place and free of all moisture-proof packing material.

TO START ENGINE. Open the fuel shut off valve located n the bottom of fuel tank, unscrew the air vent screw on fuel filler cap about two turns, unscrew the chained oil seal plug from the crankcase breather. Snap the toggle on th engine stop switch to the "ON" position. Close the carburetor choke by moving the choke handle upwards.

Engage the starter rope in the grooved pulley on the engine and wrap the rope around the pulley in a clockwise direction. Steady the engine with the left hand and exert a quick pull on the rope to spin th engin . If the engine fires, open choke valve at once.

If the engine do s not start, open choke valve and repeat rope pull operation until the engine starts. Should the engin fail to start after several ttempts with the choke open, the above peration should be repeated, closing the choke for one pull of the starter rope and opening the choke for several pulls. Do not attempt to adjust needle valve on carburetor during the starting operation as this adjustment has been made at the factory.

Never run the engine with a partially closed choke. Should the engine fail to start, the condition may be caused by over-choking, by a fouled or faulty spark plug, by a short in the stop switch system, failure of fuel supply, water in the fuel, lack of fuel, lack of compression, or a breakdown in the ignition system. Consult the Engine Trouble Chart in Section 7.

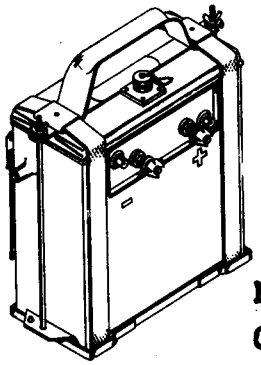
In sub zero weather special precautions must be taken or poor operation of the engine will result which may cause damage to the engine or complete failure. Winter type high vapor pressure gasoline must be used in the fuel tank.

If possible, warm the engine before starting with a blow torch, which assures proper lubrication from the start and protect it from direct air blast while warming up or if operating on light load.

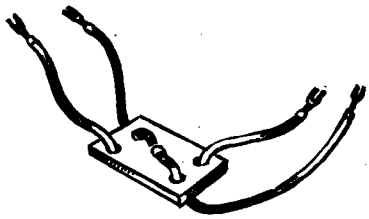
The radio equipment can be operated directly from the gas engine generator with the switch on the control box of the generator in the Radio position which gives automatic voltage control of the generator output. Whenever possible, it is advisable to use storage batteries connected to the generator f r emergency service in case of engine failure or necessity of shutting down the engine for adjustment. When it becomes necessary to charge the batteries, the switch on the control box should be placed in Battery Charging position.

STORAGE BATTERY PREPARATION

The storage batteries furnished with the MAR equipment are of the dry type and must be filled with electrolyte of the proper density before they can be put into service. This step in the preparation of the units for service is usually taken just before the batteries are moved into the field. The vent plugs should be kept tight and seals on the plugs in place until the batteries are to be filled. They should be stored in a cool dry place away from sunlight.



Navy Type
CRF-19017



BATTERY INTERCONNECTION CABLE ASSEMBLY

The first step in filling is to remove the batteries from th carrying chest by loosening the retaining clamps and placing the batteries on a convenient working surface. Remove the two wing screws from the terminal box on the side of the battery case and remove cover of the box. Unscrew the lead wing nuts on the battery terminals inside the terminal box to free connections to receptacles on the bottom of the terminal box and carefully remove entire box and discard. Retain washers found on terminal studs and replace wing nuts. This will leave terminals exposed and readily accessible for making connections.

Loosen straps over cover of battery, remove wing nuts on clamping rods and remove battery cover. Remove seals from top of vent caps and remove caps.

Fill cells to 1/4 inch over separators with electrolyte of the proper density, as shown in the table, for the climatic conditions. Replace vent plugs and wipe away any spilled electrolyte if batteries are to go into service at once.

SPECIFIC GRAVITY TABLE

	Tropical*	Temperate
Filling Sp. Gr.	1.240	1.275
Max. Temp.	125°F (52°C)	110°F (43°C)
Final Sp. Gr.	1.240-1.260	1.275-1.300

* Tropical climate is where water never freezes.

If batteries are put directly into service keep switch on control box of gas engine generator in Radio position and allow batteries to float on the line for the first 20 hours of operation. When a battery charger and ammeter are available, the batteries should be given a conditioning charge at a 3 ampere rate for 16 to 20 hours. Do not allow battery temperature to exceed temperatures listed above; reduce the charging rate if necessary.

Batt ry is fully charged when the cells are gassing freely and specific gravity does not increase in 3 hours. Specific gravity of electrolyte should b within limits shown in table, corrected to 80°F. If incorrect, draw off electrolyte to level of separators and add distilled water to lower gravity or add 1400 Sp. Gr. electrolyte to increase specific gravity as may be necessary. Continue charging and readjust specific gravity at hourly intervals until correct readings ar obtained. Final acid level should be adjusted with the cells fully charged, maximum permissible level being the star shape moulded in vent well.

Repla e cover, wing nuts on clamping rods and tighten straps before replacing battery in carrying chest.

When prepared electrolyte is not available, it may be prepared from electrolytic grade Sulphuric Acid and distilled water mixed in the following proportions.

ACID-WATER PROPORTIONS IN ELECTROLYTE

Specific Gravity	1.240	1.275	1.400
Volumes Sulphuric acid 1 835 Sp. Gr. or 65.7° Baume	1	1	1
Volumes distilled water	3.4	2.8	1.5

Note: - Use a glass or earthenware vessel for mixing the acid and water, stir constantly while adding acid to the water. Never add water to concentrated acid. Allow to cool before pouring into battery.

To correct a Specific Gravity reading of the battery to 80°F - add 4 points (.004) for every 10°F (5.5°C) the battery is above 80°F (26.6°C) or subtract 4 points (.004) for every 10°F (5.5°C) the battery is below 80°F (26.6°C).

To employ the storage batteries as a source of power proceed as foll ws:

(a) Place the batteries on a level surface adjacent to the gas engine-generator unit.

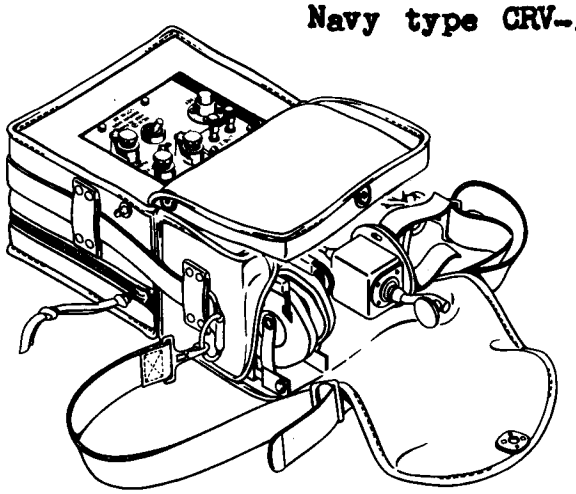
(b) Connect the batteries in parallel, using the CRV-62344 cables which are provided for this purpose.

(c) Using the type CPH-62223 cable which is furnished with the basic MAR equipment, connect the batteries to the gas engine-generator unit.

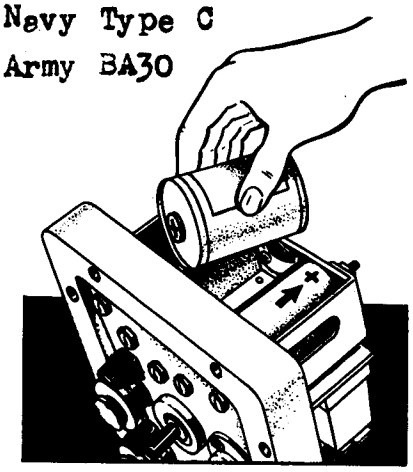
The radio equipment may now be checked for operation as discussed in connection with the shipboard installation. When operating from the gas engine generator or storage batteries it will be necessary to move the power switch on the modulator-dynamotor to the Dyn position to switch on the equipment. The equipment will operate on the batteries alone but for any period of operation over ten or fift en minutes, the engine should be put into service.

REMOTE CONTROL UNIT

Navy type CRV-23485



Navy Type C
Army BA30



The remote control unit is fitted into a canvas bag which contains the operating accessories consisting of headset and extension cord, lip microphone and extension cord with press-to-talk switch, and a key with knee clamp which is used for MCW communication. The unit may be slung over the shoulder of the operator.

Before the remote box can be put into service it is nec ssary to install three type BA30 or Navy type C flashlight cells inside the case. The cover of the case is removed by loosening the screws around the edge. The batteries are then inserted in the compartment, with their polarity as indicated by the stenciling in the case. Failure to insert the cells properly will result in improper operation of the equipment. The cover should be replaced and the scr ws tightened to pull it tightly into place, to retain the splashproof condition of the unit.

The termin ls on the remote box re connected to the line terminals on the modulator-dynamotor unit of the MAR by a pair f conductors, which may be twisted telephone wire Proper polarity of these connections must be maintained by making certain that terminal 1 on the line terminal board of the modulator-dynamotor is connected to terminal 1 on the r mote box. Should the connections be reversed, the press-to-talk switch on the microphone extension cord at the remote box will not operate the relays in the modulator-dynamotor to transfer the circuits from receive to transmit.

FIELD KIT DISASSEMBLY

To prepare the engine driven generator unit for transport it is necessary to disconnect all cables. Close air vent and valve on fuel tank and screw plug into breather on engine crankcase. Drain gasoline from bowl of carburetor by opening drain plug. The entire unit may then be slid into metal carrying case, the cover replaced and the thumbscrews tightened. The engine driven unit can then be carried in any position without danger of oil or gasoline spilling.

The batteries are made ready for transportation by removing all cables and replacing the batteries in the shipping chest. Make certain holding clips fit firmly over the batteries in the ase before closing the chest.

The antenna is dismantled by unscrewing the radiating rods from the cylindrical body. The rubber plugs furnished in the antenna carrying case are inserted in the threaded holes from which the radiating rods were removed, and the cap replaced on the cable receptacle. The antenna parts, chain clamp and 10' antenna cable are replaced in the antenna carrying ase, and the case placed in the proper shipping chest.

Covers should be replaced on the radio units, after disconnecting the cables, and the units placed in the proper shipping chests. The cables should be put in the accessory box which is then closed and returned to its shipping chest.

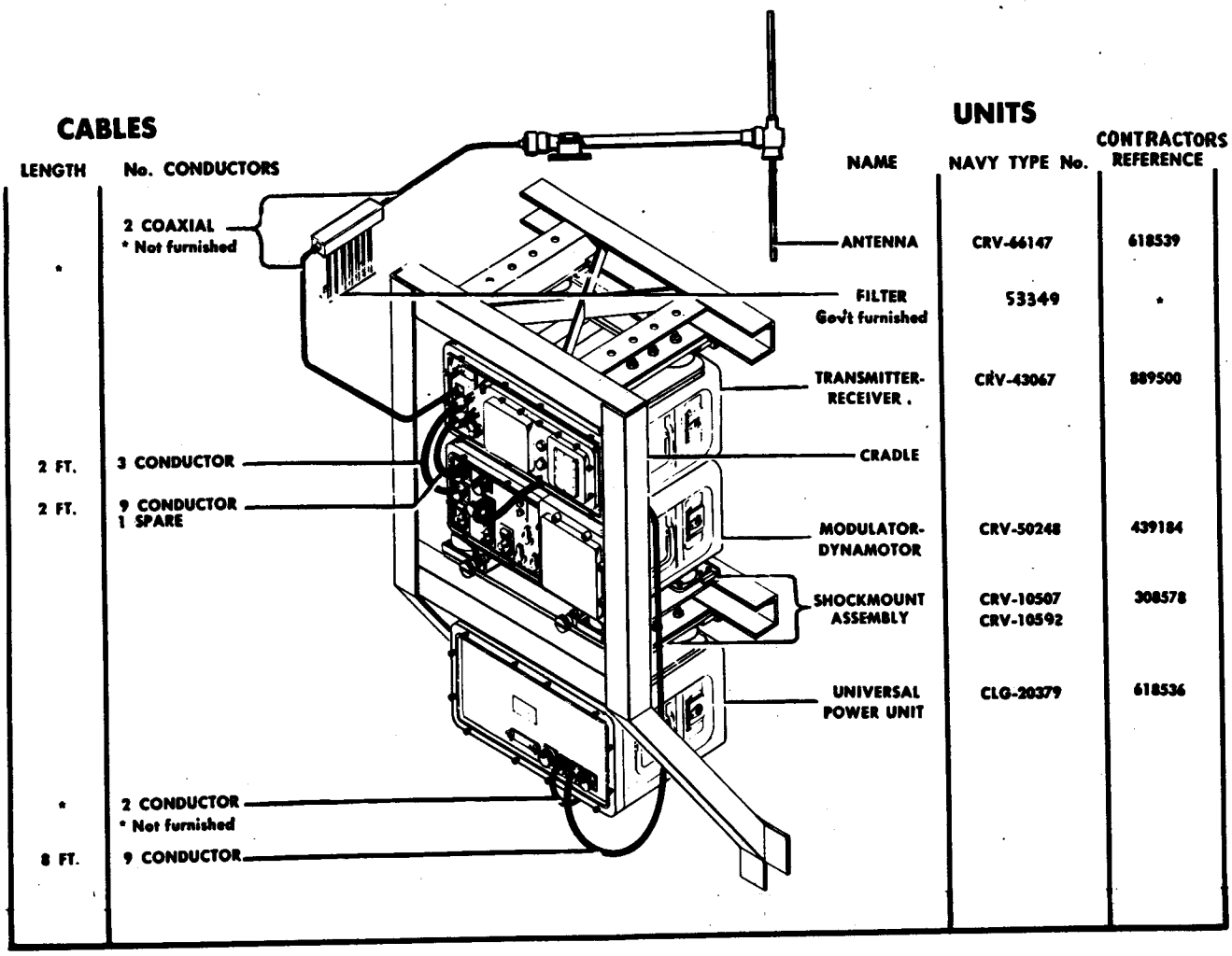
When all the equipment and accessories are stowed away in the chests from which they were removed, the equipment is ready for transport

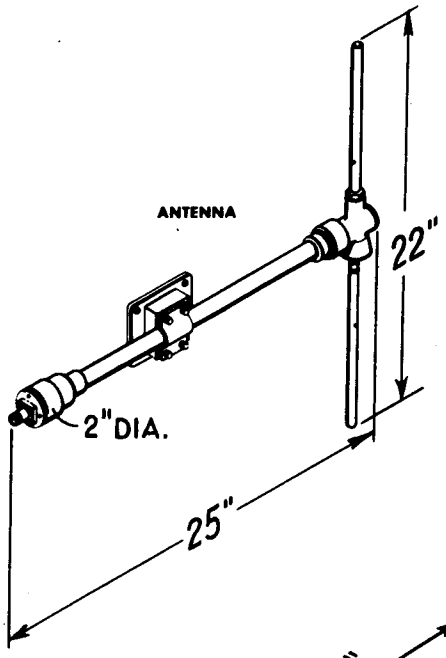
INSTALLATION REFERENCE DRAWINGS AND DATA

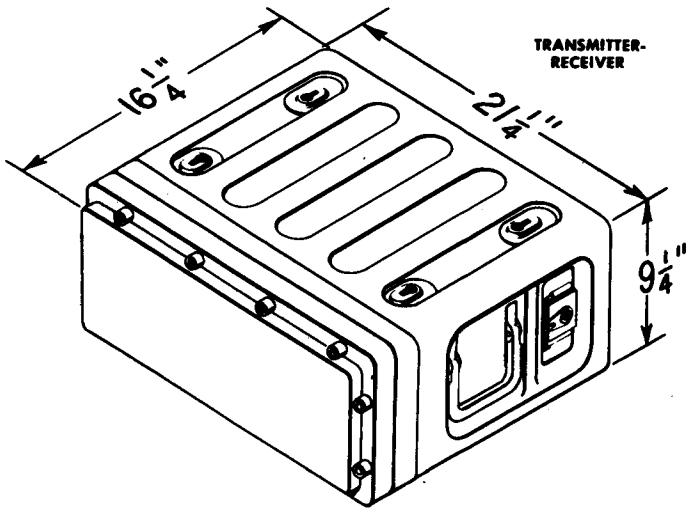
NOTE

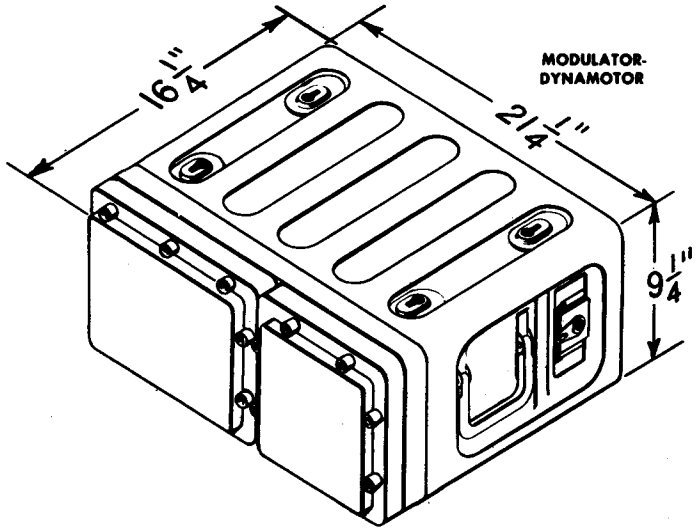
THE FOLLOWING PAGES PROVIDE CONDENSED INFORMATION PERTINENT TO THE INSTALLATION OF MAR EQUIPMENT.

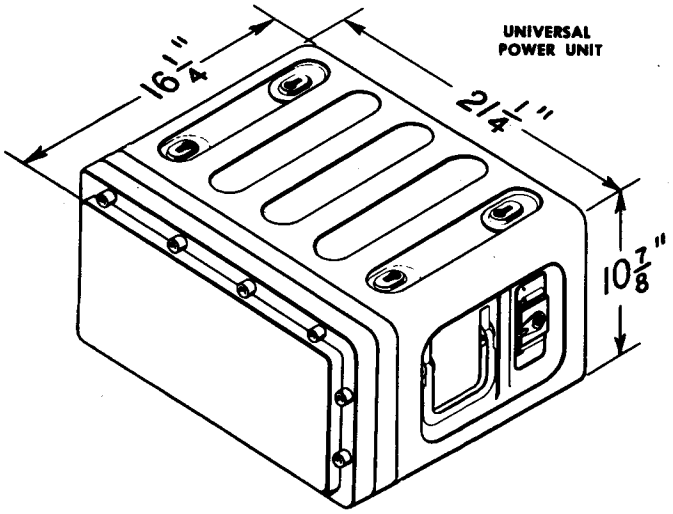
SHIPBOARD INSTALLATION

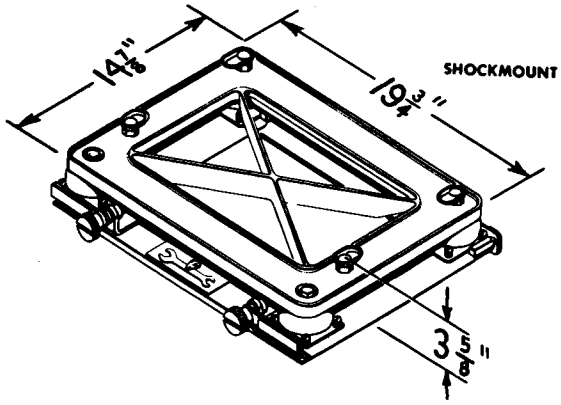



ANTENNA
22"
2"DIA.
25"

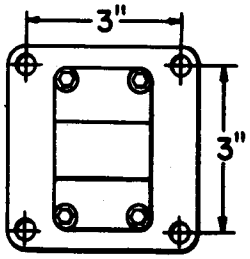

TRANSMITTER-
RECEIVER
16 1/4"
21 1/4"
9 1/4"


MODULATOR-
DYNAMOTOR
16 1/4"
21 1/4"
9 1/4"


UNIVERSAL
POWER UNIT
16 1/4"
21 1/4"
10 7/8"

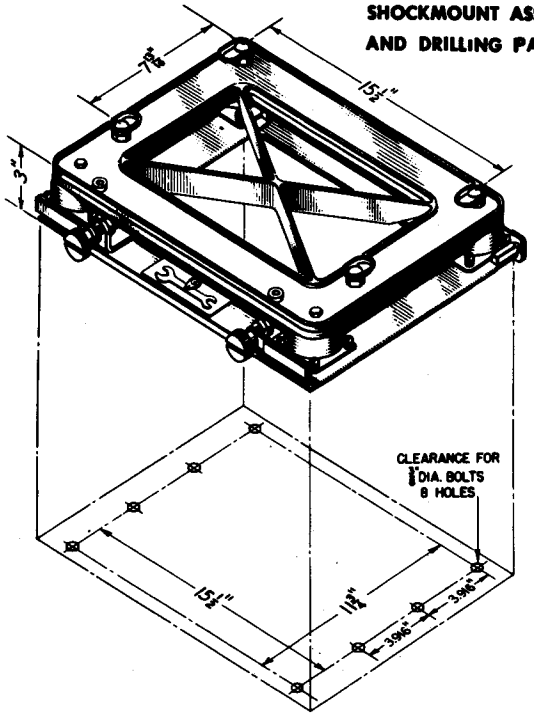

SHOCKMOUNT
14 7/8"
19 3/4"
3 5/8"

SHIPBOARD CLEARANCE AND MOUNTING DATA

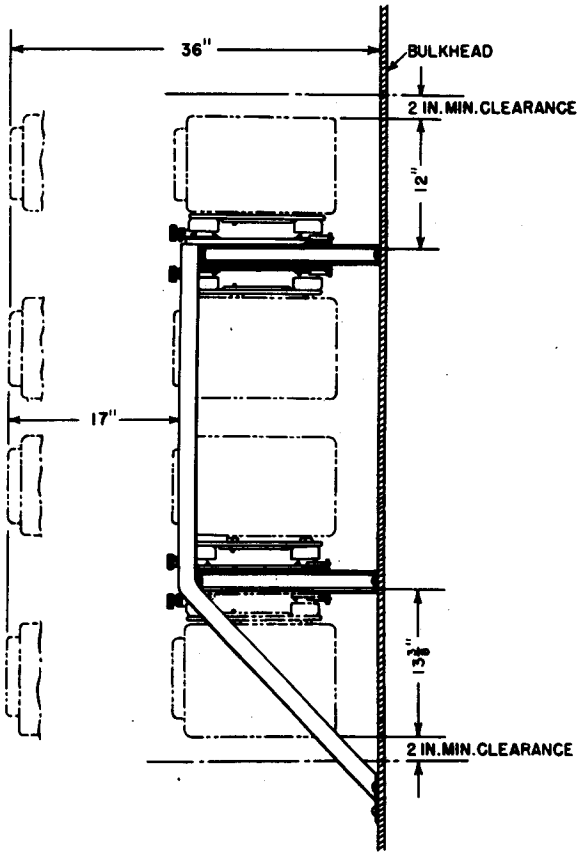


ANTENNA CLAMP
DRILLING PATTERN

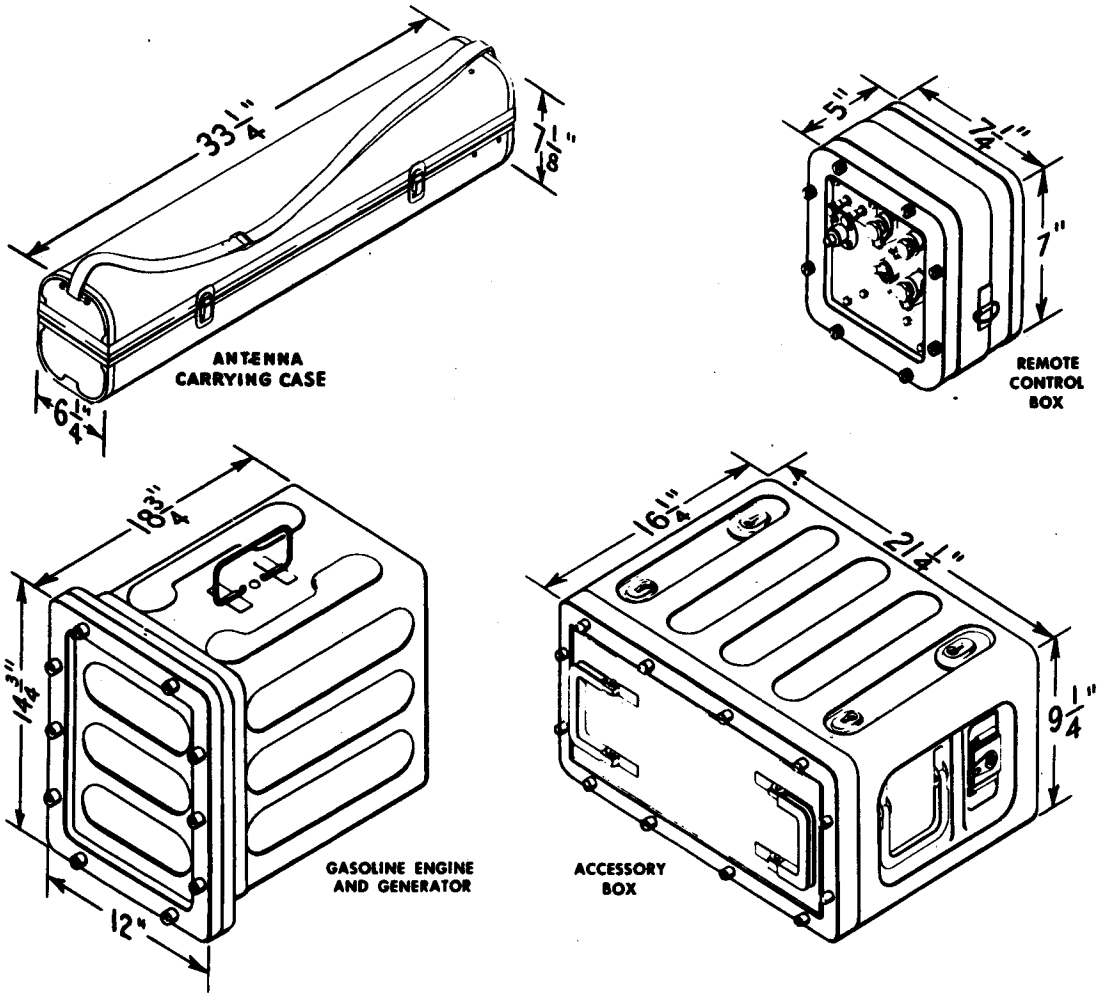
SHOCKMOUNT ASSEMBLY
AND DRILLING PATTERN



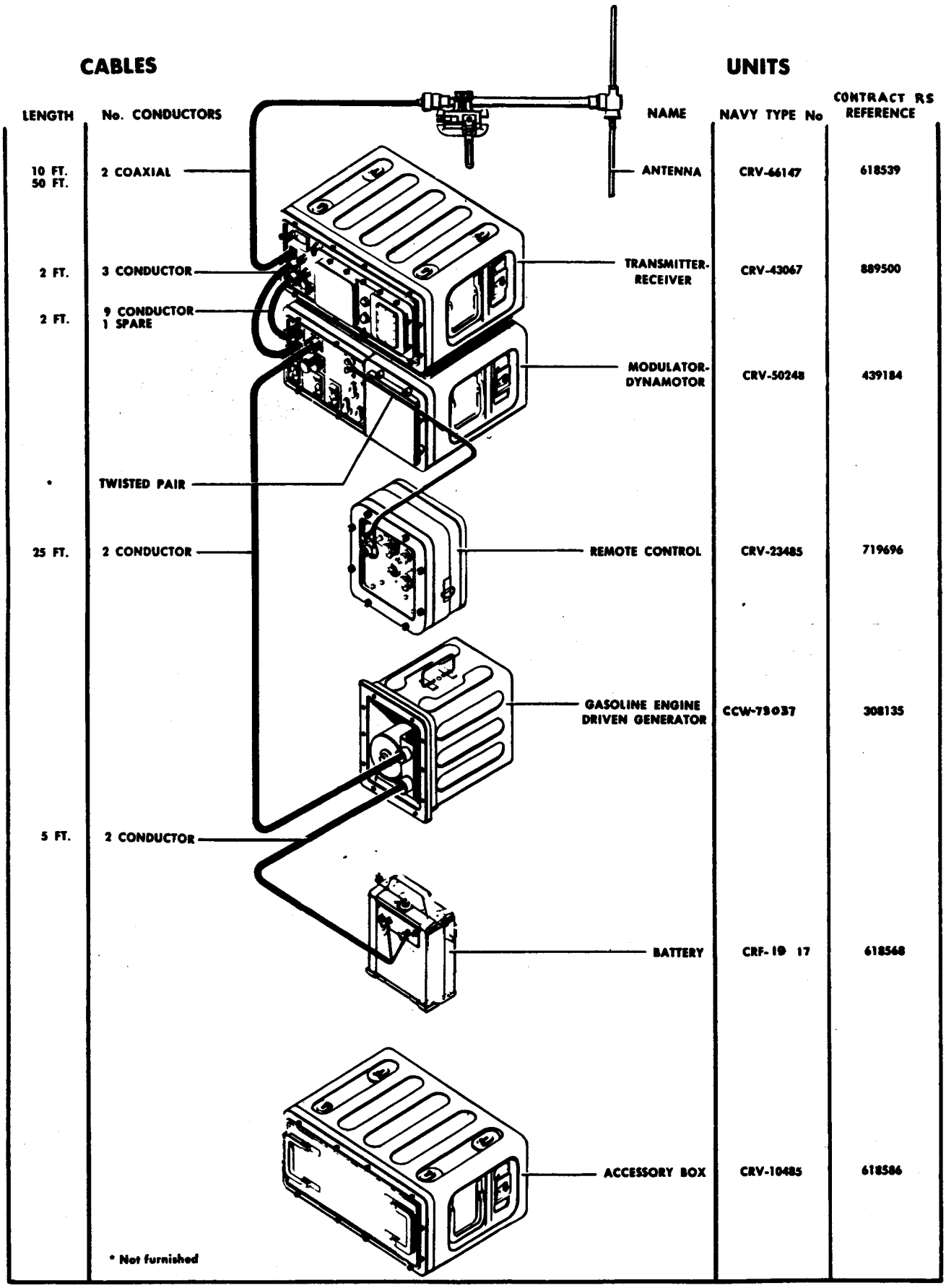
SHOCKMOUNT ASSEMBLY
INSTALLATION CLEARANCES



FIELD APPLICATION DATA



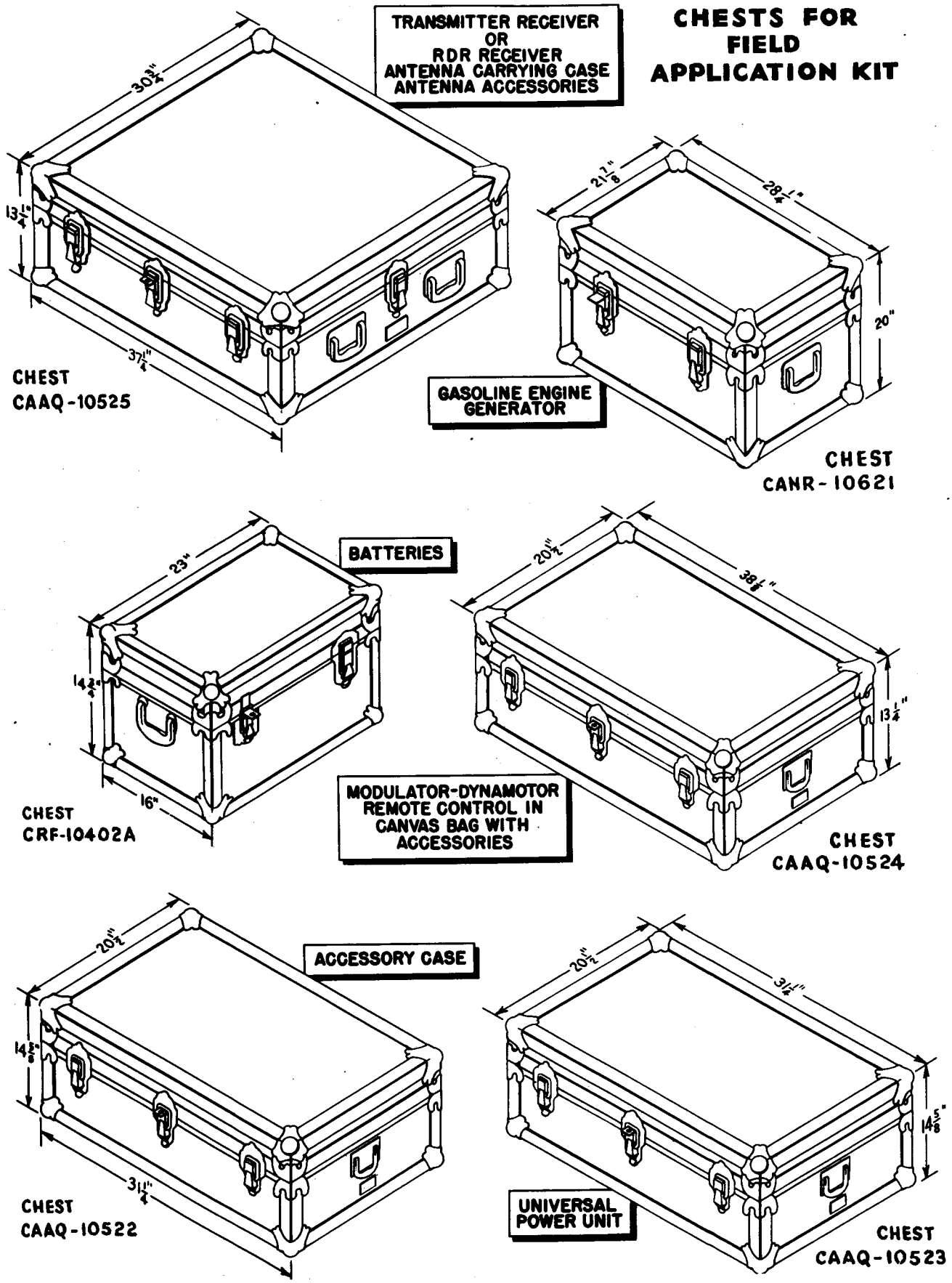
NOTE: Overall dimensions of the Transmitter-Receiver, Modulator-Dynamotor, and Universal Power Supply Units are shown on page 3-40.

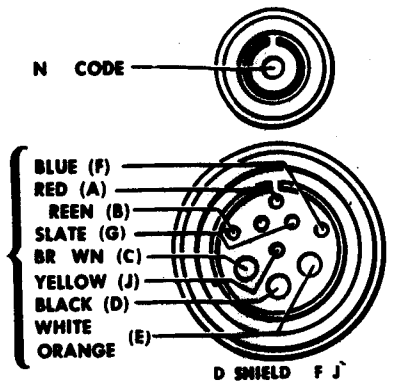


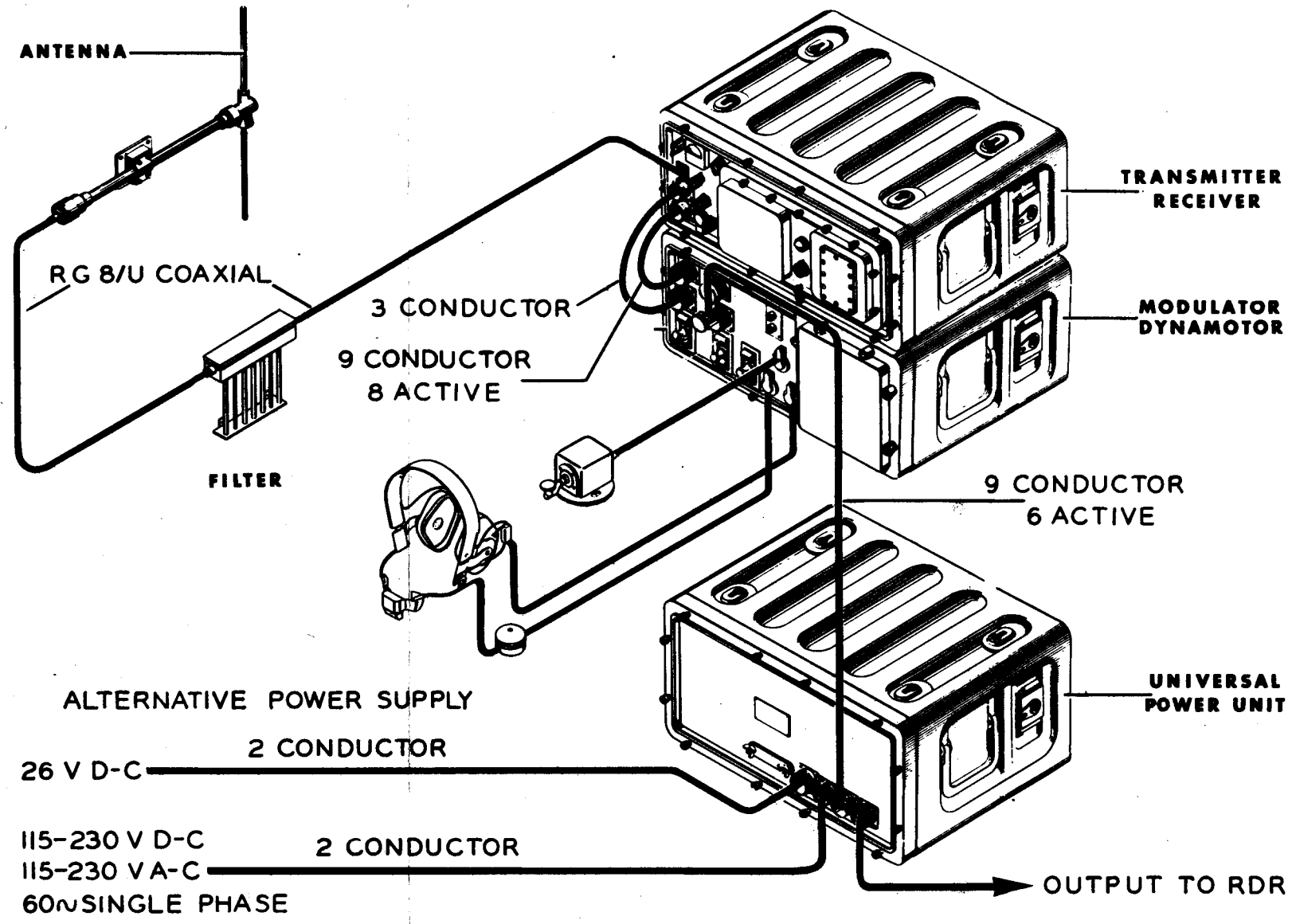
CABLES		UNITS		
LENGTH	No. CONDUCTORS	NAME	NAVY TYPE No	CONTRACT RS REFERENCE
10 FT. 50 FT.	2 COAXIAL	ANTENNA	CRV-66147	618539
2 FT.	3 CONDUCTOR	TRANSMITTER-RECEIVER	CRV-43067	889500
2 FT.	9 CONDUCTOR 1 SPARE	MODULATOR-DYNAMOTOR	CRV-50248	439184
*	TWISTED PAIR			
25 FT.	2 CONDUCTOR	REMOTE CONTROL	CRV-23485	719696
		GASOLINE ENGINE DRIVEN GENERATOR	CCW-79037	308135
5 FT.	2 CONDUCTOR	BATTERY	CRF-19 17	618568
		ACCESSORY BOX	CRV-10485	618586

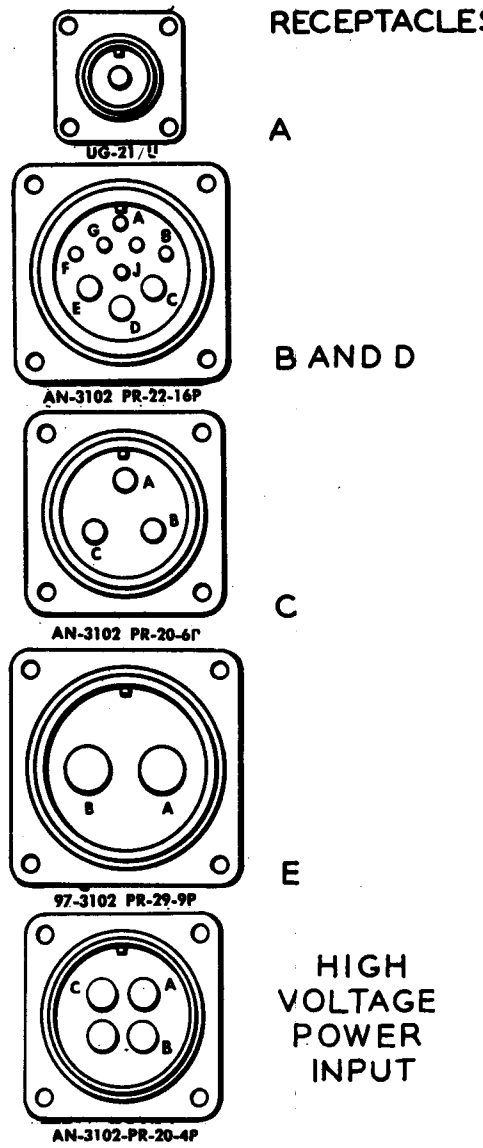
* Not furnished

CHESTS FOR FIELD APPLICATION KIT









BASIC EQUIP- POWER CABLE
4-9S
0-4S

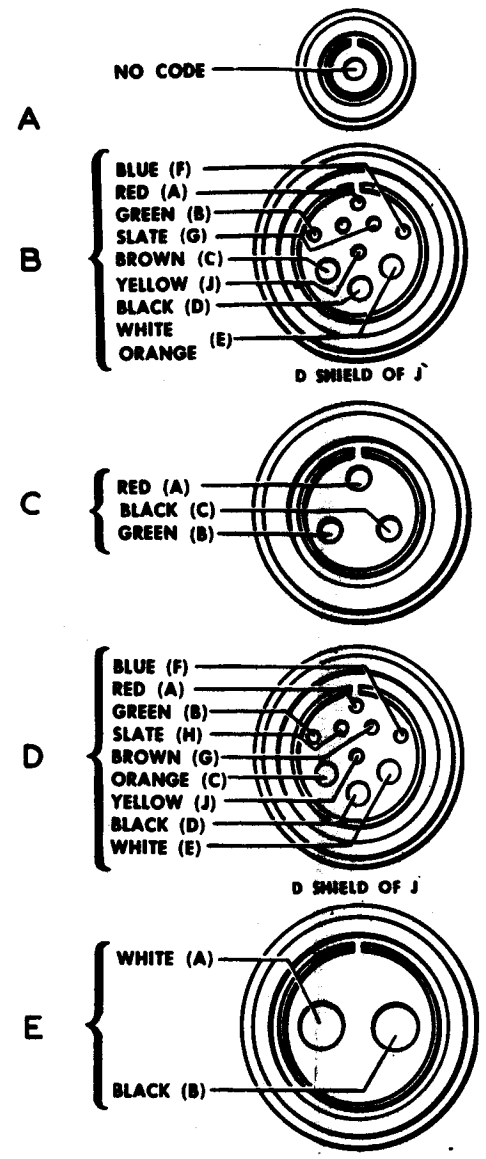
STALLATION KIT ISSION LINE
embly g Connectors r Connector

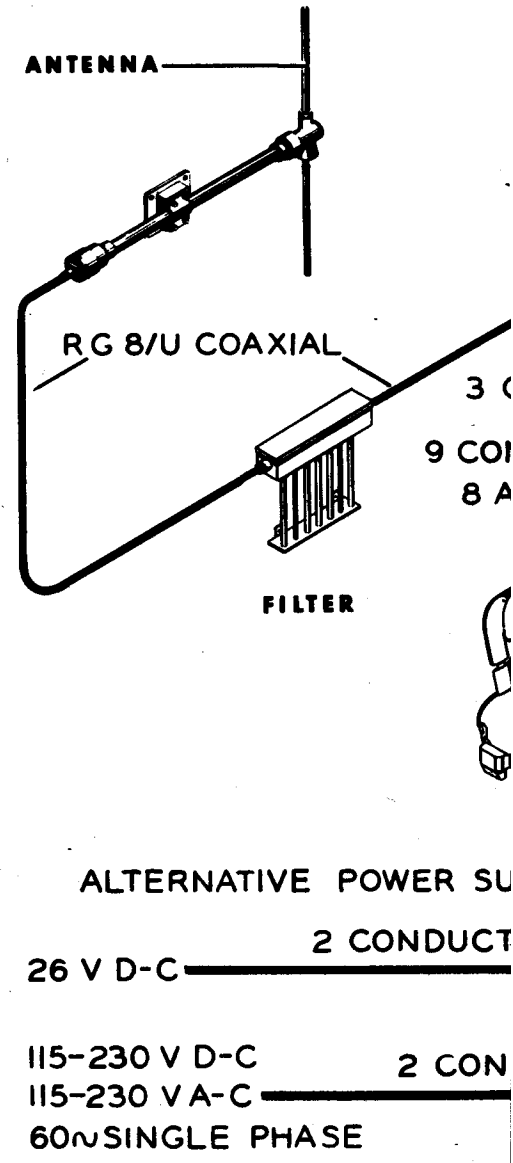
	PURPOSE	NAVY TYPE NO.	CABLE TYPE	PLUG TYPE	NO. OF COND.	ACTIVE COND.	LENGTH IN FT.	WIRE SIZE	CONTRACTOR'S REFERENCE	FURNISHED
A	Antenna		RG-8/U	UG 21/U						Plugs only
B	Mod-Dyn to Trans-Rec	62224		AN-3106-22-6S	9	8	2		722625	Complete
C	Mod-Dyn to Trans-Rec	62222		AN-3106-20-4S	3	3	2	AWG #16	722626	Complete
D	Power Unit to Mod-Dyn	62225		AN-3106-22-6S	9	6	8		722625	Complete
E	Battery to Mod-Dyn	62223		AN-3106-24-9S and clips	2	2	5	AWG #3	722658	Complete

CABLING DIAGRAM

SHIPBOARD INSTALLATION

PLUGS



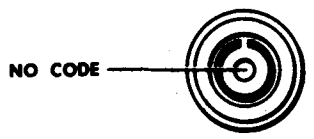


PLUGS FURNISHED WITH BASIC EQUIPMENT FOR CONNECTING POWER CABLE
1 - AN-3106-24-9S
1 - AN-3106-20-4S

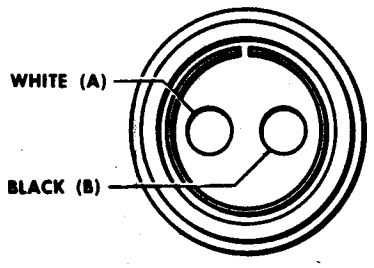
PLUGS WITH SHIPBOARD INSTALLATION KIT FOR LOW LOSS TRANSMISSION LINE
1 - UG 23/U Jack Assembly 2 - UG 167/U Reducing Connectors 1 - UG 29/U Coupling 1 - UG 21/U Connector 1 - Pin for UG 21/U Connector

	PURPOSE	NAVY TYPE NO.	CABLE
A	Antenna		RG-8
B	Mod-Dyn to Trans-Rec	62224	
C	Mod-Dyn to Trans-Rec	62222	
D	Power Unit to Mod-Dyn	62225	
E	Battery to Mod-Dyn	62223	

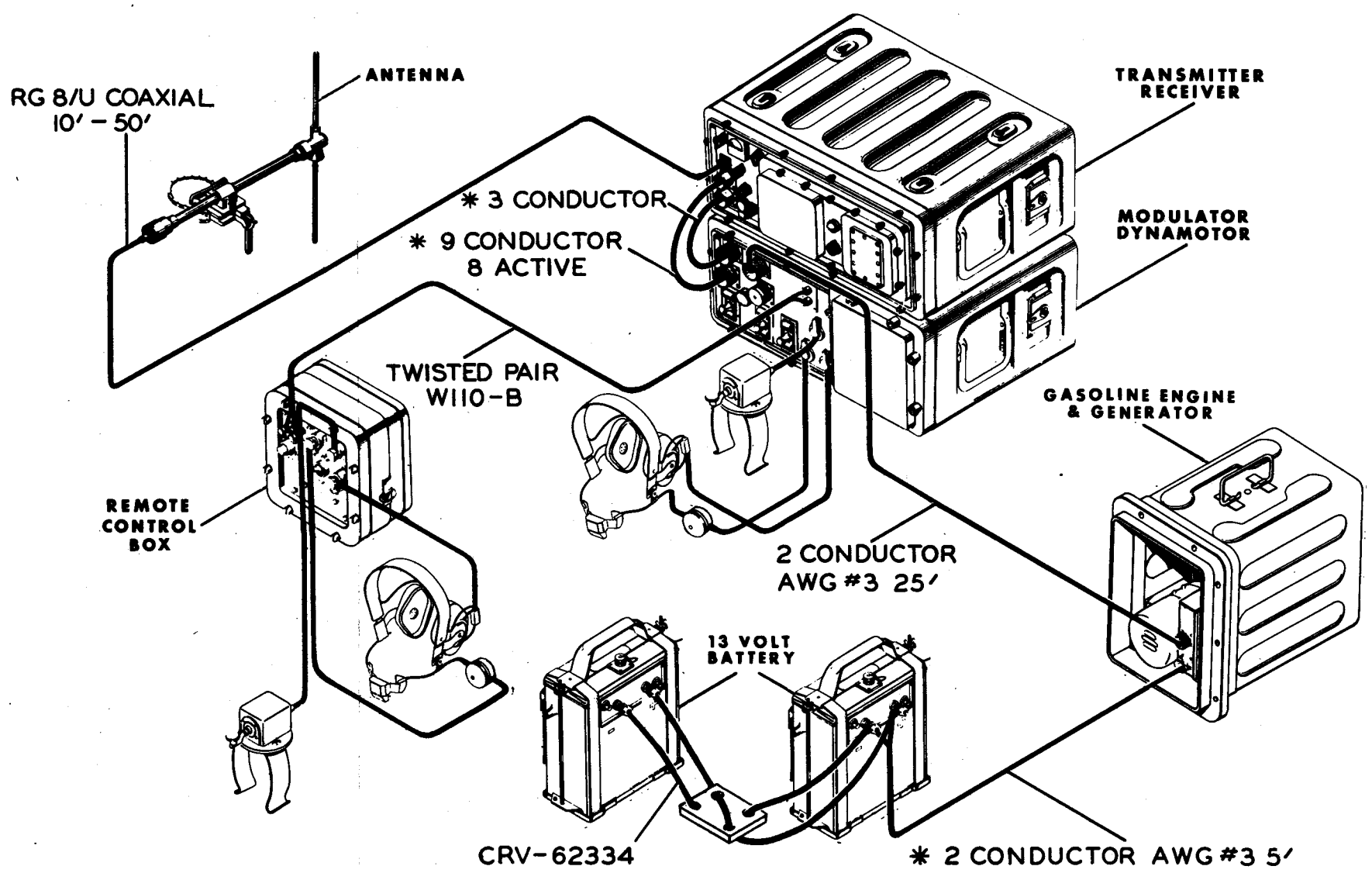
ORIGINAL

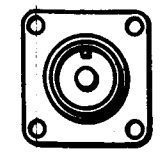


ANTENNA PLUG

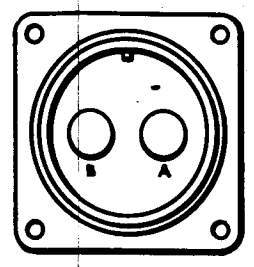


GENERATOR CABLE PLUG





ANTENNA CABLE RECEPTACLE



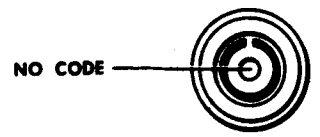
GENERATOR CABLE RECEPTACLE

PURPOSE	NAVY TYPE NO.	CABLE TYPE	PLUG TYPE	NO. OF COND.	ACTIVE COND.	LENGTH IN FT.	WIRE SIZE	CONTRACTOR'S REFERENCE	FURNISHED
Antenna		RG 8/U	UG 21/U	2	2	10		722281	Complete
Antenna		RG 8/U	UG 21/U	2	2	50		722281	Complete
Generator to Dyn-Mod	62251		AN-3106-24-9S	2	2	25	AWG #3	722627	Complete
Battery Interconnection	CRV-62344		Spade lugs	2	2	2		445548	Complete

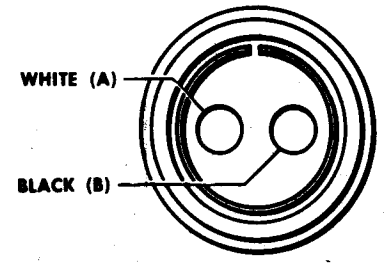
* Cables Furnished as Part of Basic MAR Equipment

RNISHED WITH
LICATION KIT

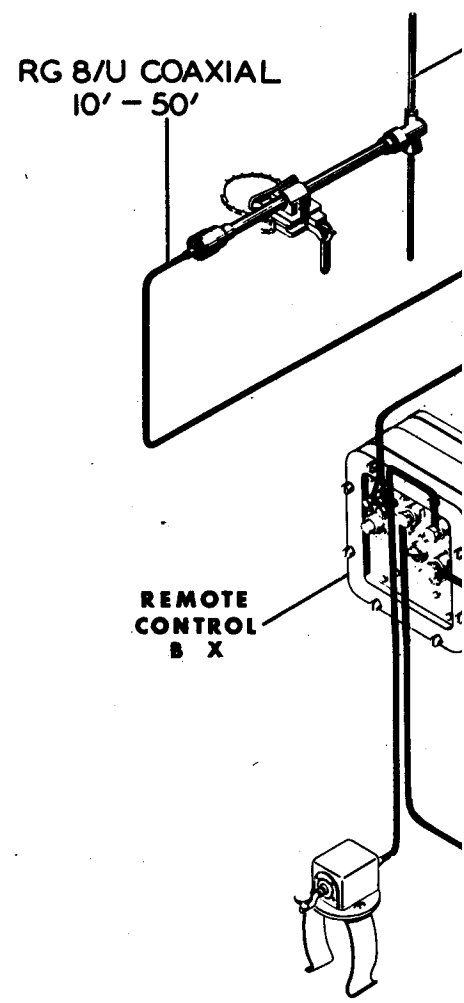
CABLING DIAGRAM
FIELD APPLICATION



ANTENNA PLUG



GENERATOR
CABLE PLUG



CABLES FURNISHED WITH
FIELD APPLICATION KIT

PURPOSE	NAVY TYPE NO.	CABLE
Antenna		RG 8/
Antenna		RG 8/
Generator to Dyn-Mod	62251	
Battery Inter-connection	CRV-62344	