INSTRUCTIONS for

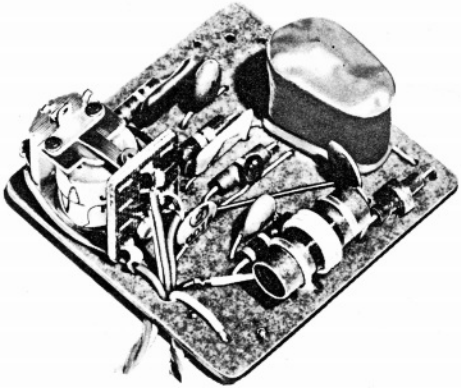
ARISTROL WAVEMASTER 2-TUBE RECEIVER

ARISTO-CRAFT
DISTINCTIVE MINIATURES

NEWARK 5, NEW JERSEY

ARISTROL

WAVEMASTER 2-TUBE RECEIVER



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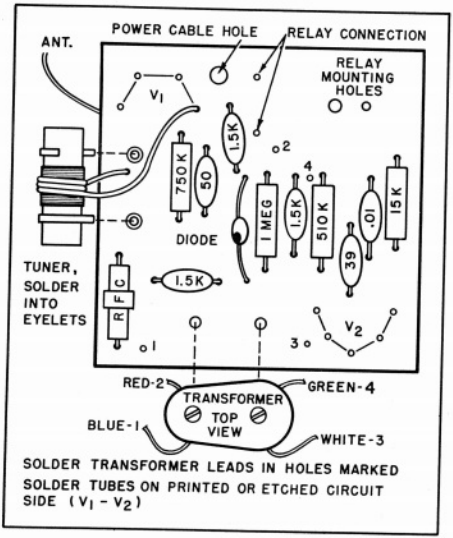
Newark 5, N. J.

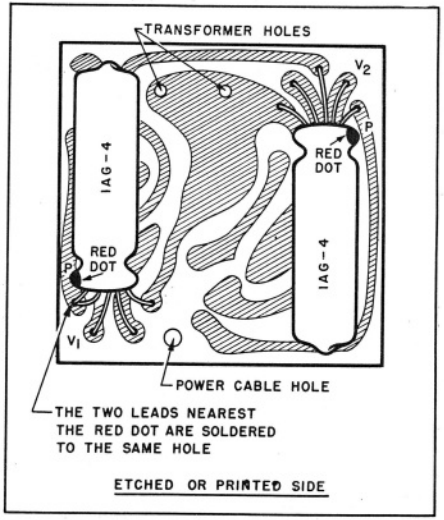
INSTRUCTION MANUAL FOR ARISTO-CRAFT WAVEMASTER RECEIVER

The Aristo-Craft "Wavemaster" receiver is unique in mode of operation and in construction. This receiver has but ONE variable control, thus simplifying tuning and increasing reliability. The circuit design enables you to obtain absolute sensitivity, assuring pin point control at maximum range, with low battery drain.

Two 1AG4 tubes are used, in order to provide long tube life, low idling power and maximum relay current change. The relay is the popular GEM relay, suitable for operating any actuating device used in normal radio control installations. Printed wiring is employed for



Component Layout (Top View)

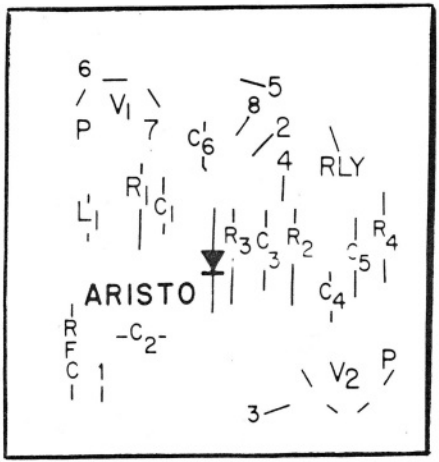


Component Layout (Etched Circuit Side)

ease of error-proof construction and reliable trouble-free operation. This same method of printed (etched) circuits is employed in guided missiles, computors, and other high quality, close tolerance and long endurance electronic equipment.

Read the instructions thoroughly before starting construction. A small light-weight soldering iron such as the Ungar Pencil-Iron is recommended for soldering. Remember also to use radio grade ROSIN-CORE solder, not acid core. An iron that is too heavy (too hot) will produce excess heat causing the copper circuit to lift from the board. Be sure the soldering iron tip is clean. Apply the iron to the component lead for a second or two, before applying solder. Do not allow the iron to remain on the copper foil longer than is necessary to flow the solder around the copper lead.

First check the contents of the kit against the component list, to be sure that everything is there and that the components are of the proper value. The components are mounted flush against the board, on the side that has the component placement numbers. The



Nomenclature

white stenciled placement numbers will allow you to drop the formed leads of the components through their proper mounting holes without actually seeing the printed wiring pattern. Fig. 1 shows how the components are mounted and soldered. After mounting the component in the holes, hold it firmly against the board and bend the leads as shown. Clip off the excess lead so that only about 1/32" of lead protrudes from the wired side of the board. When mounting the DIODE

Fig. 1

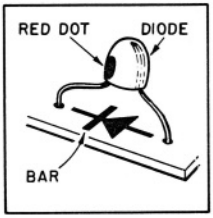


Fig. 2

be sure it is placed as shown in Fig. 2. The RED DOT corresponds to the BAR on the diode symbol. DO NOT apply excess heat to the diode leads. A moistened piece of cotton, pressed against the diode body and leads will bleed off some of the heat when soldering.

Mount all capacitors, resistor and diode as described in the preceding paragraph and according to the Components Parts List. Before mounting the tuning coil in the eyeletted holes, solder the eyelets to the copper foil to assure a good electrical connection (see Fig. 3). After mounting the coil, mount the relay in the proper holes, with the relay on the same side of the card as the components. The two 1AG4 tubes are mounted on the pattern side of the card. Note that the detector, V1, is connected as a triode and the relay tube, V2, is used as a tetrode. Bend the leads through the proper holes, making sure the red dots of the tube match up with the "P" printed on the card. Bend a small radius into each lead to act as a strain relief. Solder each lead NOT marked by a number.

POWER CABLE WIRES:

Connect a short length of wire (a clipping from a component lead) between hole #5 and the nearest coil terminal of the relay. Solder these connections. Connect another short length of wire from hole #8 to the other side of the relay coil, soldering only the connection to the pattern. Attach the length of red wire (cable wire) to the same relay terminal and now solder this connection. This connection and wire is B plus. Solder a length of black wire into hole #7, as the one tube lead. This is A- and B-. Solder a length of yellow wire into hole #6, along with the tube lead. This is A plus.

TRANSFORMER CONNECTIONS:

The transformer is already mounted on the card. The leads are connected as follows: The Blue lead of the small coil is soldered into hole #1. The Red lead of the small coil is soldered into hole #2. The White lead of the large coil is soldered into hole #3 and the Green lead of the large coil is soldered into hole #4. Use extreme caution when stripping the leads to prevent damage to transformer coils.

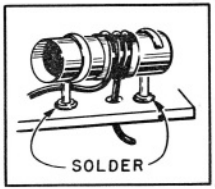


Fig. 3

Fig. 3A

ANTENNA CONNECTION:

One end of the white antenna wire is soldered to the ground end (large copper area) of C2. When this connection is made, wind 3 turns around the middle of the windings on the tuning coil (see Fig. 3). Make a loop around the ground end of the wire and pull the wire through the small hole under the coil (see Fig. 3A). Pull the turns taut, make them even, close spaced and centered on the coil assembly.

RELAY CONNECTIONS:

For normal escapement operation, solder a brown wire to the frame lug of the relay. This is the armature or common connection. A green wire is soldered to the NORMALLY OPEN, or bottom contact lug. For actuators requiring the use of both normally open and normally closed relay points, another wire must be soldered to the normally closed, or upper contact point. A 2X.01 MF Condenser is soldered to the relay contacts for arc suppression. Note that both contacts are suppressed and this condenser is supplied for the convenience of the builder and its installation is recommended.

OPERATION AND TUNING:

As per Fig. W, connect the black wire to minus $1\frac{1}{2}$ volts and minus 45 volts. Connect the yellow wire to plus $1\frac{1}{2}$ volts. Note that a switch is used between the black lead and the batteries. Connect a 0-5 or a 0-10ma DC meter in series with the red lead and plus 45 volts. With a 14"-20" antenna attached to the

receiver, the idling, or no signal, plate current should read between .08 and 1. ma. If the reading is higher than this, adjust the antenna coil until the current falls within the prescribed values. With a signal being sent on 27,255mc, from your Aristo MOPA, or other 27mc transmitter, adjust the tuning slug with the special nylon wand, until the highest reading of 4.5MA-5MA is obtained. This rise in current indicates the receiver has picked up the signal and the relay tube is conducting.

Note, that once the antenna coil has been positioned, the WAVEMASTER receiver has but ONE tuning control. The receiver should be checked out against the transmitter you use at a distance of at least 200 feet. This will assure any overloading or slight mis-tuning

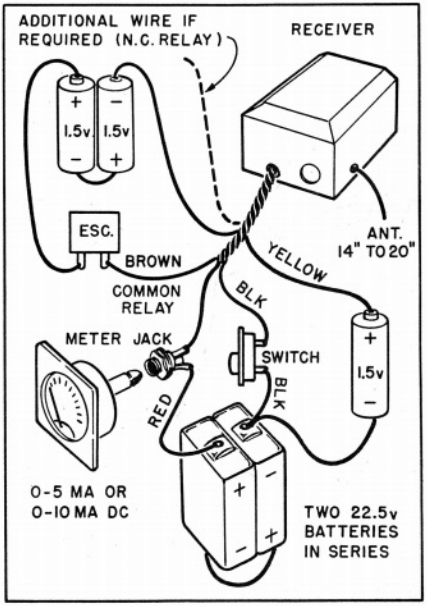


Fig. W

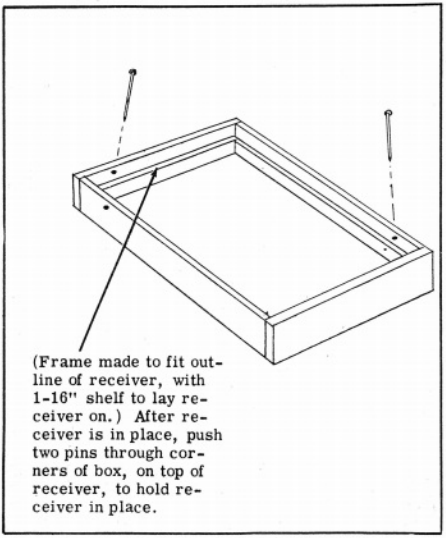


Fig. X

at close range. Once properly adjusted, this receiver will maintain its setting and perform in a reliable manner for the life of the tubes and the batteries used. Do not allow the 1½ volt battery to fall below 1.1 volts, measured UNDER LOAD, or with the receiver turned on. The 45 volt battery should not be allowed to fall below 38 volts, measured with the relay drawing current. 38 volts will still allow reliable relay operation.

A battery chart is given, which will allow you to select the optimum batteries for your particular installation. It is important to use as large a battery, or cell, as possible in order to have maximum reserve current capacity. This is especially true in cold weather.

INSTALLATIONS:

In any installations, it is important to keep the wiring neat and wires as short as possible. However, do not make the wires, or cable, so short as to impose a strain on connections. Mount batteries, switch and

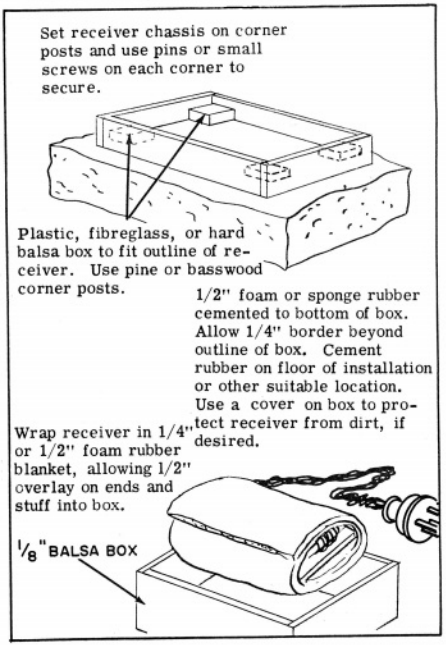


Fig. X

meter jack firmly and away from areas which may become soaked with oil or fuel. Use ONLY rosin core solder for making connections. Do not use solid wire, but rather a flexible stranded wire with a plastic insulation.

It is suggested that a box or compartment be built and lined with $\frac{1}{8}$" foam plastic. The inside dimensions of the plastic foam should make a snug fit around the box. The receiver could also be mounted in a rack or slide. This is satisfactory for boat or car use. Both types of mountings are shown in Fig. X.

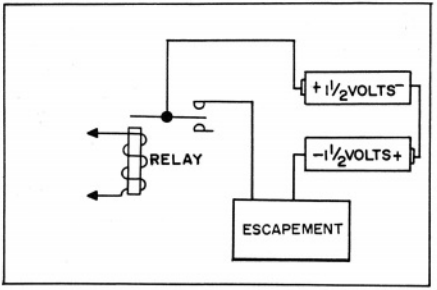


Fig. Y

ACTUATOR HOOKUPS:

Fig. Y shows the hookup for both simple escapement and for actuators requiring the use of both relay contacts. The latter group including units such as the deBolt Multi-Servo, Southwest actuator, Babcock proportional actuator and Bonner motor servo. Do not mount the actuator, receiver and batteries more than one foot apart if the lightweight hookup wire is used. For greater distances between the units and for greatest reliability, use a heavier hookup wire, such as #22 stranded, plastic covered wire.

TROUBLE SHOOTING CHART:

SYMPTOM	POSSIBLE CAUSE
1. Meter reads high,	Defective V1, change tube.
	Transformer burned out or leads pulled loose. Not true of sets ready built by Aristo-Craft.
2. Meter dips from 1.3ma upon receipt of a signal but relay does not pick up.	Relay coil burned out.
	V2 is defective, change tube.
	Open connection in V2 circuitry (Not true of sets ready built by Aristo-Craft).
	B battery (45v) is low, around 38-40 volts. Check under load and replace if necessary.

3. Meter does not dip or relay does not pick up upon receipt of a signal.	Receiver tuning coil not properly tuned.	
	Transmitter not functioning properly.	
	A and B batteries below suggested minimum voltage, check same and replace.	
	Antenna coil not properly adjusted. Move coil towards RFC. Not true of sets ready built by Aristo-Craft.	
4. Meter reading fluctuates between minimum reading and maximum relay current.	Battery voltages low.	
	Improper adjustment of antenna coil.	
	Diode received too much heat during assembly. Not true of sets ready built by Aristo-Craft.	
	Faulty V1, replace 1AG4.	

COMPONENT PARTS LIST:

C1-50 MMF Capacitor		1
C2-.0015 MF (or 1.5K)		1
C3-.0015 MF (or 1.5K)		1
C4-39 MMF		1
C5-.01 MF (or 10K)		1
C6-.0015 MF (or 1.5K)		1
C7-2X.01 MF (or 2X10K)-for arc suppression of relay contacts		1
R1-750,000 (Purple, green and yellow)		1
R2-510,000 (Green, brown and yellow)		1
R3-1 megohm (Brown, black and green)		1
R4-15,000 (Brown, green and orange)		1
RFC-Small radio frequency choke		1
L1-Tuning slug coil/core assembly		1
Diode-Small green diode with red dot		1
V1 and V2-1AG4 tubes		2
Color coded wire	pieces	5
Piece of wire, antenna lead	white	1
P.C. Chassis with mounted transformer		1
Gem relay		1
Screw for relay		1

HELPFUL HINTS IN THE BUILDING, CARE AND OPERATION OF YOUR ARISTO-CRAFT WAVEMASTER RECEIVER

A great deal of time, effort, engineering and actual field testing plus the careful selection of top grade components have gone into the overall design of your Wavemaster receiver and we feel that with some consideration for your equipment you will be rewarded with hundreds of hours of trouble-free operation.

If you are building your Wavemaster from the kit, observe the following:

1. Use fine steel wool to clean etched side (copper) side of circuit board.
2. Bend leads of resistors and RFC coil 1/16" from component body to prevent chipping of carbon body.
3. DO NOT pull diodes through holes. Pre-bend diode leads 90° so that no undue strain is placed on diode body when leads are pushed through circuit board.
4. Pre-bend condenser leads to match proper hole locations before pushing leads through circuit board.
5. Hold the tube leads with needle nose pliers or equal when soldering to circuit board; this simple precaution will dissapate the soldering heat and prevent damage to your tubes.
6. Do not glue tubes to the circuit board. Their removal at a much later date may then cause damage to the etched circuit.
7. Use clear dope or lacquer on etched circuit side after all soldering is completed; this will preserve the luster of the copper and prevent oxidation.
8. Use "Q" dope or clear nail polish to secure antenna winding to tuning coil assembly.
9. Twist power cables for greater mechanical strength.
10. Use only the special tuning wand, supplied, for tuning. DO NOT use a screwdriver.

The following applies to both the kit and factory assembled Wavemaster receiver:

1. Keep your receiver clean.
2. Prevent fuel and other contaminating materials away from your receiver.
3. Use ONLY Radio Grade Rosin Core solder for all connections.
4. Respect your Wavemaster and give it the same care and consideration you would give to any fine precision instrument.

BATTERY CHART

USE	VOLTAGE	SIZE	TYPE OF CONNECTION
RECEIVERS	$1\frac{1}{2}$	$\frac{3}{8}$ DIA. X $1\frac{3}{4}$	BRASS CAP
	$1\frac{1}{2}$	$\frac{17}{32}$ DIA. X $1\frac{31}{32}$	BRASS CAP
	$1\frac{1}{2}$	$\frac{15}{16}$ DIA. X $1\frac{15}{16}$	BRASS CAP
	$1\frac{1}{2}$	$1\frac{1}{4}$ DIA. X $2\frac{7}{16}$	BRASS CAP
	$1\frac{1}{2}$	$\frac{3}{4}$ DIA. X $2\frac{7}{32}$	BRASS CAP
	$1\frac{1}{2}$	$1\frac{3}{32}$ DIA. X $3\frac{15}{16}$	PLUG 2744
	$22\frac{1}{2}$	$\frac{19}{32}$ X $\frac{19}{32}$ X $1\frac{15}{16}$	BRASS CAP
	$22\frac{1}{2}$	$1\frac{31}{32}$ X $\frac{9}{16}$ X $\frac{31}{32}$	FLAT BRASS
	$22\frac{1}{2}$	$\frac{7}{8}$ X $1\frac{1}{4}$ X $2\frac{5}{32}$	FLAT BRASS
	45	$2\frac{17}{32}$ X $\frac{31}{32}$ X $4\frac{1}{32}$	SOCKET
	45	$2\frac{17}{32}$ X $\frac{31}{32}$ X $3\frac{21}{32}$	SNAPS
ACTUATORS	$1\frac{1}{2}$	$\frac{17}{32}$ DIA. X $1\frac{31}{32}$	BRASS CAP
	$1\frac{1}{2}$	$\frac{15}{16}$ DIA. X $1\frac{15}{16}$	BRASS CAP
	3	$1\frac{3}{16}$ X $1\frac{3}{16}$ X $2\frac{13}{32}$	PLUG

Other manufacturers have equivalent type sizes in case Burgess batteries are not available. Battery life is not given due to the widely varied use to which they are subjected.

BATTERY CHART

MFGR AND NUMBER	WEIGHT	EQUIVALENT
(1) BURGESS 7	.2 OZ.	EVEREADY 912
(2) BURGESS Z	.5 OZ.	EVEREADY 915
(3) BURGESS 1	1.5 OZ.	EVEREADY 935
(4) BURGESS 2R	3.2 OZ.	
BURGESS 5ES	1.2 OZ.	
BURGESS TE	4 OZ.	
(1) OLIN 0815	.5 OZ.	
BURGESS U15E	1 OZ.	EVEREADY 412
BURGESS K15E	2.25 OZ.	EVEREADY 420
BURGESS XX30E	8.75 OZ.	
BURGESS XX30	8.5 OZ.	EVEREADY 912
BURGESS Z	.5 OZ.	EVEREADY 915
BURGESS 1	1.5 OZ.	EVEREADY 935
BURGESS 2Z2P1	3.3 OZ.	

(1) "Baby" Pencell
(2) "Pencell"
(3) "C" size battery
(4) "D" size battery

WARRANTY AND GUARANTEE

Your factory assembled and tested Aristo-Craft Wavemaster receiver is warranted for a period of 30 days from the date of purchase, by the manufacturer. Any factory assembled and tested receiver that fails to operate within this period will be repaired or replaced on a **NO CHARGE** basis upon being returned directly to the factory. This warranty is void if the receiver has been tampered with or has been abused beyond that encountered in normal use.

The above warranty DOES NOT apply to the Aristo-Craft Wavemaster assembly kit. ALL kit components have been tested prior to packaging and are free from defects when shipped; the SUCCESSFUL assembly and efficient operation IS THE RESPONSIBILITY OF THE BUILDER. A minimum charge of $3.00 plus parts will be charged for any set returned for service or for the purpose of being put in operating condition. NO unit will be serviced AT ALL if ACID CORE SOLDER or CORROSIVE FLUXES have been used.

If your Wavemaster requires service please follow the following proceedure:

A. Return your receiver DIRECT to Aristo-Craft Miniatures, 184 Pennsylvania Ave., Newark 5, N.J.
B. Wrap your package carefully AND CLEARLY PRINT YOUR RETURN name and address in the upper left hand corner.
C. Enclose short note advising what is wrong and include $3.00 to cover service and return postage. This price does NOT include tubes, relay, transformer or circuit board replacement.
D. DO NOT SEND batteries or battery boxes.
E. SEND PACKAGE BY FIRST CLASS MAIL.

We will make every effort to return your fully repaired receiver back to you in 10 days or less.

THANK YOU