

INSTRUCTIONS for

Aristol

3-D Receiver



Aristo-Craft Miniatures
Newark 5, N. J.



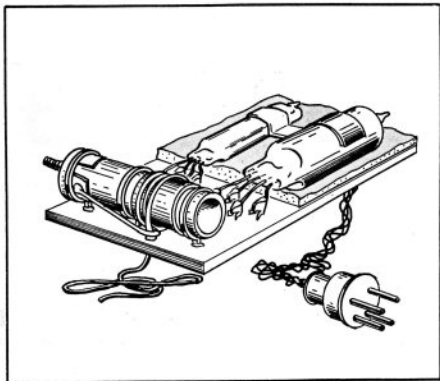
ASSEMBLY AND OPERATING INSTRUCTIONS FOR THE ARISTROL 3-D RECEIVER

INTRODUCTION

The Aristrol 3-D Receiver is new in both circuit design and method of construction. The circuit design enables you to obtain the maximum sensitivity with a minimum battery drain. The method of construction enables you to build the set in a minimum of time and with no chance of a wrong connection. The RK-61, as a detector has a 50 ma filament drain, and the second tube, which is a hard tube, may have a filament current as low as 15 ma. Recommended 2nd stage tubes are given later. The "B" supply drain, with no signal received, is no more than .25 ma, and it may be below .1, if the second stage is a gas tube. Relay current with a signal applied, depends upon the relay DC resistance and the relay tube employed.

The printed copper circuit employed makes assembly reliable and foolproof. The same idea of printed circuits is now being employed in guided missiles, computers, oscilloscopes and other high quality and high endurance electronic equipment.

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



The Aristrol 3-D Receiver

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CONSTRUCTION NOTES AND ASSEMBLY

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 values. The components are mounted flush against the board on the side that has the component placement numbers. The white stenciled placement numbers will allow you to drop the formed leads of the components through their proper holes without actually seeing the printed copper wiring. 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 down. Clip off the excess lead so that only about $1/32''$ of lead protrudes from the wired side of the board. When mounting the diodes, be sure they are mounted as shown in Fig. 1a. DO NOT apply excess heat to the diode leads. A moistened piece of cotton pressed against the diode body and leads will bleed off any small quantity of excess heat when soldering.

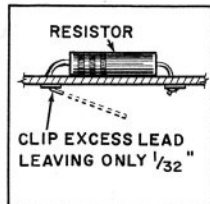


Fig. 1 Component Mounting

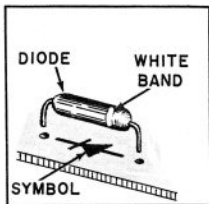


Fig. 1a Mounting of Diodes

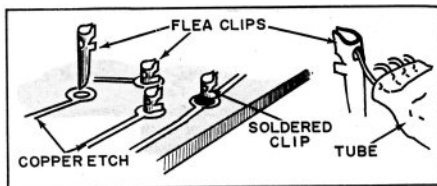


Fig. 2 Insertion of Flea Clips

Mount the flea clips as shown in Fig. 2. For their location see the exploded view, Fig. 6. The holes indicated by "O" do not have components inserted, as they are not employed in this circuit at present. When the components and flea clips have been mounted, attach the power cable, soldering the proper color lead to the proper eyelet as shown in Fig. 3. Attach the plug to the other end of these wires as shown in Fig. 4. Prior to mounting the tank coil on the copper etched side of the board, solder the three eyelets to the copper pattern. Place the coil clip leads into the eyelets and make the solder connection on the component side of the board.

Wind the antenna coil as shown in Fig. 5, soldering one end to the screw cap. Wind three turns around the coil, and make a twist around the end attached to the screw cap, before anchoring it to the board. One end of the antenna, a twenty inch length of wire, is also soldered to this spot. An alternate method of anchoring the antenna to the board is shown in Fig. 5a. If you desire, a shorter piece of wire may be used to reach from the receiver mounting to a clip-on antenna.

The balance of the antenna length is made up by plugging in the external antenna. The antenna coil should be positioned about midway on the main coil and a slight amount of slack left for minor adjustments to be explained later. This completes the electrical construction of the receiver.

Apply the piece of foam rubber by removing the cloth backing and place as shown on the copper etched side of the board. This acts as a cushion for the tubes. With the power cable towards the bottom of the receiver, the RK-61 tube is inserted on the left hand side of the receiver and the second stage tube on the right hand side. The red dot at the base of these tubes near the leads, indicates the plate lead. The red dot on both tubes should face the left. The lead nearest this dot should go into the flea clip inserted in the hole marked "P". The formed tube clamp is placed over the tubes and is held in place by a small self-tapping screw.

This completes the construction of the receiver. Before checking the operation, go over the component and wiring arrangement again thoroughly, to be sure that the receiver has been properly assembled. Check the wiring of the power cable. Examine the connections of the tube leads and see that the lead nearest the red dot is inserted in the flea clip in the hole marked "P".

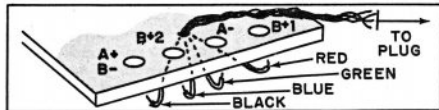


Fig. 3 Mounting Power Cable to Receiver

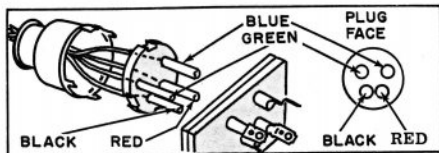


Fig. 4 Mounting Power Cable to Plug

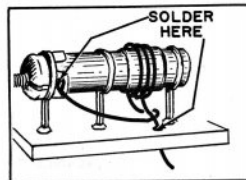


Fig. 5 Mounting Tuning Coil

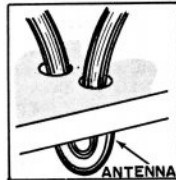


Fig. 5a Alternate Antenna Anchoring

NOTE

WHEN A HARD TUBE IS USED FOR THE SECOND STAGE, THERE WILL BE FIVE LEADS INSTEAD OF FOUR. THE SECOND LEAD FROM THE RED DOT IS FROM THE SCREEN GRID OF THE TUBE, AND MUST BE TWISTED AROUND THE LEAD NEAREST THE RED DOT AND SOLDERED BEFORE THE TUBE IS ATTACHED TO THE RECEIVER.

OPERATIONAL CHECKOUT

We are now ready to checkout the receiver. A 100,000-ohm potentiometer is used in the plate circuit of the RK-61 and a closed circuit meter jack is also in this circuit. An ON-OFF switch is placed in the A-plus, B-minus lead, to enable the receiver to be connected and disconnected from the batteries. Fig. 7 shows this hook-up. One and one-half volts are needed for the filament supply and 45 volts for the "B" supply. A recommended battery list is given later. After the hook-up is made, turn the switch ON and check to see if the tube filaments are glowing. If not, check your wiring again. Set the 100,000-ohm pot to maximum resistance, as shown in Fig. 7, and insert a 0-1 DC milliammeter in the closed circuit jack. Be sure the polarity of the meter is correct as shown. The 20' of antenna should be on the receiver. The meter will now read between .1 and .3 ma and this reading will depend upon the condition of the RK-61 and antenna coil setting. The antenna coil should be pushed toward the screw cap end of the coil form and the receiver tuned to a 27.255 mc transmitted signal. The coil slug may be adjusted by a regular screwdriver. Upon tuning to resonance, the meter reading will drop to about 0. If a dip cannot be had, check the transmitter output or move the antenna coil further to the cap end of the coil. When a dip is obtained, adjust the 100,000-ohm pot to give a meter reading of .2 ma and gradually move the antenna coil toward the open end of the core. With the antenna attached, this will tend to increase the plate current. The antenna coil should be so positioned that upon touching the free end of it, the plate current will in-

crease to about .3 ma or more, and upon removing your finger, the current will return to a normal of about .2 to .25 ma. Keying the transmitter should cause a dip on the meter reading and we are now ready to operate the second stage.

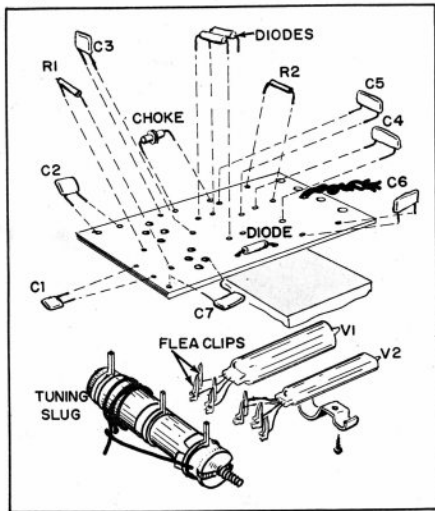


Fig. 6 Exploded View of Receiver

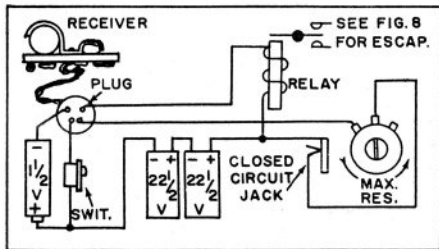


Fig. 7 Receiver Test Hook-up

A suitable relay, such as any of the types given in the recommended list, is connected as shown in Fig. 7. A relay with a DC coil resistance of from 5000 to 10,000 ohms is preferred. Upon turning the receiver ON, the first stage plate current should read between .2 and .25 ma, and the relay should remain unenergized. When a signal is received, the first stage current should drop and the relay will pick up. With no signal received, the relay tube is drawing no plate current. With a signal, the plate current will rise to from 2 to 4 ma, depending upon the resistance value of the relay and the tube used. If the first stage appears to function properly but the relay remains energized at all times, check the polarity of the diodes (that is, whether or not they are mounted as shown in Fig. 1a), and the positioning of the other components, or increase the idling current of the RK-61. When the relay picks up upon receipt of a signal, you are ready to make your installation.

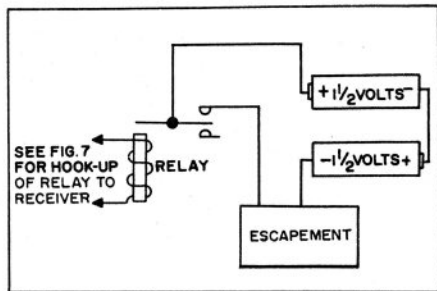


Fig. 8 Receiver Hook-up With Actuator

Fig. 8 shows a typical hook-up pictorial, with receiver, batteries, associated parts, actuator and actuator batteries in the circuit. The actuator circuit is connected to the NORMALLY OPEN points of the relay. No switch is used in the actuator circuit, since the points of the relay are open when no signal is being received or when the receiver is turned off. When making this hook-up, use only stranded hook-up wire, not solid. Make good soldered connections and do not use wires longer than are necessary to make the proper installation.

NOTE

USE ONLY RADIO ROSIN-CORE SOLDER, NEVER FLUX OR ACID CORE, AS THIS WILL CORRODE THE PARTS.

Eliminate excessively long leads or a "rat's nest" of wiring. It is suggested that the receiver be mounted in a small box which has been padded with sponge rubber. Vibration will not affect the receiver but the relay should be shock-mounted on a lord mount, or similar shock mount. The particular installation will depend upon the type of plane, boat or car you are working with, and therefore will vary in most cases. Follow the manufacturer's recommendations for placement.

COMPONENTS LIST

C 1	15 uuf Capacitor	1
C 2	120 uuf "	1
C 3	47 uuf "	1
C 4	.02 uf "	1
C 5	.015 uf "	1
C 6	.015 uf "	1
C 7	.015 uf "	1
	Choke, small RF, single winding	1
	Diodes, subminiature	3
R 4	1 megohm resistor brown, black, green	1
	Flea clips	8
	Lead, antenna	1
	Piece of Foam Rubber 1-3/4" by 1-1/2"	1
	Plug, 4 prong	1
R 1	4.7 megohm resistor yellow, purple, green	1
R 2	5100 ohm " green, brown, red	1
R 3	100 kilohm potentiometer	1
	Socket, 4 pin	1
	Tube Clamp	1
	Tuning coil slug	1
	Twisted 4 line cable	1

PLASTIC BOX MAY BE USED TO HOUSE RECEIVER

SUGGESTED TUBE COMPLEMENT

First Stage Tube:	RK-61 only
Second Stage Tube:	XFY-33 (20ma filament drain) DL-66 (15ma filament drain) 1AG4 (40ma filament drain) XFG1 (50ma filament drain) 1V5 (40ma filament drain)
	Plus practically any other subminiature tube of the pentode, POWER AMPLIFIER TYPE.

SUGGESTED RELAYS

SIGMA:	8000 ohm 4F,	GEM:	7500 ohm.
	26 F, 5F, or	PRICE:	5000 or
	Model 11.		8000 ohm.
KURMAN:	5000 ohm.	ED:	5000 ohm.
NEOMATIC:	7250 ohm.	ADVANCE:	SO

Or any other 5000 to 10,000 ohm sensitive type relay, is acceptable.

This receiver follows a generally used pulse rate. If it is desired to pulse this receiver at a more rapid rate, it may be necessary to place a 1 megohm (Brown, Black, Green) resistor across Capacitor C 7.

This resistor has been supplied for your convenience. When using it, it will probably be necessary to increase the first stage idling current approximately .1 ma.

USE	VOLTAGE	SIZE	TYPE OF CONNECTION
RECEIVERS	$1\frac{1}{2}$	$\frac{3}{8}$ DIA. X $\frac{3}{4}$	BRASS CAP
	$1\frac{1}{2}$	$\frac{17}{32}$ DIA. X $\frac{31}{32}$	BRASS CAP
	$1\frac{1}{2}$	$\frac{15}{16}$ DIA. X $\frac{15}{16}$	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.

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 2Z2PI	3.3 OZ.	

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

TROUBLE SHOOTING CHART

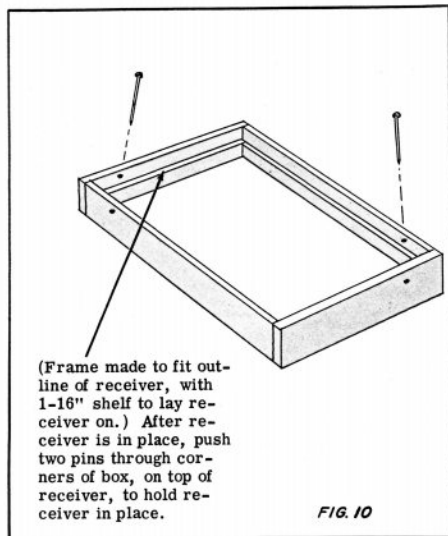
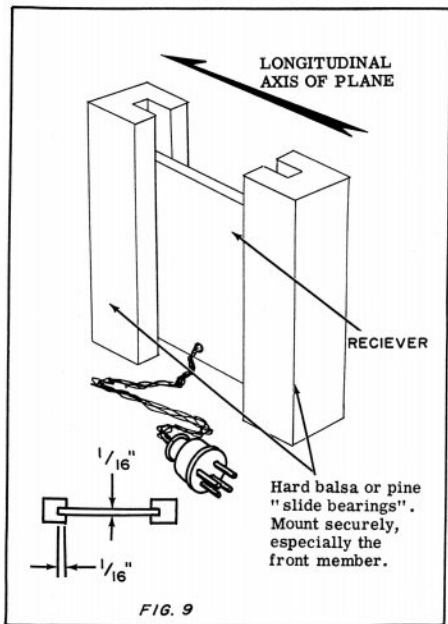
Symptom	Possible Cause
1. Relay does not operate when transmitter is keyed. Relay remains UN-ENERGIZED.	<p>(a) First stage (RK-61) is not tuned to frequency. Adjust the slug to obtain resonance indicated by a dip in plate current on the RK-61.</p> <p>(b) Relay coil burned out. Check continuity with an ohmmeter.</p> <p>(c) Check wiring between receiver and relay.</p> <p>(d) Relay tube burned out, possibly indicated by lack of filament glow.</p> <p>(e) Transmitter not functioning properly.</p>
2. Relay remains in an energized state when transmitter is turned on and no signal is received.	<p>(a) First stage tube is burned out, indicated by lack of filament glow.</p> <p>(b) Improper operation of first stage tube. Idling current too low. Adjust to read from .2 to .3 ma. First stage not oscillating. Possibly too tight coupling of antenna coil. Move antenna</p>

TROUBLE SHOOTING CHART (cont.)

Symptom	Possible Cause
	<p>coil towards screw end of coil. Antenna too long or too short. Maintain a total 20" length.</p> <p>(c) Filament and/or plate voltage too low. Check under load, to be sure filament batteries measure 1.3 volts or more, and the plate voltage is 42 volts or more.</p> <p>(d) Coupling capacitor C5 broken or improperly soldered.</p> <p>(e) Diodes broken or improperly mounted with respect to polarity (Fig. 1a).</p>

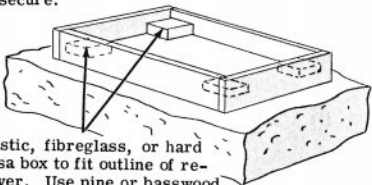
RECEIVER MOUNTING SUGGESTIONS

The Aristrol 3-D receiver may be used with almost any 5000 to 10,000 ohm sensitive relay. The relay is mounted separately so as to relieve the receiver board from excess weight and provide a greater flexibility of installations. In view of this, the receiver is rugged enough to be rigidly secured to your installation. Fig. 9 shows two typical "rigid" mountings.



If a floating type of mounting is desired,
Fig. 10 and 11 give 2 versions.

Set receiver chassis on corner posts and use pins or small screws on each corner to secure.



Plastic, fibreglass, or hard balsa box to fit outline of receiver. Use pine or basswood corner posts.

1/2" foam or sponge rubber cemented to bottom of box. Allow 1/4" border beyond outline of box. Cement rubber on floor of installation or other suitable location. Use a cover on box to protect receiver from dirt, if desired.

Wrap receiver in 1/4" or 1/2" foam rubber blanket, allowing 1/2" overlay on ends and stuff into box.

1/8" Balsa Box

FIG. 11

