INSTRUCTIONS FOR OPERATION

OF

CITIZEN-SHIP ANALOG PROPORTIONAL CONTROL SYSTEM

CITIZEN-SHIP RADIO CORPORATION
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INDEX FOR ANALOG PROPORTIONAL CONTROL SYSTEM INSTRUCTIONS

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CITIZEN-SHIP Analog Proportional Control System

Models APT Transmitter and APR Receiver

1. DESCRIPTION OF AP SYSTEM

The CITIZEN-SHIP AP Series Proportional Control System gives the modeler two continuously variable simultaneous channels and a third trimmable channel. The two proportional channels are recommended for elevator and rudder (or aileron) control. The CITIZEN-SHIP AP System is ideally suited to AMA competition in Class I, Class II, and Pylon Racing. A Class III installation can be accomplished in several ways. The rudder can be locked in neutral and the model flown with aileron and elevator control, or the ailerons and rudder can be coupled electrically by wiring two servos in parallel, thereby giving coupled ailerons and rudder (CAR).

The CITIZEN-SHIP Model APR is a selective superheterodyne proportional receiver which responds to rate and width changes of a tone to produce a plus or minus voltage corresponding to the angular movement of the transmitter stick. Your CITIZEN-SHIP Model APR is an all transistor, miniaturized radio control receiver that will fit into some of the smallest rudder or intermediate models. The superheterodyne design of the APR makes it possible to fly simultaneously with as many as five other airplanes on the legal FCC Frequencies. In addition, the CITIZEN-SHIP Model APR has a highly selective audio filter which is tuned to 3750 CPS. This filter rejects most of the noise and electrical interference encountered in model aircraft. This makes it highly unlikely that any noise problems will be encountered.

The CITIZEN-SHIP Model APT is a high power, all transistor transmitter which uses a silicon power output transistor. The APT is 100% collector modulated with a fixed 3750 CPS tone using variable rate 20-60 CPS and varying width of tone burst to obtain two proportional controls.

The transmitter has two control sticks, two trim levers, and one lever switch. The control sticks traverse an arc of 30^{o} either side of their spring-loaded neutral position. The trim levers give 20% of the control movement that the main sticks do. The lever switch is used to actuate the engine speed control. Use short beeps for small changes in engine speed. Holding for approximately 1 second gives full speed change. Rudder and elevator servos return to neutral when either high motor (solid tone) or low motor (carrier only) is signalled.

2. FREQUENCY OF RECEIVER AND TRANSMITTER

The APR Receiver is shipped adjusted and tuned for reception on the frequency which is stamped on the box and on the side of the case. The frequency of the crystal in the receiver is not the frequency at which the set will operate, since the receiver crystal is always 0.455 lower than the frequency of the transmitter and receiver. Example: If you have a receiver tuned for 27.145, the receiver crystal should read 26.690 (i.e.: 27.145 - .455= 26.690).

The APT Transmitter is crystal controlled and intended for use on all of the 27mc Citizens Band frequencies for radio control operation. It may be used on any of the 6 legal frequencies by plugging in the desired crystal without any retuning.

Crystals must be used in pairs as follows, and must be ground to a tolerance of .0025% to insure proper operation and allow replacement without making retuning necessary. Replacement crystals may be obtained directly from CITIZEN-SHIP for $4.50 plus postage.

Transmitter Crystal Frequency	Receiver Crystal Frequency
26.995mc	26.540mc
27.045mc	26.590mc
27.095mc	26.640mc
27.145mc	26.690mc
27.195mc	26.740mc
27.255mc	26.800mc

3. RECEIVER AND TRANSMITTER BATTERY REQUIREMENTS

A. Receiver Battery Requirements.

The MODEL APR Receiver should ideally be powered by four 450 MAH Nicad batteries. These four cells with center tap are also used for servo reference voltage. Pencell batteries are adequate and can be used if desired. Also 225 MAH nicads are satisfactory for lightweight installations. Receiver drain is approximately 40 MA.

In addition, the servos require four cells to run the motors. Again, 450 MAH nicads are ideal although pencells will give satisfactory results. The 225 MAH cells can be substituted in very small planes.

Charging and End Use of Receiver Batteries: When the voltage of any one cell reaches 1.2 volts or before any full day of flying, it is recommended that batteries be recharged. To simplify charging, it is recommended that all cells be of one size in a battery pack. Follow battery manufacturers' instructions for charging rates.

B. Transmitter Battery Requirements.

One of the advantages of the APT Transmitter is the fact that it has a low battery drain (60 MA) and does not require an expensive power supply, but uses a standard 9 Volt Battery. Eveready Type #276 or Burgess D6 are recommended. Check battery voltage periodically and replace when voltage reaches 7.5 Volts with transmitter on. This should give 2-3 months of normal flying for each battery.

Nicads may also be used. Seven 450 MAH cells connected in series are recommended for the APT Transmitter. This gives a voltage of 7.7 to 9.8 Volts depending on the state of charge, and best matches dry battery voltages.

Do not try to operate your APT with low batteries. Low voltage causes range to drop sharply. In any transmitter, if the voltage drops to 1/2, the output drops to 1/4.

4. MOUNTING RECEIVER

The Receiver can be mounted in any position, as its operation is unaffected by vibration. However, for best crash protection it is recommended that the case be turned so that the printed circuit boards are in the same direction as the fuselage bulkheads. Also, receiver should be surrounded by foam rubber to eliminate fatiguing of com-

ponents from vibration and to prevent crash damage. Batteries should always be mounted ahead of or below receiver.

5. USE OF WIRING BOARD AND SOLDERING ON CONNECTORS

The printed circuit wiring board for the AP System supplies all interconnecting wiring plus an Off-On switch and five Deans 2-8 connector assemblies soldered into place on the wiring board. Replacement or additional Deans connectors can be purchased from your hobby shop or from the factory. The wiring board has provision for soldering in another connector. An additional servo plugged into this connector operates in parallel with the rudder servo for coupled aileron and rudder (Car). All that remains is to solder the removable portion of each connector to each unit and to the battery pack. See Figure 1 for the color coding and follow these directions to obtain a professional soldering job.

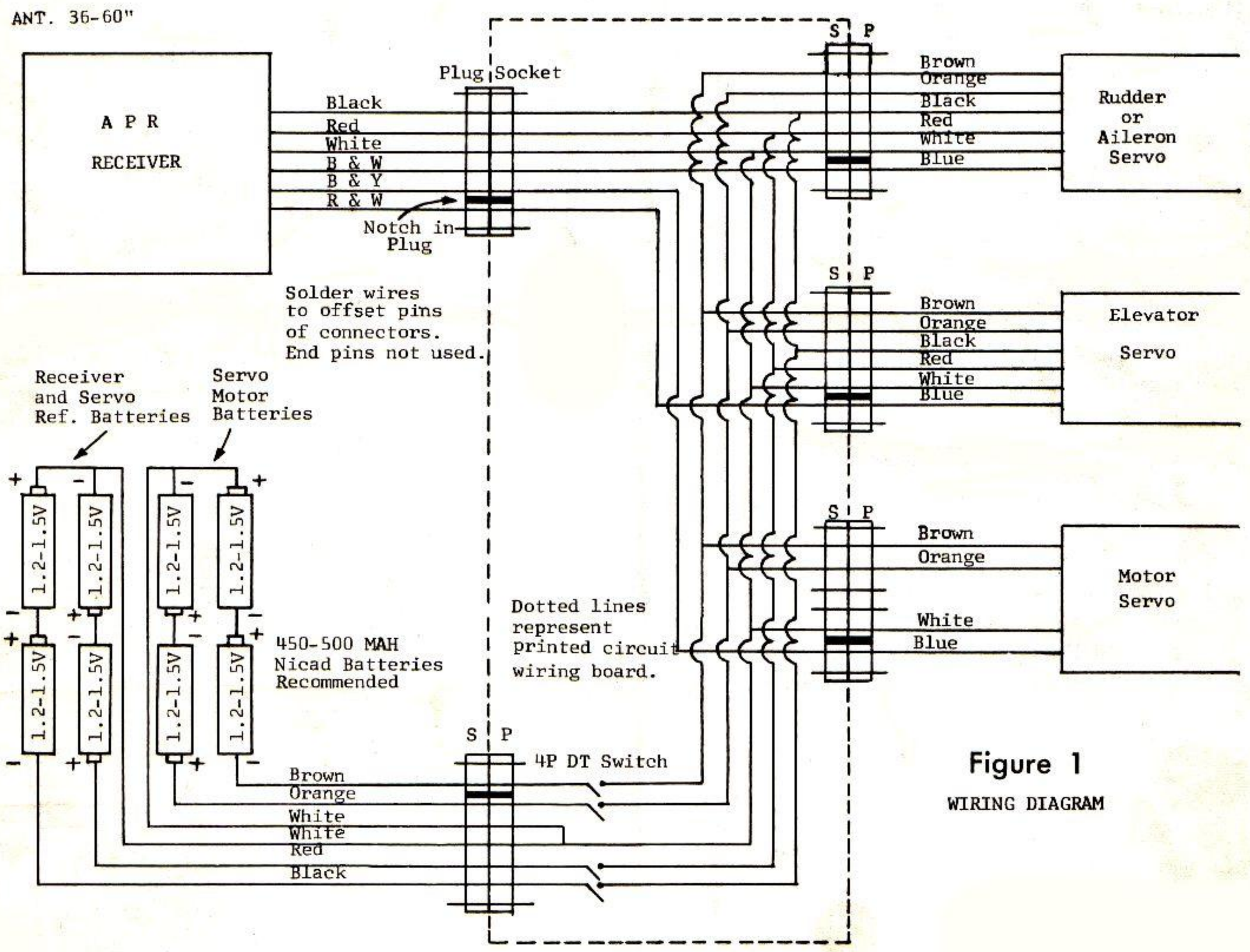


Figure 1

WIRING DIAGRAM

1. Use only a small tipped 20-50W soldering iron.
2. Cut off wires for each unit evenly at desired length (not less than 6") and leave at full length if possible as another installation may require the longer cable.

3. Strip insulation back 3/32 to 1/8" on each wire of all the units, using care not to nick or cut any of the small individual strands of wire.
4. Tin each stripped wire, using a small tipped 20-50W soldering iron and rosin core solder.
5. Tin each of the offset pins to be used on all connectors (See Figure 2) with a light coat of solder where wire will be added. Do not overheat pins, as the plastic may melt or soften and deform.

SPAGHETTI SLEEVING
COLOR CODE

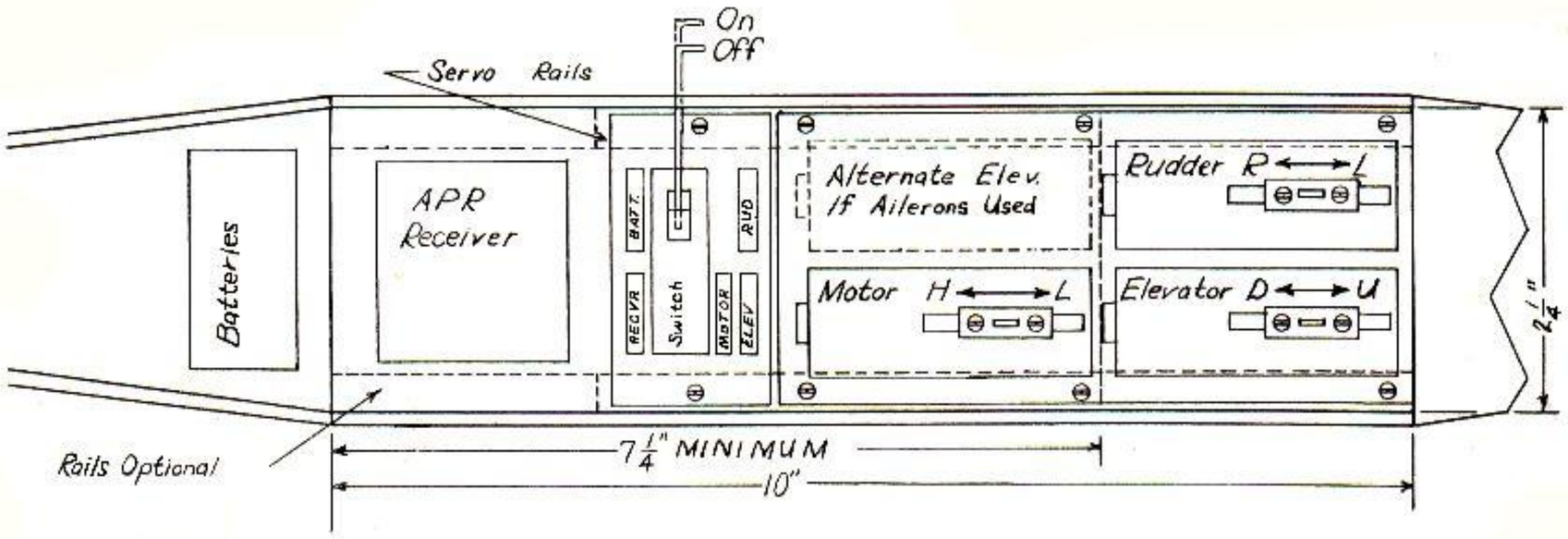
RECEIVER - GREEN
ELEV. SERVO - BROWN
MOTOR SERVO - WHITE
RUDDER SERVO - ORANGE
BATTERY - YELLOW

Figure 2

6. Slip Spaghetti on each wire. Use one color on each unit and follow the color code listed in Figure 2. You are now ready to solder wires to connectors. To make this easier, the removable part should be plugged into the connector already in the wiring board or held flat on the edge of a table, leaving both hands free to solder. Note that the connectors are polarized (two of the pins are spaced wider than the rest). Because of this, the two parts can be plugged to gether only one way.
7. Be sure to get started soldering on the wires at the correct end of connector and work across in order, also remembering that the end pins are not used. (See Figure 1).
8. After soldering, slide spaghetti down over solder joints. Twist connectors several turns to form a neat cable for each unit. After completing wiring of connectors, receiver, servos and batteries can be plugged into the wiring board for testing.

Before installation in plane, cut length of wiring board to match width of plane. Drill mounting hole in each end of board to match servo rails. (See Figure 3). Determine desired length for brass off-on switch rod. Cut, bend and thread into 0-80 tapped hole in switch. (Follow Figure 3).

TYPICAL INSTALLATION



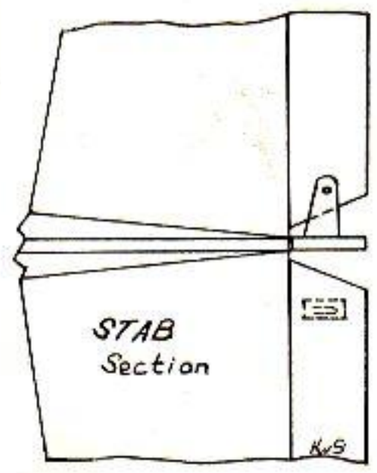


Figure 3

6. PUTTING TRANSMITTER IN OPERATION

Unpack carefully and note that the antenna assembly is in two pieces: a short, fixed length of antenna with a loading coil mounted on one end, and a collapsible antenna which is compressed to its shortest length as packed. Insert the fixed length of antenna through the rubber grommet in the top and screw onto the screw provided on the antenna mounting bracket. With the back cover off, this bracket is readily seen from the side. Then screw the threaded end of the collapsible antenna into the fitting on the top of the loading coil. Part or all of the antenna assembly can be removed from the set for convenience in transportation, or it can be left in place with the antenna collapsed. When flying, the collapsible antenna must be extended to its full length. Before flying, install screws that hold the back on the transmitter, as a loose back generates noise which is transmitted.

7. FAIL SAFE FEATURE

Fail Safe is obtained when receiver is on and transmitter off. Motor servo goes to low speed and elevator and rudder (or aileron) go to neutral. To obtain the maximum benefit from fail safe, the linkages to controls must be set so the model flys as safely as possible with transmitter off.

Fly the plane to a safe altitude, turn transmitter off momentarily, and observe the attitude the plane assumes. Make adjustments in linkages, not transmitter trims, as are necessary to correct any undesirable turn, dive or stall.

8. NOISE

A selective tone filter has been incorporated to eliminate noise as a great enemy of the AP System. However, if control troubles arise (and only with the engine running) while flying or ground testing, noise could be the cause of the problem.

Should this be the case, the use of a non-metallic clevis on the motor control linkage (at the engine throttle) will probably solve the problem as this is the worst source of noise from metal-to-metal contact.

9. ANTENNA ARRANGEMENTS

Extensive flying with the AP Proportional System has proven the superiority of two styles of antennas for the receiver over that which is now in common use. The antenna wire run directly to the rear of the plane along the body, inside or out, or to the top of the rudder fin -- which, while easy to install, is very directional and not completely satisfactory for Proportional Systems, all of which require a continuous signal being received from the transmitter.

Recommended types of antenna are:

1. A wire from receiver to one tip of stabilizer and continuing on to top of rudder, and then down to the other tip of stabilizer.
2. A vertical steel wire 24-30" long connected to the receiver lead-in.

Superheterodyne receivers require long antennas for best sensitivity. Use 36" minimum total antenna length, including lead-in.

10. RANGE TESTING

Ground range with the AP System will exceed that of most other equipment. A 1/4 mile minimum check can be expected.

Air range is tremendous and will seem completely unlimited.

11. RETUNING NOT PERMITTED IN WARRANTY

Retuning of the APR Receiver and APT Transmitter is unnecessary, and is not permitted by the Warranty. All sets have been double checked at the factory for frequency, sensitivity, and output.

Even checking operation with a meter or oscilloscope is not recommended, as transistors can easily be burned out or damaged by careless probing. Transistors are known to be operative at the time of shipment and are not covered by the Warranty.

12. LICENSING

CAUTION: Before this transmitter may be operated, it must be licensed as a Class C Station in the Citizens Radio Service.

FCC Form #505 Application for Citizens Radio License is enclosed with the transmitter. Instructions on the front page are to be carefully followed in filling out the application.

In general, the only requirements for a Citizens Radio Station License with the CITIZEN-SHIP Transmitter are that the applicant be 12 years of age or older and a citizen of the United States. If some one under 12 wishes to purchase and use the transmitter, he may have his father or another adult file application for the license. After the Citizens Radio Station License has been obtained, anyone may operate the transmitter as long as the licensee assumes the responsibility for the proper operation of the station.

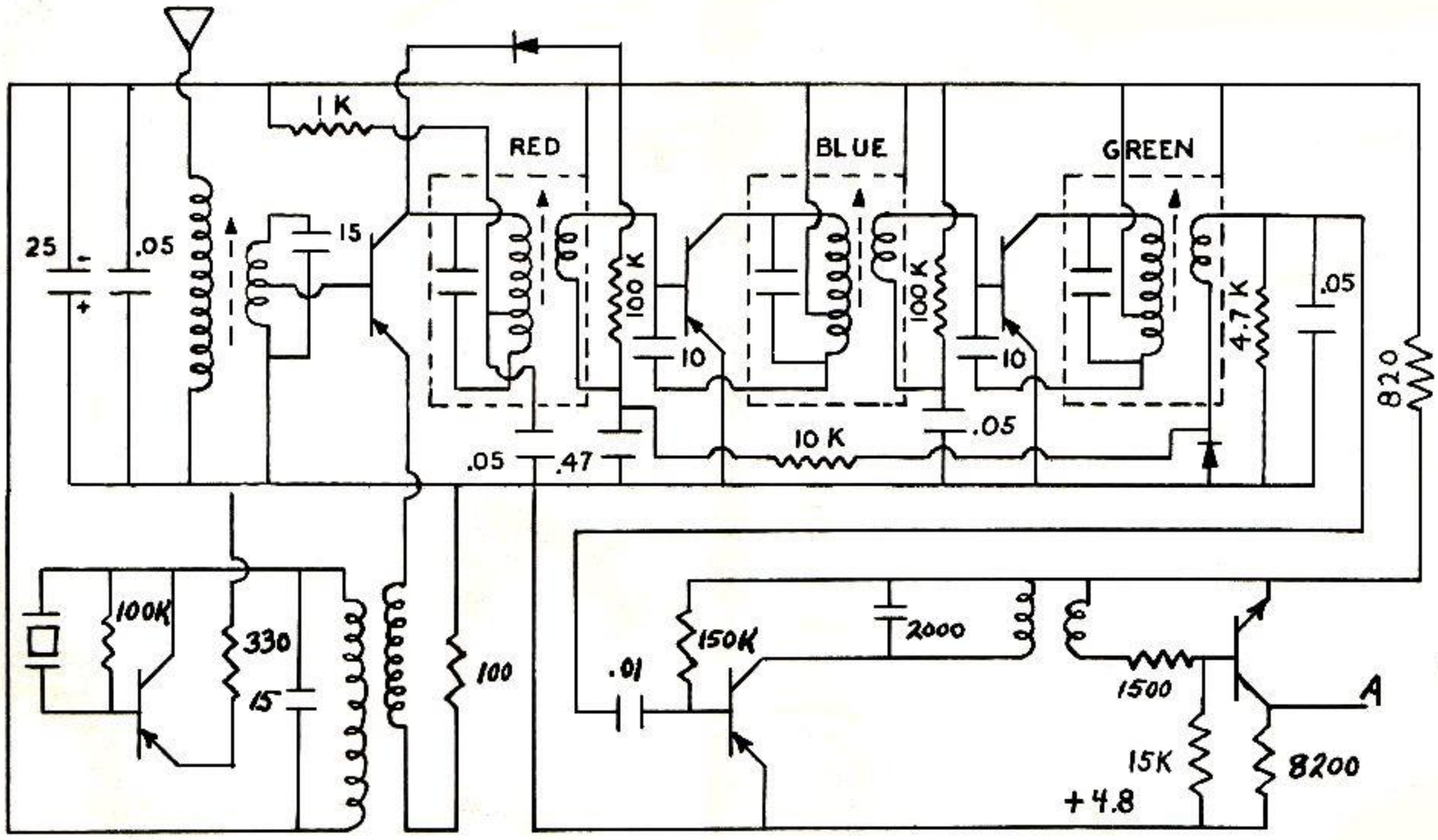
Do not operate your transmitter until you have received your Citizens Radio Station License.

WARRANTY AND SERVICE

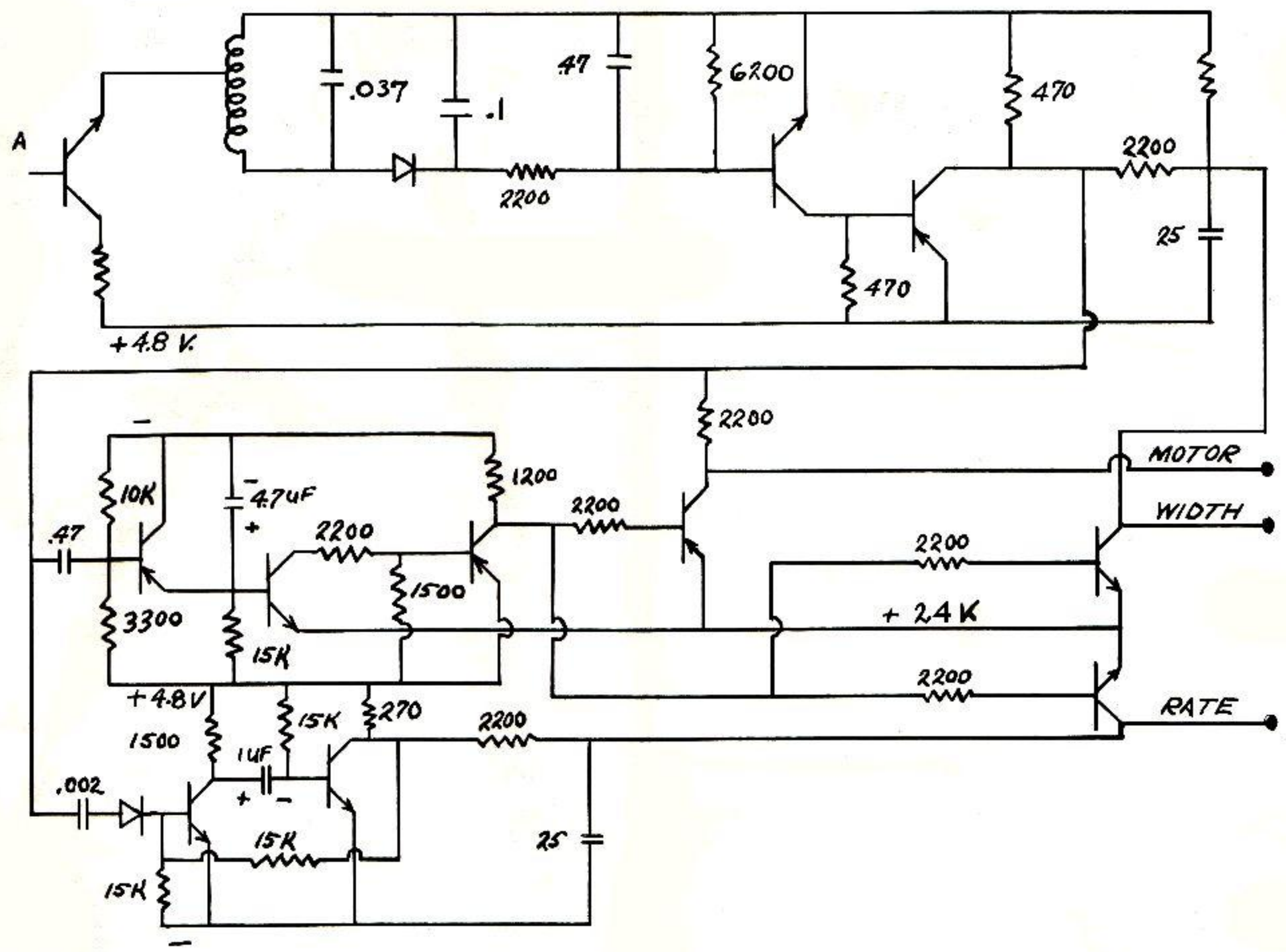
Your CITIZEN-SHIP APR Receiver and APT Transmitter are warranted by the manufacturer to be free from defects in material and workmanship. Any unit failing to operate within 30 days after date of purchase will be repaired or replaced free of charge upon being returned directly to the factory by the owner. DO NOT return the unit to the dealer for service. This Warranty does not apply to failure of operation due to exhausted or improper batteries or to failure of operation due to improper installing of connectors.

If, in our judgment, the equipment has been tampered with or received abusive treatment beyond that encountered in normal usage, this Warranty does not apply.

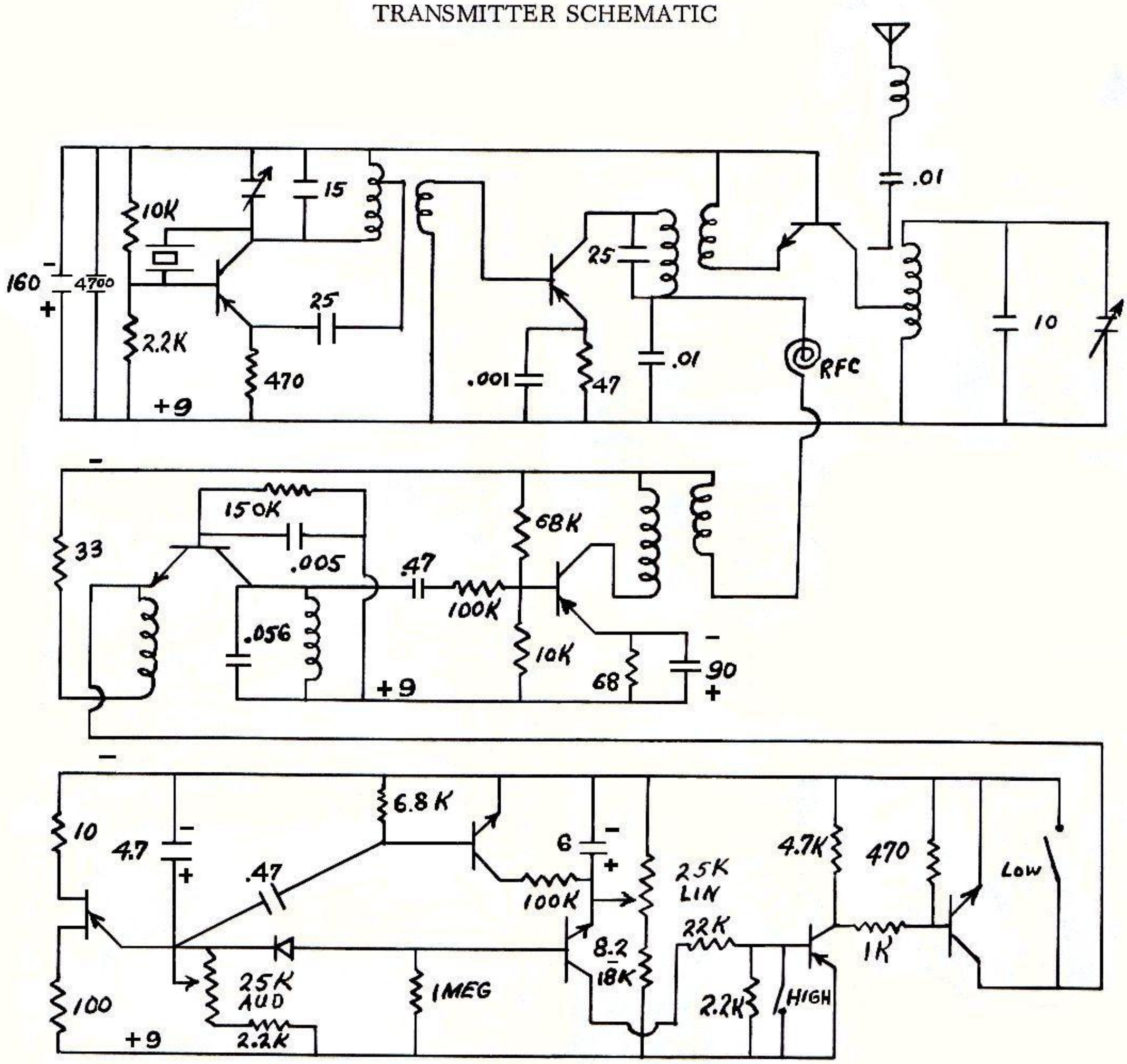
RECEIVER SCHEMATIC



DECODER SCHEMATIC



TRANSMITTER SCHEMATIC



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