

## FOR THE CG ATLAS RECEIVER

Introduction

The Atlas Receiver is an eight-channel, superheterodyne, simultaneous tone receiver. It is a custom design for R/C use, resulting from the most rigorous and extensive engineering program ever undertaken for model equipment. The Atlas is an extremely sensitive receiver, yet one capable of rejecting the many spurious and unwanted signals occurring on the citizens band. This receiver has sufficient selectivity not only to operate simultaneously with equipment operating on adjacent R/C channels, but will also provide protection from voice communications which may be only 10 kc away.

Channel discrimination is accomplished by use of a resonant reed relay. Each control relay is a power unit triggered by it's independent transistor amplifier. The amplifier is energized by the reed relay making it possible to operate the control relay with less than  $\frac{1}{2}$  MA flowing in the reed relay contacts. This insures extremely long life with no burning or pitting of the reeds. The reed relay is not as critical to dirt or dust under these circumstances.

Design Specifications:

Selectivity: 3 kc Nominal (6 db)  
16 db at 10 kc  
80 db at 50 kc

Sensitivity: 2 to 4 micro volts

Audio response frequencies: 200 cps minimum, 500 cps maximum

Temperature Operating range: 0°F - 130°F

Relay current change: 40 ma typical

Relay setting: Pull in; 25 MA maximum, 20 MA optimum;  
Drop out; 13 MA minimum

Idle current: 12 MA

Operating voltage: 3.1 volts Maximum, 2 volts Minimum

Operating frequencies: 26.995 mc, 27.045 mc, 27.095 mc, 27.145 mc,  
27.195 mc. Please specify desired frequency with  
order. Due to severe congestion on 27.255 mc, the  
Atlas will not be available on this frequency.

Physical Specifications:

| <u>Weight</u>       | <u>Length</u>     | <u>Width</u>      | <u>Height</u> |
|---------------------|-------------------|-------------------|---------------|
| 9 $\frac{1}{2}$ oz. | 3 $\frac{1}{4}$ " | 2 $\frac{1}{4}$ " | 2 1/8"        |

Case and Cover: Aluminum, .030 inches, blue anodized.

Printed circuit board: Photoetched, 1 oz. bonded copper to glass epoxy  
Tin lead protective finish.

Transmitter Requirements:

Due to the very extreme selectivity of the Atlas, it is absolutely necessary that the transmitter used be "on frequency." Only the CG Hercules transmitters are guaranteed to operate the Atlas. No commitment is made concerning the operation of the Atlas with any other transmitter.

General Remarks:

The R/C'r can be truly proud of his custom engineered Atlas.

Compare the following features:

1. The rugged, well made and attractive case and cover.
2. The glass epoxy printed circuit board. The glass epoxy assures an unbreakable base even in sub-freezing temperatures.
3. The new, smaller "power relay."
4. Silver palladium contacts, high spring tensions, and high current changes replace the sensitive and sticking relay of yesterday.
5. The guaranteed temperature operating range of 00°F to 130°F.
6. The extreme sensitivity, providing more useful range than most super-regenerative type receivers.
7. The extremely reliable local oscillator, featuring rigid stability without tuning coils and controlled by the smallest, most precision crystal used in the entire R/C industry.
8. The extremely sharp selectivity, assuring interference-free operation. To provide the best selectivity possible, the Atlas contains 4 IF transformers producing selectivity equal to commercial receivers.
9. The absolutely stable circuitry, free from oscillation producing regeneration even at high temperatures. Precision parts placement and printed circuit design aid in achieving this assured stability, in addition to rigorous circuit engineering.
10. The noise shielding of the mixer and IF stages accomplished by large "power filters" and unique printed circuit design. Everything possible has been done to eliminate actuator noise interference.
11. The economical 3 volt operation, no expensive or hard-to-get batteries are required. The Atlas is designed to be powered by two pen-cells or two series nickel-cadmium batteries. No voltage converters are used.
12. Advanced design in relay and reed circuits producing the most positive simultaneous operation ever produced with less critical adjustments.
13. The high gain transistor detector (collector detection) and expensive transformer coupled audio amplifiers provide a high gain circuit without the need for temperature unstable diode reflexing. The short time constant DC relay amplifier provides maximum protection from short duration noise bursts.
14. The CG exclusive AGC circuit, again accomplished without the use of diodes or complex feedback networks, assures reliable, blocking-free close range operation.
15. The use of precision engineered printed circuitry without messy jumpers and the exclusive use of first quality American made components throughout assures a consistent and highly reliable receiver every time.



OPERATING INSTRUCTIONS:

Batteries:

The Atlas is designed to be powered by either dry cells or series nickel-cadmium batteries.

Dry Cells

Two pen-cells or sub-miniature pen-cells will supply all the power required by the Atlas receiver for many, many flights without replacement. Powering the Atlas from 3 volt actuator dry cells is not recommended due to high noise levels encountered. In certain installations, such operation may satisfactorily be obtained, however. Dry cell batteries should be replaced when their total voltage drops to 2 volts under keyed receiver load. Only two dry cells connected in series forming 3 volts, may be used. The Atlas can be operated from series connected re-chargeable batteries using only 2 of these cells in series producing 2.4 volts.

Antenna:

The antenna length for the Atlas is not critical and may vary from 18 to 36 inches. An average antenna (measured from the receiver case) would be 30 inches in length. A vertical piece of piano wire mounted directly behind the wing is recommended. The antenna should be routed as far from other wiring and actuators (especially servo motors) as possible. Some noisy servo motors can radiate strong signals as far as one foot or more.

Installation:

For Maximum protection, the Atlas should be carefully installed by the following instructions:

Though far from delicate, the Atlas is an expensive, precision instrument. The few extra minutes spent installing it will be amply rewarded in the event of a crash. Mount the Atlas vertical with the antenna leadout upward. The receiver should be mounted base forward against a bulkhead and shock mounted by 1/2 inch of foam rubber placed between the receiver base and the bulkhead. The unit may then be held in place by rubber bands stretched securely over the case to the bulkhead. The power and actuator wiring may now be routed neatly at the bottom of the fuselage and the antenna lead at the top, clear of actuators and other wiring. Leave sufficient slack in the power wires and antenna lead for pulling in the event of a crash.

Refer to Fig. 1 for wiring connections:

When soldering connections, always wrap the wire around the connection to be soldered and solder with a good grade of resin core solder. Under no circumstances use acid core solder. Glue or tie all wiring adjacent to soldered connections to prevent vibration fatigue. Assure that all batteries are secure in their holders such that vibration cannot produce a noisy floating connection.

Spark and Noise Suppression:

Spark suppression is absolutely necessary to prevent relay contact burning due to the high inductive kick of actuators. A 100 ohm 1/2 watt resistor should be placed directly across the motor or escapement power terminals. In the event

Spark and Noise Suppression - continued

a noisy servo motor causes some trouble, a .05 mfd ceramic capacitor placed across the motor terminals, in addition, usually aids the situation tremendously. Separate power supplies for the receiver and servo, and antenna routing are influential. It must be pointed out that if a noisy servo does become a problem, the problem must be cured at the source of the trouble; not in the receiver. As was stated, the receiver is completely isolated, shielded and filtered; nothing more can be done. Tests to date indicate that only especially noisy servos present problems; and the Atlas has the least noise susceptibility of any superheterodyne R/C receiver on the market. Bonner Duramite servos are recommended as they usually require no suppression.

Tuning and Testing:

Upon completion of the wiring, double check to make certain that it is correct and that spark suppression has been installed. A reversed battery polarity or excess voltage could damage the receiver.

The Atlas is completely pretuned at the factory. The operating frequency is stamped on the case of the crystal. (See Chart) The reed relay and power relays are all adjusted and should require no further adjustment. The reed and relay contacts can be cleaned by passing a piece of clean bond paper or a calling card between these contacts. Never use a file or sand paper for cleaning contacts. Do not use cleaning solutions except those that leave no residue on the contacts. In normal operation dust can be removed by using a piece of paper. In dusty areas it would be advisable to seal the receiver can with masking tape.

It is absolutely necessary that the correct CG crystals be used in both the receiver and transmitter. To facilitate checking, refer to the following chart:

| Channel | Operating Frequency | Transmitter                                | Receiver                                      |
|---------|---------------------|--|---|
|         |                     | Crystal frequency<br>(1/3 operating freq.) | Crystal frequency<br>(operating freq. 455 Kc) |
| I       | 27.255 mc           | 9.085 mc                                   | Not Available                                 |
| II      | 27.195 mc           | 9.065 mc                                   | 26.740 mc                                     |
| III     | 27.145 mc           | 9.0483 mc                                  | 26.690 mc                                     |
| IV      | 27.095 mc           | 9.0316 mc                                  | 26.640 mc                                     |
| V       | 27.045 mc           | 9.015 mc                                   | 26.590 mc                                     |
| VI      | 26.995 mc           | 8.9983 mc                                  | 26.540 mc                                     |

Under normal circumstances, no tuning of the receiver is necessary or recommended. After completion of a double check on the wiring, position the receiver switch ON and key the transmitter. Response as noted by relay operation (or actuator operation) should be noted. A range check on the equipment should now be performed.

If for any reason tuning is deemed necessary it may be accomplished as follows:

1. Remove the receiver from it's case by unscrewing the eight small sheet metal screws holding the chassis. Connect a pair of headphones between pins #1 and #2 of the five pin connector. For more precise tuning use an AC VTVM in place of the phones.



Tuning and Testing - continued

2. Key the transmitter; a tone should be heard in the headphones or a reading on the VT volt meter.
3. Remove the antenna from the HERCULES transmitter, and have an assistant position the transmitter (while holding the key) such that the tone is very weak, but still audible. With the transmitter held absolutely stationary at this point, peak the IF transformers in order, #1, #2, #3, and #4 (see pictorial layout) by adjusting for loudest tone in headphones or highest meter reading.
4. Reposition the transmitter such that the tone is again very weak, but audible. Repeak the IFs in the order given above, insuring that the transmitted signal is steady.
5. Repeat step 4 again with extreme care. Staggered (sloppy) tuning of the several IF transformers will drastically reduce sensitivity and selectivity.
6. With the IF transformers now tuned, replace the cover on the Atlas and strap into position in model. The RF Tuning Coil is extremely broad in its tuning and will require no adjustment. Tuning is now complete. Range check prior to flight.

Extra crystals for either the transmitter (price \$4.95) or receiver (price \$6.95) are available for changing operating channels as desired. Both the receiver and transmitter crystals are especially made to CG specifications and MUST be used exclusively. To change operating channels, simply remove the installed crystals and replace with the proper crystals for operation on the desired channel. Transmitter retuning is not required. The receiver RF adjustment need not be changed, and receiver IF retuning is not necessary.

WARRANTY:

Our standard written 30-day warranty card accompanies each unit. F & M Electronics maintains a fully trained staff for the prompt repair of your CG equipment. All repair charges are itemized and nominally priced.

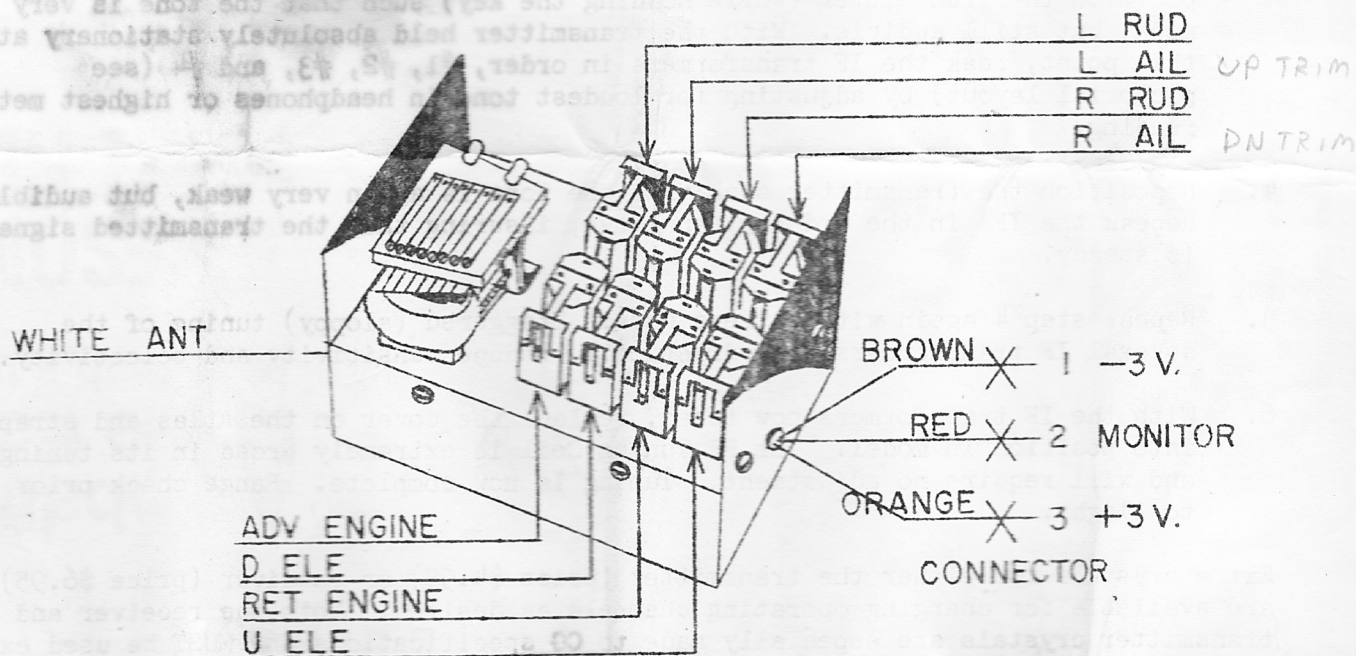


FIG. 1

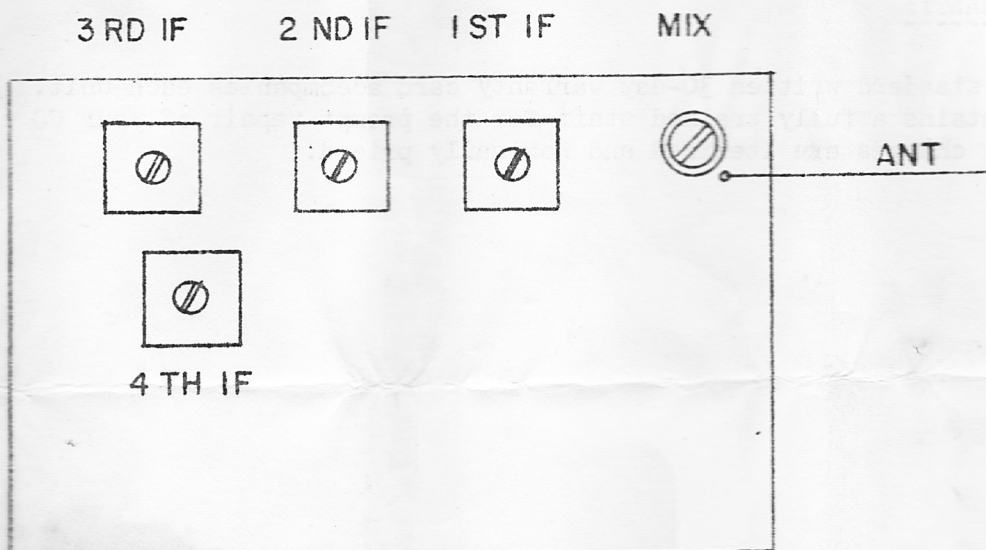


FIG. 2