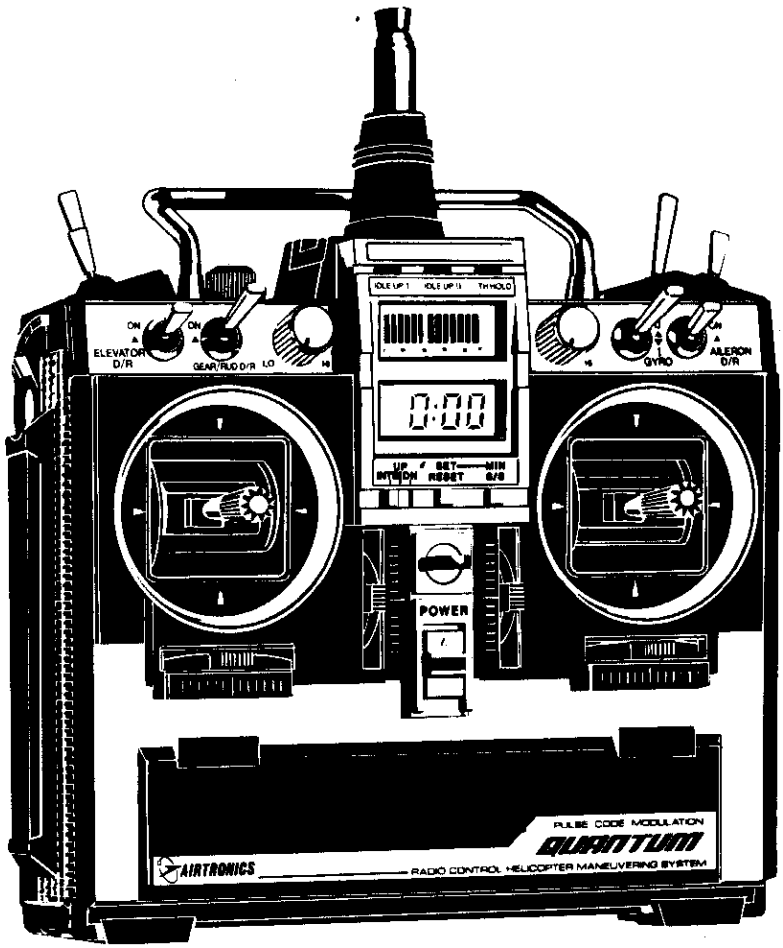
AIRTRONICS® INC

QUANTUM PCM 8H

RADIO CONTROL INSTRUCTION MANUAL



QUANTUM PCM 8H

TABLE OF CONTENTS

NOTE: FOR BATTERY CHARGING INFORMATION AND INSTRUCTIONS ON LEARNING TO USE YOUR AIRTRONICS RADIO CONTROL SYSTEM, PLEASE SEE THE AIRTRONICS INSTALLATION FUNDAMENTALS AND GUIDELONES MANUAL.

THANK YOU FOR SELECTING AIRTRONICS

We appreciate your purchase of our new AIRTRONICS Quantum PCM 8H Radio Control System.

These instructions are intended to acquaint you with the many unique features of this modern,m state-of-the-art equipment. Please read them carefully so you may obtain maximum success and enjoyment from its operation.

We ask you to pay particular attention to the design of the transmitter because it has been human engineered for the most natural and precise control of your choice of flying models.

Be certain to read all of the material in this manual, as well as that in the Fundamentals and Guidelines Manual.

SECTION I

SAFETY FIRST FOR YOURSELF, FOR OTHERS, AND FOR YOUR EQUIPMENT.

"SAFETY FIRST' is more than just a slogan when operating radio controlled models. Thus, we urge, especially with respect to radio controlled aircraft that:

FOR YOUR SAFETY:

Recognize that radio controlled models are not harmless toys, but can actually be dangerous missiles if carelessly or improperly flown. You are responsible because the reliability and safe operation of the radio equipment is largely dependent upon its proper installation, care and utilization. THEREFORE, INSTALL YOUR RADIO CONTROL SYSTEM CORRECTLY AND BE CERTAIN YOU CAN CONTROL YOUR AIRCRAFT UNDER ALL CONDITIONS.

FOR THE SAFETY OF OTHERS:

Because you are responsible for the safety of all spectators:

DO NOT FLY where your model could injure any person or property.

DO NOT FLY over anyone at any time. This includes taking off, actual flight and landing. To prevent damage to your equipment, keep everyone, except experienced and knowledgeable persons who are assisting you in flying, away from your model even when it is on the ground and you are preparing to fly.

DO NOT FLY unless and until you have an experienced instructor who has completely CHECKED OUT THE MODEL AND WILL FLY THE MODEL FOR YOU AND WITH YOU, UNTIL YOU HAVE LEARNED TO FLY COMPETENTLY BY YOURSELF.

Flying is a real skill that demands patience, practice and caution. DO NOT EXPERIMENT or run RISKS. KNOW that you can fly safely before you fly alone. The real pleasures and satisfactions come from flying or operating your model with SAFETY and competence.

DO NOT FLY in adverse weather conditions. Strong winds, for example, may cause loss of control of your aircraft and cause injury or damage to you or to others.

AT THE FIELD...

DO NOT FLY unless your frequency is "clear". The transmitting signal channel (frequency) is shown on the transmitter and YOU MUST NOT turn on your transmitter when someone is flying or operating their model on that same frequency. WARNING: IR YOU DELIBERATELY OR ACCIDENTALLY TURN ON YOUR TRANSMITTER WHILE ANOTHER MODEL IS FLYING OR IN OPERATION ON YOUR FREQUENCY, THAT MODEL WILL GO OUT OF CONTROL. The same will happen to yours, so observe "clearing" the frequency: Only one person can use a given frequency at a time. USE CHANNEL IDENTIFIER (FREQUENCY) FLAGS for your system frequency and attach the appropriate flags to your transmitter antenna. DO OBSERVE all of the rules of the flying or operating site.

•

The channels and frequencies associated with them are as follows:

72 MHz Band (Aircraft Only Channels)

CHANNEL NUMBERS	FREQUENCIES
12	72.030
38	72.550
40	72.590
42	72.630
44	72.670

TABLE (cont.)

CHANNEL NUMBERS	FREQUENCIES
46	72.710
48	72.750
50	72.790
52	72.830
54	72.870
56	72.910

CHANNELS 14 THROUGH 34 are added as of JANUARY 1, 1988. Narrow band transmitters are required to operate on Channels 12 through 34 inclusive. Channel number plaques are used to identify a specific channel in the 72 MHz band. The *Quantum PCM 8H meets narrow bank requirements.*

CHANNEL NUMBER	FREQUENCY (MHZ)
14	72.070
16	72.110
18	72.150
20	72.190
22	72.230
24	72.270
26	72.310
28	72.350
30	72.390
32	72.430
34	72.470

WARNING: The 72 MHz frequencies above are allocated for the exclusive use of radio control model aircraft. Other 72 MHz frequencies are assigned to communications and other services. Under particular circumstances these other frequencies may cause you to lose control of your model, possibly causing injury to yourself, others, or property damage. Before operating your model, check with the Federal Communications Commission (FCC) Regional Office in your area to determine whether there is potential danger of interference from other radio users. There are also 75 MHz channels assigned by the FCC for use by model cars, boats, etc.

IN SUMMARY:

1. DO NOT OPERATE your transmitter at the field until you are certain your frequency is "clear".
2. DISPLAY your channel identification plaques on the antenna of your transmitter.
3. REMEMBER that channel identifier plaques do not usually state the frequency on them, therefore ask and be certain. If you have an eyesight limitation, double check to be sure of channel plaque designations.
4. WARNING: Your model will go out of control and may do serious injury or damage if someone else turns on a transmit ter on your frequency while your are operating your model.
5. Respect all the rules of the flying field or site.
6. At any time during the operation of your model, should you sense, feel or observe any erratic operation or abnormality, end you flight as quickly and as safely as possible. DO NOT operate again until you are certain the problem has been corrected. TAKE NO CHANCES.

ADDITIONAL WARNING:

Radio controlled models are generally attractive, exciting and inviting in looks and performance. Realize that young persons, and inexperienced adults may try to operate the equipment without understanding the dangers to themselves or others. Please guard against unskilled and unknowing hands for their protection as well as for the safety of you equipment and model.

The key to R/C pleasure is the proper use of your System, and all of the other model components. If you fail to follow instructions, heed the warnings given, misuse or abuse the system through improper operation or installation, the consequences may be harmful or destruction of your system, or injury to yourself or the person or property of others.

AS TO YOUR EQUIPMENT:

The care you give your radio control equipment, and to its correct installation and operation, are the factors that make the difference between safe successful flying or injury, damage, destruction and loss.

ACADEMY OF MODEL AERONAUTICS (AMA):

The Academy of Model Aeronautics is the leading national organization made up of aircraft modeling people with headquarters near Washington, D.C. Its address is 1801 Samuel Morse Drive, Reston, VA 22090, and we urge you to examine the benefits of membership including liability protection in the event of certain injuries. The Academy has adopted simple and sane rules, a few which are especially pertinent for radio controlled flight as the OFFICIAL AMA SAFETY CODE. Abide by these rules for your protection, the protection of theirs and your equipment. Excerpts are as follows:

1. I will not fly my model aircraft in competition or in the presence of spectators until it has been proven to be airworthy by having been previously successfully flight tested.
2. I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right of way to and avoid flying in the proximity of full scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full scale aircraft.
3. Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.
4. I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.
5. I will not fly my model aircraft in the presence of spectators until I become a qualified flyer, unless assisted by an experienced helper.
6. I will perform my initial turn after takeoff away form the pit or spectator areas, and I will not thereafter fly over pit or spectator areas, unless beyond my control.
7. I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission. (Only licensed amateurs are authorized to operate equipment on amateur band frequencies).

NOTE: These basic safety precautions are for your safety, the

safety of others, and of your equipment. Consider care fully all of what has been stated and obey all precautions as well as those appropriate to your particular use. Good common sense must also be used at all times in the operation of your equipment.

SECTION II

Federal Licensing Requirements and Special Operating Standards for Model Airplanes.

The Federal Communications Commission no longer requires a license to operate an R/C model transmitter.

However, the Federal Aviation Administration has announced guidelines for operation of model aircraft. We are reprinting those guidelines here and encourage your study and cooperation.

1. Purpose: This advisory circular outlines safety standards for operators of model aircraft and encourages voluntary compliance with these standards.
2. Background: Attention has been drawn to the increase in model aircraft operations, and the need for added caution in the case of free-flight and radio controlled types to avoid creating a noise nuisance or a potential hazard to full-scale aircraft and persons and property on the surface.
3. Operating Standards: Modelers, generally, are concerned about safety and do exercise good judgement when flying model aircraft. However, in the interest of avoiding undue criticism from affected communities and airspace users, COMPLIANCE WITH THE FOLLOWING STANDARDS IS ENCOURAGED BY OPERATORS OF RADIO CON TROLLED AND FREE-FLIGHT MODELS.
    a. Exercise vigilance for full-scale aircraft (get other people to help if possible) so as not to create a collision hazard.
    b. Select an operating site at a sufficient distance from populatedareas to avoid creating a noise problem or a potential hazard.
    c. Do not fly higher than 400 feet above the surface.
    d. Do not operate closer than three miles from the boundary of an air traffic control facility in the case of and airport for which a control zone has been designated, or by the airport manager in the case of other airports.
    e. Do not hesitate to ask for assistance in complying with these guidelines at the airport traffic control tower, or air route center nearest the site of the proposed operations.

Director, Air Traffic Service
Federal Aviation Administration
Washington, D.C.

Under SAFETY, we encouraged your participation in the Academy of Model Aeronautics as a member. Many flying fields require that you be a member of the academy of Model Aeronautics before they will allow you to use their field. They want to know that all pilots are knowledgeable concerning the AMA SAFETY CODE and through membership have the liability insurance.

SECTION III

QUANTUM PCM 8H SYSTEM FEATURES

TRANSMITTER

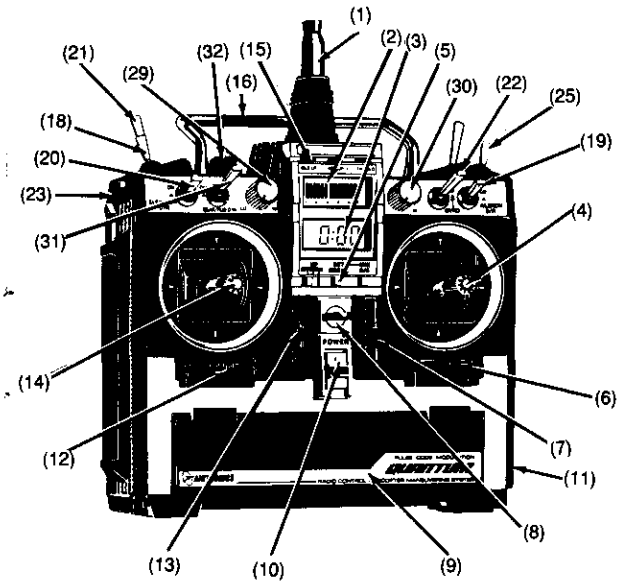
- High Power (500 MW) RF Module Frequency Control
- Advanced Gimbal Design with Individual Control Stick Length and Tension Adjustment
- Finely Ratcheted Trims for Accurate Adjustments
- Liquid Crystal Display (LCD) RF Indicator
- Low Battery Indication by flashing L.E.D.'s
- Front panel mounted LCD Digital Up, Down, Intg. Timer
- Servo Reversing Available on All Eight Channels
- Cassette Type NiCd Battery Pack for Ease of Changing and Extending Operating Time Requirements
- Adjustable Travel Volume on Elevator, Aileron, Rudder and Throttle
- Attractive Brushed Chrome, Black Plastic Case with Internally Collapsible Ten Section Antenna
- Trim Travel Adjustments on Aileron, Elevator and Rudder Channels
- Adjustable Dual Rates on Elevator, Aileron and Rudder Channels
- Exponential or Linear Control Selection on Aileron, Elevator and Rudder Channels
- Low Throttle Trim Adjust
- Programmable Fail Safe with Inhibit Capability
- Up/Down Two-Way Revolution Mixing and Hover Memory
- Four Pitch Curves with High Point Adjustment and Pitch Trim
- Hovering Pitch Trim Adjustment Potentiometer for Use During Hovering
- Hovering throttle Adjustment Potentiometer for Use During Hovering
- Two Position Gyro Sensitivity Switch
- Two Idle-Up Controls
- Throttle Hold Capability
- Synchronized Elevator System (S.E.S.) for Horizontal Tailplane Angle Adjustment as in Full Scale XH-60 Black hawk, and Huey Cobra Gunship.

RECEIVER

- Dual Conversion 8 Channel PCM Narrow Band of Advanced Design to Achieve Outstanding Range, Noise Suppression, and Adjacent Channel Rejection
- Compact Size, Only 2 13/32" L x 3/4" H x 1 5/32" W
- Lightweight, Only 2.0 Onces, Including Crystals
- Gold Plated Connectors Used for Low Contact Resistance
- Plug-In Crystal for Service Facility Frequency Change

SERVOS

- The AIRTRONICS Quantum PCM 8H unit is available with our new generation of High Performance Contest Servos.



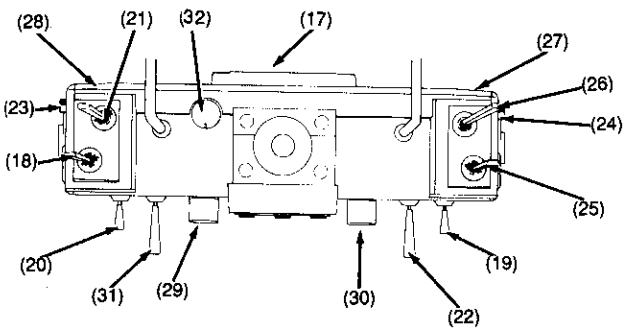


FIGURE 1

THE AIRTRONICS Quantum PCM 8H transmitter is intended primarily for the flying of model helicopters.

1. Retractable Antenna
2. LCD Battery Meter
3. Digital LCD Timer
4. Control Stick; Horizontal-Ailerons, Vertical-Throttle (Mode I); Elevator (Mode II)
5. Timer Control Switches
6. Trim Lever, Ailerons
7. Trim Lever, Throttle (Mode I); Elevator Trim (Mode II)
8. Neck Strap Connecting Hook
9. Trimmer Cover
10. Power Switch
11. Charging Receptacle (Side)
12. Trim Lever, Rudder
13. Trim Lever, Elevator (Mode I); Throttle Trim (Mode II)
14. Control Stick, Horizontal-Rudder, Vertical-Elevator (Mode I), Throttle (Mode II)
15. Power and Warning L.E.D. Monitor Lamps
16. Carrying Handle
17. Radio Frequency (R.F.) Module, (Rear)
18. Throttle Hold Switch
19. Aileron Dual Rate Switch
20. Elevator Dual Rate Switch
21. Pitch Curve Select Switch
22. Gyro Control Switch
23. Low Pitch Lever (Left Side)
24. High Pitch Lever (Right Side)
25. Idle Up I Switch
26. Idle Up II Switch
27. Hovering Memory Switch (Back)
28. Stop Watch Start-Stop (Back)
29. Hovering Pitch Trim Knob
30. Hovering Throttle Trim Knob
31. Gear or Rudder Dual Rate Switch
32. Auxiliary Channel Knob or S.E.S. Trim

SECTION IV

UNPACKING AND SETTING UP YOUR AIRTRONICS QUANTUM PCM 8H RADIO CONTROL SYSTEM

The packaging of your AIRTRONICS Quantum PCM 8H radio control system was especially designed for safe transportation and storage of the components. DO NOT DISCARD THESE CONTAINERS, as they can be used for storage or returning equipment for repair. We recommend the following procedure to familiarize yourself with the components of your Quantum system and as preparation for installation in your model:

1. Remove the transmitter from the packing box.
2. Affix channel (frequency) identifier plaques to the transmitter.
3. Charge the receiver and transmitter batteries as stated in the Installation and Guidelines Manual.
4. Extend the transmitter antenna (1) to its full height, switch on the transmitter by pushing the power slide switch upwards and note that the power and warning Light Emitting Diode (L.E.D.) lamps illuminate and the movement of the two color Liquid Crystal Display (L.C.D.) meter indicating that the unit is operating.
5. The L.C.D. meter reads R.F. output, and is an indication of the state of charge of the internal NiCd battery pack. With a fully charged NiCd battery, the meter will read approximately 10 units in the black area. With continued use, the meter indication will read less.

A reading of 4 at the red-black dividing line indicates a marginally discharged battery; while a reading in the red below 4 indicates caution should be observed since the battery is discharged below an acceptable level. Operation should cease and the battery be recharged.

WARNING: Do not attempt to use the transmitter unless the meter is reading totally in the Black area with the antenna fully extended.

CAUTION: IF NO MOVEMENT IS NOTED ON THE METER WHEN YOU TURN THE TRANSMITTER SWITCH ON, THE BATTERY PACK WITHIN THE TRANSMITTER IS MORE THAN LICKELY DISCHARGED. CHARGE THE BATTERIES AS OUTLINED UNDER SECTION IV, BATTERY CHARGING, IN THE INSTALLATION AND GUIDELINES MANUAL.

REMEMBER THAT A TRANSMITTER WHOSE PERFORMANCE HAS DROPPED MAY FAIL TO SEND THE SIGNALS NECESSARY TO ADEQUATELY AND SAFELY CONTROL THE MODEL RESULTING IN A POSSIBLE CRASH.

6. *Switch "off" the transmitter and remove all of the other* components from the foam packing box containing your AIRTRONICS Quantum PCM 8H Radio Control System.
7. Figure 2 shows how to connect the components of you system together. Note the servo and switch harness plugs are inserted in the receiver so that pin #3 is towards the bottom of the receiver. When using any auxiliary equipment or testers, the connections as shown in Figure 3 must be observed. At this point, your objective is to get the system operating on your workbench. Once connected, you must then refer to the corresponding diagram for your system (Figure 4), showing the transmitter control stick functions. Note that a special switch harness is supplied with the Quantum PCM unit that should only be used with the PCM system. It applies "Keep Alive" voltage to the memory circuit in the receiver, and therefore should only be inserted into the battery "B" receptacle of the receiver.

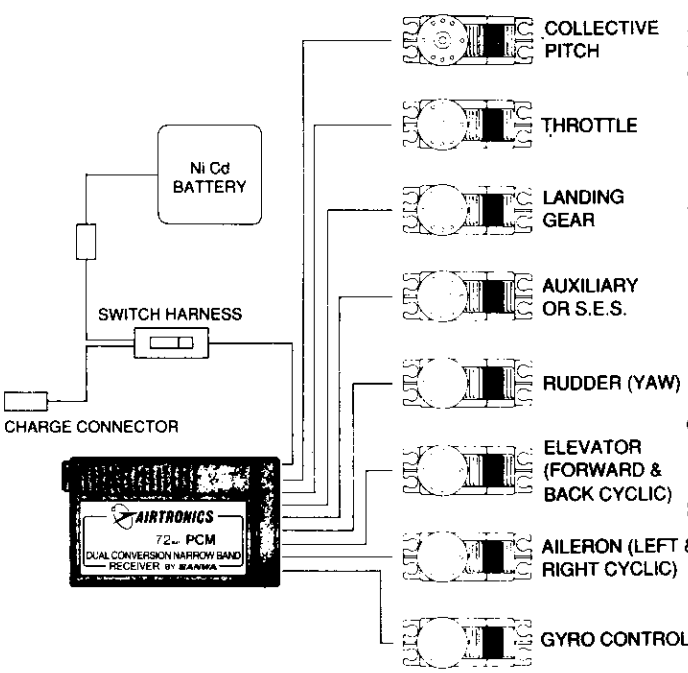


FIGURE 2

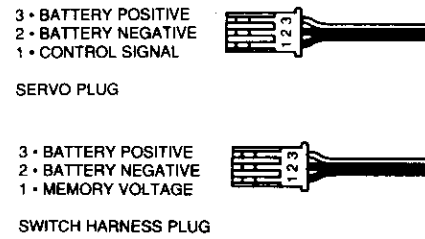


FIGURE 3

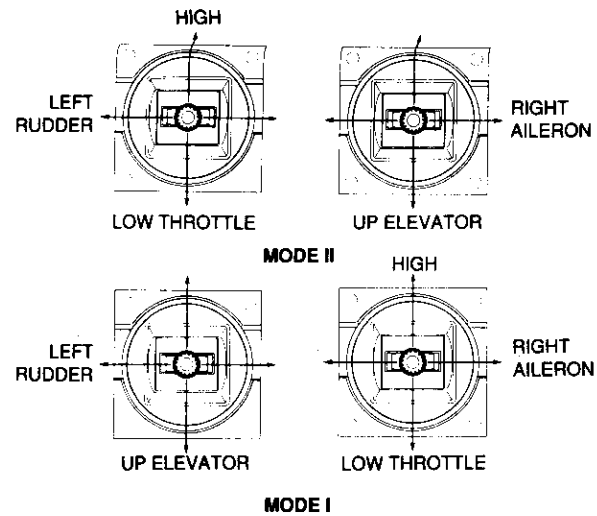


FIGURE 4

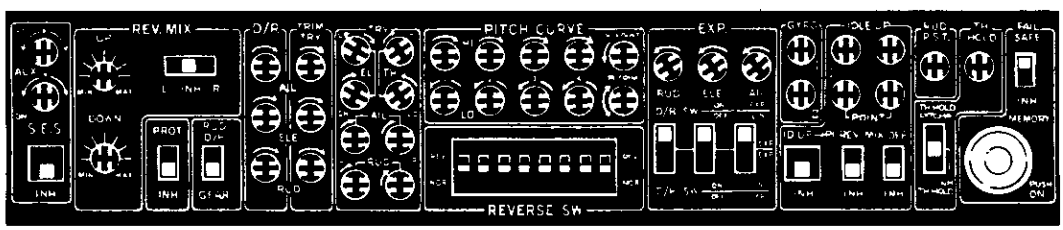
Take the time to learn the names of all the components you are going to connect and to identify all the transmitter control stick functions and names attached to these functions.

NOTE THE FOLLOWING AT THIS POINT:

a. It is of no consequence at this point which servo you plug into which function since you aim is simply to learn and see how the system operates on your bench. The numbered channel outputs are indicated on the receiver case. See Figure 2 for channel identification.
b. The connectors on your AIRTRONICS Radio Control System are rugged but should be handled with care. There are three socket contacts in each servo connector, numbered 1 through 3. The #1 is the signal pin, #2 is negative and #3 (RED) is positive, (Figure 3). Be sure to insert the plugs into the receiver so that the #3 pin is towards the bottom of the receiver.
c. Do not attempt to force any of the plugs into the receiver; properly align each plug and it will move into place.

8. Once you have followed the diagrams for connecting the airborne components of your AIRTRONICS Quantum PCM 8H Radio Control System and you have studied and under stood all of the components as well as having studied and understood the diagram illustrating the transmitter control stick functions, you are ready to energize the System and study its actual operation.

9. Switch on the transmitter, then switch on the airborne package. The System is now energized. If the airborne system fails to operate, charge the battery pack as outlined in the Battery Charging Section IV of Installation and Guide lines Manual. There may also be some initial movement in the servos even through you have not moved the transmitter sticks. This is normal. Once they have found a position, they will stay there until you move a control on the transmitter.
10. Now follow the diagram indicating the transmitter's control functions by moving each stick and watching the reaction of the servo or servos. Move the small black trim levers and note the slight servo movements. Keep these trim levers centered though the in stallation of your System in your model. They will be used in actual flight operation of the model to adjust servo position slightly...a process called "trimming".
11. Switch off the receiver, then switch off the transmitter. Get used to this sequence: When turning the System on, the proper sequence is to turn on the transmitter, then the receiver.
12. When performing range checks, as indicated in Section V of the Installation and Guidelines Manual, do not remove the transmitter antenna. Range checks are performed with the antenna fully collapsed. Adjustments of the functions on the Trimmer Panel will be addressed in Section V, Operation and Adjustments. A basic transmitter configuration is shown in Figure 5 with trimmers clockwise or counter-clockwise (arrows) as applicable to indicate their initial position together with initial switch positions. Please refer to Section IV for information on servo connections and their aircraft control application. The Quantum PCM 8H transmitter maybe operated as a basic 5 channel system by disabling, or zeroing, all of the special functions; that is, they can be used for normal aileron, elevator, throttle, rudder, and retract gear flying of any type of model. The first part of Section V of this manual covers those basic channels and features of your Quantum PCM 8H transmitter. The numbers indicated in the text are the identifying numbers to be found on transmitter sketches throughout the manual.



BASIC TRANSMITTER CONFIGURATION

FIGURE 5

SECTION V

OPERATION AND ADJUSTMENTS

FOR SAFE AND SUCCESSFUL OPERATION OF YOUR RADIO CONTROL MODEL, IT IS IMPORTANT TO CAREFULLY FOLLOW THE INSTRUCTIONS BELOW AND OBTAIN TRAINING IN THE OPERATION OF YOUR MODEL FROM A WELL EXPERIENCED INIVIDUAL.

Having followed all of the instructions, directions and guidelines contained in the earlier sections of this manual, and having completed your model and installed your Quantum PCM 8H System observing the directions and guidelines contained the separate manual entitled "FUNDAMENTALS AND GUIDELINES FOR INSTALLATION OF YOUR AIRTRONICS SYSTEM", we now present general instructions so you can operate and adjust your Quantum PCM 8H System. Most of these instructions are for the operation of a powered model helicopter.

Take a few minutes to familiarize yourself with all the features and functions of this advanced radio control system and how it permits an all electronic installation. It should be re-emphasized, you should have an experienced R/C modeler check your radio installation. We recommend the individual(s) who are "checking out" your model review all our instruction manuals to make certain you have followed all directions and guidelines and understand the warnings that have been given. This should be done even if you are obtaining flight training from experienced and competent flyers.

Basic Quantum PCM 8H Transmitter Operation

As stated previously, the Quantum PCM 8H system can be used as a basic R/C system without applying any of the special functions. Please refer to Section IV for servo connections for aircraft control application. To use the system in the basic configuration mode, open the Trimmer Panel Cover (9) to expose all the switches and adjustments. Rotate all of the trimmers to the positions shown in

Figure 5 and position the switches to INHIBIT (INH). The small plastic screwdriver that clips to the carrying handle should be used to turn the trimmers. Notice that all of the trimmers operate approximately 1/2 turn (180°). In spite of its many special features and functions, the Quantum PCM 8H transmitter is easy to set up and use in a basic configuration. The sketch of the panel (Figure 5) shows all of the trimmers set for the basic configuration with fail safe "ON".

Transmitter RF Output Indicator and Low Voltage Alarm

The Quantum PCM 8H transmitter features a Liquid Crystal Display (L.C.D.) RF output indicator that also provides an indication of the state of charge of the transmitter NiCd batteries. The meter should read in the upper Black portion of the meter face (approximately 10) after a full charge of 12-14 hours. A reading less than 4, in the Red zone, indicates the transmitter battery is discharged below an acceptable level. Since the meter indicates RF output, the transmitter module must be in place and operational in order to obtain an L.C.D. meter reading. You should note where the meter reads after the transmitter NiCd battery has been completely charged. If this reading changes significantly in the future, it may indicate a drop off in battery or RF module performance, and the unit should be returned to AIRTRONICS for service.
WARNING: Do not attempt to use the transmitter unless the L.C.D. RF indicator reads in the Black.

CAUTION: If no RF indication is present on the L.C.D. meter when the transmitter power switch is turned "ON", the NiCd battery pack within the transmitter is more than likely discharged. Charge the batteries as outlined in Section IV, Battery Charging, in the Installation and Guidelines Manual.

REMEMBER: A transmitter whose performance has dropped may fail to send the signals necessary to adequately and safely control your model, resulting in a crash.
With the transmitter Power Switch set to "ON", all Power and Warning L.E.D. monitor lamps will illuminate. When the transmitter NiCd battery is almost fully discharged, the three RED Power and Warning L.E.D. Monitor Lamps, i.e., Idle Up 1, Idle Up 2 and Throttle Hold, will blink rapidly to indicate a low transmitter battery. If this occurs while flying, land immediately and take corrective action to recharge the transmitter NiCd battery for 12 to 14 hours prior to your next flying session. Transmitter operating time for safe operation after a full charge can be expected to be approximately six to seven 10 minute flights. Recharge as indicated above. If any of the above named switches are activated during normal operation, the respective L.E.D. will blink so long as the switch is on.

Plug-In Modular Transmitter NiCd Pack:

The NiCd batteries in your Quantum PCM 8H transmitter are prepackaged and can be easily removed for cell replacement or entire replacement with a fully charged pack when extended operating time is required. To do so, locate the slide catch, Figure 6, on the right side of the transmitter at the charge socket. Push down on the slide catch until it clears the transmitter and remove it. Extract the battery pack by grasping the plastic handle and pulling the pack straight out. Reverse the procedure to replace.

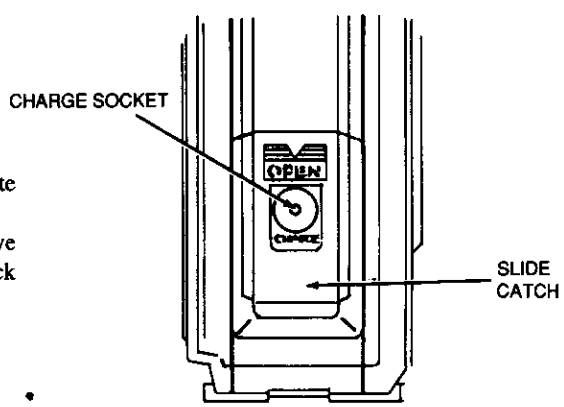


FIGURE 6

A mini-NiCd battery is included in the transmitter as a backup for the hovering memory; therefore, even if the transmitter NiCd battery is removed, the contents of the hovering memory are not lost. This battery is automatically recharged by the transmitter NiCd pack. Although fully charged prior to shipping, the mini-NiCd should be charged by charging the transmitter NiCd pack for about 30 hours prior to use. The transmitter NiCd pack must be charged while installed in the transmitter case in order to charge the mini-NiCd battery.

CONTROL STICK LENGTH AND TENSION ADJUSTMENT:

The length and spring tension of the control sticks (4) and (14) can both be adjusted as preferred by the individual flyer. Both procedures are simple.

To adjust the spring tension, first remove the frequency module and battery pack as described. Then remove the six rear cover screws as indicated on the sketch below (Figure 7). Carefully pry out the side pieces slightly to allow the rear cover to clear the Stop Watch and Hover Memory controls. The rear cover can now be lifted off. Three of the four screws indicated on the right hand sketch of a Mode II transmitter will now be visible. They control stick tension as follows: (1) Elevator Mode II; (2) Rudder; (3) Aileron; (4) Elevator Mode I. Adjust the screw "in" for more tension. Do Not touch or move any other component!

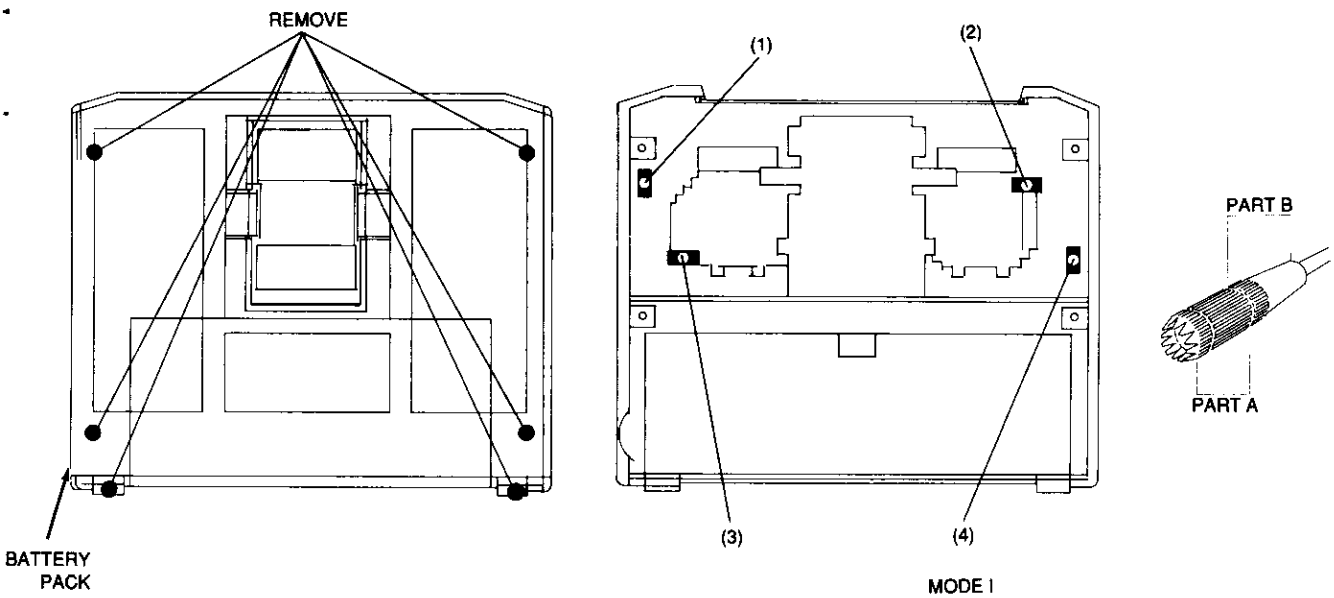


FIGURE 7

Adjusting the control stick length is even easier. To do so, hold Part B with the fingers and unscrew Part A Counterclockwise to loosen the two pieces. Now screw Part A in or out to the desired position, and lock it in place by screwing Part B against it. It is recommended that at least four threads be left inside Part A at its longest length for best mechanical security. Do not overtighten.

FREQUENCY MODULE

Changing the AIRTRONICS Quantum PCM 8H transmitter frequency module is rapidly and easily done (Figure 18). Simply press in on the two module locking tabs and lift it out. Be sure to remove it straight up, always parallel to the transmitter case to prevent bending the multi-connector pins on the lower side. To replace the new module, drop it in place, again parallel to the case, and press it into position. Transmitter module crystals cannot be changed without having the entire module realigned at AIRTRONICS.

Obviously, a change in the receiver's frequency must also be made whenever the transmitter module is changed. We do not recommend that the modeler change the frequency of the receiver by changing crystals; since to insure optimum performance it is necessary to align the unit. Be sure to always install the proper channel (frequency) identifier flag or plaque on your transmitter to prevent conflict or confusion to your fellow R/C modelers at the flying field.

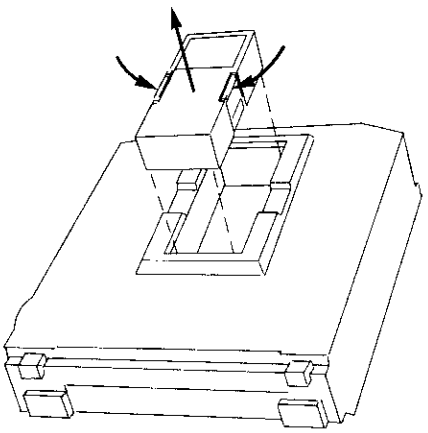


FIGURE 8

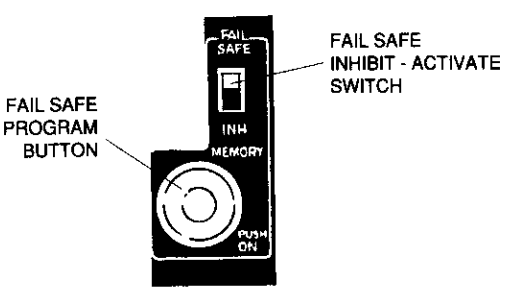


FIGURE 9

Fail Safe Programming:

The Quantum PCM 8H Transmitter and Receiver have microprocessors for processing control information. If the control position data received at the receiver is not valid, or is being interfered with, the data will not be accepted. Your Quantum PCM 8H system gives you the choice of two types of fail safe modes. The first type is defined as "Hold". If the signal is lost, or incorrect data is received by the receiver, the servos will stay at the position determined by the last good command and will remain there until good data is restored. The second programmable fail safe "Position Mode" will cause the servos, after loss of good signal data for more than one second, to go to predetermined positions, until such time as good data is received. You can select either mode of operation or delete the fail safe capability altogether by placing the fail safe switch, (Figure 9) on the trimmer panel in the "INH" position. To operate in either the first or second fail safe mode, the fail safe switch must be set to "ON", which is the recommended position.

If you are going to operate your system in the "Hold" mode nothing further is required. To operate in the pre-determined servo position mode you must first turn both the transmitter and receiver switches "ON", and check the operation of the servos. Next, position the control sticks so that the models controls surfaces and throttle are at the desired positions, i.e., maximum low throttle, slightly up elevator, (cyclic) etc., then, press the Fail Safe Program Push Button located on the trimmer panel (Figure 9). The control inputs you have set-in will be memorized and retained until such time as you disconnect the receiver battery or it is discharged.
The receiver microprocessor will retain the memorized data inputs since it is furnished "KEEP ALIVE" voltage by a special switch harness. You can check the fail safe operation by turning your transmitter "OFF", or by turning another transmitter "ON" that is on the same channel while your unit is on. The servos should move to the programmed positions when an interfering signal is present, or when your transmitter if off. CAUTION: If you remove the receiver battery, or if it is discharged, you must reset the desired control memory data at the transmitter, otherwise you will be in the "HOLD" fail safe mode of operation.

Servo Reverse and Adjustable Travel Volume Adjustments

Your PCM 8H transmitter is equipped with servo reversing located under the panel on the front of the transmitter on all its eight channels. This simplifies the servo installation in your model since you do not have to be concerned about the direction of movement of the servos, but only in their most effective hook-up. After servo installation is complete, simply move the "Reverse-Normal" switches for proper control operation as necessary. None of the other functions will be affected (see Figure 10).

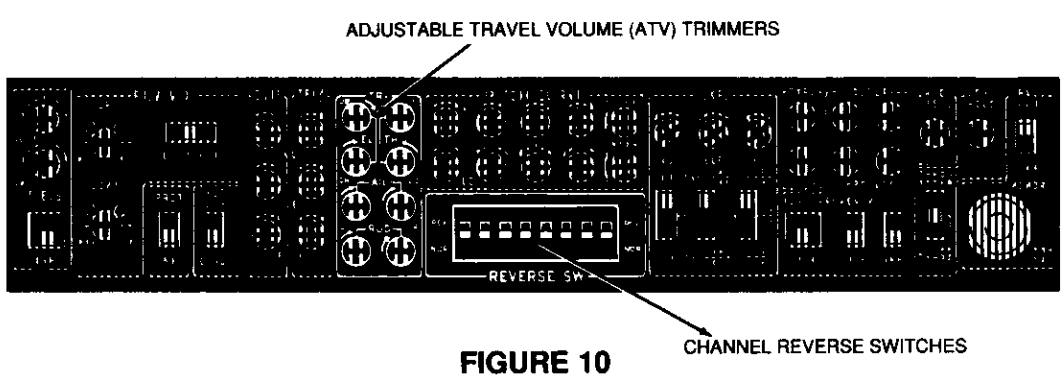
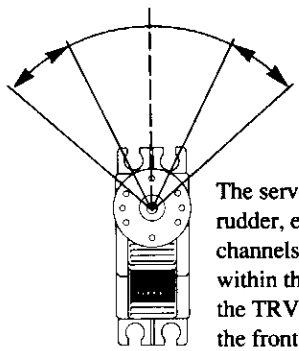


FIGURE 10

After you have completed setting the servos to operate in the proper direction, it is equally simple to set them to do so in the correct amount. This is accomplished by use of the Adjustable Travel Volume (ATV) adjustments on elevator, aileron, throttle, and rudder which allows you to vary the amount of servo throw on either side of neutral. This is especially useful for setting the low and high throttle limits on your engine. The "TRV" adjustment trimmers located under the front panel (Figure 10) can reduce the normal 90 degree servo rotation to as little as 35 degrees, (Figure 11). Be careful when making adjustments using the plastic adjustment tool furnished with the unit. The trimmers should turn easily, therefore do not exert excessive torque or pressure on the trimmers. Clockwise rotation of the TRV Trimmers increases servo throw to maximum, and counter-clockwise (CCW) rotation will reduce servo throw.

When dual rates are in the low "ON" position, an equal amount of reduced servo travel will take place.



The servo travel for aileron, rudder, elevator and throttle channels is adjustable within these ranges using the TRV Trimmers under the front panel.

FIGURE 11

DIGITAL L.C.D TIMER

Integrating Timer:

Set the transmitter power switch (10) to "on", and INTG-UP-DN Switch to "INTG":, Figure 12. The blinking dots on the timer display indicate that timing has begun, and the total elapsed time that the transmitter is on will be displayed. For example 0:04 indicates that 4 minutes have elapsed. If the transmitter power switch (10), is set to "OFF", counting stops. When the transmitter power switch is turned back on, counting continues. The integrating timer function can be started and stopped every time the transmitter power switch is set to "ON" and "OFF". To clear a count, depress the "Set-Reset" button, with the transmitter switch either "ON" or "OFF". When the transmitter is turned back "ON", a new count will begin. The total elapsed time can be used to forecast remaining NiCd battery capacity as well as other applications. Total time of operation can be displayed such as 1:25, i.e., 1 hour 25 minutes, etc.

Up-Timer:

The "Up-Timer" can be activated with the transmitter on or off. The "Up-Timer" can be started or stopped by either the button labeled "S/S" on the front panel or by the Start/Stop stopwatch button on the right rear (28), of the transmitter. When the transmitter power switch (10) is set to "ON" an audible beep tone will be heard at each elapsed minute as well as when the Start/Stop button(s) are depressed. The count can be stopped and/or count resumed by pressing the Start/.Stop button(s). The total elapsed time of the count is displayed on the liquid crystal display panel, Figure 12. For example, 1:02 indicates that 1 minutes and 02 seconds has elapsed. The count can be cleared by depressing the "Set-Reset" button on the front panel.

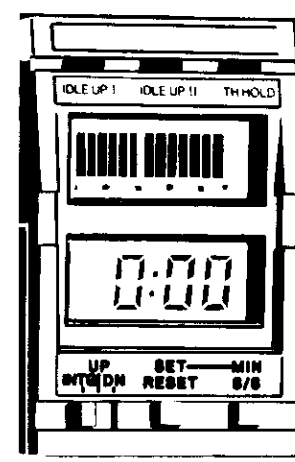


FIGURE 12

Count-Down Timer:

The count-down timer function can be selected by positioning the "INTG-UP-DN" select switch to the "DN" position. 0:00 will appear on the display if a time has not previously been programmed. If it has, then that reading will appear on the liquid crystal display. To program the count-down timer for the desired start time, depress and hold down the "Set-Reset" button on the face of the transmitter. Now, depress and hold down the "MIN-S/S" button until the selected time is reached for the start of the count-down. Release both buttons when the selected time has been reached. To start the count-down, momentarily depress either the "MIN-S/S" button on the face of the transmitter or the "Start-Stop" button located on the left rear of the transmitter back. A beep will be heard if the transmitter power switch is "ON".
Example: timer is set for 10:00. After the "MIN-S/S" button has been pushed the timer starts counting down, and an audible beep tone will be heard at each elapsed minute if the transmitter power switch is "ON". If you desire to stop and then continue the count-down, depress the "MIN-S/S" twice. When the count-down reaches 10 seconds a beep will be heard as each second elapses, until zero seconds 0:00 are reached at which time a continuous tone will be heard for a few seconds. If you do not press the SET-RESET or MIN-S/S buttons the timer will count up, and continue to do so until it reaches 59:59 at which time it will again count-down. Anytime during the count-down cycle you can depress the "Set-Reset" button to reset the timer to the original programmed count-down start time. To reset to zero, depress and hold the "Set-Reset" and then the "MIN-S/S" button momentarily. The timer will return to 0:00 and a new count-down start time will have to be reprogrammed.

DUAL RATE (D/R) AND EXPONENTIAL CONTROL ADJUSTMENT

The Quantum PCM 8H transmitter gives you the capability of selecting either linear or exponential control for ailerons, elevator, or rudder. In the linear position for example, a 25 degree movement of the control stick will move the servo output wheel a corresponding 25 degrees, Figure 13. The next small movement of the control stick will produce a corresponding proportional movement of the servo wheel. No matter where the control stick is positioned in its total range of movement, the servo output wheel and controlled function will move an identical proportional amount. The use of dual rate on these primary flight controls will generally help in smoother flying, since it will reduce the servo throw even when the control sticks are moved to their maximum positions. Use the small plastic screwdriver supplied with the unit that attaches to the carrying handle when adjusting the dual rate trimmers.
When you select the exponential control functions, it provides a continually changing ratio of control stick to servo output wheel movement. Around the neutral position control response is very soft and as you move the control stick further, Figure 13, note that when you reach maximum stick throw that both linear and exponential servo movement are the same.

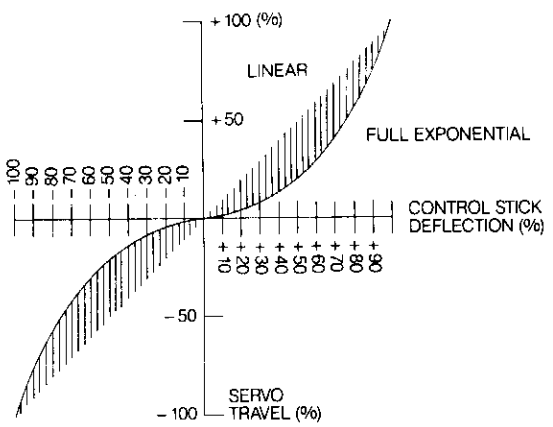


FIGURE 13

To set the aileron and elevator dual rates, turn on the entire system; transmitter, receiver and servos. Set the Dual Rate Switches (19) (20) to the "OFF" position. Operate the elevator and aileron control channel stick (4) over its full deflection and observe the corresponding servos, note that you obtain full servo movement. Now switch the elevator and aileron dual rate switches to the "ON" position and operate the same controls. You should see less servo rotation than previously when operating the controls. If not, the dual rate trimmers on the panel, (Figure 14) may be set to full travel (no travel reduction). Assuming this is the case, insert the plastic screwdriver into the associated D/R trimmer slot and rotate the trimmer counterclockwise (CCW) until, with the control stick held to its full deflection, some reduction in servo travel is seen. Continued rotation of the D/R trimmer will cause servo travel to be reduced as much as 90 percent. Now adjust the other dual rates in the same manner. Turning the dual rate switches off will return servo travel to its normal full movement. You may set reduced travel trimmers anywhere within their range, and when the associated D/R switch is set to "ON", servo travel on that channel is reduced to the preset amount.
You may select either linear dual rate, exponential or a combination of exponential and dual rate by positioning the "EXP-LIN" switches on the trimmer panel, Figure 14, as shown in the table, Figure 15.

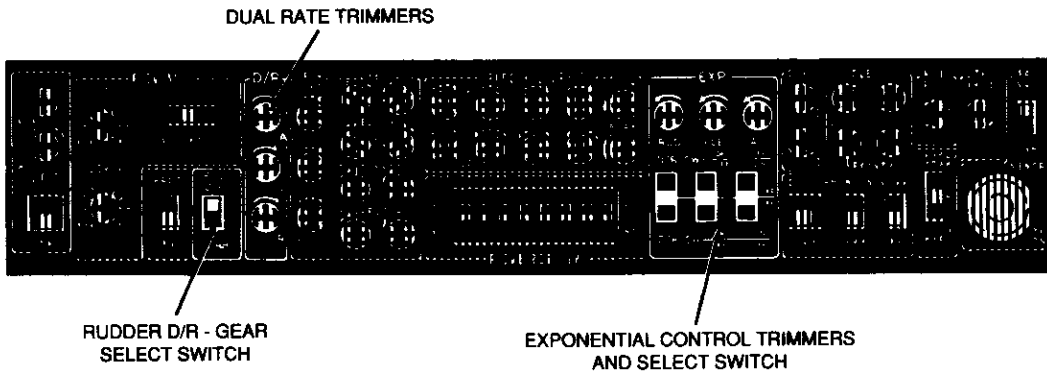


FIGURE 14

The three exponential select switches, Figure 14, are used to select linear, exponential, dual rate linear or dual rate exponential for the rudder, elevator and aileron controls respectively. The position of these select switches, as well as the position of the dual rate switches, are used to select between the options mentioned.

The key in using these select switches is the diagram provided on the panel by the switches or by Fig. 15, which shows the function obtained with each switch in the up, center or down position.
Three important points to remember are:

1. Whenever a dual rate switch (19, 20, or 31 Fig. 1) is placed to the "ON" position the dual rate function is activated, and total servo throw is therefore controlled by the dual rate trimmers.
2. When in the exponential mode, the exponential trimmers determine the amount of servo movement around neutral.
3. When using Exponential dual rate both the dual rate trimmers and exponential trimmers will affect overall servo movement.
   Using the aileron select switch as an example:
   a. Aileron select switch - up.
      Dual rate switch (19) "ON" provides exponential dual rate. The dual rate function is controlled with the dual rate trimmers and the amount of exponential is controlled by the exponential trimmer.
      Dual rate switch (19) "OFF" provides full linear control.
   b. Aileron select switch - center.
      Dual rate switch (19) "ON" provides exponential dual rate as described above.
      Dual rate switch (19) "OFF" provides exponential control and is adjustable with only the exponential trimmer.
   c. Aileron select switch - down.
      Dual rate switch (19) "ON" provides linear dual rate and is adjustable with only the dual rate trimmer.
      Dual rate switch (19) "OFF" provides exponential control and is adjustable with only exponential trimmer.

The elevator and rudder select switches work in a similar manner. Note, however, that for rudder dual rate to be available the GEAR-RUD D/R switch on the trimmer panel must be in the RUD D/R position.

EXPONENTIAL - DUAL RATE CONTROL MODES

D/R SWITCH (19)(20)(31) POSITION	EXPO SW	OUTPUT CONTROL MODE
OFF	CENTER	EXPONENTIAL
OFF	UP	LINEAR
OFF	DOWN	EXPONENTIAL
ON	CENTER	EXPONENTIAL D/R
ON	DOWN	LINEAR D/R
ON	UP	EXPONENTIAL D/R

FIGURE 15

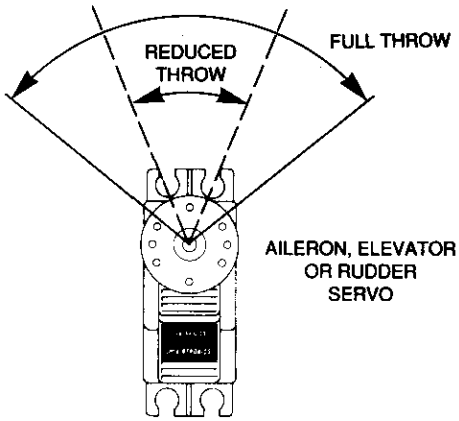


FIGURE 16

Note: When using dual rates with the exponential function, the amount of servo movement around neutral could be very small, especially at greatly reduced dual rate settings.

Operation of the system using the exponential mode of control helps the modeler to fly in a smoother manner and lessens the skill required to perform certain maneuvers by either the novice or expert flyer. When using the exponential mode you do not have to throw the dual rate switches to obtain maximum control, yet you have reduced servo throw around the neutral axis.

WARNING: Be certain that you pay careful attention to the position of rate switches, especially during take offs and landings. Improper or unexpected rate switch settings could cause insufficient control, resulting in a crash and/or injury to yourself or others.

Dual rates are adjustable within the ranges shown in Figure 16, using the D/R trimmers under the front panel. D/R throws are activated using the aileron, elevator or rudder D/R switches (19) (20) or (31) respectively.

Throttle Servo Adjustment

Your Quantum PCM 8H transmitter has the capability to independently adjust both the high and low throttle positions of the throttle servo. The throttle trim located on the control gimbal is only effective at low throttle position. The throttle Hi and Low travel volume adjustment trimmers located on the adjustment panel (Figure 17) can be used to electronically set the low and high throttle positions independent of collective control.

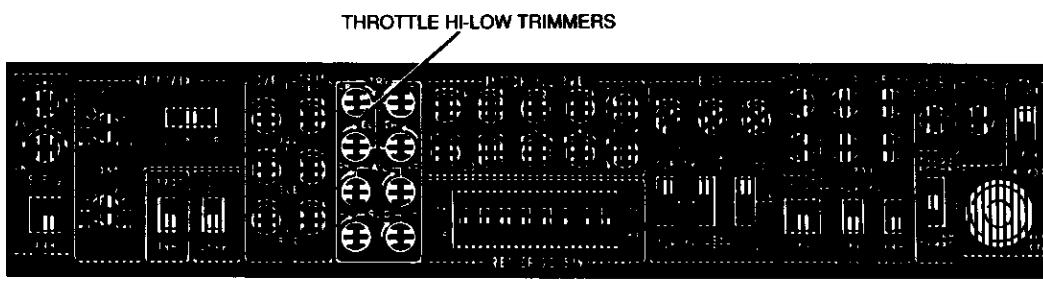
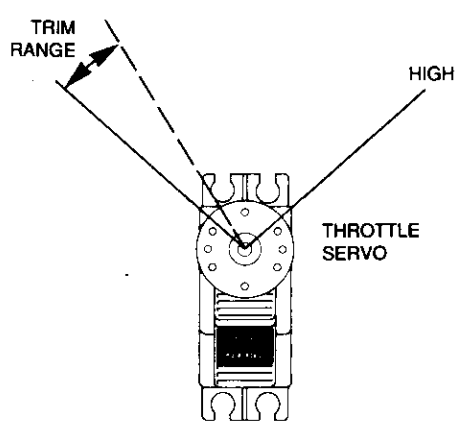


FIGURE 17



The transmitter throttle trim lever (13) only functions when the throttle control stick is in the low position.

FIGURE 18

This will be especially useful to match the servo throw with that required by your engine carburetor. Use the TRV trimmers under the panel to set the throttle barrel to maximum close and maximum open position with the throttle trim on the transmitter in the low position. Your throttle trim can than be advanced to fine tune the engine idle as well as used for engine cut-off, since it is only effective at low throttle control stick position, Figure 18.

THE HOVERING THROTTLE

The Quantum PCM 8H Transmitter has a hovering throttle function designed to produce the best possible engine speed for this critical maneuver. It is operated by the hovering throttle trim knob (30) on the front of the transmitter, Figure 19. This function controls the throttle servo for about 10% of its normal rotation, Figure 20, when the throttle control stick (14) is in its center position and is completely independent of any pitch controls. For an initial setting, it is recommended the throttle linkage be installed so the throttle barrel on the engine is half open with both the throttle control stick (14) and the hovering throttle trim knob (30) at their mid-point position.

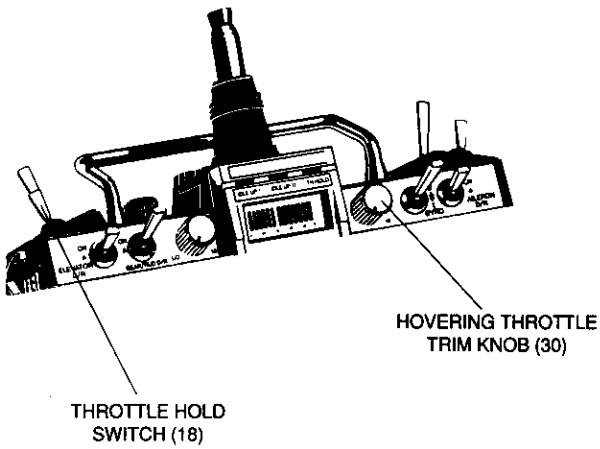
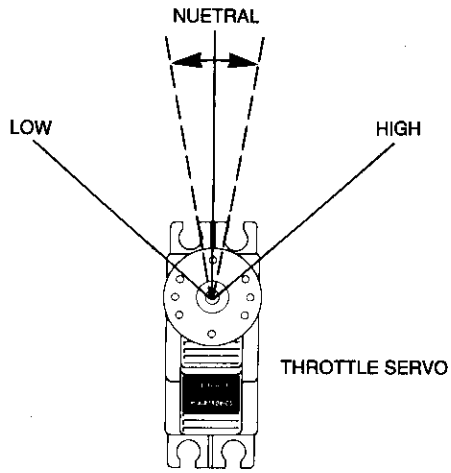


FIGURE 19

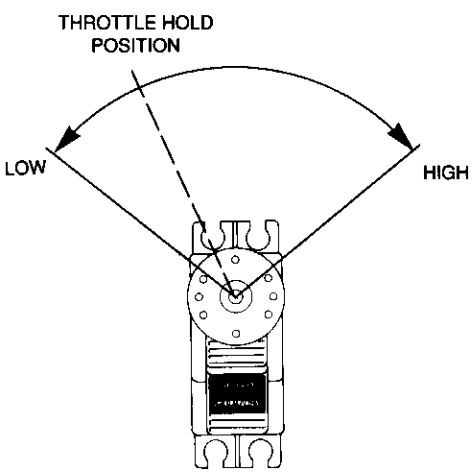


The hovering throttle trim is adjustable within the range shown using the Hovering Trim Knob (30).

FIGURE 20

THROTTLE HOLD

The Quantum PCM 8H Transmitter incorporates a Throttle Hold function, which does exactly what it says, i.e., it holds the throttle servo at a predetermined setting no matter where the throttle control stick (14) is moved; see Figure 21.



The Throttle is held in a predetermined position, as determined by the "TH HOLD" trimmer under the front panel cover, when the Throttle Hold-Inhibit switch is in the "TH Hold" position and the throttle Hold switch (18) is on, regardless of the throttle stick position.

FIGURE 21

On Mode II transmitter, the left stick controls both the throttle and collective functions. However, when the Throttle Hold function is activated you can adjust the engine to a reliable idle when practicing autorotations by adjusting the "TH HOLD" trimmer to position the throttle servo to the desired point and then the throttle stick will only control the collective pitch. Throttle Hold is activated by placing the throttle hold "TH HOLD-INH-TH Hold Pitch 4" switch on the trimmer panel, Figure 22, in the "TH HOLD" position and the Throttle Hold switch (18) on the top left of the transmitter, Figure 23, to "ON". The "TH HOLD" L.E.D. will then blink rapidly. The throttle "LO" TRV trimmer should be adjusted to approximately midrange so that the "TH HOLD" trimmer, Figure 22, is effective. The engine speed when in the Throttle Hold mode of operation is controlled by the "TH HOLD" trimmer. The Throttle Hold feature allows you to hold the engine at a specific throttle setting and still maintain full command of collective pitch with the throttle stick. It is recommended that when ever the Throttle Hold feature is not desired, the Throttle Hold "TH HOLD-INH-TH HOLD Pitch 4" switch be maintained in the "INH" position to prevent accidental operation.

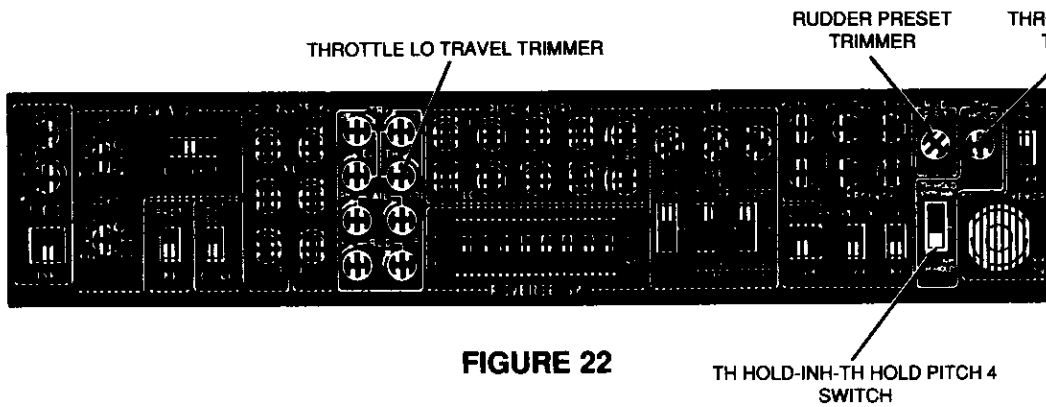


FIGURE 22

When the "TH HOLD-INH-TH HOLD PITCH 4" switch on the trimmer panel, Figure 22, is place in the 'TH HOLD Pitch 4"position, the "Pitch Curve Trimmers #4", both Lo and Hi, will adjust pitch when the "TH HOLD" switch (18) is on. Use of the "TH HOLD PITCH 4" switch in this manner overides the use of the Pitch Curve Select switch, and Pitch Curve #4 is automatically selected when the Throttle Hold switch (18) is moved to the "Hold" position. This allows auto rotations to be performed using Pitch Curve #4 by only activating the Throttle Hold switch which under most circumstances is the desired mode of operation. By placing the TH "HOLD-INH-TH HOLD Pitch 4" switch to the Inhibit (INH) position on the front panel the Pitch Curve Select Switch (21) continues to operate independently of the Throttle Hold function to allow you to select the pitch curve desired throughout all phases of flight, Figure 24.

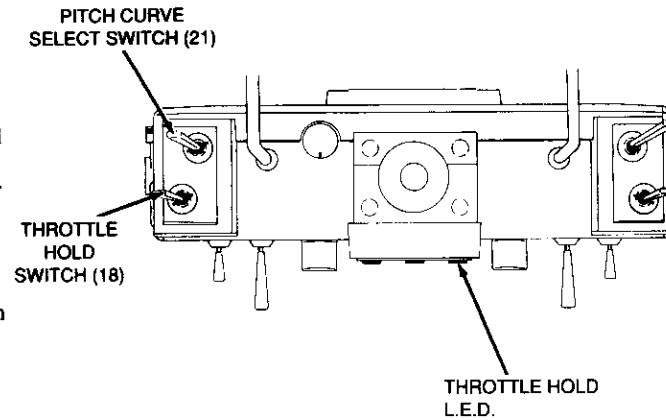
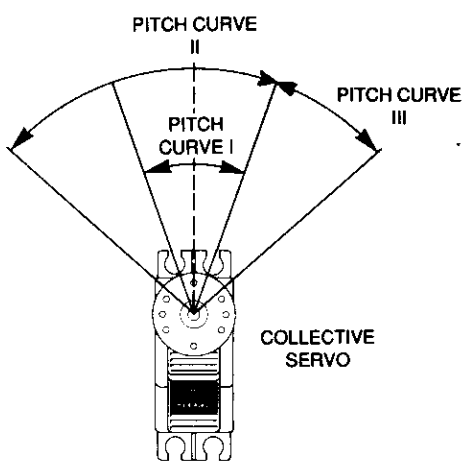


FIGURE 23



Three pitch curves, each with a high and low point adjustment, are set using the pitch trimmers located under the front panel cover, and selected by the Pitch Curve Select Switch (21), located on the top left of the transmitter

FIGURE 24

RUDDER PRESET TRIM

The Rudder Preset trim feature is activated when the "TH HOLD-INH-TH HOLD PITCH 4" switch on the trimmer panel (Figure 22) is in the "TH-HOLD" or "TH HOLD Pitch 4" position.

The rudder P.S.T. trimmer sets the amount of rudder servo deflection, either left or right, upon activation of the Throttle Hold Switch (18), located on the upper left front of the transmitter, to "ON". The Preset Rudder Trim allows the modeler to compensate for any yaw induced when using the Throttle Hold feature.

THROTTLE IDLE-UP

The new two level Idle-Up system used on the QUANTUM PCM 8H provides both an amount and point setting method for both Idle-Up I and Idle-Up II.

The Idle-Up feature is used to maintain the engine speed at a predetermied point idle even though the throttle control stick is moved to the low throttle position to produce a low collective pitch condition. This is desireable for aerobatics because the engine RPM and rotor speed must be kept high even though the collective pitch is reduced to a low setting. Idle-Up creates some of the effect of an engine low speed govenor, and while it does not operate exacly as such a govenor would, it does prevent the engine speed from dropping during aerobatics even when the throttle stick is at the lowest pitch position. We recommend that the "Idle-Up" function be used during these maneuvers. The operation of the "Idle-Up" function is controlled by the two Idle-Up switches (25) (26) located on the top right side of the transmitter, and by the respective "Idle-Up" trimmers located on the trimmer pannel, (Figure 25).

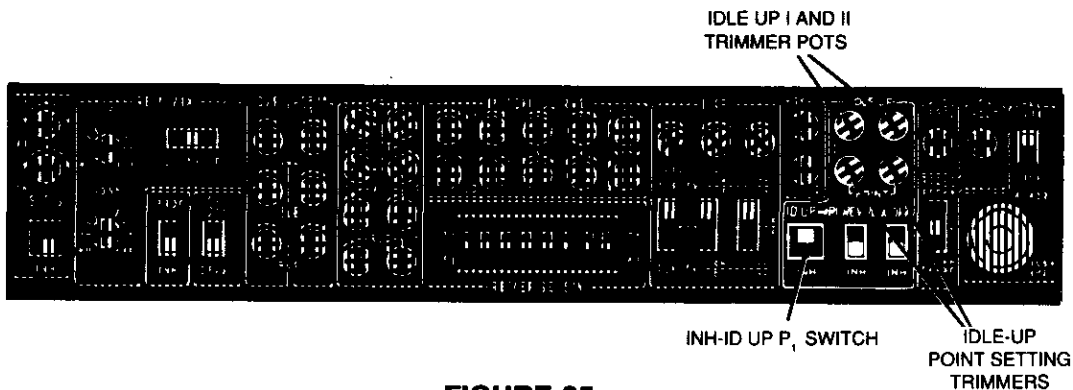
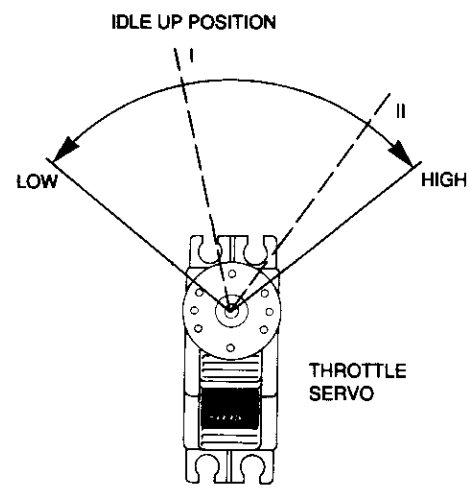


FIGURE 25

Use the Idle-Up I and II trimmers to set the desired Idle-Up throttle servo position when the Idle-Up, switches (25) (26) are in the respective "ON" position. When either Idle-Up I or II switches are activated, the respective Idle-Up L.E.D. will blink rapidly. It should be noted that the Idle-Up II switch (26) has priority over Idle-Up I, and even though the Idle-Up I switch has been positioned "ON", Idle-Up II will be in effect when that switch is positioned "ON". The Idle-Up "Point I and II" trimmers control the points where Idle-Up occurs in throttle servo position, and they work in conjuction with the Idle-Up I and II trimmers.

Idle-Up I can be adjusted to maintain Rotor RPM during approaches and landings while Idle-Up II can be set near full throttle for maximum rotor RPM for Aerobatics, (Figure 26).



Each of the two Idle-Up's are set with trimmers under the front panel cover. When the "INH-ID Up P1" switch is in the "ID UP P1" position, the Idle-Up switches (25 & 26) on the top right side of the transmitter are then used to select the desired Idle-Up position which prevents the throttle from decreasing below the set value even though the throttle control stick is reduced to a low setting.

FIGURE 26

In the Quantum radio there is the flexibility of three high idle systems, the throttle trim lever and the two idle up switches. By selecting to use either of the Idle switches you have the ability to adjust the point and trim of high idle through the use of pots. The throttle trim is exactly what it sounds like, a fixed point trimmer.

The throttle trim only affects the servo movement on the lower half of the throttle throw, thus when the throttle trim is at full low, low throttle is at maximum. It is not possible to set either of the two idle up positions lower than the setting of the throttle trim.

The setting of a high idle through the use of the throttle trim is done through test flights of the helicopter. The trim is set by finding what position will maintain a constant rotor speed while making a normal landing approach. If the rotor RPM tends to overspeed, then the throttle trim should be reduced slightly. If the rotor RPM is too slow, then advance the throttle trim.

For each of the two high idle switches there is a Point and Trimmer pot. This allows the user to fine tune his high idle system to his particular helicopter or mode of flying.

The Point pot determines at what point the throttle stick resumes normal throttle throw. It is adjustable from 0 to 100 percent however most settings are in 50 to 70 percent range.

The Trimmer pot determines how much throttle is removed below the Point setting. A normal use of Idle Up I would be to maintain rotor speed during a descent. Since a descent is made at half throttle or below, the Point would be adjusted with the throttle stick at the half position. The rotor head speed is then adjusted to maintain a constant RPM by use of the Trim pot. This of course is done test flying the helicopter.

The Idle Up switches are set as follows:

1. Activate either one of the Idle Up switches. (Note that Idle Up II will override Idle Up I.)

2. Set the throttle trim to full low.

3. Set the Trim pot for the selected Idle Up to full hi (cw).

4. Adjust the Point pot to the point you want normal throttle throw to begin. This is done by turning the Point pot to full low (ccw) and then moving the throttle stick to the desired position, in this case one half. With the throttle at half stick, turn up the Point pot (cw) until the throttle servo just starts to move. By moving the throttle stick you will see that there is no movement below half stick and normal movement above.

5. Move the throttle stick to low position.

6. Adjust the Trimmer pot down (ccw) for the amount of throttle you want to remove below half stick. In this particular example, a setting to maintain about 80% of a hover RPM is a good starting point. For aerobatics 100% of hover throttle might be needed. Again, this is something that must be tested by actual flight. If there is a tendency for the rotor to overspeed then turn the Trimmer down (ccw). In the case of underspeed then turn the Trimmer up (cw).

TRIM TRAVEL TRIMMERS

The Quantum transmitter provides you with the capability to vary the amount of servo trim travel for aileron, elevator and rudder channels by use of the "TRIM TRV" trimmers located on the trimmer panel, Figure 27. Minimum trim travel is achieved by rotation of the associated AIL, ELE or RUD TRV trimmers counterclockwise.

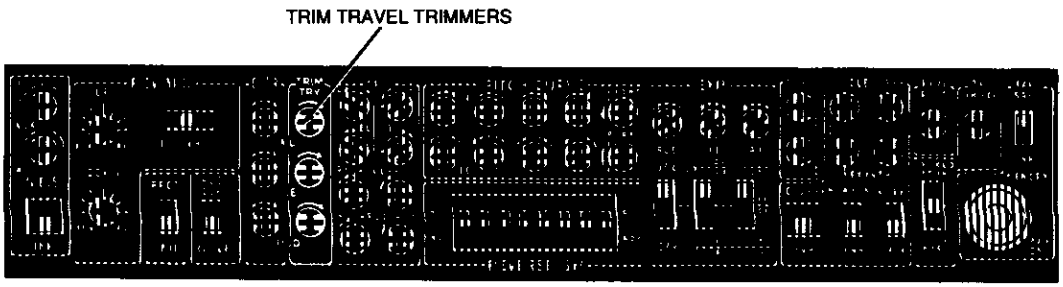


FIGURE 27

SYNCHRONIZED ELEVATOR SYSTEM (S.E.S.)

The S.E.S. is similar to the system used on the actual full sized Huey Cobra gun ship, and YH-60 Black Hawk helicopters, in that when the elevator control stick is moved up or down, the angle of the horizontal tail plane also changes. Separate trimmer adjustments are provided under the trimmer panel cover, Figure 28 for up and down trim of the tail plane. The auxillary potentiometer knob (32) at the top left side of the antenna mount can also be used to trim the tailplane servo while in flight. If the "INH-S.E.S." switch on the trimmer panel is placed in the "INH" (inhibit) position, the 8th channel can then be used as an auxillary function, and adjusted by use of the aux potentiometer knob (32).

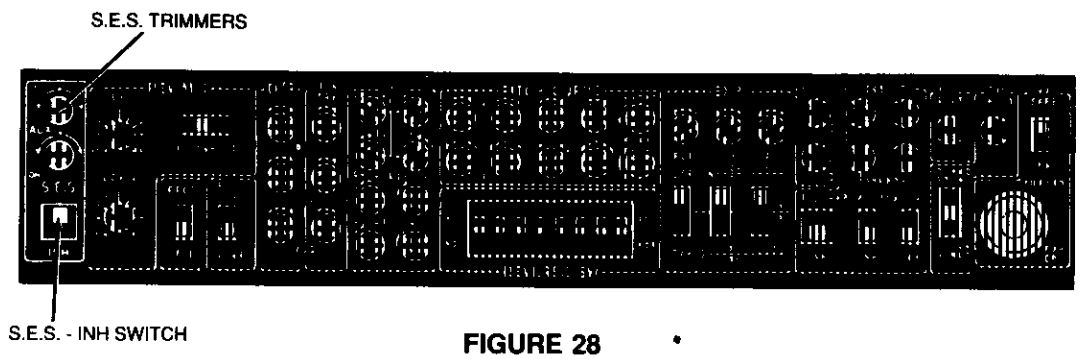


FIGURE 28

RUDDER MIXING AND HOVERING MEMORY

As power and/or collective are applied to the main rotor of the helicopter, a reverse torque is generated which causes the fuselage to rotate in the opposite direction. To counteract this torque, a certain amount of opposite rudder control must be applied as the throttle/collective is advanced. The Quantum PCM 8H does this for you automatically. There are no external controls for rudder mixing, only those "Set and Forget" trimmers under the Trimmer Panel Cover (13) and a switch which is used to set the direction of the control to be applied or to disable the function. Note, there are two trimmer settings, one for ascending and one for descending flight. The *Quantum PCM 8H incorporates* a Hovering Memory which is used to electronically memorize the position of the stick during hovering flight and thus to simplify future hovering maneuvers. These two functions work together.

To use the Quantum PCM 8H Rudder Mixing and Hovering Memory functions:

1. First, viewing the helicopter from above, set "L-INH-R" switch, Figure 29, under the trimmer panel in the same direction as the rotation of the rotor. If the main rotor turns to the right (clockwise) set the switch to "R". If the main rotor turns to the left (counter clockwise), it should be set on "L".
2. Set the Hovering Memory Switch (27), Figure 30, to "OFF" and set "Rev Mix" adjustment trimmers as follows: "up or ascent trimmer to 50% travel (from Min to Max); the "DOWN" or descent trimmer to 50% travel (straight up). These are the beginning settings. Next, set the throttle stick to approximately half throttle, and turn Hover Memory Switch "ON".
3. Adjustment for actual flight: start the engine and while the helicopter is hovering, turn the Hover Memory Switch OFF then quickly turn it ON again. A beginner who is undergoing hovering training need only land the helicopter, stop the engine, then set the throttle stick to the position required to maintain hover, then set the Hover Memory Switch as stated above. The actual mixing point is now set.
4. Final setting of these controls is determined in the following manner: With the helicopter in a hover, add power/collective to climb and watch the movement of the nose. Based on helicopters whose main rotor turns to the right (clockwise), if the nose seems to turn to the left, turn the "Up" knob a slight amount to the right. If, on the other hand, the nose seems to turn to the right, rotate the same knob a small amount to the left. Make small changes and repeat the "Climb Test". Now, with the helicopter in descending flight, we will make the same adjustment to the "DOWN" trimmer. If the nose swings to the left, turn the trimmer setting slightly to the left. Conversely, if the nose turns to the right, turn it right. Easy does it!

NOTE: Always refer to the helicopter nose, not the tail, since you always fly the nose.

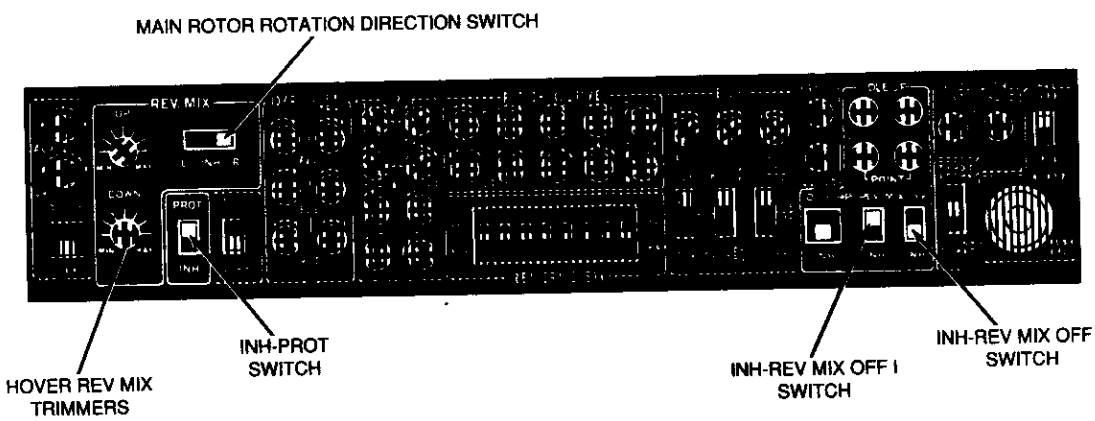


FIGURE 29

Please pay particular attention to the fact that the trimmer correction is made opposite to each other in the ascending/descending steps just described. Somewhat similarly, if the helicopter's main rotor rotates to the left, (counterclockwise), each of the corrections described above is made in the opposite direction. That is, for ascending flight, if the nose swings right, correct left, etc.

If it is necessary to reset the memory function or make minor adjustments, simply hover the model, turn the Hovering Memory Switch"OFF", and then "ON" again.

Note that Hovering Memory will be lost if the transmitter battery pack is either removed or discharged, since the memory circuit is powered by this transmitter battery pack.

The "INH-PROT" switch, Figure 29, protects the hovering memory from accidental cut-off of Hovering Memory, when the switch is placed in the "PROT' position. Cut-off could occur if the Hovering Memory switch (27), were inadvertently moved to the "OFF" position. When the "INH-PROT" switch is in the "PROT" position, the memory will be retained no matter what position the Hovering

Memory switch may be in.
There are two 'INH-REV MIX OFF"switches on the trimmer panel, Figure 29, which are associated with REV MIXING as well as IDLE UP. When the "INH_REV MIX OFF I" switch is in the "REV MIX OFF" position, activation of the IDLE UP I switch (25) will cancel the REV MIX action of the Rudder servo so long as the IDLE UP I switch is in the "ON" position.
The same action occurs for the 'INH-REV MIX OFF II"switch on the trimmer panel and the IDLE UP II switch (26).

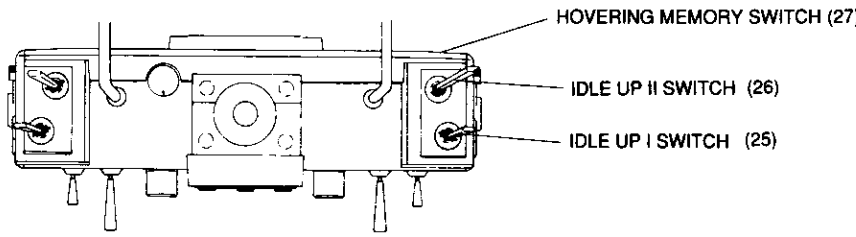


FIGURE 30

PITCH CURVE ADJUSTMENT

With variable collective pitch helicopters it is desirable to match the engines torque curve and the pitch curve. In essence, the modeler has the capability to adjust (or limit) the maximum and minimum angle of incidence, i.e., collective pitch of the main rotor blades. The QUANTUM PCM 8H provides for adjustment of both the high and low collective points by four pitch curves, Figure 31. The High and Low end points of the fourth pitch curve can be adjusted when using the Throttle-Hold function, and has already been described in that section, page 14.

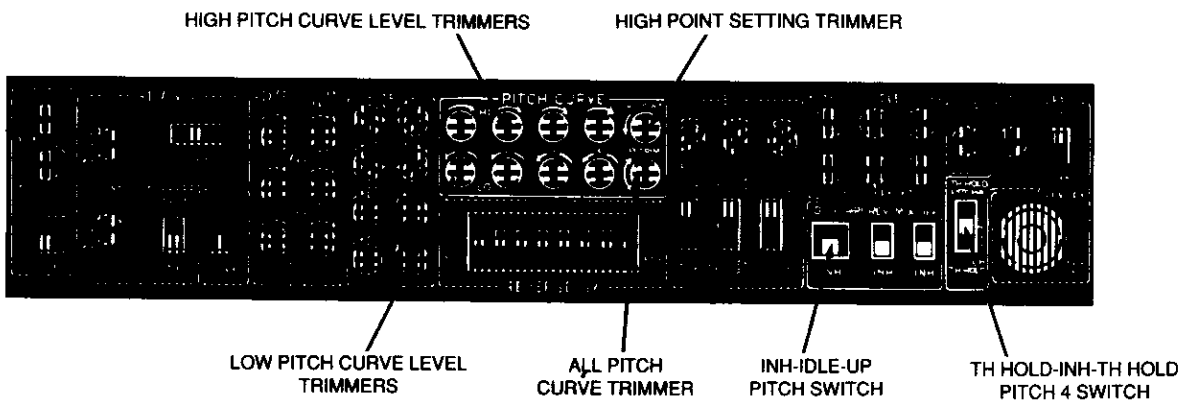


FIGURE 31

The new pitch curve system for the QUANTUM PCM 8H permits four levels of pitch curve settings for both HIGH and LOW. A high-point setting trim control is included for setting the point for the throttle stick at which the pitch differential begins to have an effect. The Pitch Curve Select Switch (21) in the upper left-hand corner permits three levels of manual switching (PITCH 1 to 3) to be selected in conjunction with the Idle-Up Switches (25) (26) (throttle normal › PITCH 1; Idle-Up I › PITCH 2; Idle-Up II › PITCH 3). Pitch 4 can be used to select Throttle-Hold or be left unused, thus allowing a maximum of four settings.

1. High point setting and High-Pitch level setting: The High-Point is the setting at which the pitch differential starts and it can be set as desired from the middle position of the throttle stick up to 80% of the full-high position, as shown in Figure 32.

The high-pitch level, based on this point, can be set from 0 to 100%. First, turn the High-Pitch Level adjustment trimmer all the way to the left (minimum) and gradually begin to move the throttle stick from low to high. Set the High-Point setting trimmer so that the pitch servo does not begin to operate until the stick is well past the position set for hovering. Next, using the High-Pitch Level adjustment trimmer control, set the maximum pitch with the throttle at full-high. The high-side pitch settings are now complete. Then, during actual flight, if the helicopter climbs rapidly while hovering turn the High-Point setting trimmer to the left; if the rotor revolutions increase without a good climb ratio, turn the High Point adjustment trimmer control a little to the right.

NOTE: If the High-Point Setting trimmer is turned all the way to the right, the High-Pitch Level adjustment trimmer range is reduced; in this case, even if the High-Pitch Level adjustment trimmer control is moved, it has no effect.

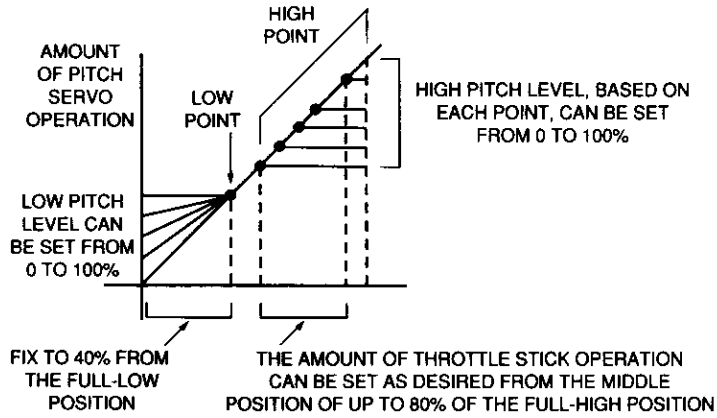


FIGURE 32

2. Low Pitch Level setting: Low-pitch can be set at any point on the throttle stick from 0 to 40% as shown in figure 34, and can be set from 0 to 100%.
3. Manual switching: Set the Idle-Up Pitch-INH operation switch, located on the Idle-Up adjustment trim control section, to "INH" (release).
4. When operating Idle-Up: set the Idle-Up Pitch-INH curve operation switch, located on front trim control panel, to the up ("ON") position.

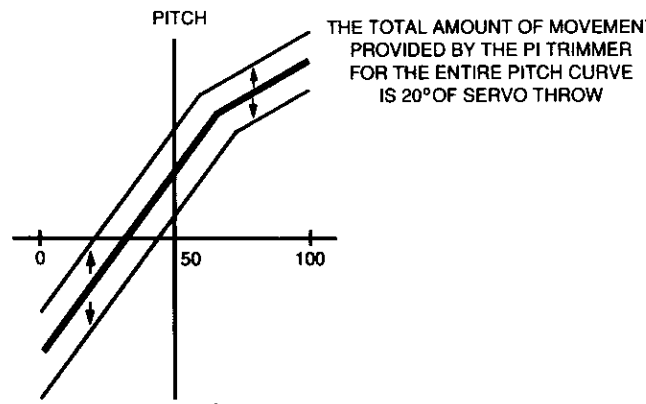


FIGURE 33
OVERALL PITCH TRIM
CONTROL OPERATION

If Idle-Up has not yet been used, set PITCH I, Idle-Up I switch (25) to "ON" and PITCH 2, Idle-Up II switch (26) to "ON" and then switch to PITCH 3 with the Pitch Curve Select Switch (21).

5. When using Throttle-Hold and PITCH 4: Set the Throttle-Hold selector, located on the Throttle-Hold adjustment trim control section, to the TH Hold Pitch 4 position.
6. To move the entire pitch curve: The overall pitch trim control is provided to permit moving the entire pitch curve up or down the desired amount. This operation does not require adjustment of the rotor head pitch link to increase or decrease the pitch. (See Figure 33; the amount of movement is 20% of the servo movement).
   (For an example of pitch setting levels, refer to the section on Idle-Up).

The above pitch curves are also affected by the PI TRIM and HI POINT trimmers, located next to the pitch curve trimmers as shown in Figure 31.

The PI TRIM trimmer adjusts, up or down, the entire collective pitch range to bring you within suitable limits from which the individual pitch curves can be adjusted.
The HI POINT trimmer adjusts only the high collective pitch range which will be affected by the pitch curve high trimmers. With the HI POINT trimmer turned completely clockwise there will be very little, if any, adjustment possible to the high collective pitch range using the high pitch curve trimmers. Turning the HI POINT trimmer counterclockwise will increase the collective pitch range to be adjusted with the pitch curve trimmers.

The Hovering Pitch (H.P.) trim knob (29) at the top left face of the transmitter, Figure 34, provides for pitch trim adjustments during hovering.
"High Side" pitch trim is provided by the potentiometer lever on the right side of the transmitter; "Low Side" pitch trim is accomplished by the potentiometer lever (23) located on the left side on the transmitter, see Figure 34.

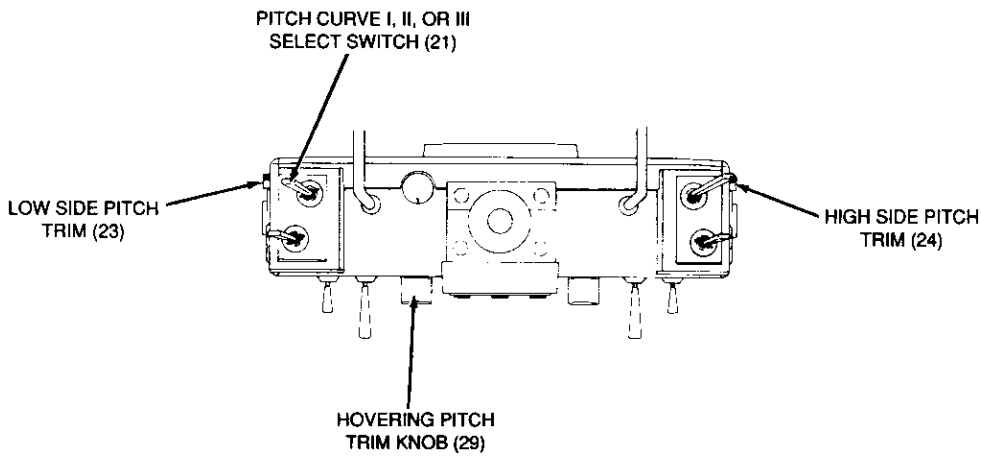


FIGURE 34

USING THE GYRO SYSTEM

Gyro systems for R/C model helicopters, and the transmitters they are flown with, have to be designed to work together to make full use of the best features of both. The Airtronics 96252 gyro system is designed to take full advantage of the features of the Quantum PCM 8H, and vice versa, and therefore are highly recommended for use with each other.
It is recommended that you set up the gyro system on the bench for familiarity and perform the initial adjustments on the Airtronics 96252 Gyro as follows:

1. Connect the gyro system to the QUANTUM PCM 8H receiver as indicated in Figure 35. A single 1200 MAH or 700 MAH battery can be used to power both the receiver and the gyro as shown in Figure 36. However, if a separate power source is desired for powering the gyro, the connections should be made as shown in Figure 37.

2. Turn Gain I and Gain II trimmers on the control box fully counter clockwise (CCW) and turn the switch "ON". The Gyroscope motor should operate.

3. Use the Neutral Adjustment Trimmer on the Gyro Mixer to neutralize the rudder servo.

4. Set your QUANTUM 8H servo reverse switch for channel #1, Gyro control, in the reverse position, and Gyro "I"-"II" control switch (22) to the "I" position. To activate the gyro, position the Gyro Control switch to the number II position.

5. If you desire to only control Gyro "ON-OFF" operation, leave Gain I Trimmer on the control box fully CCW, and adjust Gain II for the desired control response from the rudder servo when the tail of the helicopter is slewed. If the tail rotor pitch correction is in the incorrect direction, switch the Gyro Output Reverse Switch on the Gyro Mixer from Normal to Reverse or Vice Versa.

6. If you desire to have two different sensitivity settings for gyro response instead of Gyro On-Off continue with step 7.

7. Adjust Gain I on the Control Box for the desired "I-II" rudder servo response, when the Transmitter Gyro switch is in the "I" position. The "II" position is then set by Gain Trimmer II as previously stated. Final setting of both trimmers are set according to flight tests.

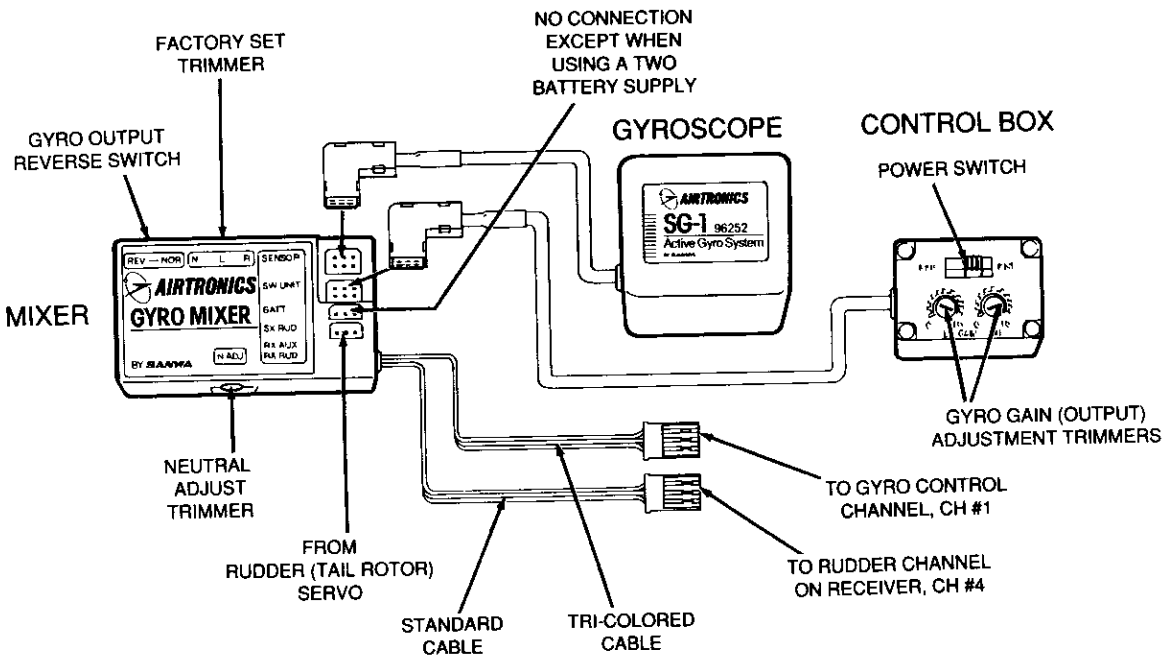


FIGURE 35

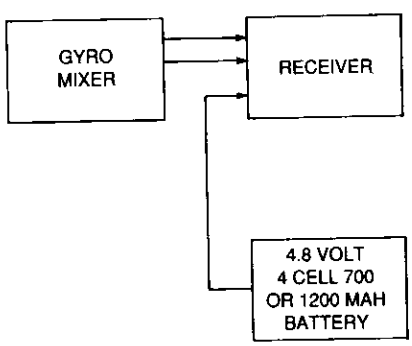


FIGURE 36

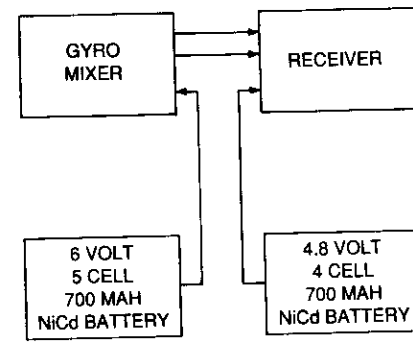


FIGURE 37

QUANTUM PCM 8H
TROUBLE SHOOTING CHART

SYMPTOM	PROBABLE CAUSE	FIX
1. No throw reduction on Elevator or Aileron servo(s) when Dual Rate switch(es) are "ON".	1. Elevator and Aileron Dual Rate Trimmers on panel are turned fully clockwise.	1. Position "ELE" and/or "AIL" Dual Rate Trimmers CCW for desired servo throw reduction.
2. Pre-programmed fail safe doesn't work, i.e., when the transmitter is turned off or another transmitter on the same channel is turned on, the servos all remain in present position.	2A. Fail Safe Program Button was not depressed after turning receiver switch harness "ON". 2B. Fail Safe-Inhibit switch on trimmer panel in the "INH" position.	2. Place "ON-INH" switch on trimmer panel to "ON" position. Turn receiver and transmitter switches on. Move throttle control stick to low throttle position, elevator to up, etc. and depress Fail Safe push button. Move throttle to high, and re-test.
3. RF Meter on transmitter does not illuminate or is not in black portion of Meter Scale.	3. Transmitter battery is discharged or RF Module is not in place.	3. Recharge transmitter battery with P/N 95030 charger. Install or replace RF Module.
4. No throw reduction on Rudder when Gear/Rudder Dual Rate switch (31) is "ON".	4A. RUD D/R-GEAR Switch on trimmer panel in Gear position. 4B. Rudder Dual Rate Trimmer on panel turned fully clockwise.	4A. Place switch in RUD D/R position. 4B. Postion RU Dual Rate Trimmer CCW for desired servo throw.
5. Servos rotate in wrong direction for control stick action.	5. Reverse switch(es) in wrong direction.	5. Place approproiate reverse switch in proper position.
6. Rudder, Elevator or Servos have unequal travel.	6. Travel Volume (TRV) trimmers on panel are not positioned fully clockwise.	6. Reposition trimmers for desired servo throw.
7. Throttle servo does not move.	7. Throttle Hold Switch (18) in "ON" position.	7. Turn Throttle Hold switch (18) off or deactivate the throttle hold switch altogether by placing the HOLD switch under the front panel cover to the INH position.
8. Pitch Curve I, II, or III position does not work,	8. TH Hold Pitch 4 Switch under front cover and Throttle Hold switch (18) are activated.	8. Turn Throttle Hold switch (18) and or TH Hold Pitch 4 switches "OFF".
9. Throttle only opérates near the high throttle position.	9. Idle Up switch (25) or (26) are "ON".	9. Turn Idle Up Switches off.
10. Insufficient pitch throw.	10. Pitch curve trimmers under front cover are set too low.	10. Turn pitch curve trimmers clockwise.

11. Revolution Mix trimmers under front cover have no effect.	11. Hover Memory switch (27) is not "ON".	11. Turn on the hover memory when the helicopter is in a hover.
12. Gyro does not work.	12. 1) Transmitter Gyro switch (22) not turned on. 2) Gyro sensitivity set too low. 3) Gyro not turned on. 4) Gyro batteries discahrged.	12. Turn gyro switch (22) on. If this does not solve the problem refer to the gyro instruction manual.
13. Revolution Mix works backwards from the instructions.	13. Revolution Mix switch in wrong position.	13. This switch should be placed in the "R" position for clockwise rotating main motor blades and "L" for counter clockwise rotating main rotor blades.
14. Helicopter yaws either right or left when the Throttle Hold switch is activated.	14. INH-TH Hold - TH Hold Pitch 4 switch under front cover is activated and the RUD P.S.T. trimmer is adjusted too much either right or left.	14. Adjust RUD P.S.T. trimmer or place TH Hold - TH Hold Pitch 4 switch in INH position.
15. Hover memory switch has no effect.	15. PROT-INH switch under front panel in PROT position	15. Place PROT switch to INH position.
16. Pitch curve select switch (21) does not activate pitch curves 2 or 3.	16. IDLE-UP - PI-INH switch under front panel in IDLE-UP - PI position causing pitch curves 2 and 3 to be controlled by the idle up switches (25) and (26) respectively.	16. Place IDLE-UP-PI switch to INH position.
17. Turning HI Pitch Curve trimmers under front panel have no effect.	17. HI POINT trimmer turned too far clockwise.	17. Turn HI POINT trimmer CCW.
18. Very little servo movement around nuetral.	18. A Exponential and/or dual rate trimmers set too low. B. Exponential select switches in an undesired position.	18. A. Turn exponential and/or dual rate trimmers more clockwise. B. Refer to Fig. 15 for proper exponential select switch position.
19. REV. MIX control trimmers under front panel do not work.	19. A. REV. MIX switch under front panel in INH position. B. REV. MIX OFF - INH switches under front panel in OFF position. and IDLE-UP is activated.	19. A. Position REV. MIX switch to R or L, as required. B. Deactivate idle-up or turn REV. MIX OFF switch to INH position.