

procedure with a high quality user friendly radio system that can be depended upon for years to come. Your new F400ex system is also equipped with an extra 5th channel, which will extend the capabilities of your F400ex so that it may be used in more advanced aircraft than any other 4 channel system.

particular attention to section 9, charging your receiver Radio System Prior to Installation.

TABLE OF CONTENTS

1. Introduction to the F400ex Radio System . . .	3	9. Pre-Installation System Preparation	9
2. System Specifications	4	9.1 Flight Pack Connections	9
3. F400ex Transmitter	4	9.2 Transmitter Preparation	10
3.1 Transmitter Features	4	9.3 517 Servo Preparation	10
3.2 Transmitter Layout	4-5	9.4 System Check	10
3.3 Transmitter Specifications	5	10. Flight Pack Installation	11
3.4 Control Stick Length Adjustment	5	10.1 Installation Suggestions	11
3.5 Neck Strap Attachment	5	10.2 Servo Reversing	12
4. NER-600 Receiver	6	10.3 Setting Reversing Switches	12
4.1 Receiver Features	6	10.4 Adjusting Control Surface Travel	13
4.2 Receiver Layout	6	11. Pre-Flight Information	14
4.3 Receiver Specifications	6	11.1 F400ex Trainer System	14
5. 517 Servo	7	11.2 Operating the Trainer System	14
5.1 Servo Features	7	11.3 Range Testing Your Model	14
5.2 Servo Layout	7	12. Using Extra 5th channel	15
5.3 517 Servo Specifications	7	13. General Notes	16
6. Airborne (Receiver) Battery Pack	7	14. Daily Flight Checks	16
7. Charger Specifications	8	15. Warranty and Service Information	17
8. Charging Your F400ex Radio System Prior to Installation	8	15.1 Warranty Coverage	17
8.1 Battery Charger	8	15.2 Repair Service Instructions	17
		16. Replacement Parts List	18
		17. Frequency Chart	19

2. SYSTEM SPECIFICATIONS

System Name	F400EX	Servos	NES-517 x (3 or 4)
Transmitter Body	NET-104EX	Accessories	Mini Switch Harness Servo Accessories 12" Aileron Extension Instruction Manual Frequency Flags
Receiver	NER-600		
Charger	NEC-22		
Airborne Battery	Sanyo 4.8V 600mAh		

3. F400EX TRANSMITTER

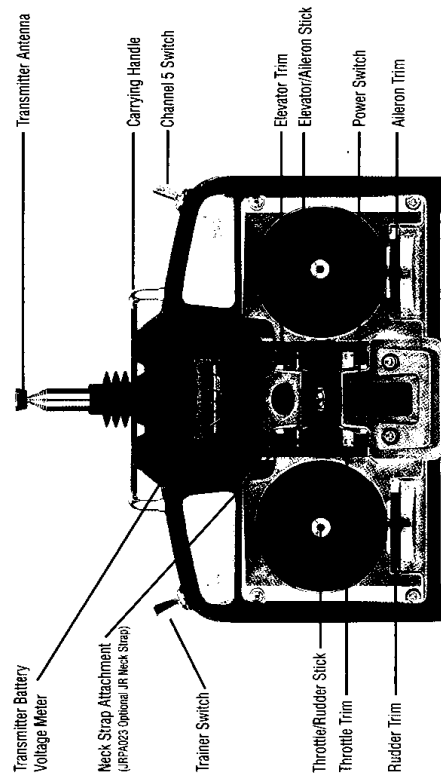
3.1

TRANSMITTER FEATURES

- Computer-designed, ergonomically styled case
- Easy-to-read transmitter battery voltage meter
- Servo reversing on all five channels (page 12)
- Premium Sanyo 9.6V 600mAh transmitter battery pack
- Adjustable control stick length (page 5)
- Trainer system feature compatible with all current IR radio systems
- Power output approximately 750mw

3.2

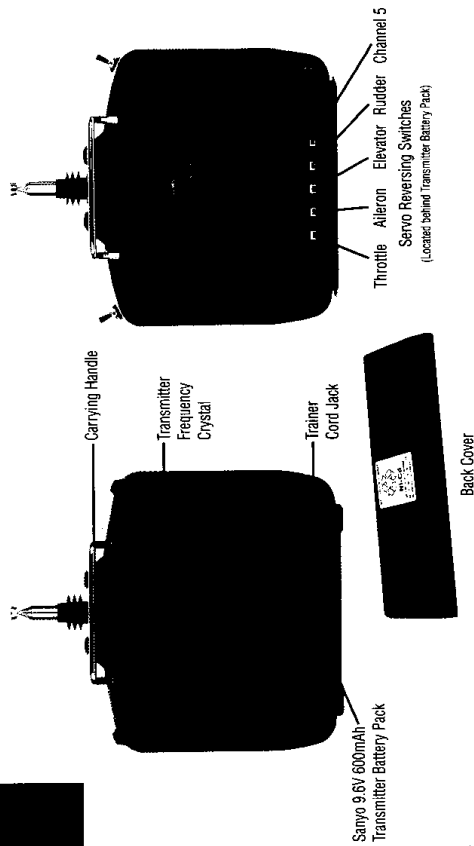
TRANSMITTER LAYOUT



3. F400EX TRANSMITTER

3.2

TRANSMITTER LAYOUT — CONTINUED



3.3

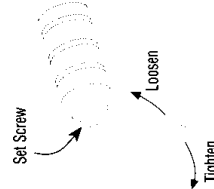
TRANSMITTER SPECIFICATIONS

Model Number	NET-104EX	Output Power	Approximately 750mw
Encoder	5-Channel Analog System	Current Drain	150mA
RF	50/53/72 MHz	Power Source	1.2V x 8 Sanyo Ni-Cad (9.6V 600mAh)
Modulation	PPM (FM)	Output Pulse	1.0–2.0ms

3.4

CONTROL STICK LENGTH ADJUSTMENT

To adjust the control stick length, use a 2mm Allen wrench to unlock the set screw located inside the end of the control stick. Turn the set screw counterclockwise to loosen it; then turn the knurled portion of the stick to adjust the length. Counterclockwise will lengthen the stick and clockwise will shorten it. After the control stick(s) has been adjusted to suit your flying style, tighten the set screw.



4. NER-600 RECEIVER

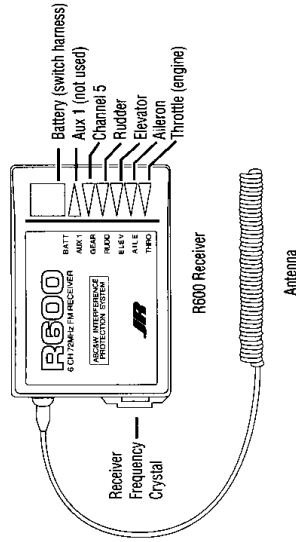
4.1

RECEIVER FEATURES

- Patented ABC&W noise rejection system for increased interference protection
- Compact, lightweight design provides easy installation into most model design
- State-of-the-art surface mount technology (SMT) design
- 6 channel capability

4.2

RECEIVER LAYOUT



4.3

RECEIVER SPECIFICATIONS

Model Number	NER-600	Selectivity	8KHz/50db
Type	6-Channel FM	Weight (oz.)	1 oz.
Frequency	ABC&W	Size (W x L x H)	1.43" x 2.06" x .55"
Sensitivity (Microseconds)	50/53/72 MHz	Receiver Antenna	39" for all Aircraft Frequencies

5. 517 SERVO

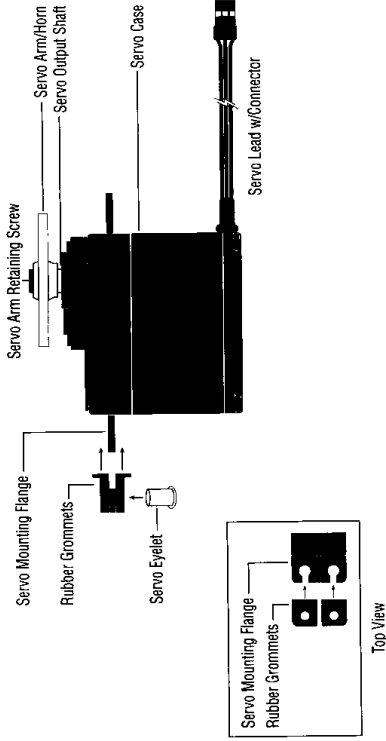
5.1

SERVO FEATURES

- A zero deadband amplifier ensures accurate neutral centering
- Low current drain
- An indirect drive feedback potentiometer gives additional protection from vibration
- State-of-the-art surface mount technology (SMT)
- The 517 features a 3-pole ferrite cored motor for reliability
- Ball bearing supported output shaft

5.2

SERVO LAYOUT



5.3

517 SERVO SPECIFICATIONS

Torque (oz/in)	40.3	Size (WxLxH)	0.73" x 1.52" x 1.32"
Speed (sec./60°)	.25	BB	Yes
Weight (oz.)	1.58	Motor	3-Pole Ferrite

6. AIRBORNE (RECEIVER) BATTERY PACK

Model Number 4N600

Size (WxLxH)

2.24" x .59" x 2.05"

7. CHARGER SPECIFICATIONS

Model Number	NEC-221
Input Voltage AC	100-120V

Output Current	50mA Ah Transmitter/ 50mA Ah Receiver
Charging Time	15 Hours

8. CHARGING YOUR F400EX RADIO SYSTEM PRIOR TO INSTALLATION

Your F400EX Radio System is shipped from the factory with both the transmitter and receiver NiCad batteries in a discharged state. Before attempting to install/operate your F400EX system, it's important that the system be charged for approximately 24 hours to ensure that both transmitter and receiver packs are at peak capacity.

Under normal conditions, subsequent recharging of your F400EX system will require only an overnight charge (approximately 16 hours) to attain peak charge capacity.

The charger supplied with this system is designed to recharge your transmitter and receiver battery packs at a rate of 50mA.

Special note on IR transmitter charge polarity:
The center pin of the charge receptacle on all IR brand radio systems is negative polarity. Therefore, the center pin on all IR chargers is negative, not positive. Your IR radio system's charge polarity is reversed from many other manufacturers' chargers. Beware of improper polarity connections based on "color code" wire leads as they **do not apply** in this instance.

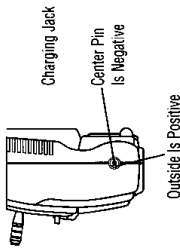
You must always be certain that the center pin on any charger used with this system is wired for negative polarity, otherwise damage will occur to the charge circuit of the F400EX. The IR warranty does not cover any system that is damaged by reverse polarity charging.

BATTERY CHARGER

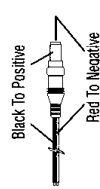
The pilot lamps on the battery charger should always be on during the charging operation. If they are not, check to make sure you have turned off

Do not use other manufacturers' after-market accessories that plug into the transmitter's charging jack. If you do, any damage that results will not be

Right Side of Transmitter



Charger Pigtail For Transmitter



Charger Pigtail For Receiver



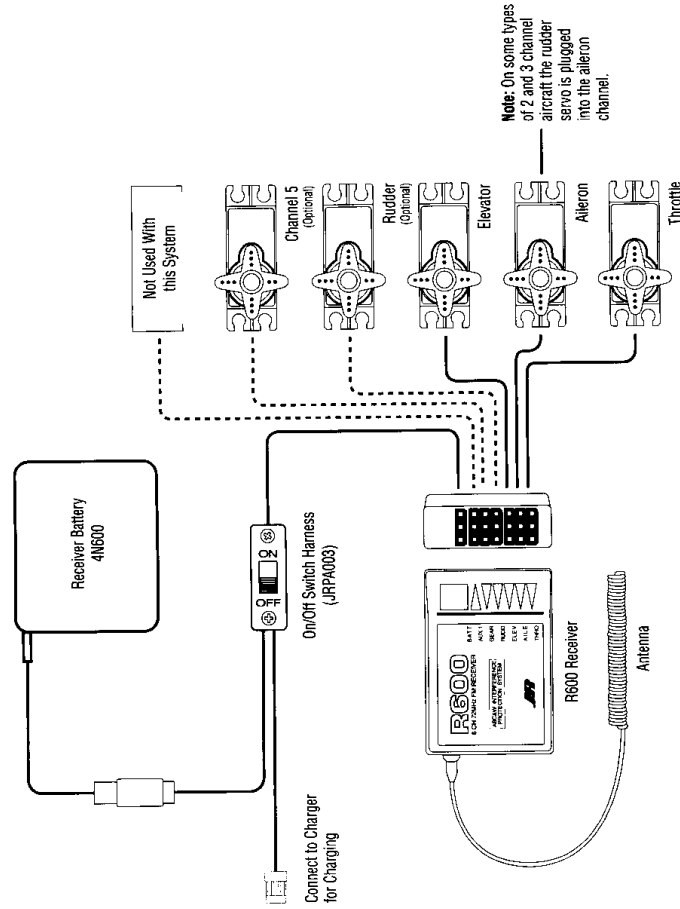
Red-Positive/Brown-Negative/Orange-Signal

9. PRE-INSTALLATION SYSTEM PREPARATION

9.1

FLIGHT PACK CONNECTIONS

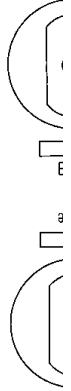
Connect all flight pack components of your F400EX system as outlined in the diagram below:



9.2

TRANSMITTER PREPARATION

Adjust each of the four trim levers (aileron, elevator, rudder, and throttle) to the center position.

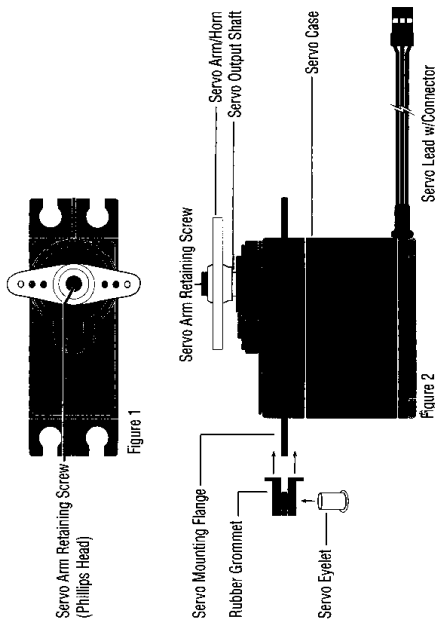


8.1

9.3

517 SERVO PREPARATION

Using a Phillips screwdriver, remove the servo arm retaining screws from each of the 517 servos as shown in Figure 1. Next, install four servo grommets and four servo eyelets to each 517 servo as shown in Figure 2.

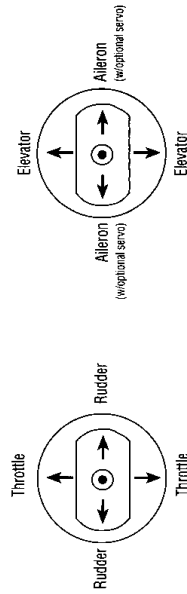


9.4

SYSTEM CHECK

Slide the power on/off switch on your F400Ex transmitter to the "on" position.

Next, slide the on/off switch on your flight pack switch harness to the "on" position.

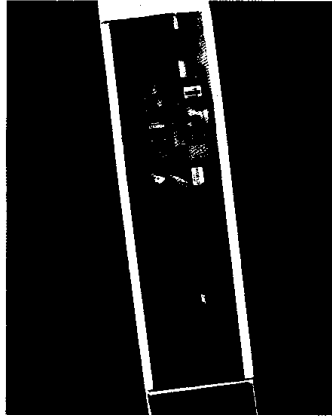


With the system still activated (on), move the throttle stick to the neutral (center) position.

the power "off" to the flight pack first, then the transmitter. By doing this, the 517 servos will be left

10. FLIGHT PACK INSTALLATION

Flight pack installation varies greatly from one model to another. For your convenience, we have included the photograph below outlining a typical



Fuselage Servo, Receiver, Battery Installation

flight pack installation in a standard 4-channel trainer type model airplane.



Aileron (Wing) Servo Installation

10.1

INSTALLATION SUGGESTIONS

It's important to correctly install the radio system in your model. Please read and carefully follow the suggestions listed below:

1. For added protection, wrap the receiver and the receiver NiCad in foam rubber that's at least 1/4" thick.
2. Run the receiver antenna through the fuselage and make sure it is fully extended. Never cut or bundle your receiver antenna — this will decrease range and performance.
3. Rubber servo grommets are included with your radio system and should be installed in the servo flanges. The servos should then be mounted on either hardwood rails or a plywood tray with the mounting screws provided. Do not overtighten the mounting screws. The flange of the brass eyelets should face down (toward the wood). See Section 9.3.
4. With the servo at neutral, install the required servo arm/horn exactly 90 degrees to the servo case as shown in the diagram below.
5. Before installing the servo output arms, make sure the servo is in its neutral position.
6. All servos must be able to move freely over the full range of their travel. Make sure the linkages do not impede servo travel. A stalled servo will drain the battery pack within a few minutes.
7. In the case of gas-powered model aircraft, mount the receiver power switch on the side of the fuselage opposite the muffler to protect the switch from exhaust residue. With other types of models, mount the switch in the most convenient place. Make sure the switch operates freely and is capable of traveling its full distance.

Servo Horn

10.2

SERVO REVERSING

After radio installation, it's imperative that the proper servo/control system direction be established. Servo reversing allows you to alter the direction of the servo/control surface movement to

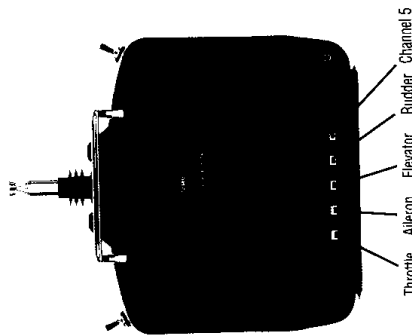
match the direction of the transmitter stick. Please refer to the chart in the section below to determine the proper control surface direction.

10.3

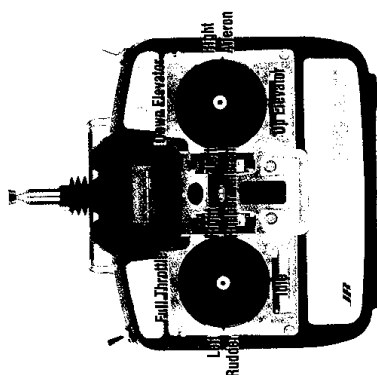
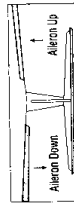
SETTING REVERSING SWITCHES

1. Connect all control linkages and check to see that all servos move freely.
2. While standing directly behind the airplane, go through the steps shown in the charts below to check proper direction of the control surface.

3. Using the servo reversing switches, located behind the transmitter battery pack, adjust the direction of each servo as necessary for proper operation.



Servo Reversing Switches
(Located behind transmitter battery pack)



(Mode II Transmitter Shown)

10.4

ADJUSTING CONTROL SURFACE TRAVEL

The final step in your flight pack installation will be to determine the amount each control surface will move on your model at full transmitter stick deflection. Please refer to your aircraft's instruction manual for suggested travel limits.

It's possible to increase/decrease the amount that your control surface moves at full stick deflection by mechanical adjustments.

It's imperative that the servo does not attempt to push/pull the control surface past its mechanical limits. This condition is called "binding." When a servo moves a control surface into a "binding"

position, the servo itself then becomes "stalled," meaning it's unable to reach its full deflection. This condition is both harmful to your control linkage and to your servo. This "stalled" condition will also force the servo to drain power more quickly from your flight pack battery, thereby reducing your usable flying time. Fortunately, servo "stalling" is usually easy to detect by either a "buzzing" or "humming" sound coming from the stalled servo.

The following diagram is designed to help clarify how to increase or decrease control surface travel mechanically to eliminate control surface "binding" and servo "stalling."

Figure 1 Normal (Linear) Linkage Set Up

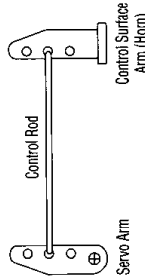


Figure 2 Increased Control Surface Movement

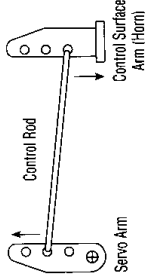
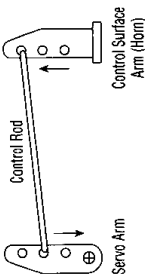


Figure 3 Reduced Control Surface Movement



To increase control surface travel, select a linkage attachment point further outward on the servo arm or further inward on the control horn closer to the control surface (Figure 2).

To reduce control surface travel, select the linkage attachment point close to the center of the servo area or further out on the control horn on the control surface (Figure 3).

reduced, and by moving the control rod out on the servo arm, the control surface travel will be increased. The opposite holds true for the control surface arm (horn) as well. You may also use any combination of these positions to achieve proper control surface/servo travel.

NOTE: Once the appropriate servo arm/wheel and control rod location has been established, be certain that you have secured the servo arm to the servo output shaft using the original servo horn screw.

Quite simply, by moving the control rod in on the servo arm/wheel, control surface travel will be

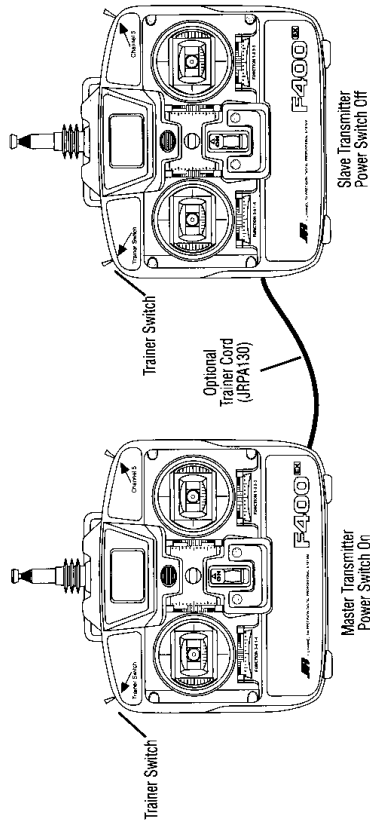
11. PRE-FLIGHT INFORMATION

11.1

F400EX TRAINER SYSTEM

The F400EX features a built-in trainer system. The transmitter can be used as either a master (trainer) or as a slave (trainee). The F400EX is compatible

with all other current PPM selectable (FM) IR radios that have built-in trainer systems. An optional trainer cord is needed (IRPA130).



11.2

OPERATING THE TRAINER SYSTEM

1. Match the servo reversing and trims of both radios.
2. Plug the optional trainer cord into both transmitters.

3. Turn on the master transmitter.

NOTE: The slave radio must be left off.

4. Test all the control functions on your aircraft with the master radio.

5. Push the trainer button on the master transmitter and check all the control functions with the slave radio.

Special Note to Beginners: We strongly suggest that you seek the help of an experienced model airplane pilot prior to flying your new model.

11.3

RANGE TESTING YOUR MODEL

We suggest that before the initial flight of your model, you first perform a ground range test to ensure that the transmitting/receiving abilities of your F400EX perform properly. Conduct the range test as follows:

system should function properly to a distance of approximately 60–65 feet.

NOTE: If your test falls short of the described range, confirm that your NiCad batteries are fully

12. USING THE F400EX EXTRA 5TH CHANNEL

Your new F400EX system is unique in that it comes equipped with an extra 5th channel, which allows the F400EX to be used in a wider variety of models than other, 4-channel systems.

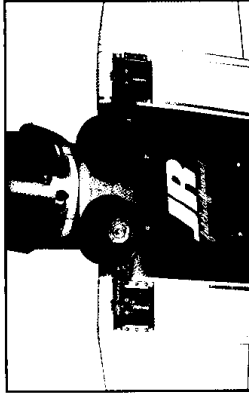
12.1

5TH CHANNEL APPLICATIONS

Your F400EX's extra 5th channel can be utilized for a variety of useful functions. Below is a listing of some of the more popular and useful applications that will add fun and excitement to your model. Many of the items listed below are commercially available through your local hobby dealer.

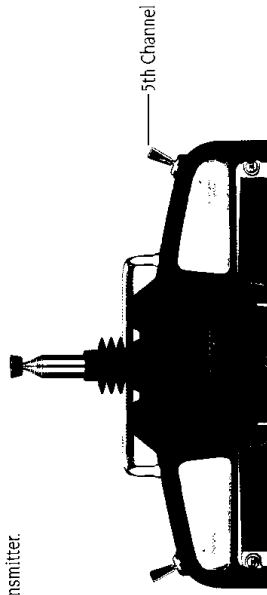
Possible Options:

- Retractable Landing Gear
- Bomb Drops
- Flaps/Spoilers/Air Brakes
- Remote Fuel Shutoff Switch
- Special Smoke Exhaust Systems
- Glider Tow Hook Release
- Scale Navigation Lights
- Aerial Camera Photography
- On-Board Glow Systems



LOCATION AND OPERATION

The extra 5th channel of the F400EX is activated through the two-position switch located on the top right shoulder of the transmitter.



The 5th channel function of the F400EX, due to its activation by the two-position switch, is non-proportional in operation. In other words, when the switch is moved from its rearward to forward position, the servo will move its full travel, with no neutral position. The servo reversing function is also available for the 5th channel.

13. GENERAL NOTES

Radio controlled models are a great source of pleasure. Unfortunately, they can also pose a potential hazard if not maintained and operated properly. It's imperative that you install your radio control system correctly. Additionally, your level of piloting competency must be high enough to ensure that you are able to control your aircraft under all conditions. If you're a newcomer to radio controlled flying, please seek help from an experience pilot or your local hobby shop.

Listed below are some safety Do's and Don'ts that must be followed by all pilots.

- Ensure that your batteries have been properly charged prior to initial flight.
- Keep track of the time that the system is turned on so that you will have an idea of how long you can safely operate your system.
- Perform a ground range check prior to the initial flight of the day. See the Daily Flight Checks Section below for information on how to do so.
- Check all control surfaces prior to each takeoff.
- Use frequency flags.

- Do not fly your model near spectators, parking areas, or in any other area that could result in injury to people or damage of property.
- Do not fly during adverse weather conditions. Poor visibility can cause disorientation and loss of control of your aircraft. Strong winds can cause similar problems.
- Do not fly unless your frequency is clear.

Warning: Only one transmitter at a time can operate on a given frequency. If you turn on your transmitter while someone else is operating a model on your frequency, both pilots will lose control of their models. Only one person can use a given frequency at a time. It does not matter if it is AM, FM or PCM — only one frequency at a time.

- Do not point the transmitter antenna directly toward the model. The radiant pattern from the tip of the antenna is inherently low.
- Do not take chances. If at any time during flight you observe any erratic or abnormal operation, land immediately and do not resume flight until the cause of the problem has been ascertained and corrected.

14. DAILY FLIGHT CHECKS

1. Check the battery voltage on both the transmitter and the receiver battery packs. Don't fly below 9.0 Volts on the transmitter or below 4.7 Volts on the receiver. To do so can cause a crash of your aircraft.
NOTE: When you check the receiver battery, be sure that you have polarities correct on your expanded scale voltmeter (optional).
2. Check all hardware (linkages, screws, nuts, bolts) prior to each day's flight. Be sure binding does not occur and everything is properly secured.
3. Ensure that all surfaces are moving in the
- Do not extend the transmitter antenna at this time. Turn the transmitter "on."
- Turn the model "on."
- Slowly walk away from the model while moving the control surfaces. The aircraft should function properly at a distance of 60-75 feet. (If your system tests to a lesser distance, check that your batteries are fully charged and re-test. If the situation does not improve, contact the Horizon Service Center for further instructions.)
5. Ensure that all trim levers are in the proper location.
6. Check to be sure that all servo pigtails and

15. WARRANTY AND SERVICE INFORMATION

15.1

WARRANTY COVERAGE

Your new equipment is warranted to the original purchaser against manufacturer defects in material and workmanship for one year from the date of purchase. During this period, Horizon Service Center will repair or replace, at our discretion, any component that is found to be factory defective at no cost to the purchaser. This warranty is limited to the original purchaser of the unit and is not transferable.

damaged in a crash, or to any unit which has been repaired or altered by any unauthorized agencies. Under no circumstances will the buyer be entitled to consequential or incidental damages. This limited warranty gives you specific legal rights; you also have other rights which may vary from state to state.

As with all fine electronic equipment, do not subject your unit to extreme temperatures, humidity or moisture. Do not leave it in direct sunlight for long periods of time.

This warranty does not apply to any unit which has been improperly installed, mishandled, abused, or

15.2

REPAIR SERVICE INSTRUCTIONS

In the event that your equipment needs service, please follow the instructions listed below.

1. Check all on/off switches to be sure they are off. This will speed the repair process of checking battery condition.

area/function which may better assist our technicians in addressing your concerns. Date your correspondence, and include your name, mailing address, and a **phone number where you can be reached during the business day.**

5. **Warranty Repairs.** To receive warranty service you must include a legible photocopy of your original dated sales receipt to verify your proof-of-purchase date. Providing that warranty conditions have been met, your radio will be repaired without charge.

2. Return your system components only (transmitter, receiver, servos, etc.) Do not return your system installed in a model: car, boat, plane, etc.
3. Use the original carton/packaging (molded foam container), or equivalent, to ship your unit. Do not use the carton itself as a shipping carton; you should package the equipment carton within a sturdy shipping container using additional packing material to safeguard against damage during transit. **Include complete name and address information inside the carton, as well as clearly writing it on the outer label/return address area.** Ship your equipment fully insured and prepaid. Horizon Service Center is not responsible for any damages incurred during

6. **Normal Non-Warranty Repairs.** Should your repair cost exceed 50% of the retail purchase cost, you will be provided with an estimate advising you of your options.

Within your letter, advise us of the payment method you prefer to use. Horizon Service Center accepts VISA or MasterCard, or we can return the equipment C.O.D. cash-only. If you prefer to use a credit card, include your card number and expiration date.

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16. PARTS LIST

REPLACEMENT PARTS

JRPA003	Small Switch Harness
JRPA100	12" Gold Aileron Extension
JRPA220	Servo Accessory Bag
JRPA225	Servo Mounting Screws
JRPA226	Servo Mounting Eyelets
JRPA233	Receiver Battery 600mAh 4.8V
JRPA3140	Transmitter/Receiver Charger
JRPC221	R600 FM Receiver
JRPA600**	F400ex Instruction Manual
JRPM400ex	517 Servo Case
JRPS517	517 Servo Gear Set
JRPS517	517 Standard Servo
JRPF**	FM Crystal Set
JRPA960	Large IR Decal Sheet

** Add channel number to stock number when ordering.

OPTIONAL PARTS

JRPA004	IR Charge Switch
JRPA023	IR Neck Strap
JRPA101	18" Gold Aileron Extension
JRPA102	24" Gold Aileron Extension
JRPA103	36" Gold Aileron Extension
JRPA130	Trainer Cord
JRPA133	Y-Harness w/Amplifier
JRPA242	2 x 1 Servo Tray
JRPA243	1 x 1 Servo Tray
JRPA244	Aileron Servo Tray
JRPA380	Transmitter/Receiver Battery Checker
JRPA480	Model Beacon Alarm
JRPA3040	Standard Receiver Battery 270mAh 4.8V Flat
JRPA3240	Standard Receiver Battery 1500mAh 4.8V Flat
JRPA531	531 Premium Sport Servo

Please refer to your IR Catalog for additional accessories.

17. FREQUENCY CHART

72 MHz requires no special license to operate.

50/53 MHz requires the operator to have an FCC amateur radio license (Ham).

* It is important that you attach the enclosed frequency ID plates/flag to your F400ex transmitter antenna.

CH. NO.	FREQUENCY	CH. NO.	FREQUENCY	CH. NO.	FREQUENCY
11	72.010	36	72.510	00	50.800
12	72.030	37	72.530	01	50.820
13	72.050	38	72.550	02	50.840
14	72.070	39	72.570	03	50.860
15	72.090	40	72.590	04	50.880
16	72.110	41	72.610	05	50.900
17	72.130	42	72.630	06	50.920
18	72.150	43	72.650	07	50.940
19	72.170	44	72.670	08	50.960
20	72.190	45	72.690	09	50.980
21	72.210	46	72.710		
22	72.230	47	72.730		
23	72.250	48	72.750		
24	72.270	49	72.770	CH. NO.	FREQUENCY
25	72.290	50	72.790	A1	53.100
26	72.310	51	72.810	A2	53.200
27	72.330	52	72.830	A3	53.300
28	72.350	53	72.850	A4	53.400
29	72.370	54	72.870	A5	53.500
30	72.390	55	72.890		
31	72.410	56	72.910		
32	72.430	57	72.930	CH. NO.	FREQUENCY
33	72.450	58	72.950	A6	53.600
34	72.470	59	72.970	A7	53.700
35	72.490	60	72.990	A8	53.800

LOW FREQUENCY 53 MHz

CH. NO.	FREQUENCY	FLAG COLOR
A1	53.100	Black/Brown
A2	53.200	Black/Red
A3	53.300	Black/Orange
A4	53.400	Black/Yellow
A5	53.500	Black/Green

HIGH FREQUENCY 59 MHz

CH. NO.	FREQUENCY	FLAG COLOR
A6	53.600	Black/Blue
A7	53.700	Black/Purple
A8	53.800	Black/Gray