

receiver comes equipped with six channels. The FM version includes channels 1 through 4 + 6 and 7 to accommodate a wide variety of special mixing capabilities found in today's computer radios. The AM version includes channels 1 through 6. When hooking up power to your receiver, you may either connect a nicad battery pack to any unused channel input or purchase one FMA Direct Y-Connector block (PN: 209) available through your local hobby dealer. The Y-Connector block connects battery power and one servo to one channel of the Tetra.

RANGE TEST

To assure proper performance, the Tetra series receiver must be range tested with the "host" transmitter. The major reason for this important test is that over time, all R/C transmitters are susceptible to de-tuning and frequency "drift". To ensure the utmost in secure RF reception, current technologies for narrow-banding used in FMA designs can actually place a higher demand on transmitters. Power level and frequency accuracy of your transmitter are more important than ever before. Therefore, for the initial range check and in rare cases when you suspect degradation of performance from your R/C system, FMA would like to suggest the following guidelines: Begin by placing the receiver on a cardboard box or another non-metallic surface to elevate it about 2 feet off the ground. Connect only one servo and the battery direct. Do not install a switch harness for the initial range test because switch harnesses are often the cause of poor range. Perform the range test with the receiver antenna fully extended VERTICALLY into the air on a dowel rod or the like, and the transmitter antenna collapsed. Apply power and walk away from the receiver moving one stick on the transmitter. You should obtain at least 200 feet of line-of-sight ground range if everything is operating properly. If any loss of servo control occurs, the system must be calibrated by an FMA service station. CALL (301) 831-8980 for FMA Direct technical assistance. In certain cases, the FMA service station may ask you to send in your transmitter along with your receiver.

ACCESSORIES:

Aileron extension cables, Y-harness, switch harness, and numerous other accessories as well as a full line of servos, batteries, and chargers are available for use with your FMA receiver either direct or from your local FMA dealer.

FMA LIMITED WARRANTY ON RADIO RECEIVER PRODUCTS

THE WARRANTY

FMA, Inc. warrants this receiver to be free of manufacturing defects for the term of one year from the date of purchase. Should any defects covered by this warranty occur, the receiver shall be repaired or replaced with a unit of equal performance by FMA, Inc., or an authorized FMA service station.

LIMITS AND EXCLUSIONS

This warranty may be enforced only by the original purchaser, who uses this receiver in its original condition as purchased, in strict accordance with the Tetra series owner's manual. Receivers returned for warranty service to an FMA service center will be accepted for service when shipped post-paid, with a copy of the original sales slip or warranty registration form, to the service station advised by FMA, Inc.

THIS WARRANTY DOES NOT APPLY TO

1. Consequential or incidental losses resulting from the use of this receiver.
2. Damage resulting from accident, crashes, misuse, abuse, neglect, electrical surges, reversed polarity on connectors, lightning or other acts of God.
3. Damage from failure to follow instructions supplied with the product.
4. Damage occurring during shipment of the product either to the customer or from the customer for service (claims must be presented to the carrier).
5. Damage resulting from repair, adjustment, or any alteration to product by any one other than an authorized FMA technician.
6. Installation or removal charges, or damage caused by improper installation or removal.

CALL (301) 668-7614 FOR MORE INFORMATION ABOUT SERVICE AND WARRANTY REPAIRS.



Tetra

OWNER'S MANUAL

NOTE: PLEASE READ MANUAL COMPLETELY BEFORE OPERATION

INTRODUCTION:

Thank you for purchasing the FMA Direct Tetra series sub-micro receiver. Tetra series receivers are designed to be the smallest, lightest, full-capability R/C receivers available. You may fly your Tetra in anything from indoor R/C to IMAA legal quarter scale aircraft with complete confidence. Offered in either AM or FM versions, these high-performance designs incorporate the latest advancements in RF technologies available to the R/C industry. Superior RF mixer technology and advanced circuitry for detecting and amplifying PPM information enables the Tetra series to out-perform other single and dual conversion designs presently offered. Heavy-duty, SMT construction on a single, glass-epoxy P.C. board provides outstanding reliability. New, universal operation makes user-programmable shift switching a snap in the FM version. This means that the same FM receiver can now be programmed to operate with any FM transmitter regardless of the direction of the FM shift.

SPECIFICATIONS:

SIZE:	2.13"L X 0.80"W X 0.55"H
WEIGHT:	0.5 OZ.
DESIGN:	SINGLE CONVERSION, SUPER HETERODYNE
CHANNELS:	1 THROUGH 4 + 6 AND 7 (FM) AND 1-6 (AM)
MODULATION:	AM OR FM - BOTH PPM (PULSE POSITION MODULATION)
FREQUENCY:	R/C CHANNELS 00 THROUGH 60 - U.S. LEGAL 50, 53, 72 MHz
ULTIMATE BANDPASS:	± 8.5 KHz @ >55 dB DOWN
USABLE SENSITIVITY:	> -93 dBm
3OIP:	+12 dBm
OPERATING VOLTAGE:	+3.5V TO +26V DC LIMITED ONLY BY SERVO REQUIREMENTS
LEGAL USE:	MEETS AMA GUIDELINES

FMA, Inc.
 5716A Industry Lane
 Frederick, MD 21704
 Sales: (800) 343-2934 -Technical: (301) 668-7614



* FCC Information: FCC ID: KH8-T2000 - This device complies with Part 15 of the Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept interference received, including interference that may cause undesired operation.

PACKAGE CONTENTS:

1. FMA Direct Tetra series AM or FM, 6 channel, Universal PPM receiver
2. Dealer or factory-installed, low profile channel crystal (if purchased with unit)
3. Owner's Manual
4. Programming Quick Reference

PREPARATION:

• **AM VERSION COMPATIBILITY**

Tetra AM version receivers are compatible with any AM transmitter set up on the same frequency as your Tetra AM receiver. All Tetra receivers support full crystal interchangeability using FMA Direct low-profile Tetra series crystals. Contact your local FMA Direct dealer or call FMA Direct to obtain the correct Tetra series crystal for operation with your transmitter frequency.

• **FM VERSION COMPATIBILITY - PROGRAMMING THE TETRA FOR OPERATION WITH YOUR FM TRANSMITTER**

1. Designed for the utmost in reliability and compatibility, the new series of receivers from FMA Direct are the first to incorporate user-programmable FM shift compatibility with any standard FM/PPM transmitter currently being sold. User programmable through a series of 5 dip switches, the same receiver can now operate with positive or negative FM shift transmitters. So if you have a Futaba and a JR transmitter with you at the field on different R/C channels, and one channel is already in use, you can simply plug in the correct receiver crystal, change the settings of the dip switches using a small screw driver and you're ready to fly!
2. In general, 72 MHz Tetra series receivers are shipped compatible with "negative", Futaba type frequency modulation (FM) - also termed "high-going-low" modulation. JR and Airtronics transmitters incorporate "positive" or "low-going-high" frequency modulation. At Ham band (50 and 53 MHz), all current R/C transmitters incorporate "positive" modulation so, in general, Ham frequency Tetra series receivers are shipped compatible with "positive" modulation. If you are using JR or Airtronics equipment on 72 MHz, you may need to adjust the DIP switch settings on the Tetra before the receiver will "listen" to your transmitter.
3. In order to program the Tetra receiver to a different FM shift, refer to the Programming Quick Reference included with your receiver. The DIP switches are located on the top of the P.C. board. Each switch is labeled 1, 2, 3, 4, 5 and the word ON is identified on the other side of the switch array. You may need to make a small slit in the top of the clear heat shrink case directly over the switch array to permit access to the individual switches or you may be able simply to remove the crystal to obtain access. Use a small jeweler type flat screw driver to change the switches from one state to another. On the Programming Quick Reference, identify your transmitter brand, the frequency band of the transmitter/receiver combination (i.e. 72, 53, 50 MHz), and the R/C channel on which you fly. Correlate this information to the proper diagram and set the DIP switches at the positions shown. There are only two settings which work. If one setting doesn't work, the other one will.

• **INSTALLATION, POWER AND SERVO CONNECTION**

1. Care must be taken when installing your receiver to isolate the electronics from vibration. Do this by wrapping the receiver in 3/8" thick foam rubber. Restrain the foam-packed receiver using Velcro or a rubber band if necessary.

NOTE: FAILURE TO USE FOAM RUBBER AS DESCRIBED ABOVE DURING INSTALLATION VOIDS PRODUCT WARRANTY.

2. Extend the antenna to its full length. Do not coil the antenna up or range will be shortened. If you are installing the Tetra in a small aircraft and you require a shorter antenna, you may cut off a portion of the 39.75" antenna without de-tuning the

receiver; a unique feature of FMA Direct receivers. Reducing antenna length will reduce range, however. Proceed carefully, removing only a short amount at a time and be certain to ground range check the receiver with each incremental reduction in antenna length. **NEVER CUT THE ANTENNA SHORTER THAN 18 INCHES!** A special note to helicopter pilots concerning standard FM receivers and antenna placement: FMA Direct receivers are tested thoroughly in all types of aircraft including helicopters. Helicopters often create a challenge because they generate RF noise and heavy vibration from fast-moving parts. In order to improve reception in a helicopter, it is recommended that you route the antenna of the receiver as far away from the tail boom as possible. This is particularly true of carbon-fiber booms. Nylon push rod material mounted to the underside of the skids provides a good channel through which to route the antenna.

3. Tetra series receivers are compatible with all Futaba, JR, Hitec servos, Airtronics servos equipped with the new "Z TYPE" connectors, as well as other brands that use standard polarity (GROUND, PLUS, SIGNAL). Tetra series receivers are not compatible with "OLD STYLE" Airtronics connectors that use reverse power polarity (PLUS, GROUND, SIGNAL). See warning below.

TABLE 1 SERVO PLUG COLOR ORIENTATION

SERVO BRAND	1	2	3
FUTABA	BLK	RED	WHT
JR	BRN	RED	ORG
HITEC	BLK	RED	YLW

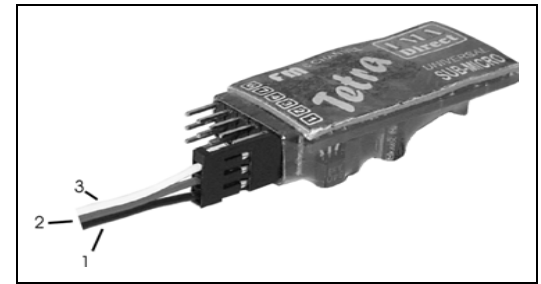


Figure 1

WARNING: IF YOU INTEND TO INTERFACE AIRTRONICS SERVOS THAT USE "OLD STYLE" (PRE-"Z TYPE") AIRTRONICS CONNECTORS TO THE TETRA, YOU MUST UPDATE THE CONNECTOR TO THE CURRENT INDUSTRY STANDARD POLARITY (SEE FIGURE 1) AND PROPER INDUSTRY STANDARD SHELL THICKNESS. YOU MAY READILY CONVERT YOUR EXISTING "OLD STYLE" AIRTRONICS CONNECTORS TO CURRENT STANDARDS 1) BY INSTALLING APPROPRIATE ADAPTERS OR 2) BY REMOVING THE OLD CONNECTORS AND PINS AND REPLACING THEM WITH FMA PART NUMBER SEASSYJ. EACH SEASSYJ CONTAINS ONE JR COMPATIBLE MALE SHELL AND 3 FEMALE PINS. YOU WILL NEED TO CRIMP THE PINS AND SOLDER THEM TO THE WIRES OF YOUR EXISTING SERVO AND PLUG THEM INTO THE SHELL PROVIDED. MAKE CERTAIN THAT THE RED WIRE (+V) GOES TO THE CENTER PIN AS ILLUSTRATED IN FIGURE 1. FMA WILL NOT ACCEPT RESPONSIBILITY FOR ANY ATTEMPT TO USE "OLD STYLE" AIRTRONICS CONNECTORS THAT DO NOT HAVE THE POLARITY CHANGED TO INDUSTRY STANDARDS.

4. When hooking up servos to your receiver, use TABLE 1 and FIGURE 1 to check its plug wire color orientation. Note: with the receiver sitting label side up, the signal lead (marked #3 in FIGURE 1 and color coded as in TABLE 1) must match up to the pin closest to the label side of the receiver. No damage will occur by plugging a servo in backwards (reversing shell 180°), but the servo will not operate. Your Tetra series