Do so at your own risk, and recognize you may harm a pack that has too much internal resistance. WARNING: We all have a tedency to "pop the start button" a second time just to "be sure we have a full charge", BAD PRACTICE, especially with the smaller packs. The VERSAPULSE has been tested to as low as two cells and found functional; however, FMA Direct does not guarantee that VERSAPULSE will work reliably on less than four cells. The user must conduct at least one carefully monitored cycle with the battery under test to ensure that the pack does not overheat and that cut-off actually occurs.

- **SELF-LIMITING FEATURE**
  VERSAPULSE is protected from abuse and mistakes by being self-limiting as noted on the face of the unit. Consult the unit label for maximum charge rates versus cell count. You need not worry about these limits, the unit does the work. If you wish to charge a battery that falls within the MAX RATES parameters, turn the knob fully clockwise and current will not increase above the limit for the number of cells that the charger senses as being connected.

SPECIFICATIONS:

SIZE:	**4.93" X 5.60" X 3.42"**
WEIGHT:	**3.1 POUNDS.**
FUNCTION:	**SINGLE CHANNEL, NICAD BATTERY RAPID CHARGER / MAINTENANCE CHARGER**
INPUTS / CONNECTIONS:	**110V AC VIA P.C. TYPE CABLE OR *+13.5V D.C.* OR LEAD ACID BATTERY VIA ALLIGATOR CLIPS**
OUTPUT CAPABILITIES:	**AC INPUT:**
	***1 NiCD PACK*: 4 TO 10 CELLS, VARIABLE CHARGE RATE (0.5A TO 2.8A) FOLLOWED BY SLOW CHARGE (200 mA), PEAK DETECTION CUT-OFF**
	DC INPUT:
	***1 NiCD PACK*: 4 TO 7 CELLS, VARIABLE CHARGE RATE (0.5A TO 4.2A) FOLLOWED BY SLOW CHARGE (200 mA), PEAK DETECTION CUT-OFF**
PROTECTION:	**7.5A AUTO FUSE AND REVERSE POLARITY PROTECTION**
MAXIMUM CHARGE RATES:	
	AC INPUT: 4-7 CELL (2.8A); 8 CELL (2.2A); 9 CELL (1.5A); 10 CELL (1A)
	DC INPUT: 4-6 CELL (4.2A); 7 CELL (3.0A)

FMA LIMITED WARRANTY ON RAPID CHARGER PRODUCTS

THE WARRANTY

FMA, Inc. warrants this charger 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 charger 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 charger in its original condition as purchased, in strict accordance with the VERSAPULSE owner's manual and battery manufacturer's guidelines for charge rates applicable to any batteries connected to the unit. Chargers 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 charger.
2. Damage resulting from accident, 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 INFORMATION ABOUT SERVICE AND WARRANTY REPAIRS.

VERSAPULSE

MODEL FC600 AC/DC VARIABLE RATE RAPID CHARGER

OWNER'S MANUAL

NOTE: PLEASE READ MANUAL COMPLETELY BEFORE OPERATION

INTRODUCTION:

Thank you for purchasing the FMA Direct / RCLine VERSAPULSE rapid charger. VERSAPULSE is one product in a family of quality battery management devices from FMA, Inc. The VERSAPULSE is an affordable, yet highly flexible AC/DC rapid charger with delta peak cutoff. The VERSAPULSE utilizes a standard personal computer type, AC power cord that quickly disconnects from the back of the charger for convenient field use. VERSAPULSE can charge a 4 to 10 cell NiCD pack using AC input or a 4 to 7 cell NiCD pack using +13.5 V DC input. Alligator clips are provided for DC input connection. Self–limiting, variable charge rates from 0.5A all the way to 4.2A, a rugged plastic enclosure, a heat sink, fuse, and reverse polarity protection make VERSAPULSE a great value. Continuously variable charge rate set via a knob, not a two or three position switch, lets you carefully control the charge current for cell capacities ranging from relatively small packs (250 mAh) up to 5 AH or higher. When used as a complement to the FMA EINSTEIN Deluxe, you get the most economical and complete battery management system made for shop and field use.

OPERATION:

- **OVERVIEW**
  A vast array of different battery manufacturers and cell configurations are available to the model builder today. The VERSAPULSE is capable of safely rapid charging *most* NiCd batteries. Using delta peak detection circuitry, the VERSAPULSE will safely monitor and cutoff high-rate charging when the peak, or maximum charge voltage, is detected for the battery being charged. WARNING: VERSAPULSE IS NOT DESIGNED OR INTENDED FOR CHARGING LITHIUM CELLS OF ANY TYPE. VERSAPULSE will *not* safely charge the single cell used in glow drivers. Typically, most modern NiCD batteries are capable of withstanding a moderate 1C charge rate. Some will handle 2C, and fewer will accept up to 4C. A 1C charge rate is defined as 1 times the mAh capacity of your battery pack. As an example, at a 1C charge rate, a 500 mAh battery pack charges at 500 mA (0.5A). This equates to a 1 hour charge time on a battery that is completely dead at start of charge. A 2C charge rate for this same 500 mAh pack would be 1000 mA (or 1A) and the battery would be fully charged in 1/2 hour from a completely dead state. It is generally good practice to charge a pack at no more than the minimum rate that will have it ready when you need it. Please also recognize that rapid charging inevitably shortens pack life, even if just a little bit as compared to normal charging (C/10). Rapid charging with peak detector cutoff is an efficient method of putting a full charge into a battery without overcharging it because the electrons within the battery become more active with greater current flow. CAUTION: It is

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FMA Direct

the responsibility of the user to determine that the pack intended for charging be capable of accepting rapid charge at the rate you set. There are far too many battery types on the market for FMA to veriy whether or not your particular brand/cell type is capable of accepting the charge rates supplied by VERSAPULSE. That being the case, it is important that you consult your battery manufacturers' guidelines for charging the battery types that you have. FMA, Inc. will not accept any liability for failure to comply with your battery manufacturers' guidelines when charging batteries using any FMA Direct rapid charge products.

SAFETY PRECAUTIONS: 1) When using VERSAPULSE, always set it on a stable, non-flammable surface along with the batteries connected to the unit. When VERSAPULSE has completed rapid charging, fully charged batteries will feel warm to the touch. Do not be alarmed; this is a normal outcome of rapid charging batteries. As current flows through the battery, exciting electrons, excess energy as a result of certain inefficiencies in the charging process, will cause heat to be emitted from the interior of the battery. Should the batteries being charged ever become uncomfortably warm to the touch, remove them from the charger immediately to preclude the possibility of explosion. Re-check the battery manufacturer's guidelines for charging your battery pack. If the problem recurs, call FMA Direct at (301) 831- 8980 for service information. 2) Do not mix old and new cells or cells from different manufacturers. 3) Always ensure the charger and batteries have adequate ventilation. Do not charge in a closed space and never charge in a car with the windows closed in summer heat. Charging is always safest when the charger and pack are in a cool location, such as in the shade. Never charge a battery pack in the model or where it is insulated from full release of heat. 4) Before fast charging, when possible, charge the battery on SLOW CHARGE to equalize the cells. This helps ensure longer life for the battery, especially if the battery pack has been in storage for a long time without use. 5) Most batteries will develop considerable internal heat during periods of rapid *discharge*. Do not rapid charge a pack until it cools to ambient temperature from fast *discharge*. 6) Always follow the charging instructions from the manufacturer of your pack. 7) Never charge two packs in parallel. 8) Never charge two packs in series unless both are the same cell type from the same manufacturer and are of the same capacity. 9) Do not attempt to open the case or service the VERSAPULSE under any conditions. Your warranty will be automatically voided. Service or repair of the VERSAPULSE should only be carried out by FMA authorized service persons. Contact your dealer or FMA Direct for service or repair information. 10) Under no circumstances should VERSAPULSE be connected to AC *and* DC input at the same time; damage to product and voiding of the warranty will result. ***11) WHEN USING THE CHARGER ON AC INPUT, DO NOT ALLOW THE DC INPUT ALLIGATOR CLIPS TO TOUCH; DOING SO WILL CAUSE A SHORT CIRCUIT AND DAMAGE TO THE CHARGER!*** Clip the red or black clip to the body of the cable so that the clips can not inadvertently touch each other.

- **CONNECTING THE VERSAPULSE TO +13.5V DC POWER SOURCE**

Connect VERSAPULSE to a +13.5V DC source capable of at least 10A consumption by using the alligator clips provided. Although +13.5V DC is the ideal DC input voltage for the VERSAPULSE, fully-charged 12V automotive batteries or field box batteries work well as a power source. The RED cable is + Volts and the BLACK cable is - Volts, or "ground". Power ON is indicated by the RED LED labeled "PWR" on the unit faceplate. *WARNING:* Under no circumstances should you ever attempt to make connection to 110/220VAC using the alligator clips. They are intended for connection to DC volts only! NOTE: If you connect +13.5V DC with the red and black leads reversed, the RED POWER light will not come on; however, VERSAPULSE is protected from reverse polarity.

- **CONNECTING THE VERSAPULSE TO AC POWER SOURCE**

Connect the line cord to VERSAPULSE before plugging the free end to AC house current. *CAUTION:* The charger must have the proper AC type and connection. There are some six different connections used world wide. Make certain your VERSAPULSE is configured for your particular AC type and that you have the proper AC cable. Take the same precautions you need to use when connecting any household appliance to AC current. Never perform this operation in your bare feet or on a floor that is wet, or when your hands are wet. Do not use the charger in close proximity to water. When disconnecting VERSAPULSE from AC, reverse the procedure and observe the same precautions. Always turn the charger OFF by disconnecting from the AC or DC supply when not in use.

- **OUTPUT CONNECTIONS**

VERSAPULSE has one set of + and - output connections indicated by a + (RED) and – (BLACK) spring loaded clips at the bottom center of the face of the charger. This arrangement allows for flexibility in the connectors that you connect to VERSAPULSE and to your battery. You may clip any charge cords that are with your car, radio, or boat into the spring clips. Please recognize that light charge wire may heat up when putting 4.2 amps through the wire. #14 black and red hook up wire soldered to your favorite Tamiya, Deans, SERMOS, Astroflite or other charge connector will do the job. For charge rates up to 4.2 amps, an FMA Direct P/N 302BC or 402BC power cable and the FMA Direct Versatile Adapter (P/N 501MC) make an ideal charge connection to mate with all popular radio packs. To connect the Output Charge leads, first ensure that the bare wire ends are not frayed and that they are clean. It is best to twist the bare wire tightly and then to tin the bare end with solder. Depress the RED spring clip to open the clip and insert the bare end of the POSITIVE charge lead into the open clip. Let off on the spring clip so that it grips the bare wire. Repeat for the BLACK terminal and NEGATIVE charge lead.

- **CHARGING MOST BATTERY PACKS**

Please review the SAFETY PRECAUTIONS section listed under OVERVIEW, above before connecting a battery pack to VERSAPULSE for charging. If charging using AC input, verify that your pack contains from 4 to 10 cells and that rapid charging is allowable for the pack. If charging using DC input, verify that your pack contains from 4 to 7 cells. Consult your battery manufacturer's guidelines concerning charge rates for your battery type. Make certain that the battery is designed to handle the rapid charge rate you plan to set (from 0.5 to 4.2 Amps). Keep in mind that 2C is two times the capacity, e.g., 1A for a 500 mAh pack, etc. Make certain the battery polarity matches the charge leads. Failure to maintain proper polarity may result in damage to the battery. Turn the charge rate adjustment knob fully counterclockwise before commencing FAST CHARGE. Complete the following steps to rapid charge a pack: 1) Connect the charger to the AC or the DC source per above instructions. The RED power LED labeled "PWR" will indicate power available. 2) Connect the battery to be charged to the proper, mating connector on the end of the charge cable. The GREEN Normal Charge LED labeled "SLOW" will light. The SLOW CHARGE rate is 200mA. Battery packs having capacity less than 2000 mAh should not be left on trickle charge for extended periods. SLOW CHARGE may be used to normal charge batteries of 2000 mAh or greater capacity or cells that are not intended for rapid charge. 2) To begin "FAST CHARGE", press the red "START" button. A beep will be heard and the RED FAST CHARGE LED labeled "FAST" will light solidly. Both the RED and GREEN LEDs will remain lit continuously during FAST CHARGE. 3) Set your desired FAST CHARGE rate by turning the adjustment knob labeled "AMPS" clockwise. 4) At the end of fast charge, the battery will approach 1.6 V per cell; then start to decrease very slightly. It is this drop that the delta peak detector sees and cuts off fast charge. The pack will continue to be SLOW CHARGED so that it is always peaked for capacity. VERSAPULSE issues an audible warning when fast charge is complete. You may stop the beeping by pressing the start button two times. 5) To stop charging, disconnect the battery from the charger. You can manually "alternate" the VERSAPULSE between SLOW and FAST charging by cycling the "START" switch at any point in the charging process. **WARNING: Transmitter batteries must be removed from the transmitter enclosure to fast charge them**. That is, you must remove the pack from the transmitter and connect it to VERSAPULSE via an adapter cable or by using the FMA Versatile Adapter, P/N 501MC. The reasons are: 1) while in the enclosure, heat from the battery will be contained and the pack may overheat causing damage to your transmitter case. 2) most transmitters have a blocking diode to protect the battery from reverse charging. That diode will act just like a fuse if high current is passed through it by fast charging. 3) the blocking diode may prevent the charger from sensing the voltage of the pack properly and peak cut off may not occur.

- **SPECIAL CHARGING NEEDS**

VERSAPULSE can be used to charge a wide range of battery packs if the user has some knowledge of batteries and reasonable precautions are taken. Simply connecting a pack of unknown characteristics to VERSAPULSE or any other rapid charger is inviting trouble. However, if you stay close to the unit and check the battery and charger condition frequently on the first charge cycle, you may successfully fast charge smaller packs than you might have imagined. Since VERSAPULSE can be set for rapid charge rates as low as 0.5 A, good 250 mAh packs might be charged at 500mA in one half hour. The 270 mAh Sanyo test packs used in writing this manual were just barely warm to the touch at completion of charge. Most 500 mAh receiver or transmitter packs may be charged at 1C or higher. We have successfully charged Sanyo 110 mAh packs in 15 minutes without overheating or venting.