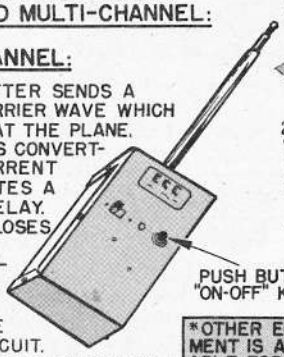
# FM DATA SHEETS

## #14 MULTI-CHANNEL R/C EQUIPMENT

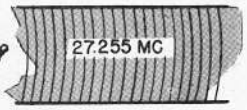
### THE DIFFERENCE BETWEEN SINGLE- AND MULTI-CHANNEL:

### SINGLE-CHANNEL:

THE TRANSMITTER SENDS A 27.255 MC* CARRIER WAVE WHICH IS RECEIVED AT THE PLANE. THIS SIGNAL IS CONVERTED INTO A CURRENT WHICH OPERATES A SENSITIVE RELAY. THE RELAY CLOSES AND OPENS A PAIR OF ELECTRICAL CONTACTS THAT OPERATE THE CONTROL CIRCUIT. (SEE FM DATA SHEET NO. 11 FOR FULL DETAILS)



PUSH BUTTON "ON-OFF" KEY




27.255 MEGACYCLE* CARRIER-WAVE IS AT RADIO FREQUENCY AND CANNOT BE HEARD BY THE HUMAN EAR.

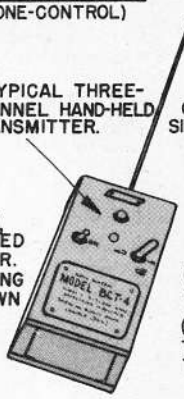
*OTHER EQUIPMENT IS AVAILABLE FOR 465 MEGACYCLE OPERATION.

IN THE TRANSMITTER SHOWN, THE CONTROL STICK IS MOVED IN THIS MANNER. SEE THE WIRING DETAIL SHOWN BELOW FOR COMPLETE UNDERSIDE DETAILS.


### MULTI-CHANNEL:

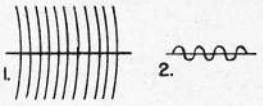
(TONE-CONTROL)

A TYPICAL THREE-CHANNEL HAND-HELD TRANSMITTER.





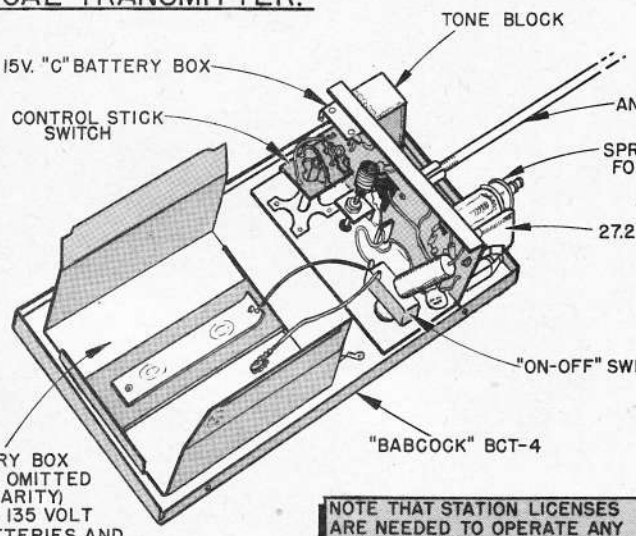
27.255 MEGACYCLE (MILLION CYCLES PER SECOND) BROADCAST SIGNAL IS A COMBINATION OF:




(1) A 27.255 MC CARRIER-WAVE -- SAME AS SINGLE-CHANNEL.

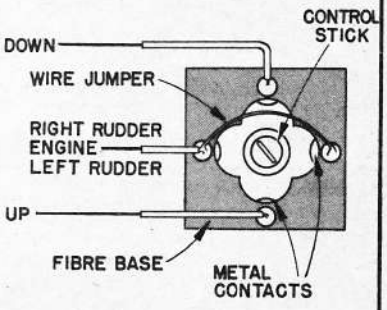
(2) AN AUDIBLE SOUND OR TONE. THE RECEIVER SORTS OUT THE TONE AND DISCARDS THE 27.255 MC.

### TYPICAL TRANSMITTER:




A MULTI-CHANNEL TRANSMITTER CAN SEND THREE OR MORE TONES. EACH CONTROL CHANNEL OPERATES ON A SEPARATE TONE--THREE TONES PROVIDE THREE CHANNELS. THE "BABCOCK" BCT-4 TRANSMITTER SENDS THREE TONES, AS AN EXAMPLE--300~(CYCLES PER SECOND), 720~ AND 1620~.

CONTROL STICK SWITCH →




NOTE THAT STATION LICENSES ARE NEEDED TO OPERATE ANY R/C EQUIPMENT. FILE FORM 550 AT YOUR F.C.C. DISTRICT OFFICE.

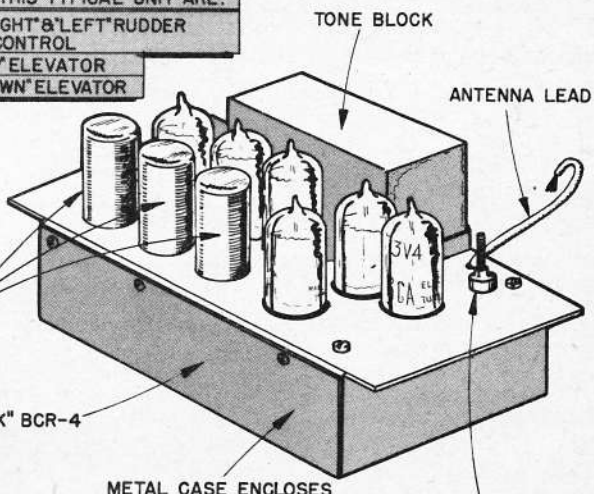
THE CONTROL STICK IS MOVED TO MAKE CONTACT, TO OPERATE THE DESIRED CHANNEL. ONLY ONE TONE CAN BE SENT AT A TIME! NOTE THAT "RIGHT", "ENGINE", OR "LEFT" IS OBTAINED BY PULSING THE CONTROL STICK BACK AND FORTH UNTIL THE MODEL RESPONDS TO THE PROPER CONTROL.

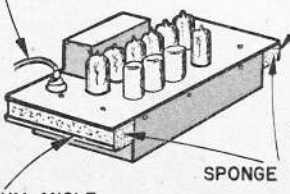
### TYPICAL RECEIVER:

THE TONES ARE RECEIVED, ONE AT A TIME, AND ARE FED INTO THE TONE BLOCK WHICH PASSES A CURRENT TO THE RELAY WHICH OPERATES THE PROPER CONTROL CIRCUIT. NOTE THAT THE 27.255 MC SIGNAL IS ONLY USED AS A CARRIER TO TRANSMIT THE TONES. THE RECEIVER WILL NOT OPERATE ON A 27.255 MC SIGNAL ONLY--CORRECT TONES ARE A "MUST."

THE TONE BLOCK IS AN ELECTRICAL FILTERING (TUNED) CIRCUIT, AND HAS NO MOVING PARTS.

| TONES RECEIVED BY THIS TYPICAL UNIT ARE: | |
|---|---|
| 300~ | OPERATES "RIGHT" & "LEFT" RUDDER AND ENGINE CONTROL |
| 720~ | OPERATES "UP" ELEVATOR |
| 1620~ | OPERATES "DOWN" ELEVATOR |

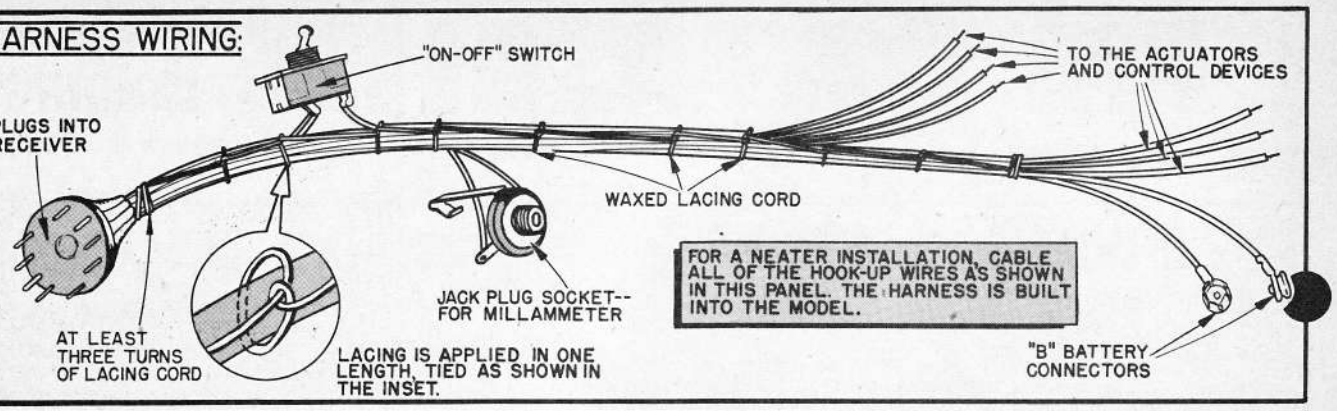



SOME MULTI-CHANNEL SETS USE TUNED METAL REEDS--SIMILAR TO A HARMONICA WITH ELECTRICAL CONTACTS--TO SORT OUT THE TRANSMITTED TONES.

BY BOB BURAGAS

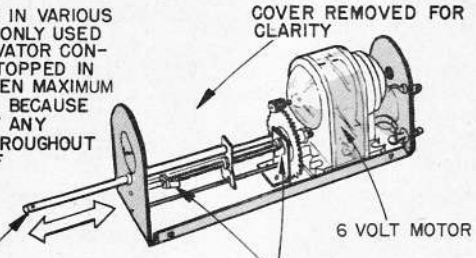
## HARNESS WIRING:

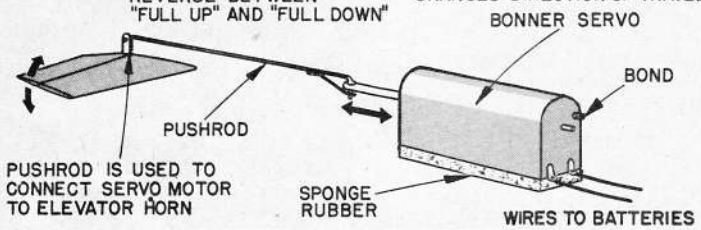



FOR A NEATER INSTALLATION, CABLE ALL OF THE HOOK-UP WIRES AS SHOWN IN THIS PANEL. THE HARNESS IS BUILT INTO THE MODEL.

## SERVO MOTORS:

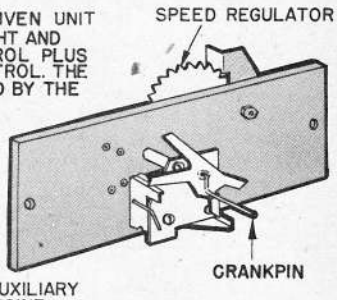
THESE ARE AVAILABLE IN VARIOUS TYPES AND ARE COMMONLY USED TO OPERATE THE ELEVATOR CONTROL. THEY CAN BE STOPPED IN ANY POSITION BETWEEN MAXIMUM "UP" AND FULL "DOWN". BECAUSE THEY CAN BE LEFT AT ANY CONTROL POSITION THROUGHOUT THE ENTIRE FLIGHT, IF DESIRED, THEY ARE CALLED "TRIMMABLE."




## COMPOUND ESCAPEMENT:

THIS IS A RUBBER-DRIVEN UNIT WHICH SUPPLIES RIGHT AND LEFT RUDDER CONTROL PLUS ONE AUXILIARY CONTROL. THE RUDDER IS ACTIVATED BY THE CRANKPIN.

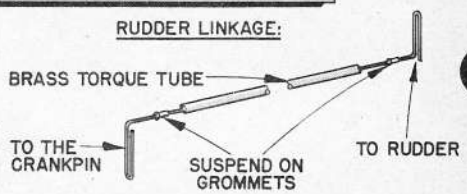



THE AUXILIARY CONTROL IS HOOKED TO A PAIR OF ELECTRICAL CONTACTS WHICH CLOSE EVERY THIRD OPERATION.

THE COMMONEST AUXILIARY CONTROL IS AN ENGINE CONTROL AND CUT-OFF.

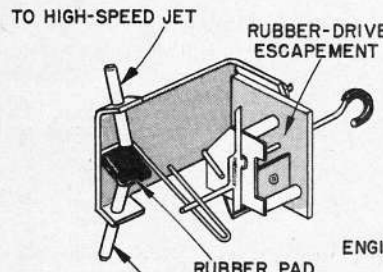
THE CONTROL SEQUENCE OF THIS DEVICE IS:
NEUTRAL, RIGHT, NEUTRAL, LEFT, NEUTRAL, AUXILIARY, NEUTRAL.....

RUDDER LINKAGE:

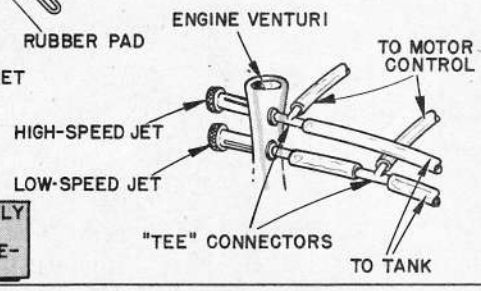



(SEE "BONDING" - BELOW)

## MOTOR-CONTROL ESCAPEMENT:




THE COMMONEST TYPE OF ENGINE CONTROL IS THE "AIR BLEED" USING TWO NEEDLE VALVES. THE CONTROL DEVICE "BLEEDS" AIR INTO THE HIGH-SPEED OR LOW-SPEED FUEL-LINE. THE VALVES ARE PRE-SET INDIVIDUALLY.




THESE ARE USUALLY HOOKED UP TO A COMPOUND ESCAPEMENT.

## ACCESSORY EQUIPMENT:

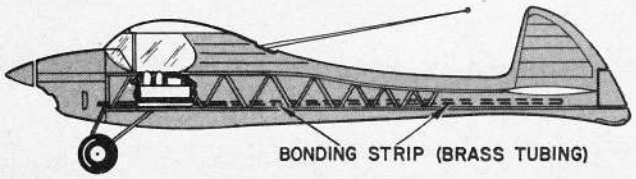
AS WITH SINGLE-CHANNEL R/C EQUIPMENT, IT IS NECESSARY TO HAVE AN ASSORTMENT OF MILLAMMETERS AND VOLTMETERS--OR A MULTIMETER.

A PLASTIC TUNING WAND IS A "MUST" FOR BEST RESULTS

HEADPHONES ARE NESSARY TO TUNE MOST RECEIVERS. THEY PLUG INTO THE METER-JACK. AN IDEAL CHECK FOR MIS-OPERATION.

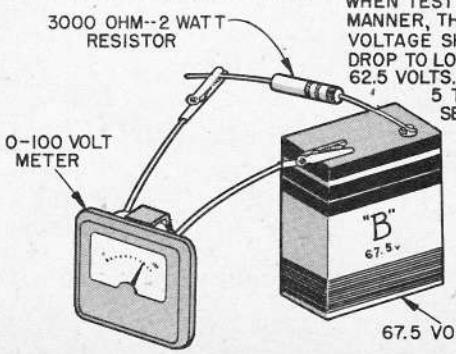
## BONDING:

OPTIMUM PERFORMANCE RESULTS WHEN ALL OF THE METAL PARTS IN THE MODEL ARE BONDED TOGETHER ON A COMMON GROUND, EXCEPT ANTENNA!




WIRE THE ENGINE, LANDING GEAR STRUTS, ACTUATOR CASES AND FRAMES, PUSHRODS, CONTROL HINGES, RECEIVER BASE, ETC. TO BONDING STRIP.

## "B" BATTERY TEST:




WHEN TESTED IN THIS MANNER, THE BATTERY VOLTAGE SHOULDN'T DROP TO LOWER THAN 62.5 VOLTS. TEST 5 TO 10 SECONDS!