ESTES
A SUBSIDIARY OF DAMON

ROCKETRONICS CATALOG

NOW YOU CAN ADD ELECTRONIC INSTRUMENTATION TO YOUR MODEL ROCKET HOBBY!

Now you can add a new measure of realism, challenge and education to your model rocket hobby by flying the Estes TRANSROC. The TRANSROC is a miniature, multi-purpose model rocket transmitter manufactured in both kit and preassembled form by Estes Industries.

The TRANSROC system is based on an advanced transmitter with multi-mode capability. Used as a rocket finder (its most basic mode of operation), the five transistor TRANSROC is an exciting addition to the world of model rocketry. You also have a choice of sophisticated Estes accessories that will literally transform your model into a "talking bird".

The TRANSROC is just over four inches long and fits neatly into a BT-50 paper body tube (or PST-50FJ clear plastic body tube) or can easily be adapted to larger rockets. It is powered by a 15 volt battery which has a life of up to 24 hours and transmits on any channel of the 27 Megahertz (megacycle) citizens band which you specify. No FCC license is required to operate the TRANSROC.

In its basic rocket-finder mode, the TRANSROC emits a "beep" about once per second. Depending upon the level of interference present and the sensitivity of the receiver used, it can be received at distances up to five miles or more during flight and up to a few hundred yards after the rocket has landed. This signal can be used to locate hard-to-find rockets, and the TRANSROC is ideal for demonstrating the electronic techniques commonly used for locating lost weather balloons, rockets, and airplanes. Imagine the fun your group can have by holding rocket-finding contests with each contestant using a separate walkie-talkie.

Once you have mastered the operation of the TRANSROC in its rocket-finder mode, you are ready to add any of the accessories that will provide many more hours of educational enjoyment. You become an integral part of the flight as you listen to your rocket send data back to "Mission Control" on the ground.

You can add an accessory kit which includes a miniature microphone and tape record in sequence via your receiver the sounds from on-board the rocket: countdown, lift-off, coasting, parachute ejection, and landing. Playing the recording back at your next club meeting is sure to make a hit.

Another accessory for the TRANSROC is a spin-rate sensor that tells you how fast your rocket is spinning as it streaks upward. There are also two temperature telemetering kits for use in determining temperature versus altitude profiles in the lower atmosphere. This can be a useful technique for predicting air pollution conditions. Each accessory kit contains complete instructions for installation and operation plus explaining how to convert TRANSROC back to the rocket-finder mode.

The TRANSROC possibilities are not limited to the Estes accessories. Let your imagination run free! Designing and building your telemetering components for use with the TRANSROC can give you an even greater feeling of achievement in the ever-expanding field of model rocketry.

The TRANSROC is just one component of the most complete Model Rocketry line available. See the exciting world of Estes Model Rocketry in our current catalog. Send 25¢ to Estes Industries, Dept. TX, Penrose, Colo. 81240 for your copy.

TRANSROC - MODEL ROCKET TRANSMITTER (ROCKET-FINDING MODE)

The TRANSROC is the basic unit for use in all your transmitter activities. Used alone it sends out a "beep" approximately every second and is useful for demonstrating radio communication principles or tracking down a lost bird. With the addition of other components the TRANSROC can measure and send back air temperatures, spin rates, or the sounds of flight from on board the rocket.

Order this basic unit now, and get in on the fun and excitement of Rocketronics - the joining of electronics with model rocketry.

AVAILABLE IN KIT AND PREASSEMBLED FORM

If you are the do-it-yourself kind with experience in soldering and electronic construction, you should have no difficulty in assembling the TRANSROC from the Estes kit. If you do not have electronic experience or an experienced friend or relative who can help you, we recommend that you purchase your TRANSROC factory assembled. Either version of the TRANSROC (kit or assembled) will be supplied to you complete with copies of the "TRANSROC Owner's Manual" and the "Electronic Kit Builder's Handbook".

Specifications and Technical Information:

Complete specifications and additional technical information begin on page 5 .

Licensing:

None required. (See page 6 for details.)

Selecting the Proper Channel:

When ordering the TRANSROC be sure to specify which of the 23 CB channels you wish your TRANSROC to operate on. Of course, it must operate on the same channel as the walkie-talkie you now own or the one you may select. The TRANSROC in either kit or preassembled form when ordered for use on Channel 11 or 14 will normally be shipped from stock complete with crystal. This provides you with the fastest possible delivery.

TRANSROC kits ordered for use on CB channels other than 11 or 14 will normally be shipped from stock with a prepaid crystal certificate. You then fill in your name, address, and the desired CB channel and mail it to the crystal manufacturer to obtain the crystal you need.

Factory assembled TRANSROCS ordered for CB channels other than 11 or 14 may require extra time for delivery. If we stock the crystal you need, shipment can be made immediately, otherwise one to two weeks extra will be required in order for us to obtain a crystal for the proper frequency.

See page 5 for more information relating to CB frequencies and channels.

TX-1 (Kit Form)..... $14.95
TX-1A (Factory assembled and tested)..... $21.95

The TRANSROC is shown on page 8.

TRANSROC ACCESSORY KITS

Make your TRANSROC talk to you (and your tape recorder) about rocket flight by adding an accessory kit. Even when the TRANSROC is being used for telemetering or microphone operation it still provides you with essential rocket-finding information.

In the telemetering modes the TRANSROC transmits pulses that are spaced in proportion to the changing conditions on board your rocket. An educational challenge awaits you as you record and interpret this data.

When used in the microphone mode, the TRANSROC transmits an amplitude modulated signal similar to that transmitted by your local broadcast station or a walkie-talkie.

MICROPHONE KIT

The next best thing to flying with your rocket is to hear and record via TRANSROC and your walkie-talkie the on-board sounds of rocket flight.

With the microphone kit installed on the TRANSROC circuit board you will be able to record in sequence the sounds and exact timing of countdown, engine thrusting, coasting, parachute ejection, rubbing together of recovery components, and landing.

The kit consists of a miniature microphone, a transistor, two capacitors, and an instruction manual.

Kit TXA-1.....$2.95

SPIN-RATE TELEMETERING KIT

To increase the excitement and utility of your TRANSROC flights, you may add spin rate telemetering capability. This enables you to analyze your rocket's spin rate characteristics. A clear plastic payload section allows sunlight to strike the masked photocell. As the rocket spins during flight, more and less sunlight alternately strike the photocell causing the TRANSROC to transmit a tone which changes in proportion to the light intensity.

Kit consists of a specially masked photocell, two capacitors, and instruction manual.

Kit TXA-2 ..... $3.95

TEMPERATURE TELEMETERING KITS

Add even more to the versatility of your TRANSROC by making it capable of measuring temperature-versus-altitude (a function of flight time) in the lower atmosphere. Your TRANSROC data flights can include studies of temperature inversions and aid in predicting air pollution.

Both kits consists of a fast response thermistor in a special thermal-isolated mounting, two capacitors, a JT-50C stage coupler, a 1-1/2 inch piece of (BT-50AE) body tube, and an instruction manual.

Kit TXA-3 (50-110 deg. F. ground temp. range).... $5.95

Kit TXA-4 (20 to 60 deg. F. ground temp. range).. $5.95

PAYLOAD SECTION KIT:

Specifications:

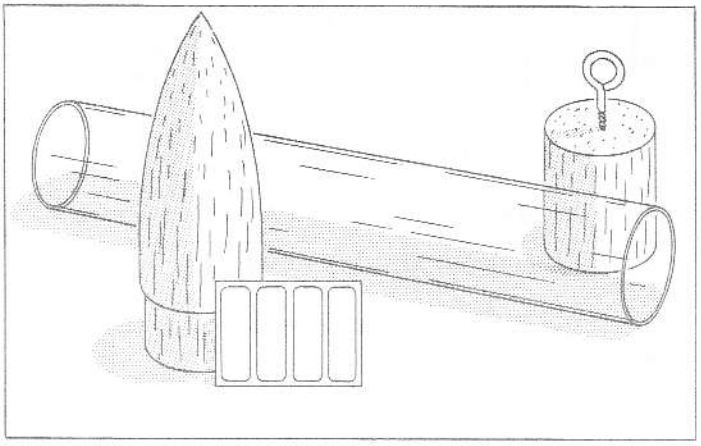
Inside diameter: 0.950 inch (Same as BT-50)

Inside length: 5.17 inches (Can be shortened for use without microphone, etc.)

Overall length: 9.42 inches

Net weight: 0.40 oz.

Construction: Clear plastic - accommodates standard TRANSROC or TRANSROC with accessories. May be modified for many applications.



Kit PS-50FJ $1.00

PLASTIC BODY TUBE: PST-50FJ

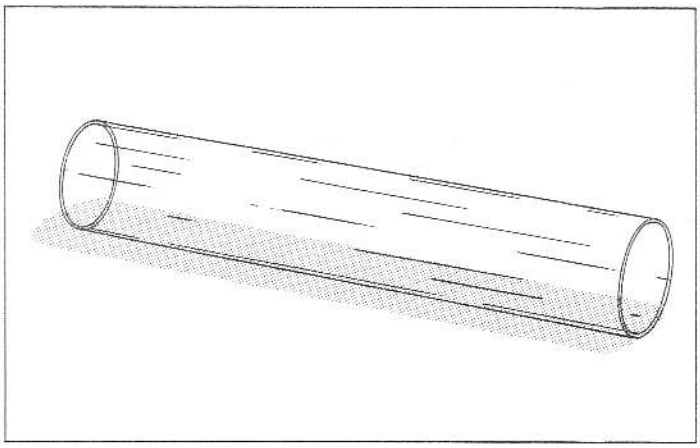
Same as included in PS-50FJ above

Specifications:

Inside diameter: 0.950 inch (same as a BT-50)

Length: 6.0''

Net Weight: 0.12 oz.



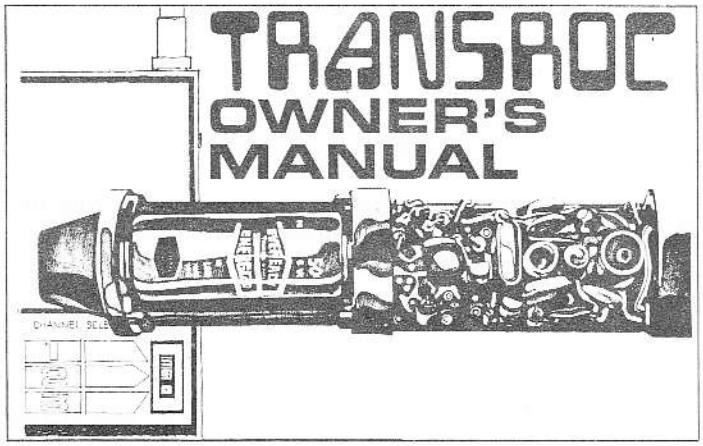
PST-50FJ . . . . . $.40

BATTERIES:

PFB-15 Eveready Type 504 or equivalent 15-volt battery (fits TRANSROC)..... $1.50

TRANSROC OWNER'S MANUAL:

Although the TRANSROC is an electronic device, no knowledge of electronic theory is needed in order to attach the components to the miniature circuit board. We rate the assembly of the TRANSROC kit as simple for those with some experience in soldering and electronics and difficult for those with no experience. The TRANSROC Owner's Manual gives complete, step-by-step instructions on assembly, theory, and operation of the TRANSROC, including many illustrations, schematic diagrams, photos, and block diagrams. It also contains basic information on operation in various telemetry modes. If you purchase and study in advance a copy of the Owner's Manual, you will be able to better determine whether you wish to tackle the assembly of the TRANSROC from a kit or whether purchase of a unit factory assembled and tested would be a better choice.



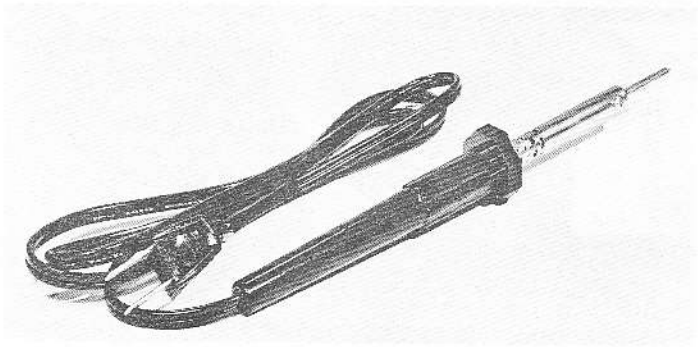
TX-IM $1.00

REPLACEMENT PARTS:

The Owner's Manual for each of the kits (TRANSROC and all accessories) contains a complete parts list including component descriptions and prices. Order these parts from your Manual.

SOLDERING PENCIL:

25 watt, top quality tool for making good connections in launchers, PC boards, and other electrical circuits. Does the work of many irons of higher wattage. Develops up to 720 deg. F. Handle remains cool. The "Electronic Kit Builder's Handbook" (included with TRANSROC kits) includes directions for dressing the tip to a "dull lead pencil" shape for soldering miniature PC boards such as TRANSROC. Use with RESIN core solder.



671-SI-2 . . . . . $4.00

RESIN CORE SOLDER

This coil of solder is the same as the solder included with the TRANSROC kit. It can be used with your soldering pencil (listed above) for soldering practice and/or construction of electronic devices. 36" per package.

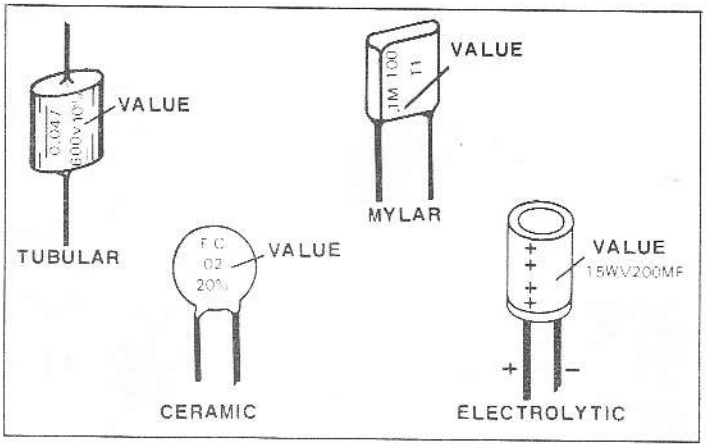
RS-1 . . . . . $.25

SPARE AND REPLACEMENT CRYSTALS

Transmit and receive crystals suitable for use with the TRANSROC and most walkie-talkies.

By purchasing extra crystals you can change the frequency of your TRANSROC or single channel walkie-talkie or make a multi-channel walkie-talkie capable of operating on more than the one channel which had factory installed crystals. Note that a pair of crystals (one transmit and one receive) are required in order to activate or change a channel on your walkie-talkie while only one crystal (transmit) is required to change the frequency of a TRANSROC.

Crystals ordered for use on channel 11 or 14 are normally shipped from stock. Crystals ordered for other CB channels are normally supplied via a prepaid crystal certificate. When you receive the certificate you fill in your name, address, the desired CB channel, and whether you want a transmit or a receive crystal. You then mail this certificate to the crystal manufacturer for redemption and receive the crystal you need from them by return mail.



REPLACEMENT PARTS

See page 5 for information relating to CB channels and frequencies.

TXX (transmit crystal) . . . Specify CB channel . $2.95

RXX (receive crystal) . . . Specify CB channel . $2.95

RECEIVER CONSIDERATIONS

An essential accessory for use with the TRANSROC is a portable receiver capable of operation in the 27 Mhz Citizens Band. A communications receiver, such as those used for amateur radio or a Citizens Band receiver (either fixed or mobile), works well except for rocket finding or other applications where portability is required.

Walkie-talkies are mass produced in Japan at low cost. Some of them are ideal for use as receivers for the TRANSROC. If you buy two or more of them, you can also have the added enjoyment and utility of two-way communication with your friends. Be careful when buying a walkie-talkie though. While some work very well with the TRANSROC, others can be worse than useless and may even cause you to lose your rocket.

There are two types of receivers commonly used in walkie-talkies. One (the superregenerative) has the advantage of low cost, and the other (the superheterodyne) has the advantage of far superior performance.

Superheterodyne receivers when used with the TRANSROC provide from five to more-than-ten times the operating range that can be expected from the use of superregenerative receivers. Because of this vast difference in performance we at ESTES INDUSTRIES recommend only walkie-talkies that employ superheterodyne receivers.

TABLE OF CB CHANNELS AND RESPECTIVE CRYSTAL FREQUENCIES

CB CHANNEL	TRANSROC & WALKIE-TALKIE TRANSMIT CRYSTAL	WALKIE-TALKIE RECEIVE CRYSTAL	CB CHANNEL	TRANSROC & WALKIE-TALKIE TRANSMIT CRYSTAL	WALKIE-TALKIE RECEIVE CRYSTAL
1	26.965	26.510	13	27.115	26.660
2	26.975	26.520	14	27.125	26.670
3	26.985	26.530	15	27.135	26.680
4	27.005	26.550	16	27.155	26.700
5	27.015	26.560	17	27.165	26.710
6	27.025	26.570	18	27.175	26.720
7	27.035	26.580	19	27.185	26.730
8	27.055	26.600	20	27.205	26.750
9	27.065	26.610	21	27.215	26.760
10	27.075	26.620	22	27.225	26.770
11	27.085	26.630	23	27.255	26.800
12	27.105	26.650			

ADDITIONAL INFORMATION AND DATA ON THE TRANSROC SYSTEM

SPECIFICATIONS:

Weight including battery: 1.3 ounces

Length including battery: 4.2 inches
(Add approximately 1 additional inch to rocket length for microphone or temperature TM mode.)

Length of trailing wire antenna: 30 inches

Diameter - TRANSROC/battery assembly:
The TRANSROC/battery assembly fits into a BT-50 (paper) or PST-50FJ (clear plastic) body tube.

Circuitry - all silicon: 5 transistors including one unijunction plus 5 diodes

Transmitter power input: 100 milliwatts

Transmitter frequency tolerance: ±0.005%

Battery: Miniature 15 volt (Eveready type 504, Ray-O-Vac # 220, Burgess type Y10, etc.) -- not included

OPERATING VOLTAGE RANGE

Rocket Finder mode: 6 to 15 volts

Temp. and Spin Rate TM modes: 9 to 15 volts

Microphone mode: 12 to 15 volts

CURRENT DRAIN (average)

Rocket finder mode: 3 milliamperes

Temp. and Spin Rate TM modes: 3 to 4 milliamperes

Microphone mode: 11 milliamperes

BATTERY LIFE CONSIDERATIONS:

Approximate total useful battery life, intermittent useage:

Rocket Finder mode: 24 hours

Temp. and Spin Rate TM modes: 10 hours

Microphone mode: 1 hour

A single battery will usually be sufficient for a year or more of rocket finding and telemetering useage by the average rocketeer. Due to more severe battery requirements (higher current drain and higher minimum useable voltage) the battery life is much shorter (six to ten flights) in the microphone mode. Of course, the sooner you recover your rocket and turn off the TRANSROC, the more flights you can expect from a battery.

After a battery has served its useful life in the microphone mode, it will usually be plenty good for a number of flights in the other modes (particularly rocket-finding). We recommend therefore that you purchase a new battery when you are going to undertake a series of microphone mode flights. You can use the "new" of it in the microphone mode and then finish it off in other applications.

CHANGING MODES:

The TRANSROC is changed from one operating mode to another by adding, removing, or replacing one or more of the components. Eyelets are provided at these "change" points in order to reduce the chance of printed circuit board damage caused by repeated application of soldering heat.

LICENSES:

The TRANSROC may be operated legally without obtaining an FCC license since it complies with part 15 of the FCC regulations as follows:

a. The power input to the final RF amplifier does not exceed 100 milliwatts.

b. The antenna does not exceed five feet in length.

c. The transmitter frequency is confined within the limits of the 27 MHz citizens band (26.97 - 27.27 MHz) and any radiation outside these frequency limits is at least 20 decibels below the power level of the RF carrier.

RECOMMENDED ROCKETS AND ENGINES:

The TRANSROC can be used with any rocket which has a BT-50 diameter payload section. (Directions are also included for installing it in larger payload sections by the use of suitable adapters.) The payload compartment must have an inside length of at least 4.2 inches. An attractive transparent payload section can be made by using a PST-50FJ clear plastic body tube. A transparent payload section is a requirement for use with the spin-rate TM mode.

Any engine can be used which is capable of lifting the weight of the rocket plus the 1.3 ounce weight of the TRANSROC to the desired altitude. Some typical examples are listed:

1. Single-stage rockets which have BT-50 payload sections and are suitable for use with C6-5 engines:

   X-Ray, Constellation } TRANSROC requires a longer payload body tube.

   Drifter, Alpha, Sprint } Complete new payload section required. (Cat. PS-50FJ or equivalent)

2. Two-stage rockets which accommodate BT-50 payload sections and are suitable for use with C6-0/C6-7 engine combinations:

   Shrike - Longer payload body tube required (BT-50 or PST-50FJ)

   Avenger - Comes complete with extra-long payload section to carry all versions of TRANSROC. (PST- 50FJ can be substituted.)

   Delta - Complete new payload section required (PS-50FJ or equivalent)

3. Other ESTES rockets which can be modified for use with TRANSROC are:

Cobra, Farside } Longer payload body tube required (BT-50 or PST-50FJ)

Scrambler, Sandhawk, Omega } Adapter assembly required (Instructions in Owner's Manual)

Recommended engines are C6-5, C6-0/C6-7, DI2-5, and DI2-0/DI2-7.

See the current ESTES Model Rocketry Supplies catalog for more information on the complete line of Estes Model Rockets. Send 25¢ to Estes Industries, Dept. TX, Penrose, Colo. 81240 for your copy.

DATA REDUCTION

Any metering system (telemetering or other) must be calibrated in meaningful units before the data is very useful. Preparation for a TRANSROC temperature flight usually includes recording three or four temperature calibration points.

The data reduction procedure begins with transferring the tape-recorded data to a chart (analog) recording. Final data reduction consists of measuring the spacing between pips on the chart recording and plotting two graphs. The first is a temperature calibration graph for the TRANSROC, and the second is a graph of temperature versus flight time. Detailed instructions are included in the Owner's Manual Supplement supplied with the temperature TM kit. "Typical" calibration curves are also included which you may prefer to use.

For those who may not be familiar with analog recorders, a brief explanation may be in order. An analog recorder is a device that records on a paper chart the analog (equivalent) of a physical or electrical function. In the case of temperature data telemetered from the TRANSROC, the function being recorded is the output voltage from your receiver (or tape recorder) and is, therefore, the analog (equivalent) of the signal being transmitted from the TRANSROC. The vertical axis of the recording signal is amplitude, and the horizontal axis is time.

The physics department of most schools and universities would have an analog recorder, and (if asked in a nice way) many teachers and professors would be willing to help you transfer your data.

OTHER ROCKETRY APPLICATIONS OF THE TRANSROC

1. Determine the velocity of a rocket launched in the temperature TM mode. This process would begin with a determination of aerodynamic heating (as extracted from the ascent and descent temperature profiles). A formula plus rudimentary information about its application and limitations are included in the temperature TM kit owner's manual. A challenging project for those who wish to do further study.

2. Combine the TRANSROC with microphone kit and an Estes CINEROC model rocket movie camera to produce a sound-color motion picture that would be a real wow. This would require including in your rocket enough sound-insulating material to effectively isolate the microphone from the noise generated by the CINEROC. Be careful though. Providing adequate acoustical insulation could turn out to be a severe challenge!

NON-ROCKETRY APPLICATIONS:

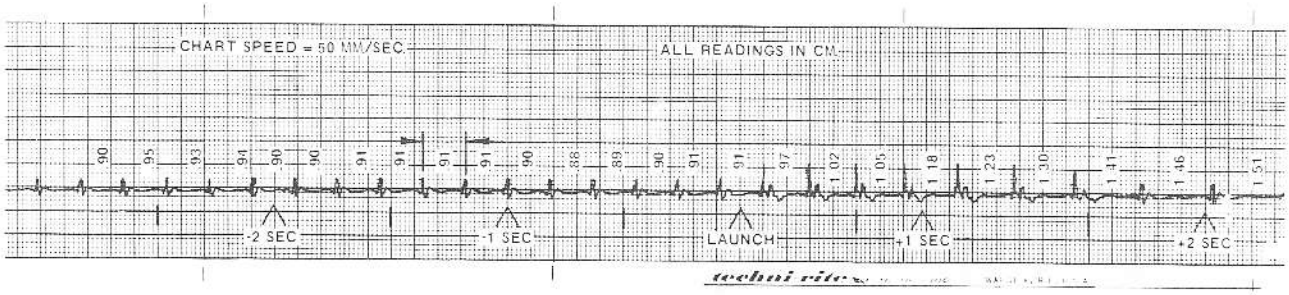
Although the TRANSROC was designed for model rocketry, other applications are feasible as well. The following are a few possibilities:

1. Install the TRANSROC (rocket-finder mode) in a free-flight model airplane to aid in locating it after it has landed.

2. Install the TRANSROC (microphone mode) in a radio-controlled model airplane to enable the operator to hear the engine for better feel for the operation of the model. A word of caution: when a transmitter and a receiver are operated simultaneously in the near proximity of each other, the transmitter may cause interference to the receiver, even though they are not on exactly the same frequency.

3. Install TRANSROC (spin-rate telemetering mode) on an oscillating or rotating machine. The TRANSROC will telemeter the rate of cycle rotation the same as it would that of a spinning rocket.

4. Install a TRANSROC with temperature TM kit on a kite or balloon and telemeter temperature for a much longer flight duration than would be possible in a model rocket.



SAMPLE CHART RECORDING

SUPPLEMENTARY INFORMATION RELATING TO TYPES OF RECEIVERS USED IN WALKIE-TALKIES.

If you presently own one or more super-regen walkie-talkies we recommend that you purchase your TRANSROC plus a superheterodyne walkie-talkie, both with crystals for use on the same citizens band channel as your super-regen walkie-talkie(s).

Your super-regen walkie-talkie will probably receive the TRANSROC during part of it's rocket flight and can serve in conjunction with the superheterodyne walkie-talkie to provide communication between two or more points for launch recording, coordination, for TM applications as a beat frequency oscillator, etc.

The following information will help you to determine what type receiver is employed in your present walkie-talkie or one that you may be considering purchasing:

(1) Superheterodyne walkie-talkies cost considerably more (usually at least twice as much as super-regens).

(2) Superheterodynes have two crystals per operating channel while super-regens have only one (since super-regen receivers are not crystal controlled).

(3) Superheterodynes usually have six or more transistors while super-regens usually have five or less.

(4) The sensitivity and selectivity of a superhyterodyne is far superior to the sensitivity and selectivity of of a super-regen.

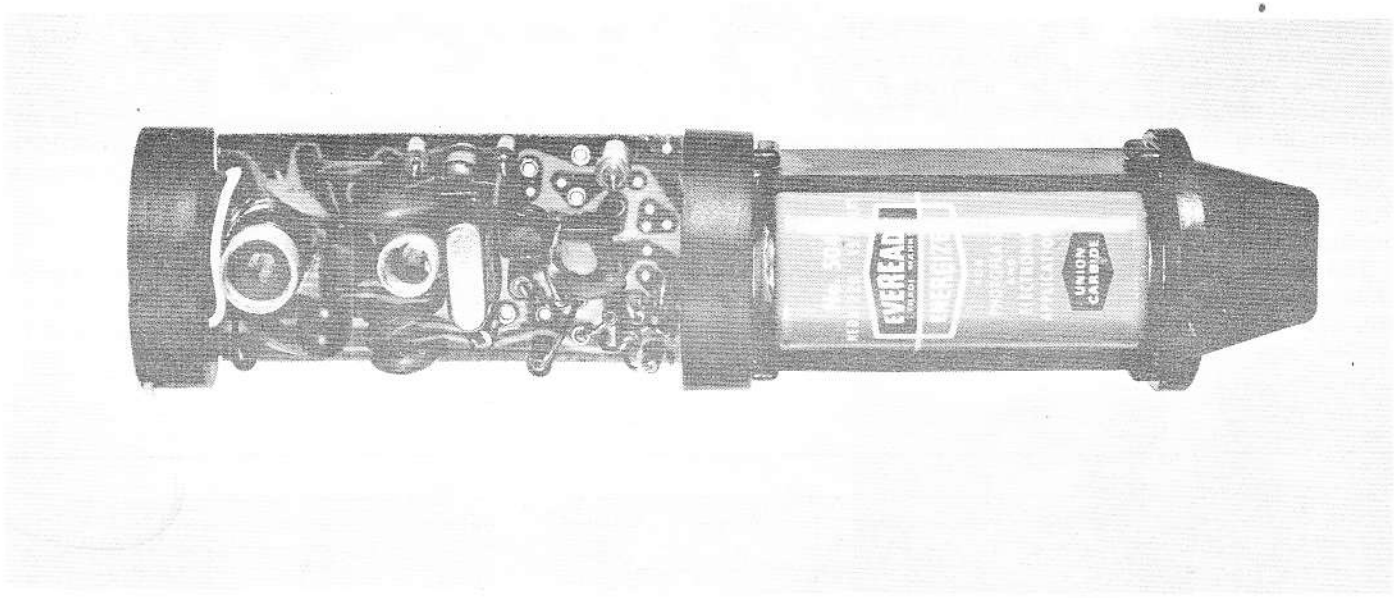
(5) A super-regen usually emits a louder hiss when not receiving a signal than does a superheterodyne.

CRYSTALS AND FREQUENCY COMPATIBILITY CONSIDERATIONS

It is absolutely essential that your TRANSROC and your walkie-talkie have crystals for compatible operation on the same CB channel. The prices listed for the TRANSROC include a crystal for operation on one channel.

If you already own one or more walkie-talkies which would be suitable for use with the TRANSROC, you will need to specify the proper channel when ordering the TRANSROC. Check the markings on the crystals in your walkie-talkie and compare them with the tabulated information in the chart. If your present walkie-talkie is a super-regenerative type, you will probably want to purchase both a TRANSROC and a superheterodyne walkie-talkie for the same channel as your super-regen.

If you have a multi-channel walkie-talkie with only one pair of factory installed crystals, you may wish to activate one or more additional channels by plugging in extra crystals. Note that a pair of crystals (one transmit and receive) is required to activate a spare channel in your walkie-talkie.



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