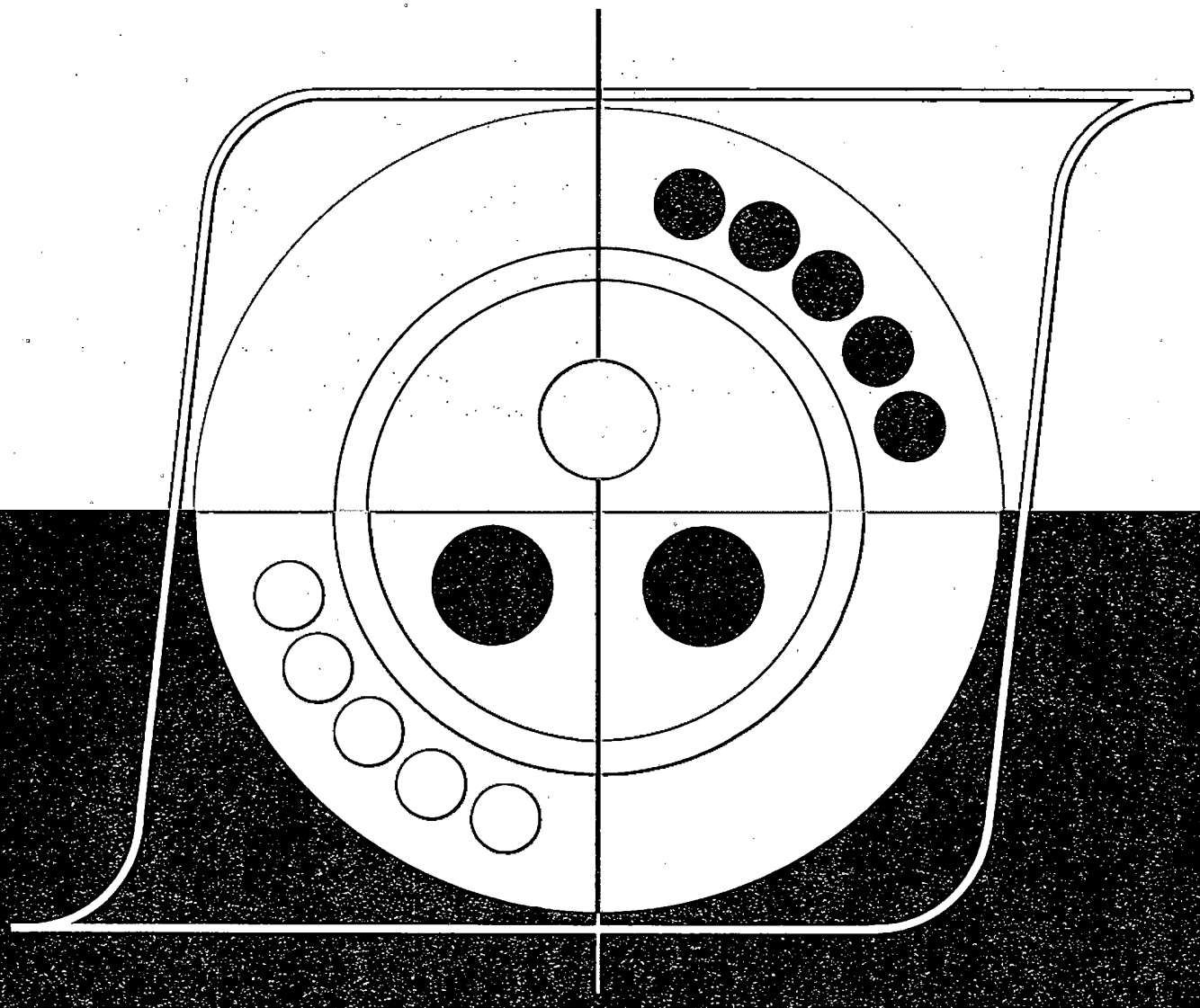
custom

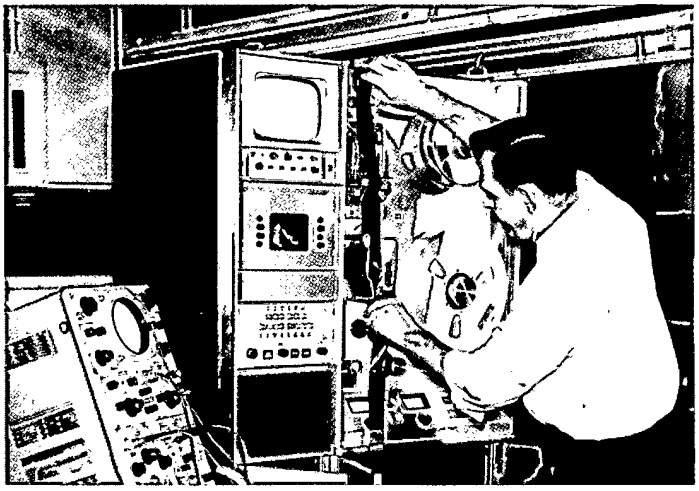
recording equipment for military & space programs



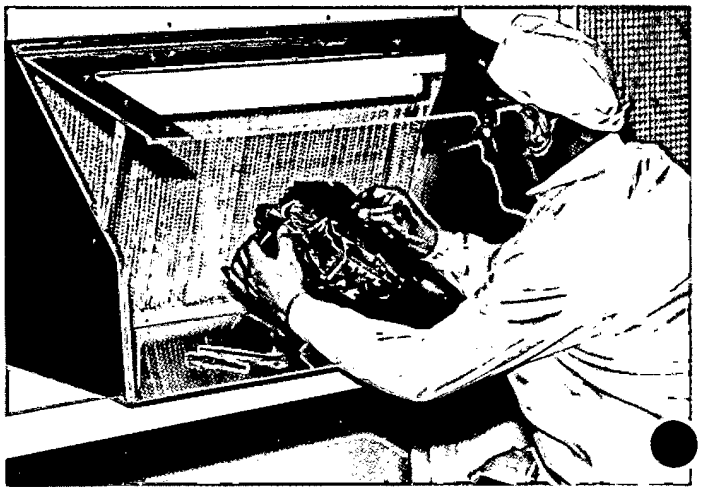
RCA DEFENSE ELECTRONIC PRODUCTS • COMMUNICATIONS SYSTEMS DIVISION

Declassified and Approved For Release 2012/11/15 : CIA-RDP79B00873A002900020085-9

Testing a Continuous Video Recorder



Assembling a Gemini Recorder in a Recording White Room



introduction

The Radio Corporation of America has long been a recognized leader in the design and development of a wide range of magnetic recording products. RCA's activity in this area began back in the middle forties, and through the years has contributed numerous advances in recording technology and has accumulated a vast amount of knowledge and experience in the magnetic recording field.

A significant portion of RCA's research, development and production facilities is devoted directly to magnetic recording. Activities within the various divisions of the company are closely coordinated to insure efficient use of research, development, manufacturing skills and experience in developing a wide range of magnetic recording products for military and commercial applications.

The Magnetic Recording Engineering Department within the Communications Systems Division has primary responsibility for coordinating RCA's military and aerospace magnetic recording activities. This well staffed and experienced organization is equipped to meet the complex requirements in developing custom magnetic recording equipment for military and space systems. A continuing emphasis by this department on extending the present state of the art in all magnetic recording developments enables RCA to meet the exacting requirements of military and aerospace systems.

DEP

CATALOG B-146

TR22
HL-CVR

CONTINUOUS WIDEBAND RECORDER

FEATURES

- *Transient Free Operation*
- *Excellent Time Base Stability*
- *Supplied with Either One or Two Wideband Channels*
- *Airbearing Headwheel for Maximum Stability and Long Life*
- *Advanced Design Functionally Styled for Utmost Ease of Operation*
- *Instrumented Test, Setup Procedures*
- *Illuminated Warning and Mode Indicators to Determine Operational Status*
- *Economical, Low Power Operation*
- *Plug-in Modular Construction*

RCA DEFENSE ELECTRONIC PRODUCTS • COMMUNICATIONS SYSTEMS DIVISION

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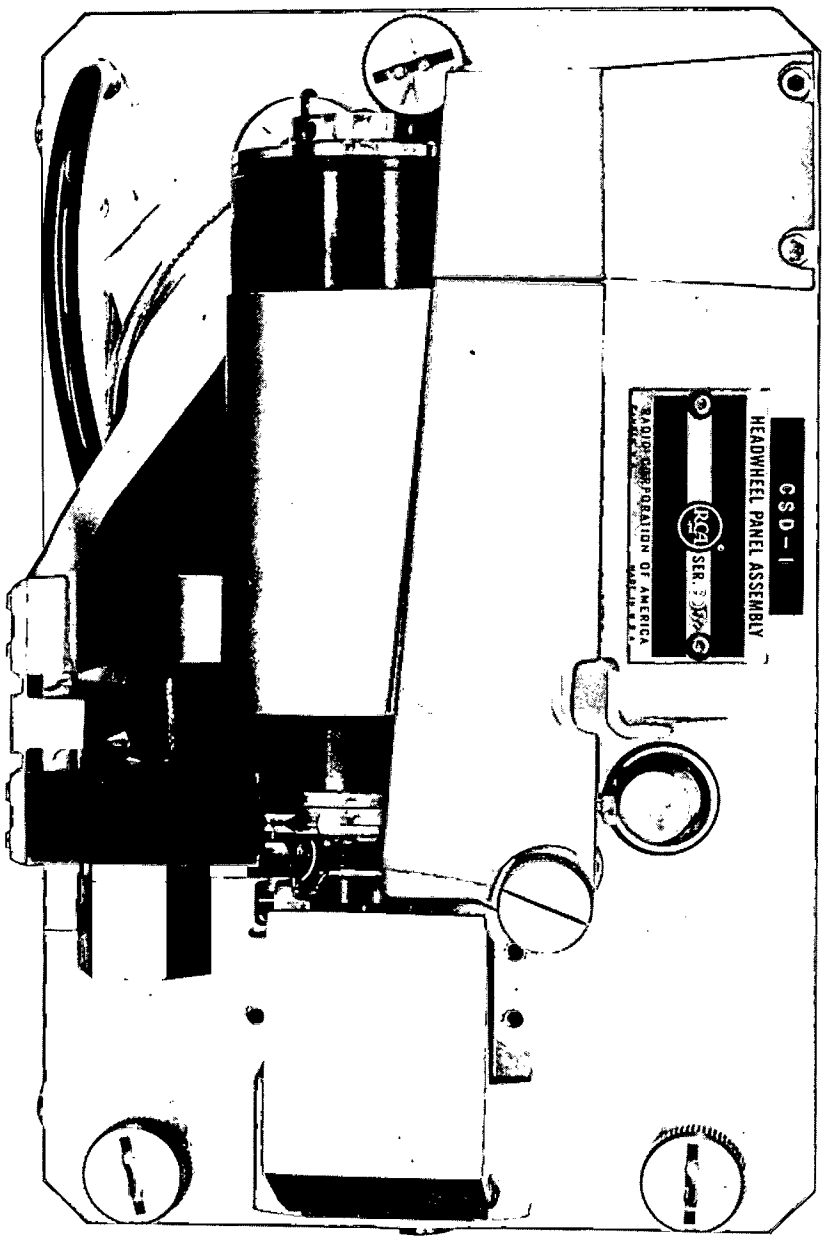
SELECTED FEATURES



- Outstanding single or dual channel performance due to superior Octaplex Headwheel Design
- Built-in precise crystal timing reference
- Switchable Frequency Response (4 mc/6 mc)
- Full line of accessories for ultra-precise time-base stability
- Provision for range marker insertion
- Permits N time around range tracking
- Pulse amplitude linearity better than 5%
- (2) 10 KC Auxiliary Channels
- Can be used to playback standard television information

Single Channel Quadruplex Airbearing Headwheel Panel Assembly

CATALOG B-146-B

TR22
HL-CVR

CONTINUOUS WIDEBAND RECORDER

SPECIFICATIONS

General

Recording Medium ..... Magnetic tape 2 in. wide
Tape Speed ..... 15 inches per second
Recording Time ..... 96 min. on a 14 in. reel (7200 ft.)
Rewind Time ..... Approx. 4 min. for 7200 ft. reel
Recording Time Reference ..... Internal Crystal
Playback Time Reference ..... Internal Crystal
Reference Switchable to External Line or Sync for TV Recording Purposes
Stopping Time ..... Approx. 0.2 sec. from Record or Play Mode
Start Time for Stabilized Video and Auxiliary Information .... Approx. 5 seconds from stop, approx. 3 seconds from standby or set-up
Tape Interchangeability ..... Tapes are made on any machine providing they are made in accordance with all applicable recommended practices
Tape Timer ..... Accumulated time measured in minutes and seconds

Video Channel

Bandwidths:	BW
STD I HiBand 6 MC	30Hz to 6MHz ±1.5db
STD II HiBand 4 MC	30Hz to 4MHz ±1.5db
STD III LoBand 4 MC	30Hz to 4MHz ±1.5db

	S/N	
	Full Track	Half Track
STD I	38	36
STD II	40	38
STD III	40	38

Linearity ..... Within 5% measured from max. dynamic range to 20db below max.
Rise Time 100ns
Overshoot 10%
Transient Level ..... 6db below peak noise
Input Volts/Imped. ..... 0.5VPP to 1.5VPP/75 ohms
Output Volts/Imped. ..... 1.0VPP/75 ohms
No. of Video Outputs 3
Time Base Stability ..... Tonewheel Servo (CVR option)—150ns rms absolute phase error (approx. 300ns peak)
Electronic Time Base Correction ..... (—3 option) 10ns rms absolute phase error (approx 20ns peak)

Auxiliary Channels*

No. of Aux. Channels 2
Freq. Response ..... Aux 1 50Hz to 10KHz ±3db
Aux 2 350Hz to 10KHz ±3db
Signal-to-Noise Ratio ..... Aux 1 30db rms sig/rms noise
Aux 2 30db rms sig/rms noise
Volts In/Impedance:
Aux 1 —20dbm to + 18dbm / 10K Bal. Bridging
Aux 2 —20dbm to +18dbm / 10K Bal. Bridging
Volts Out/Impedance
Aux 1 +18dbm/600 ohm w 1000Hz In @ —20db
Aux 2 +18dbm/600 ohm w 1000Hz In @ —20db

* digital replacement specifications available on request.

Mechanical Specifications

Transport ..... Centrally located at 45 degree angle and at a reel height of 48 inches (122 cm)
Cooling ..... Filtered, forced air
Weight, Shipping ..... Approximately 1400 lbs.
Dimensions:
Width (overall) ..... 55 inches
Width (less end panels) ..... 53 inches
Height ..... 71¼ inches
Depth ..... 26½ inches

Models

Four basic models are available.
TR22-HL-CVR with 150ns rms absolute time base stability
TR22-HL-CVR-3 with 10ns rms absolute phase time base stability
TR22-HL-2CVR (2 video channels)
TR22-HL-2CVR-3 (2 video channels)

Equipment Supplied

All models include the following equipment complement:
1 TR22-HL-CVR Tape Recorder (Console Mounted) complete
1 Headwheel Panel Assembly (Air-bearing)
2 End Panels
1 Kit of Maintenance Materials

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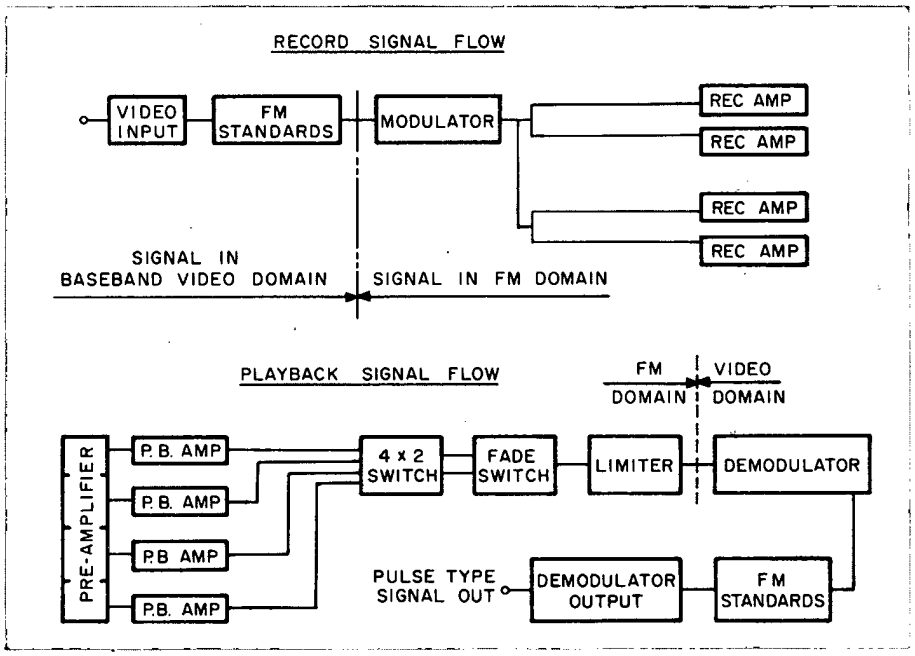

FM & Video Block Diagram, TR22-HL-CVR

APPLICATIONS

The TR22-HL-CVR is a deluxe, extremely flexible, transient free wideband recorder. It represents the most advanced wideband recorder/reproducer available to the military and aerospace market.

The TR22-HL-CVR is an ideal instrument for use in recording radar, sine wave, predetection IF and PPI display information. It is suitable for applications requiring continuous pulse recording bandwidths up to 6 megahertz, with excellent time-base stability. It can be used onboard ship, for remote field installation, in research laboratories, and can be flown in large or medium sized aircraft.

The TR22-HL-CVR is completely modularized. It is designed to accept accessories that will provide varying degrees of time-base stability, data channel bandwidth, and remote control operation. It may be operated at either 7½ or 15 IPS recording speeds, (for single channel) providing continuous recording time to three hours maximum.

DESCRIPTION

The basic machine can be supplied in either of two versions; a single channel continuous wideband recorder, Type TR-22-HL-CVR, or a dual channel continuous wideband recorder, Type TR22-HL-2-CVR. This dual channel recorder offers two 6-megahertz recording channels. Interchannel time-base stability of the basic TR22-HL-CVR is 100 nanoseconds peak. This can be further improved to 10 nanoseconds RMS by the addition of an electronic variable delay line accessory. (This is also available for the single channel recorder.) It provides time-base stability within each channel of 10 nanoseconds RMS.

The TR22-HL-CVR series of recorders makes use of a technique known as fade switching to provide continuous transient-free playback of pulse and analog information. Both the quadruplex and octaplex record/playback headwheel assemblies utilize air bearings and ultra-precise vacuum guide positioning. Both these factors play an important part in achieving the excellent time-base stability of which the TR22-CVR is capable.

A Switchable bandwidth and FM standards feature permits recording of video information at either 4 or 6 MHZ bandwidth. In addition to the main channel, two 10 KC audio channels are offered as standard. Additional options are available to further increase the bandwidth of the auxiliary channels if required.

The all solid-state construction of the TR22-HL-CVR assures maximum dependability, reliability, and a minimum of maintenance. The equipment is entirely of modular construction and has been functionally designed for utmost ease of operation. Built in features include a video monitor and a series of indicator lights which indicate operational status as well as faulty operation during record or playback, enabling technicians to quickly locate, isolate and correct malfunctions, should they occur.

The built-in monitoring features of the TR22-CVR permit an operator to readily setup the recorder utilizing a standard SMPTE video alignment tape.

The inclined, waist-high tape deck and strategically placed controls and visual and audio monitoring facilities result in extreme simplicity and ease of operation and loading and threading of tape.

The TR22-CVR is a completely self-contained, compact console unit, measuring 55 inches wide, 71¼ inches high, and 26½ inches deep. It weighs less than 1600 pounds and requires approximately 2 KW of power.

LIST OF ACCESSORIES

Auxiliary Channels to Order

EVDL Time Base Accessory

Spare Airbearing Headwheel Panel Assembly (Quadruplex)

Spare Airbearing Headwheel Panel Assembly (Octaplex)

UNIT DESIGNATIONS

RCA has developed a line of broadcast quadraplex video recorders second to none in the industry. As defense needs for ultra-wideband data recording increased, RCA developed a means of adding modifications to a broadcast video recorder to make it a "black box" and thus permit many defense recording tasks to be tackled in a sound, economic manner. Basically, the changes are concerned with changing the unit from a discontinuous TV display (line-by-line interruption) to a Continuous Video Recorder. Many wideband recording tasks such as radar, spectrum monitoring, wideband telemetry, and pre-detection wideband signals can then be handled on the wideband video channel of the recorder.

The letters CVR after any of RCA's broadcast line units thus identify the unit as having the modification kit necessary for continuous general purpose recording. It is interesting to note that the CVR mod kit in no way interferes with the ability to reproduce a TV test or program tape. RCA presently offers 5 quadraplex type recorders: the TR70, TR22, TR4, TR3 and the TR5.

Further options, such as 2 video channels, multiple standard operation (paralleling TV type units) and electronically variable delay lines can also be added. These features are designated with additional numerical and letter designations such as:

CVR = Continuous Video Recorder
HL = Hi-Band/Lo-Band Multiple Standard Unit
—3 = Electronically Variable Delay Line Time Base Correction
—2 = 2 Video Channels

Examples of various units which may be ordered are:

TR22-CVR: A basic 4 MC bandwidth unit with transients removed.

TR22-HL-CVR: A dual bandwidth, dual FM standard TR22 with transients removed.

TR22-HL-CVR-3: A TR22-HL-CVR with electronic time base correction.

TR4-2-CVR: A dual channel 4 MC unit with transients removed.

Specifications applicable to each selected option are available on the insert sheet.

Units commonly available are:

TR22-CVR	TR4-CVR	TR5-CVR
TR22-CVR-3	TR4-CVR-3	TR5-CVR-3
TR22-2-CVR	TR4-2-CVR	TR5-2-CVR
TR22-2-CVR-3	TR4-2-CVR-3	TR5-2-CVR-3
TR22-HL-CVR	TR4-H-CVR	TR5-LO-10-CVR
TR22-HL-CVR-3	TR4-H-CVR-3	TR5-LO-10-CVR-3
TR22-HL-2-CVR	TR4-H-2-CVR	TR5-LO-10-2-CVR
TR22-HL-2-CVR-3	TR4-H-2-CVR-3	

For Further Information Please Contact:

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Communications Systems Division
Defense Electronic Products
Radio Corporation of America, Bldg. 1-3
Camden, New Jersey 08102
Telephone: (609) 963-8000

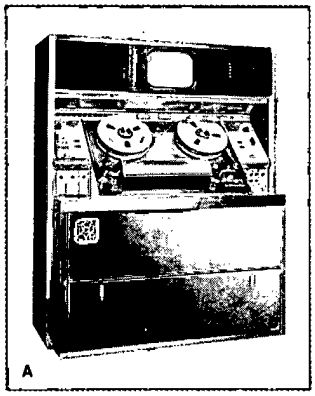
THE MOST TRUSTED NAME IN ELECTRONICS

supporting facilities The Magnetic Recording Department of the Communications Systems Division, located in Camden, New Jersey, is staffed with experienced managers, engineers, scientists and other specialists supported by excellent research laboratories, well-equipped model shops, manufacturing facilities and environmental laboratories. A Standards Department, modern production line techniques and comprehensive Product Assurance Programs provide equipment of uniformly high quality and reliability.

In addition, significant complementary research is conducted in magnetic recording techniques by the Defense Electronic Products Applied Research Activity, the RCA Laboratories at Princeton, New Jersey, RCA's Astro-Electronics Division where special skills and experience directly applicable to electronic and electromechanical space systems have facilitated development by RCA of a number of successful satellite recorders, and the Broadcast and Communications Products Division with its wideband video and magnetic head development activities.

design experience RCA's Defense Electronic Products Magnetic Recording Engineering capability has been gained through a series of challenging development tasks that have extended the recording "state of the art" significantly in reliable performance under rigorous environmental conditions for a number of important military programs.

- Aerospace Recorders, for such vehicles as Gemini, Tiros, Nimbus and OGO.
- Aerospace wideband Transverse Scan Recorders.
- Navy and Submarine Shipboard Radar Recorder/Reproducers.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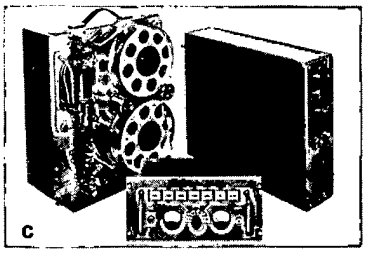
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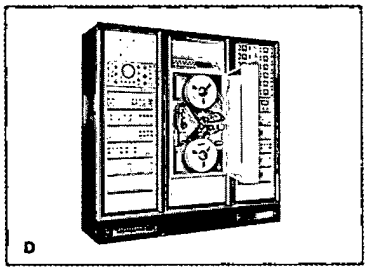
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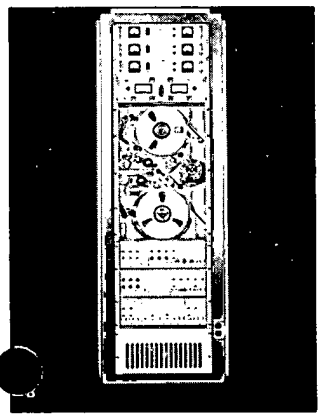
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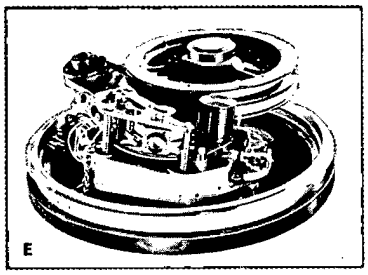
E

- Wideband multi-track longitudinal precision radar recorder/reproducers used in precision instrumentation radar recording.
- Portable Video Recorders for use in nuclear submarines and for a variety of mobile applications.
- Continuous Video Recorders for Radar, Spectrum, Pre-Detection and all wideband Instrumentation Recording Applications.
- A series of high-performance transverse and helical scan recording equipments for radar and instrumentation recording applications demanding high stability and bandwidths to 10 megahertz.
- Tactical Tape Cartridge Recorder/Reproducers developed for the U.S. Army Missile Command to program automatic checkout ground support equipment computers.
- Low Speed Video data reduction equipment for direct computer reduction of wideband Video Data or for time expansion and compression.
- Miniature Spaceborne Video Recorders.

advanced development In our laboratories, we are continually involved in development programs to improve the technology of magnetic recording products.

Typical of these developments are:

- Recording of 20 megabit digital data rates, 15 megahertz analog data rates and packing densities of over 5000 bits per linear inch.
- Video and Telemetry Data Cartridge recorders for space applications.
- Low cost slant track recorders for wideband recording.
- Eight channel wideband Instrumentation Recorders.

A 6 Mc Continuous Video Recorder **B** Two-Channel Radar Video Recorder **C** Portable Video Recorder **D** Precision Wideband Radar Recorder **E** Tiros Satellite Television Recorder

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For further information on RCA Communications Systems Division Products, their facilities for research and development . . . write or call • Manager, Marketing Department, Building 1-3 • Area Code 609 WO 3-8000 • Defense Electronic Products • Communications Systems Division • Radio Corporation of America, Camden, New Jersey . . . or your nearest RCA Defense Electronic Products field office.

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