Librascope

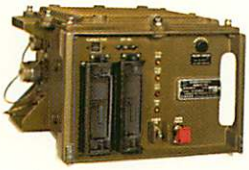
Tactical Computer Terminal (TCT)
AN/UYQ-30
AN/UYQ-30(A)
AN/UYQ-30( )

Tactical Computer Terminal was developed for use by the U. S. Army by Librascope Corporation.

TCT Modular Configuration

JUNCTION BOX
J-3696A/UYQ-30

LINE PRINTER-PLOTTER
RP-271 A/G



MAGNETIC TAPE
RECORDER-REPRODUCER
RD-463/UYQ-30

DISPLAY-KEYBOARD PROCESSOR
CP-1414A/UYQ-30

TAPE TRANSPORTS

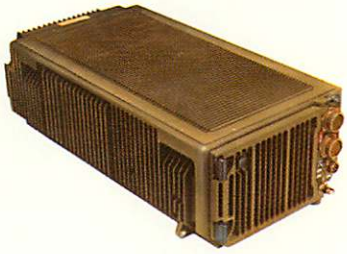
POWER DISTRIBUTION MODULE
SB-4057/UYQ

POWER SUPPLY
PP-7607

SECONDARY/MEMORY OPTIONS

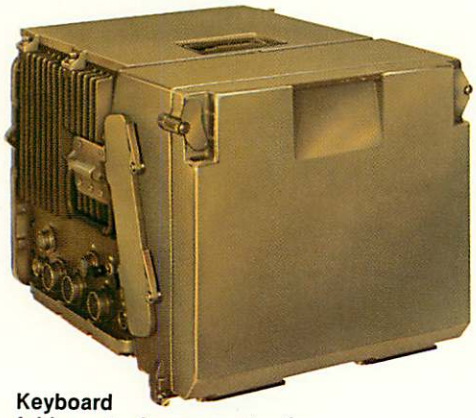
FLEXIBLE DISK
RECORDER-REPRODUCER
USED IN AN/UYQ-30

MAGNETIC BUBBLE
RECORDER-REPRODUCER
USED IN AN/UYQ-30(A)



WINCHESTER DISK
RECORDER-REPRODUCER
USED IN AN/UYQ-30( )

Fully Militarized Tactical Computer Terminal



Keyboard folds up to form a protective cover in transport configuration.

The Tactical Computer Terminal (TCT), designed and manufactured by the Librascope Corporation, is a fully militarized, compact, general purpose data processing, display, and communication terminal for Army field use at all echelons in a variety of highly mobile tactical applications. It facilitates the collection, generation, review, analysis, and distribution of tactical information both in textual and graphics modes.

The TCT is available in three versions with different options for secondary memory:

- AN/UYQ-30 with Flexible Disk
- AN/UYQ-30(A) (TCT ') with Magnetic Bubble
- AN/UYQ-30( ) with Winchester Disk

TCT capabilities include: Computation; Data Entry; Message Composition and Editing; Validation; Processing, Storage; Message Filing; Data Base Management; Display/Printout; Transmission/Reception; and Monitoring of digital and voice

messages using standard existing and planned Army tactical communications equipment. The TCT communicates over two independent full or half duplex ports.

TCT design is modular in both hardware and software. Hardware modularity is achieved through the use of many different peripherals including bulk memory devices.

Display-Keyboard Processor

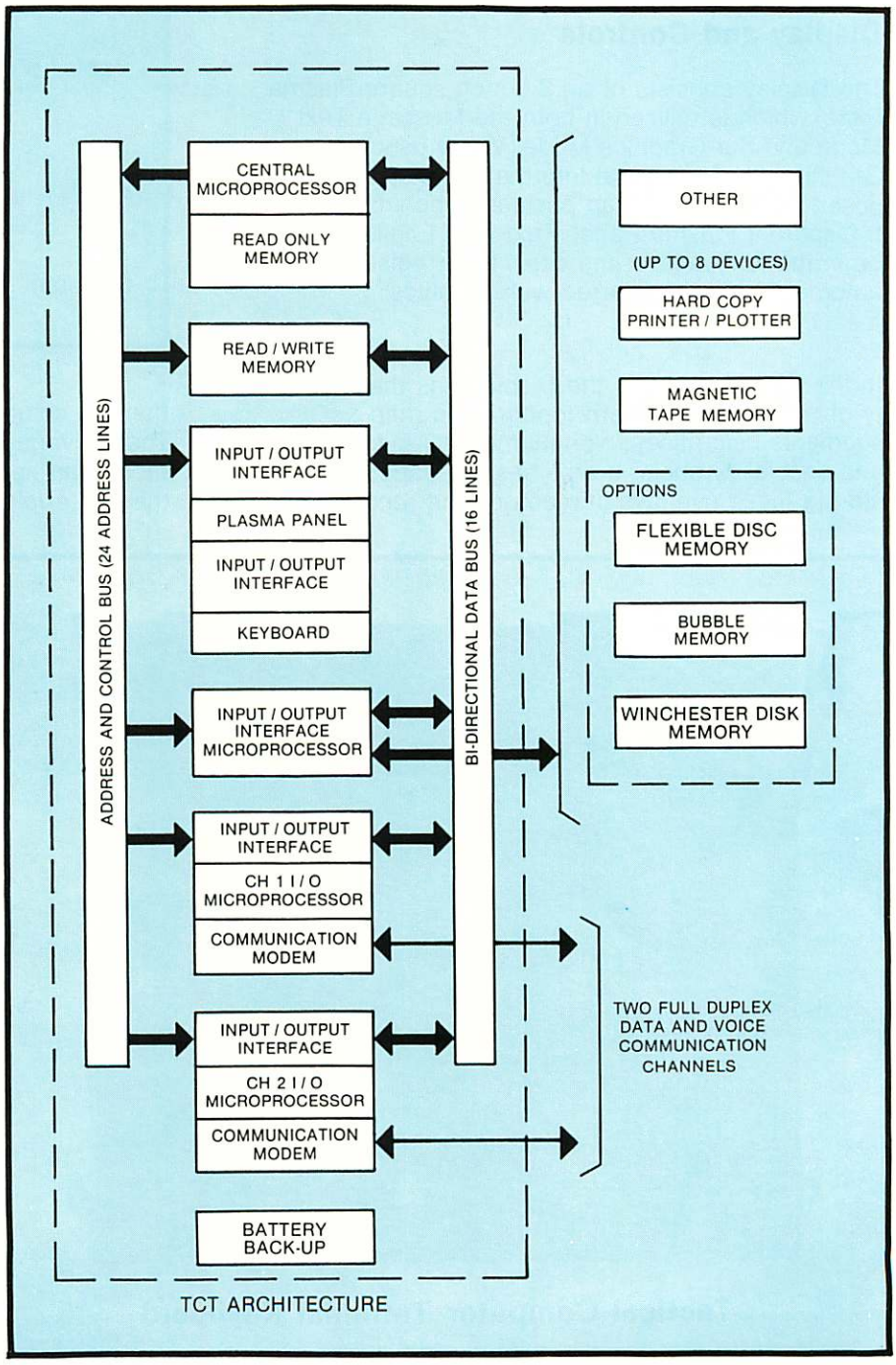
The Display-Keyboard Processor consists of a plasma display panel, a keyboard, I/O microprocessors, communications modems, controllers for external peripheral devices, such as a printer and a bulk memory, and a central microprocessor. The central microprocessor provides for complete functional flexibility with capabilities determined by the software resident in memory. Over 1 megabyte (8 megabytes as an option) of Random Access Memory (RAM), with battery backup, is packaged in the unit. All of these elements, including the required power supplies, are packaged in a single case 14.5 inches high, 17 inches wide, and 23.2 inches deep. The keyboard is an integral part of the case and folds up to form a protective cover in the transport configuration. Cooling is accomplished entirely without the use of fans, either internal or external. The unit operates directly from 28 volt DC vehicular power. Options of a 32-bit MC68020 microprocessor and a primary semi-conductor memory of 8 megabytes in the Display-Keyboard Processor will be available.

Communication Interfaces

The TCT contains two complete independent communications ports including all input/output interface circuits and modems. These ports provide for either full or half duplex operation with existing military communications equipment over radio, 2-wire, or 4-wire links. Automated dialing is provided as an interface to Army switchboard equipment. Voice and data capability are provided. Data rates of 600 or 1200 bits per second with Frequency Shift Keyed (FSK) modulation over voice grade channels are provided. NRZ at 75-32,000 bits per second and Conditioned Di-phase at 8000, 16,000, and 32,000 bits per second are also included. Voice netting of the channels is also provided. Protocol software for AUTODIN Mode I, Block-by-Block and continuous, AUTODIN Modes II and IV and TRI-TAC Mode VI, (with DACM) with NRZ modulation at rates up to 16,000 bits per second will be available as an option.

Each Modem microprocessor provides for on-line Error Detection and Correction (EDC) coding and decoding, and Time Dispersion Coding (TDC) and decoding under software control.

Message formats, communication routing, and synchronization characteristics are under software control.



TCT ARCHITECTURE

Message Handling Capabilities

The TCT has the capability of allowing an operator to receive/transmit text/graphics, display this on the plasma panel, store it in memory, and recall it at some future time. Editing capability consists of deleting or inserting letters, words, or lines. As an operator aid, standardized message formats and associated message prompters are stored in memory and are available for display on the plasma panel. The TCT also has the capability of transmitting messages by wire or radio via the two independent communication ports. Hard copies of selected text/graphics messages may be obtained by printing them on the high speed printer/plotter.

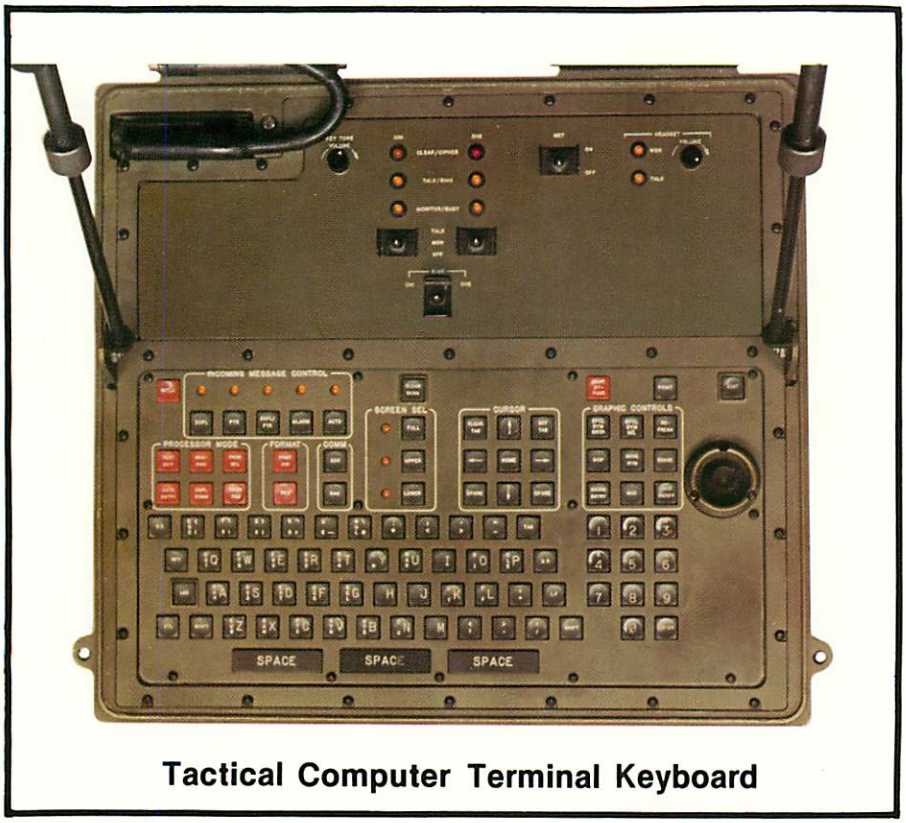
Display and Controls

The Display consists of an 8.5 inch square Plasma Panel which is utilized in both the Message Text Mode and the Graphics Mode. When used in the Graphics Mode, tactical information is superimposed over a paper map positioned behind the transparent Plasma Panel. Text is in English or can be in the language of the user. Map registration is automated and transferred with graphics messages.

In the Graphics Mode, the Display has the capability of overlaying standard topographic map segments using lines, alphanumerics, and standard and special symbols. It also has the capability of storing these overlays in memory and recalling them at some later time for modification or update. These overlays may be transmitted by wire or radio, and hard copies may be obtained by use of the printer/plotter.

DISPLAY CHARACTERISTICS

Display Medium:	Plasma panel
Element Resolution:	60 elements per inch 512 X 512 matrix
Character Size:	5 elements wide 7 elements high
Character Capacity:	46 lines of 85 characters each
Writing Rate:	23 microseconds per element
Character Writing Period:	800 microseconds maximum
Vector Writing Rate:	35 microseconds per element average (computation time included)
Display Intensity:	50 foot-lamberts maximum adjustable to 12.5 foot-lamberts
Refresh:	No refresh required



Tactical Computer Terminal Keyboard

Variable Function Keys (VFK) are located around the periphery of the Plasma Panel so that the functional legends associated with the Keys can be displayed on the Plasma Panel under software control.

The Keyboard utilizes elastomeric construction and is rainproof in the operational position. It folds upward to protect the Display face in transit. A standard ASCII character set is featured with the numerics placed to one side. A separate set of cursor control switches is provided.

Graphic controls include a Joystick which slews a marker at a rate proportional to the Joystick displacement. Processor Control Switches, Input/Output Control Switches, and Voice Channel Selection Switches are also located on the keyboard.

TCT Modules

Display-Keyboard Processor CP-1414A/UYQ-30

The Plasma Panel is mounted angularly to enhance viewer use while seated or standing. To superimpose panel information over a standard Army paper map, the operator clips a map onto a slide and inserts it behind the panel through an entry slot to the left of the panel. This function can be performed easily while seated.

Variable Function Keys are located about the panel perimmeter and are programmed by the user to provide access to selected standard data such as map symbols from a standard symbol library.

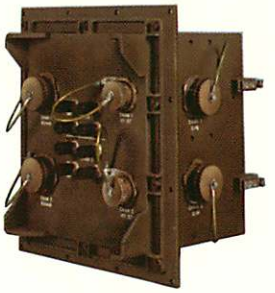
The Display-Keyboard contains four microprocessing units: one 16-bit Motorola MC68000*, for user application processing, two MC68000's (one for each channel) for communications I/O processing, and one for external peripheral devices I/O processing. Each processor has its own memory.

*Note: A 32-bit Motorola MC68020 for user application processing will be available as an option.

- **FUNCTIONS**
  - Operator/Machine Interface
  - Message Reception and Control
  - Tactical and Graphics Displays
  - Communications Access Control
- **CHARACTERISTICS**
  - 14.5"h x 17"w x 23.2"d
  - 130 Pounds
  - 295 Watts
  - 4266 Hours MTBF
  - 12 min MTRR
- **SPECIAL FEATURES**
  - Map Background
  - Graphics
  - Variable Function Keys
  - User Data Bases

Junction Box J-3696A/UYQ-30

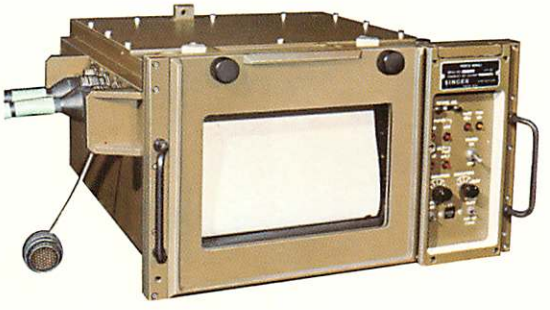
The Junction Box provides for connecting communication devices to the TCT (radios, switchboards, etc.)



- **FUNCTIONS**
  - Communications Interface
    - 2-wire
    - 4-wire
    - GFE Device
- **CHARACTERISTICS**
  - 5.25"h x 9.25"w x 7.25"d
  - 16 Pounds

Line Printer-Plotter RP-271 A/G

The Printer is an 80 column, noiseless, fast, non-impact type capable of 1200 lines per minute. It produces hard copy printout of data and messages, diagnostic data and errors, and accomplishes system logs. The unit also provides for plotting of graphcis data of 8400 lines/minute.



- **FUNCTIONS**
  - Hard Copy Output of Data and Messages
  - System Logs
  - Printout of Diagnostic Data and Errors
- **CHARACTERISTICS**
  - 9.3"h x 17"w x 21.5"d
  - 73 Pounds
  - 130 Watts
  - 9105 Hours MTBF
  - 8.3 min MTTR
  - 1200 Lines per Minute
- **SPECIAL FEATURES**
  - Plotting Graphics

Magnetic Tape Recorder-Reproducer RD-463/UYQ-30

The Magnetic Tape Recorder-Reproducer contains two Tape Transport Cartridges, one of which serves as an initial loading device for loading system programs and the other which is used for reading, writing, and retaining initialization data. The system program cartridge is completely inhibited from writing under normal circumstances. This feature can be overridden only by a guarded Emergency Purge switch which may be used to purge all information contained on both tapes.

- **FUNCTIONS**
  - Operational Program Load
  - Diagnostic & Maintenance Programs
  - Initialization
  - Message Storage/Filing
  - Non-Resident Programs and Data
- **CHARACTERISTICS**
  - 8.6"h x 9.6"w x 12"d
  - 25 Pounds
  - 50 Watts
  - 12000 Hours MTBF
  - 12 x 10^6 Bits per Cartridge

Power Supply PP-7607 / G

When 28 VDC is not available, the Power Supply accepts inputs of 50 Hertz, 60 Hertz, or 400 Hertz AC power and converts it to 28 VDC. Output is 50 to 2500 watts.

- **FUNCTIONS**
  - Conversion of 50/60/400 Hertz AC to 22-30 VDC
  - Distribution to Remote Devices
- **CHARACTERISTICS**
  - 7.0"h x 17"w x 22"d
  - 138 Pounds
  - 50-2500 Watts DC Output
  - 8649 Hours MTBF
  - 6 min MTTR

Power Distribution Module SB-4057 / UYQ

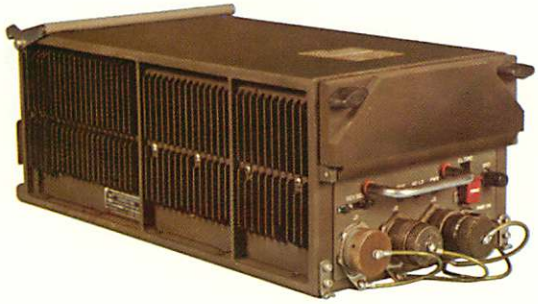
The Power Distribution Module accepts 28 VDC input from the Power Supply and provides seven outlets for distribution of power to remote devices. Two of the outlets are secure.

- **FUNCTIONS**
  - Distribution of DC Power to Remote Devices
  - System Over-voltage Protection
- **CHARACTERISTICS**
  - 7.0"h x 17.0"w x 8.0"d
  - 19 Pounds
  - Provides 7 Remote DC Outlets
  - Capacity: 100 amps

Memory Options

Flexible Disk Recorder-Reproducer RD-508/G

The Flexible Disk Recorder-Reproducer module is a random access memory device providing in excess of 700 kilobytes of auxiliary storage for the TCT on interchangeable 8-inch floppy disk media.



- **FUNCTIONS**
  - Secondary Memory
- **CHARACTERISTICS**
  - 7.6"h x 10.1"w x 20.7"d
  - 47 Pounds
  - 50 Watts
- **SPECIAL FEATURES**
  - 500 Kilobits per second Internal Transfer Rate
  - 360 RPM
  - Six Millisecond Track-to-Track Access
  - Meets MIL-E 16400, MIL-M-38510, MIL-STD-88 Class B

Magnetic Bubble Recorder-Reproducer RD-509/G

The magnetic bubble Recorder-Reproducer is a non-volatile, fast-access, high density memory. It has a storage capacity of 8 megabytes and an access time of 40 ms average and 80 ms maximum. The memory provides instant uploading and downloading and is portable and removable. The unit also contains a microprocessor which can be used for local file management.

- **FUNCTIONS**
  - Secondary Memory
- **CHARACTERISTICS**
  - 8."h x 12.5"w x 25.5"d
  - 80 Pounds
  - 180 Watts
- **SPECIAL FEATURES**
  - Non-Volatile
  - Fast Access
  - High Density
  - Expandability
  - Emergency Erase
  - File Management

Winchester Disk Recorder-Reproducer

The Winchester Disk Recorder-Reproducer uses a pluggable Winchester technology disk drive designed for high speed mass data storage. The disk drive cartridges store 92 megabytes, formatted, and 106 megabytes, unformatted with an average access time of 40 milliseconds. Each cartridge is hermetically sealed against the environment. Complete plug-in interchangeability provides the user with a data storage medium that features manual interchange of files. The unit also contains a microprocessor which can be used for local file management.

- **FUNCTIONS**
  - Secondary Memory
- **CHARACTERISTICS**
  - 8.25"h x 12.75"w x 27"d
  - 85 Pounds
  - 175 Watts
- **SPECIAL FEATURES**
  - Winchester Technology
  - Dual 5.25" removable sealed cartridges
  - Balanced rotary voice coil positioner
  - 5M bits per second Internal Transfer Rate
  - File Management
  - Meets MIL-E-16400, MIL-E-5400, MIL-E-4158

Operational Software

Operational software is packaged into 11 major functional modules. Communication programs reside in two separate microprocessors used in conjunction with a CPU. The programs are loaded in from the Magnetic Tape Recorder-Reproducer or any of the Optional Secondary Memories.

Ada Run Time Kernel

The Ada Run Time Kernel provides real time control of all TCT software. It also provides interfaces to all TCT hardware including peripherals. New Ada applications programs can be supported.

Communications Processing Program

The Communications Processing Program provides the capability to receive, transmit, store, display, and enqueue messages according to procedure and priority.

Print Program

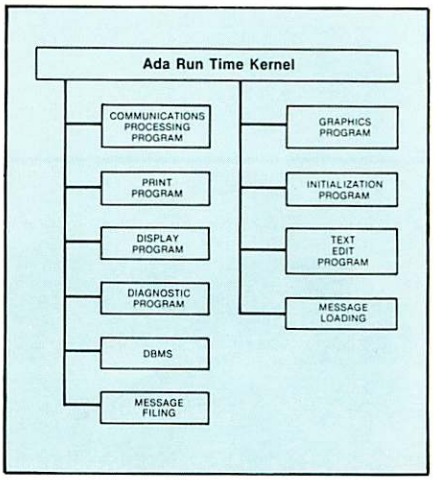
The Print Program provides the capability to print messages (text and graphics), message logs, and alerts.

Display Program

The Display Program provides the capability to manage and format all data to be output to a selected Plasma Panel. It controls displayed cursor position and displays messages, graphics, and Variable Function Key nomenclature.

Diagnostic Program

The Diagnostic Program performs real time fault isolation on TCT hardware to the least replaceable unit. When operator interaction is required, instructions or test patterns are displayed, and the system waits for keyboard inputs. The Diagnostic Program requires that the TCT be offline during fault isolation.



DBMS

The Data Base Management System (DBMS) program has the capability to generate Commanders' rollups from its filed messages and to remotely store and retrieve friendly unit information enemy unit in formation/ obstacles, and barriers. Data can be retrieved locally or from remote locations via query messages and Standing Requests for Information (SRI's).

Message Filing

The Message Filing function provides for message filing and retrieval. Messages may be filed and retrieved locally or from a remote TCT.

Graphics Program

The Graphics Program allows the operator to create graphics messages using full graphics drawing capability, special symbol creation, and a predefined Army Tactical Symbol Library. Graphics data is stored and transmitted using UTMG coordinates.

Data Initialization Program

The Data Initialization Program permits input of remote and local system initialization data and provides edit capability during operations. Initialization data can originate from offline storage.

Text Edit Program

The Text Edit Program provides the TCT with the capability to edit and compose messages. Prompts assist the operator in composing messages and in operating the system.

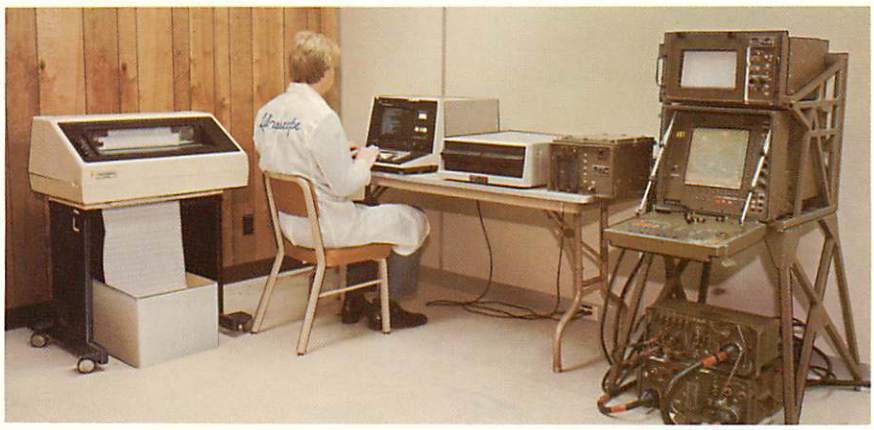
Message Logging

The message logging function collects data on received, transmitted, relayed, and aborted messages and automatically prints a log after 20 communication transactions have occured. The operator also has the option of printing or displaying the log at any time.

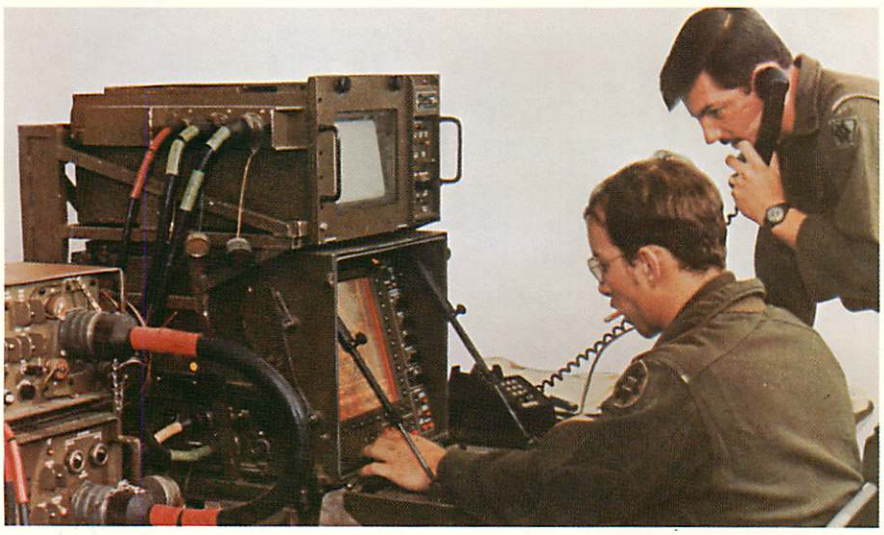
Software Development/ Support Centers

TCT production is complemented by an off-line Software Development Center operational at Librascope's Glendale, California facility. This center is coordinated with the U.S. Army's Post-Deployment Software Support (PDSS) Center at Ft. Leavenworth, Kansas. In addition, development centers are located at other sites. Librascope's Software Development Center features:

- Real Time Disk Operating System
- Editors
- Macro Assembler
- Ada Compiler
- Relocateable Loader
- Debugging Facilities
- Cross Assembler
- Arithmetic Library
- Utilities



Section of Librascope's TCT Software Support Center



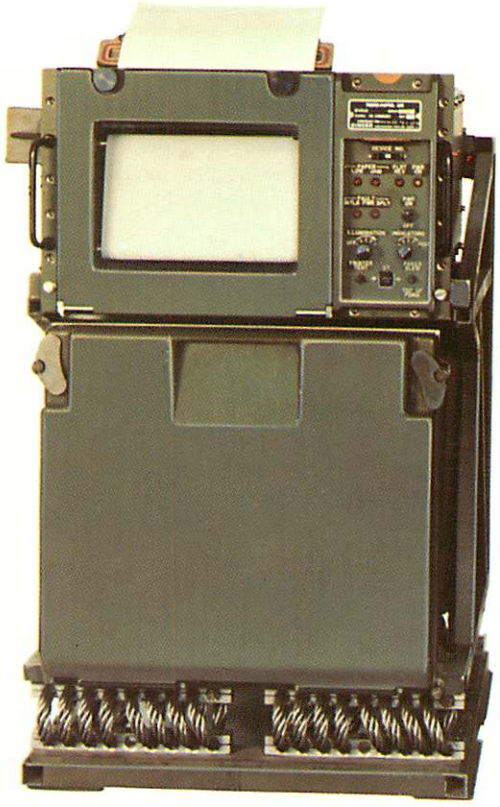
TCT being operated in a fixed command post during a tactical exercise

TCT In U.S. Army Maneuver Control System

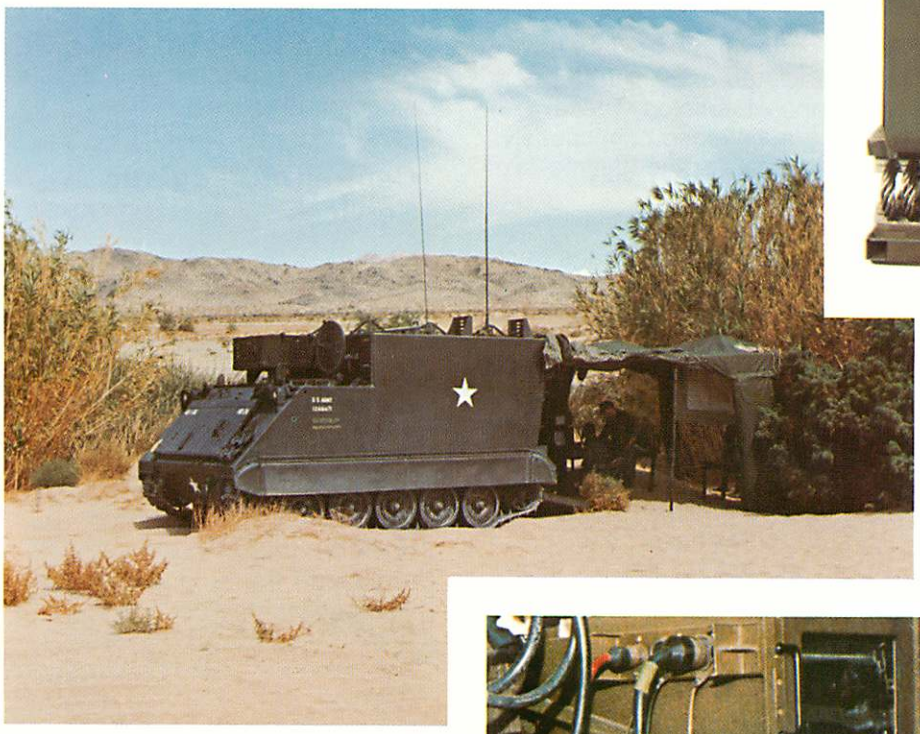
Depicted here is the first application of the TCT in the U.S. Army's Maneuver Control System, one of five control systems employed by the Army. Inherent in this configuration is the basic concept of distributed processing and information interchange between Army echelons.

Vehicular Installation

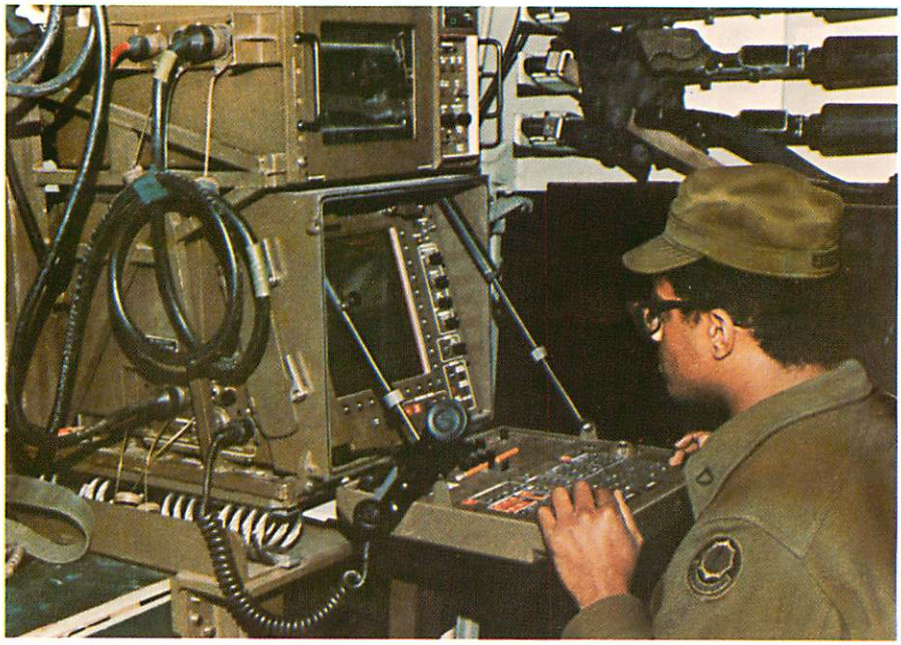
Demonstrating the TCT's suitability for vehicular deployment in the field, a TCT was shelf-mounted in a tracked M577 Command Post Carrier for roadability tests at Aberdeen Proving Grounds. The vehicle moved at varying speeds over three miles of straightaway, cross-country profile, and washboard courses. During the straightaway and washboard runs, the TCT was placed in full operation, which included the keyboarding of data and the production of hardcopy display printouts at all speeds. At the conclusion of the test regime, no malfunctions of the TCT had occurred. Subsequently TCTs were fielded in similar configurations for tactical exercises in Europe, where results were reported as equally satisfactory.



TCT vehicular mounting configuration provides rugged shock mounting and permits efficient utilization of space.



TCT in a rack-mounted configuration being used externally to its transporting M577



TCT in an M577 installation during European field exercises

Logistic Support

The TCT is provided with a complete range of logistic products and services developed to U.S. Army specifications and designed to assure maximum utilization of the TCT over its life cycle. Each item of logistic support has been prepared and validated as an element of a comprehensive Integrated Logistic Support (ILS) program and is immediately available. The logistic package supports the TCT at the four maintenance support levels: Operator/Organizational, Direct Support, General Support, and Depot.

Technical Manuals

Operator, Organizational Maintenance, and Direct Support Maintenance manuals are written to the Army user's level of experience and capability. Highly illustrated, they employ step-by-step procedures keyed to work requirements and training materials. The manuals provide for individualized instruction and on-the-job-training. General Support Maintenance and Depot Maintenance manuals are written to the level of experience and capability of the technician for use in off-line repair.

Training Materials

Individuals of varying MOS's can train themselves as opportunities permit and at their own rates of speed using the manuals provided. The operational and diagnostic software permit rapid performance of man-machine interfacing and of operator and maintenance routines.

Librascope offers complete in-plant facilities for initial training under simulated field conditions, to the degree that this type of training is desired. Librascope training instructors are also available for assignment at Army schools or field sites as needs might dictate.

Provisioning Data

Repair parts and tools data have been tabulated and illustrated for each support echelon. These data are maintained continuously by Librascope for the lifetime of the equipment.

All processing of this data is carried out by EDP means, facilitating the currency and frequency of issue of the data.

Maintenance Engineering Services

Maintenance Engineering Services are continuously and readily available to the TCT user to assist in vehicle or shelter installation design, to contribute to planned maintenance systems, and to perform other support engineering services as the need might arise.

A full-time Maintenance Engineering group is located at Librascope within the Logistics Department Personnel of this organization represent maintainability and other logistic interests and work to assure an easily supportable product.

Field Service

The TCT user can call upon Librascope's world-wide network of technical specialists to provide maintenance services at remote sites. These specialists stand ready to repair equipment, conduct special training, deliver parts, and provide consulting services in general.

Centralized Logistic Services

The Librascope Logistics Department incorporates all logistic service groups under a common leadership, thus offering customers a well-integrated array of logistic products. The two major objectives of the Logistics Department are always: (1) to assure an easily-supported, user-oriented product design, and (2) to support the product promptly wherever it may be in use.

Automated Test Program Sets

Librascope has developed Test Program Sets for use with AN/USM-105 automated test equipment to isolate faulty components on TCT printed circuit boards (PCBs) and to keep Army circuit board maintenance procedures current and validated.

Test Program Sets information has been integrated with the troubleshooting procedures in the General Support Maintenance Manuals.

Technician conducting fault-finding of an Army PCB using AN/USM-105 automated test equipment

Environmental Specifications

Altitude: Operation to 10,000 ft.
Transport to 50,000 ft.

Temperature: MIL-STD-810B, Method 501, Procedure II.

Operational −45° to 60°C.
Storage −57° to 71°C.

Humidity: MIL-STD-810B, Method 507, Procedure III.

Vibration: 5.0 to 5.5 Hz at 1.0 inch double amplitude.

5.5 to 30 Hz at 1.5G.

30 to 48 Hz at 0.036 inch double amplitude.

48 to 500 Hz at 4.0G

Shock: MIL-STD-810B, 15G, 11 millisecond shocks on three mutually perpendicular axes.

MIL-S-901C with tracked vehicle installation mounts.

Rain: MIL-STD-810B, Method 506, Procedure I.

Sand and Dust: MIL-STD-810B, Method 510, Procedure I.

Salt Fog: MIL-STD-810B, Method 509, Procedure I.

Acoustic Noise: SCL-1280D, Para. 4.7.4

Fungus: MIL-STD-810B, Method 508.

Bench Handling: MIL-STD-810.

Electromagnetic Interference: MIL-STD-461, Notice 4.

CE01 CS01 RE02 RS03
CE04 CS02 RE02.1 RS03.1
CS06

Chemical, Biological, Radiological: TM3-220

TEMPEST: Qualified

Nuclear: Survivable

Power Requirements

DC Voltage: 22 to 30 VDC vehicular power per MIL-STD-1275 (AT) except for Para. 5.4 Abnormal System Without Battery Support.

22 to 30 VDC mobile generator power per MIL-STD-1332B, Class 2C.

AC Voltage:

Input Voltage	Input Frequency
120/240 VAC (three wire)	50 to 60, or 400 Hz
115 VAC	50 to 60, or 400 Hz
230 VAC	50 to 60, or 400 Hz

Per MIL-STD-1332 for Type I and II, class 1 and 2 and Mode I, II and III DOD generator sets.

Librascope

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