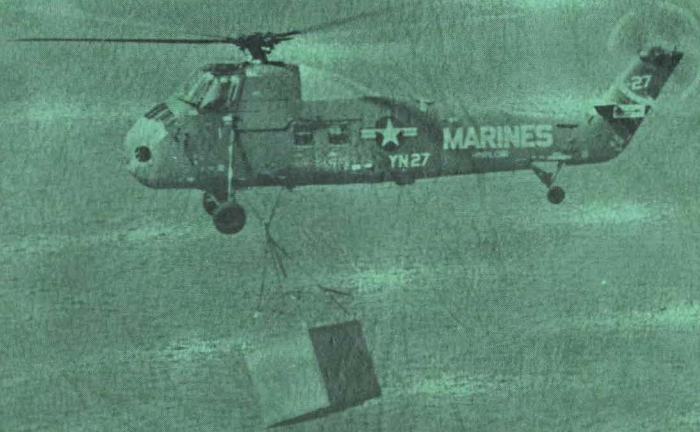
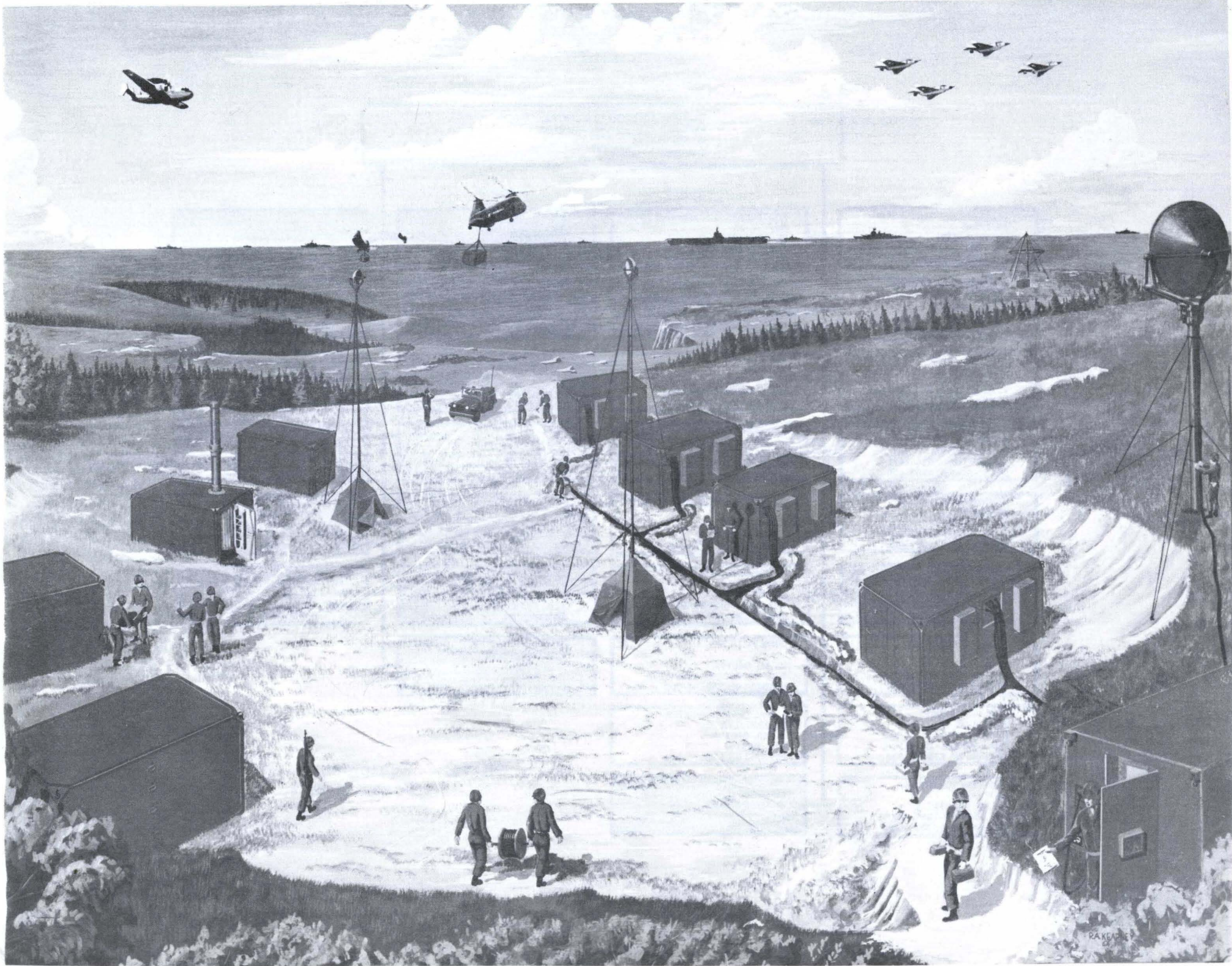


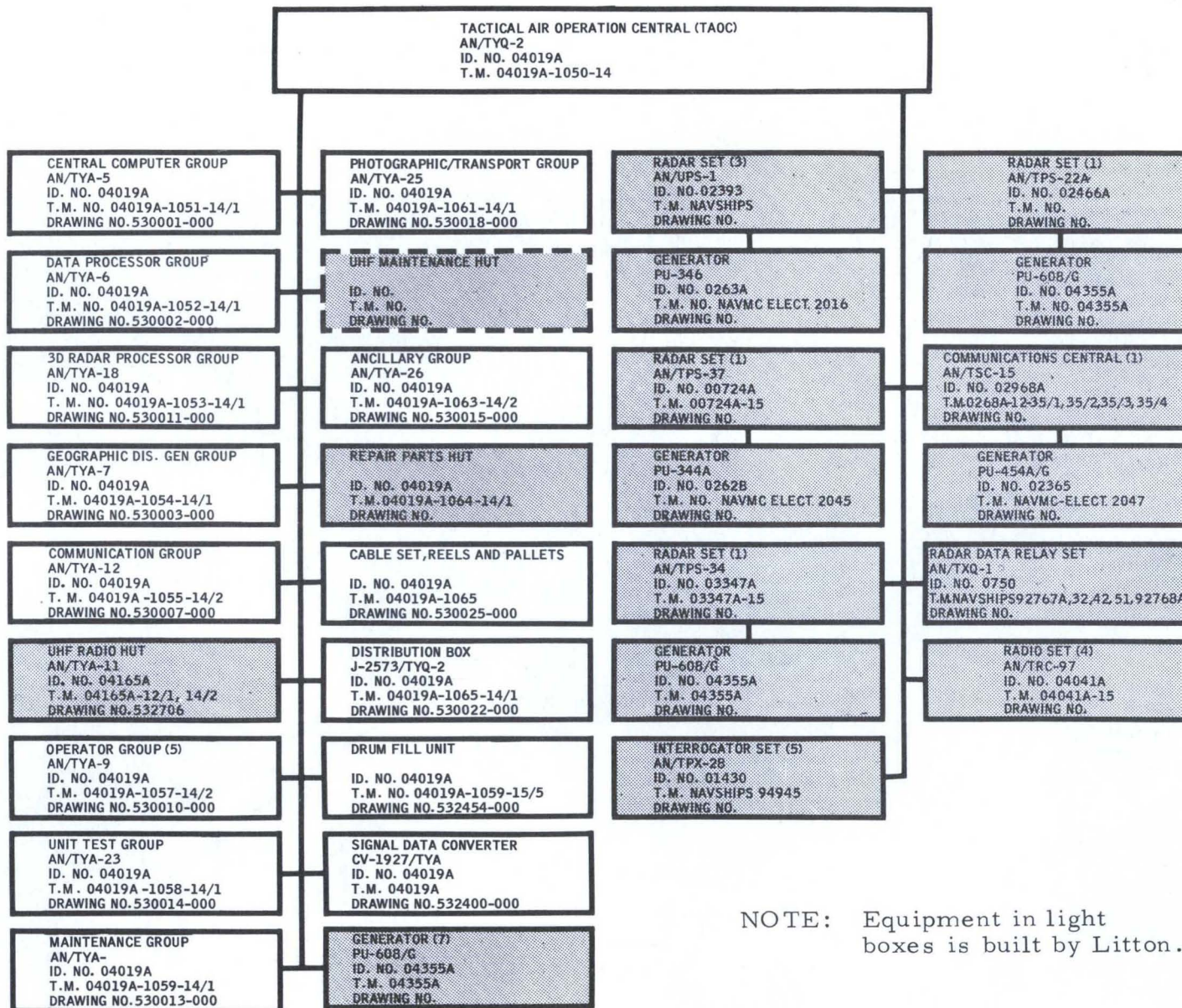
*File
Marine Corps*



MTDS
TACTICAL AIR OPERATIONS CENTRAL HARDWARE



RAKEBY



NOTE: Equipment in light boxes is built by Litton.

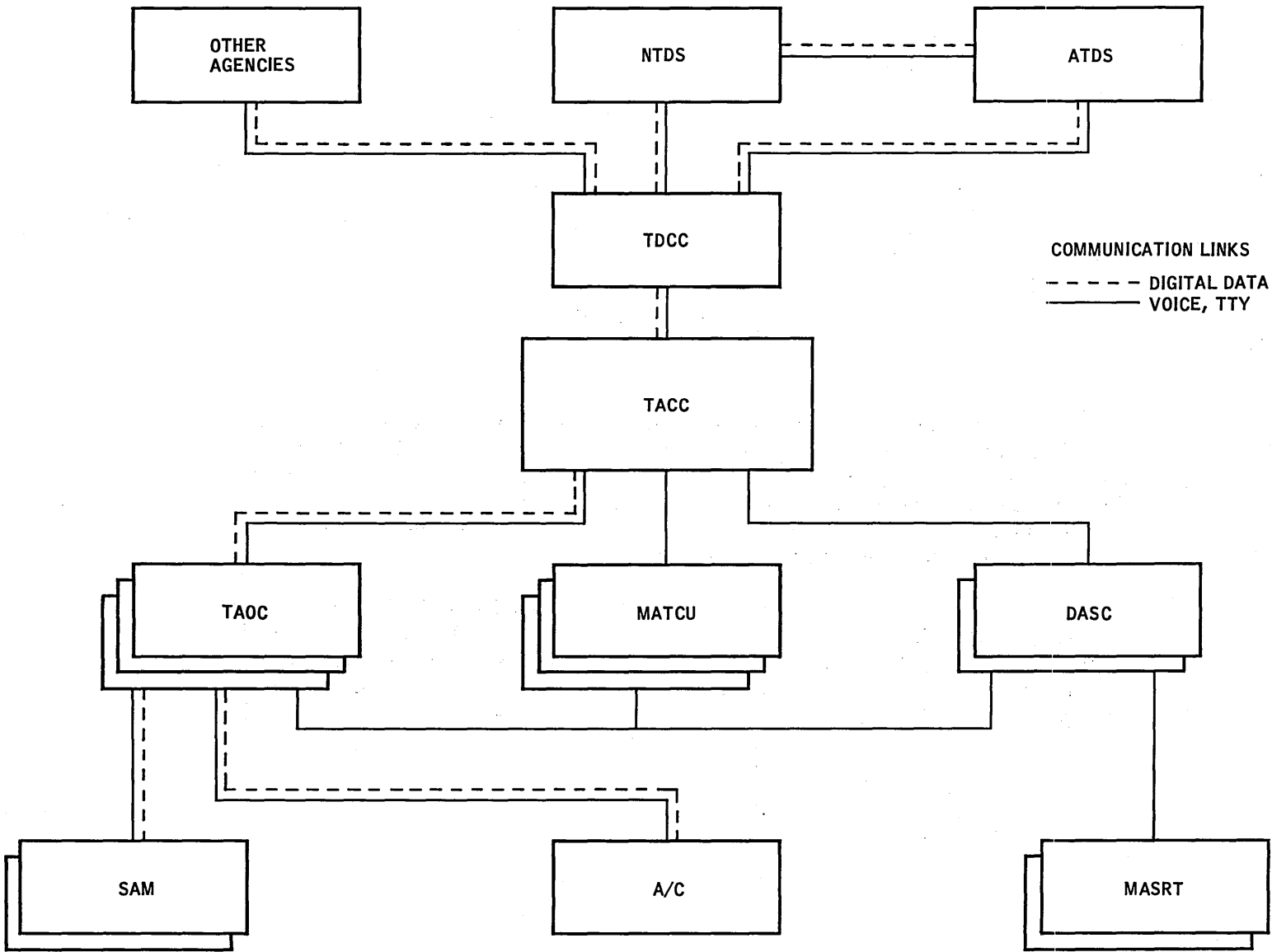
CONTENTS

Item	Page	Item	Page
Introduction	1	Memory Drums	28
MTDS Complex	2	Magnetic Drum, Data Storage	29
TAOC AN/TYQ-2 Complex	3	2D RIDP Memory Drum	29
Central Computer Group AN/TYA-5	4-5	Drum Memory Heads	30
Data Processor Group AN/TYA-6	6-7	Video Converters	31
Geographic Display Generation Group AN/TYA-7	8-9	TAOC Console Card Racks	32
Operator Group AN/TYA-9	10-11	TAOC Auxiliary Display Unit	33
Communications Group AN/TYA-12	12-13	Console Common Circuits	34
Ancillary Hut AN/TYA-26	14-15	Common Circuit Racks	35
Distribution Box J-2573/TYQ-2	16-17	Service Test Consoles	36
Maintenance Group AN/TYA()	18-19	Production TAOC Consoles	37
Unit Test Group AN/TYQ-23	20-21	Typical TAOC Module	38
Photographic/Transport Group AN/TYA-25	22-23	Silicon Controlled Rectifiers	38
Micropositioner Test Set	24	TAOC Communication Modules	39
Digital Test Set	25	Logic Cards	40
Analog Test Set	25	Printed Circuit Cards	41
Power Supply Test Set	26	Typical Production TAOC 3 by 3 Inch Cards	42
Drum Fill Unit	27	Power Supplies	43
		Production Test Equipment	44-45

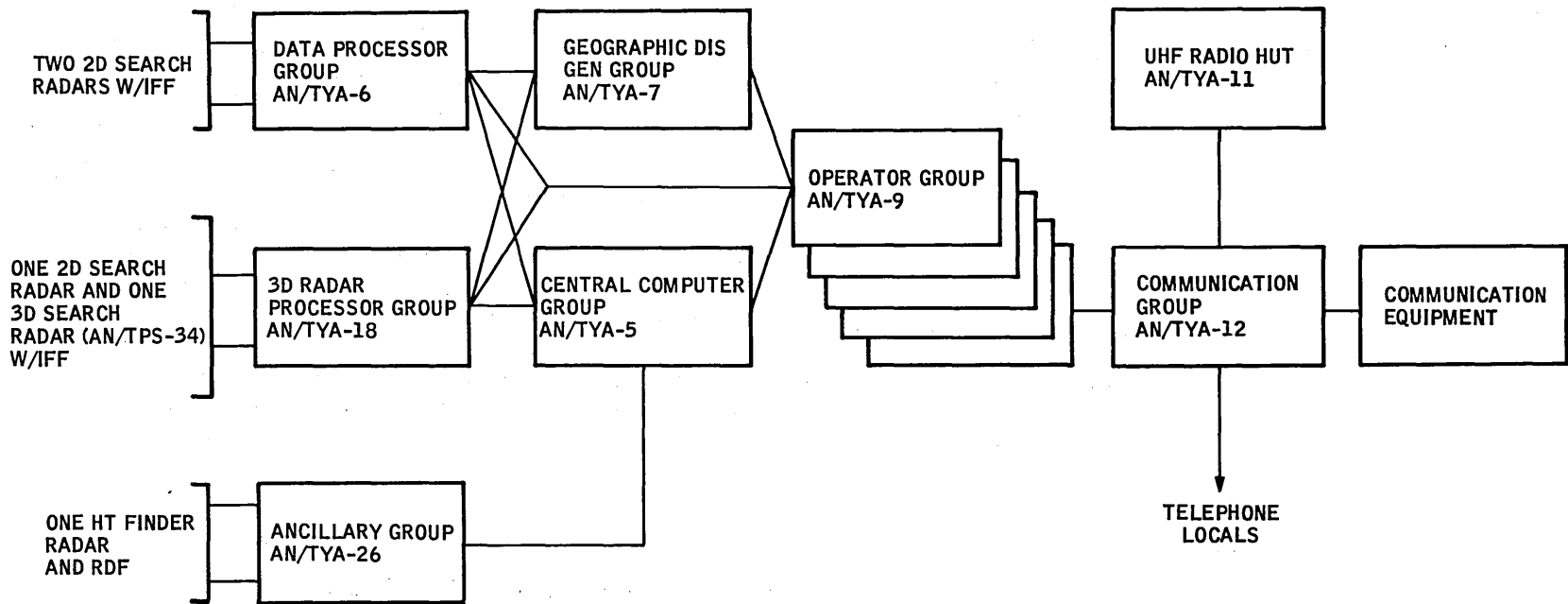
INTRODUCTION

This brochure is designed to familiarize the reader with the physical characteristics of the Tactical Air Operations Central AN/TYQ-2 (TAOC) and the typical elements of which it is comprised. The hardware displayed in this brochure is produced for the Marine Corps by the Data Systems Division of Litton Industries under the contractual direction of the Chief, Bureau of Ships.

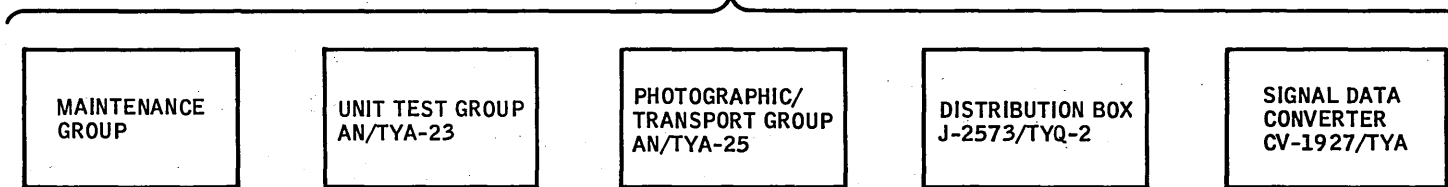
An artist's conception of the TAOC, AN/TYQ-2, is shown in the frontispiece. An equipment list for the TAOC is shown following the frontispiece. Subsequent sections illustrate the various equipment shelters and typical building blocks which impart the modular construction and plug-in maintenance features to the equipment.



MTDS COMPLEX



SUPPORT GROUPS



TAOC AN/TYQ-2 COMPLEX

CENTRAL COMPUTER GROUP AN/TYA-5

FUNCTIONAL DESCRIPTION

The Central Computer Group AN/TYA-5 is a transportable shelter containing electronic data processing equipment which, used in conjunction with several related group facilities, comprise the Tactical Air Operations Central AN/TYQ-2 (TAOC).

The equipment includes seven bays of ten-shelf card racks accommodating over 1800 removable printed circuit boards. These boards are categorized into 16 functional logic units that function with a magnetic memory drum to form programming and computing equipment. The logic units provide automatic tracking of targets, correlation of target information, programming for height-finder, programming for digital symbol display, programming for data links and teletype, maintenance and intercept computers, timing, drum read and write provisions and applicable buffers.

The Central Computer Group also contains power supplies, terminal assemblies, personnel access and operational facilities, air conditioning, lighting, maintenance outlets, fire extinguishers and work table.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 154 in. Height: 73.5 in.
Width: 76 in. Volume: 497.0 cu. ft.

WEIGHT

Operational: 4624 lbs. (total equipment)
Transport: 4183 lbs. (441 lbs. removed,
no system degradation.
3997 lbs. (627 lbs. removed,
slight system degradation.

POWER REQUIREMENTS

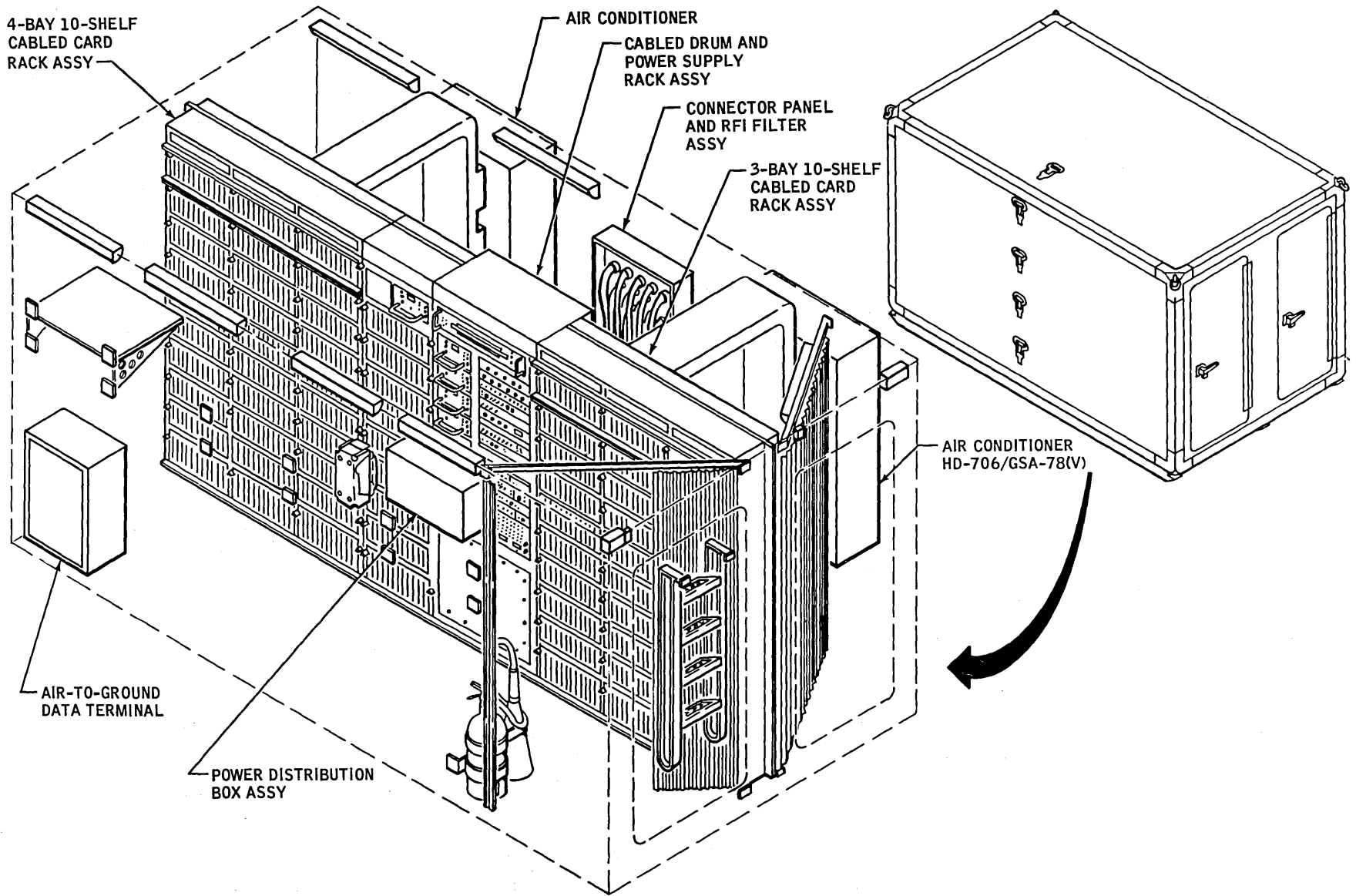
115/208 vac, 400 cps, 3 ph, 18.0 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



CENTRAL COMPUTER GROUP AN/TYA-5

DATA PROCESSOR GROUP AN/TYA-6

FUNCTIONAL DESCRIPTION

The Data Processor Group AN/TYA-6 is a transportable shelter containing 2D radar and electronic data processing equipment which, used in conjunction with several related group facilities, comprise the Tactical Air Operations Central AN/TYA-2 (TAOC).

The equipment includes three bays of a ten-shelf card rack accommodating over 700 removable printed circuit boards. These boards are categorized into three functional logic units that function with two Radar-IFF Data Processing (RIDP) drum assemblies to form programming and computing equipment. Additional equipment consists of two modules each of IFF decoder, video quantizer, and drum servo supporting their respective RIDP drum assemblies. The equipment receives 2D radar information from the AN/UPS-1 and the AN/TPS-22 radar, appropriately processes and delivers digital target information to associated TAOC facilities for subsequent processing and display. Specifically, the equipment detects the presence of target patterns in the radar video inputs, generates azimuth and range for each target, separates noise from targets, determines suitability of target for automatic acquisition and checks the availability of corroborating IFF video.

The Data Processor Group also contains power supplies, operation and maintenance panel assemblies, personnel access and operational facilities, field telephone, air conditioning, lighting, maintenance outlets, fire extinguisher and work table.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 134 in. Height: 73.5 in.
Width: 76 in. Volume: 433.0 cu. ft.

WEIGHT

Operational: 3424 lbs. (total equipment)
Transport: 3002 lbs. (422 lbs. removed,
no system degradation.)

POWER REQUIREMENTS

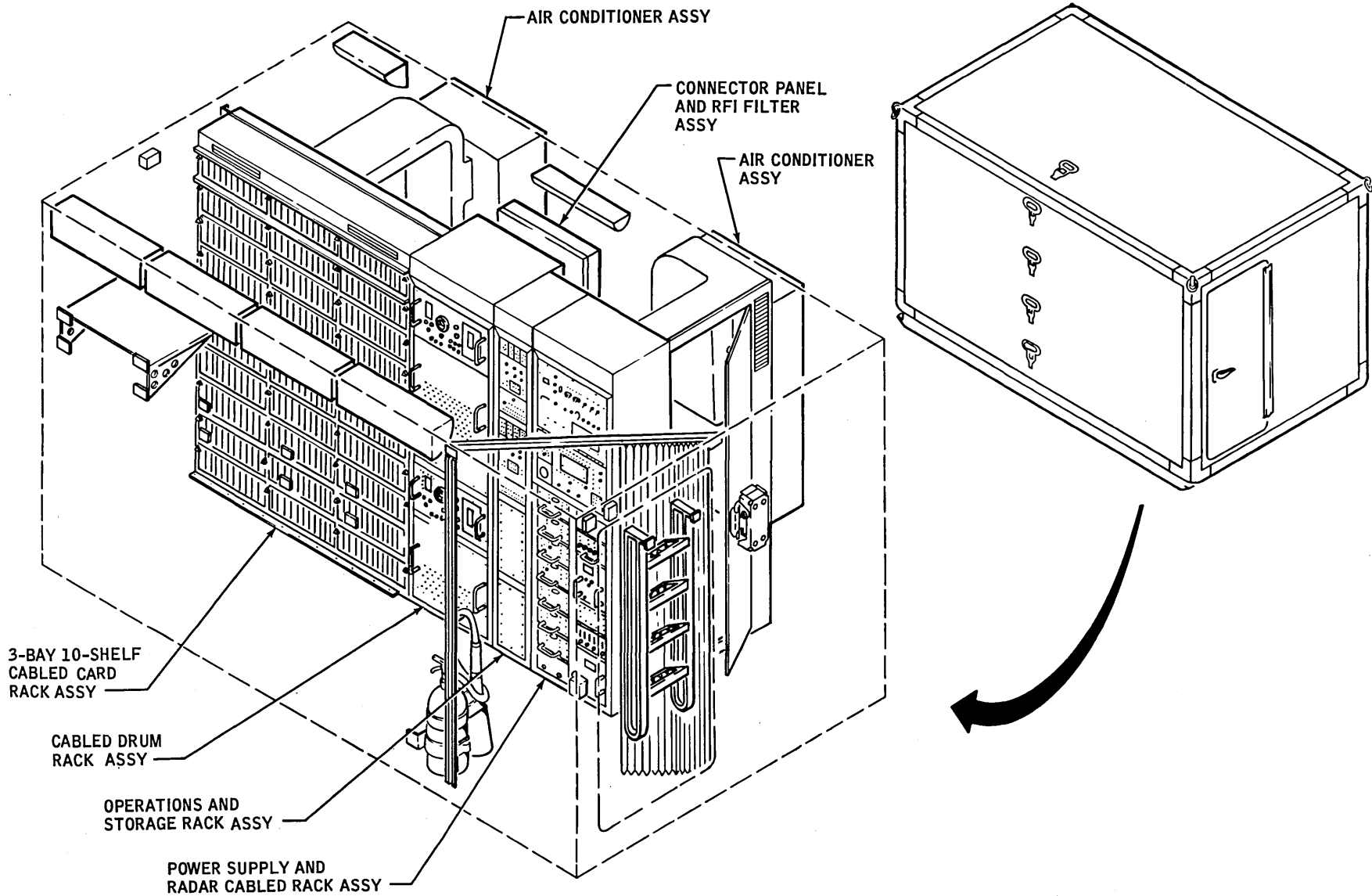
115/208 vac, 400 cps, 3 ph, 17.0 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



DATA PROCESSOR GROUP AN/TYA-6

GEOGRAPHIC DISPLAY GENERATION GROUP AN/TYA-7

FUNCTIONAL DESCRIPTION

The Geographic Display Generation Group AN/TYA-7 is a transportable shelter containing electronic scanning, mapping, and processing equipment which, used in conjunction with several related group facilities, comprise the Tactical Air Operations Central AN/TYQ-2 (TAOC).

The equipment includes a major rack assembly containing four radar censor mapper assemblies (Video Converter CV-1930/TYA-7) each supporting a specific TAOC radar unit. By use of a flying spot scanner, masks, phototubes, and associated circuitry, the censor defines the area of responsibility to targets within the surveillance volume and inhibits all other target information, including clutter, from being automatically acquired and tracked. The mapper portion converts tactical geographic-orientated map data into digital information. An additional rack contains monitor, clear plot (Video Converter CV-1928/TYA-7), and crosstell data transference. A one-bay, ten-shelf card rack contains over 200 removable printed circuit boards comprising a supporting logic unit. The group incorporates applicable panel, deflection amplifier, CRT, photo-multiplier, and high and low voltage power supply modules to support these assemblies.

The group provides terminal assemblies, personnel access and operational facilities, maintenance panels, field telephone, air conditioning, lighting, maintenance outlets, and fire extinguisher.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 134 in. Height: 73.5 in.
Width: 76 in. Volume: 433.0 cu. ft.

WEIGHT

Operational: 3841 lbs. (total equipment)
Transport: 3456 lbs. (385 lbs. removed,
no system degradation)

POWER REQUIREMENTS

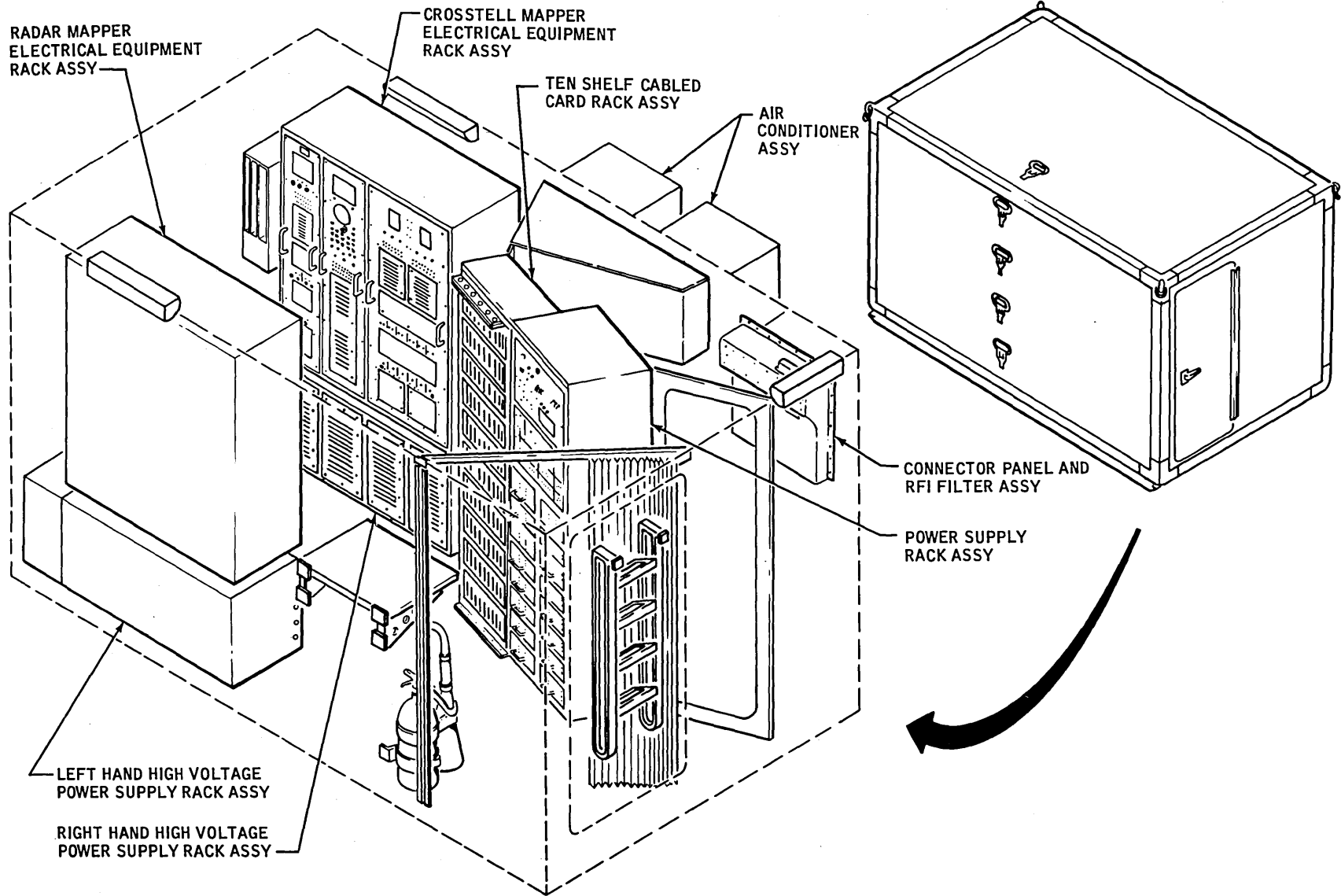
115/208 vac, 400 cps, 3 ph, 16.0 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



GEOGRAPHIC DISPLAY GENERATION GROUP AN/TYA-7

OPERATOR GROUP AN/TYA-9

FUNCTIONAL DESCRIPTION

The Operator Group AN/TYA-9 is a transportable shelter containing electronic data processing, display, and communications equipment. Up to five operator groups may be used in conjunction with several other type data processing group facilities to comprise the Tactical Air Operations Central AN/TYQ-2 (TAOC).

The operator group provides three universal display consoles and one communications console. Each display console contains a CRT indicator with conducting glass plate face (forms x-y coordinates), pencil probe, foot switch, display panels, control panels, intercommunications panel, and supporting power supply and circuitry modules. The console displays selected elements of radar video, processed video, computer generated symbols, vectors, pairing lines, and a plan view of the assigned operational area. These display consoles exhibit the prevailing air traffic and tactical situation and permit threat evaluation and weapon assignment and control.

The communications console incorporates a Teletypewriter AN/TGC-15, cryptographic unit, and applicable control panels. The console transmits and receives flight strip data and other messages to and from other networks. It also enters, reads, or deletes data to or from the system main computer.

The group also contains manual status boards, provisions for an IFF Decoder Control Unit AN/GPA-60, operations and maintenance control panel, personnel access and facilities including chairs and shelving, clock, air conditioning, lighting, and fire extinguisher.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 134 in. Height: 73.5 in.
Width: 76 in. Volume: 433.0 cu. ft.

WEIGHT

Operational: 4631 lbs. (total equipment)
Transport: 4105 lbs. (526 lbs. removed,
no system degradation)
3636 lbs. (995 lbs. removed,
slight system degradation)

POWER REQUIREMENTS

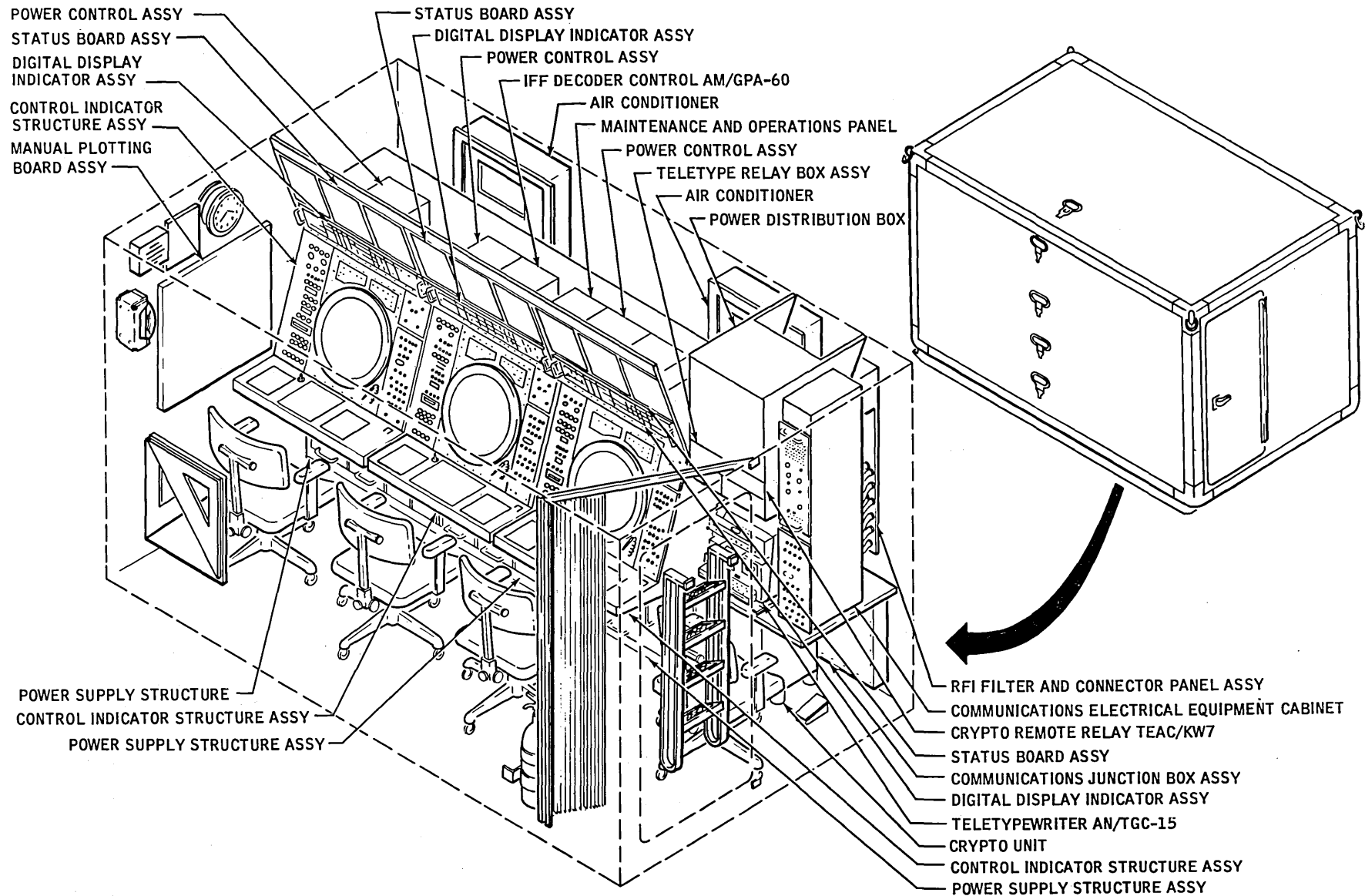
115/208 vac, 400 cps, 3 ph, 18.5 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



OPERATOR GROUP AN/TYA-9

COMMUNICATION GROUP AN/TYA-12

FUNCTIONAL DESCRIPTION

The Communication Group AN/TYA-12 is a transportable shelter containing electronic digital and communication equipment which, used in conjunction with several related group facilities, comprise the Tactical Air Operations Central AN/TYQ-2 (TAOC).

The Communication Group provides circuitry for several different categories of communications. A manual telephone switchboard and telephone terminal assemblies provide voice communications between any combination of internal or external communications media. A master intercommunication station is located adjacent to the switchboard at the operators station with a communications status panel. Equipment capability also includes reception and transmission of intercenter, missile battery, and teletype data. Two radio sets (AN/GRC-112 and AN/GRC-134) with appropriate filters, antennas, and isolation and conversion modules provide some of the UHF radio links between the TAOC and other centers and aircraft. The group utilizes over 800 printed circuit boards for the supporting communications modules and buffering the logic unit.

The group also contains power supplies, terminal assemblies, personnel facilities, field telephone, air conditioning, lighting, maintenance outlets, fire extinguisher, and storage provisions for UHF antennas.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 134 in. Height: 73.5 in.
Width: 76 in. Volume: 433.0 cu. ft.

WEIGHT

Operational: 4130 lbs. (total equipment)
Transport: 3823 lbs. (307 lbs. removed,
no system degradation)
3473 lbs. (657 lbs. removed,
slight system degradation)

POWER REQUIREMENTS

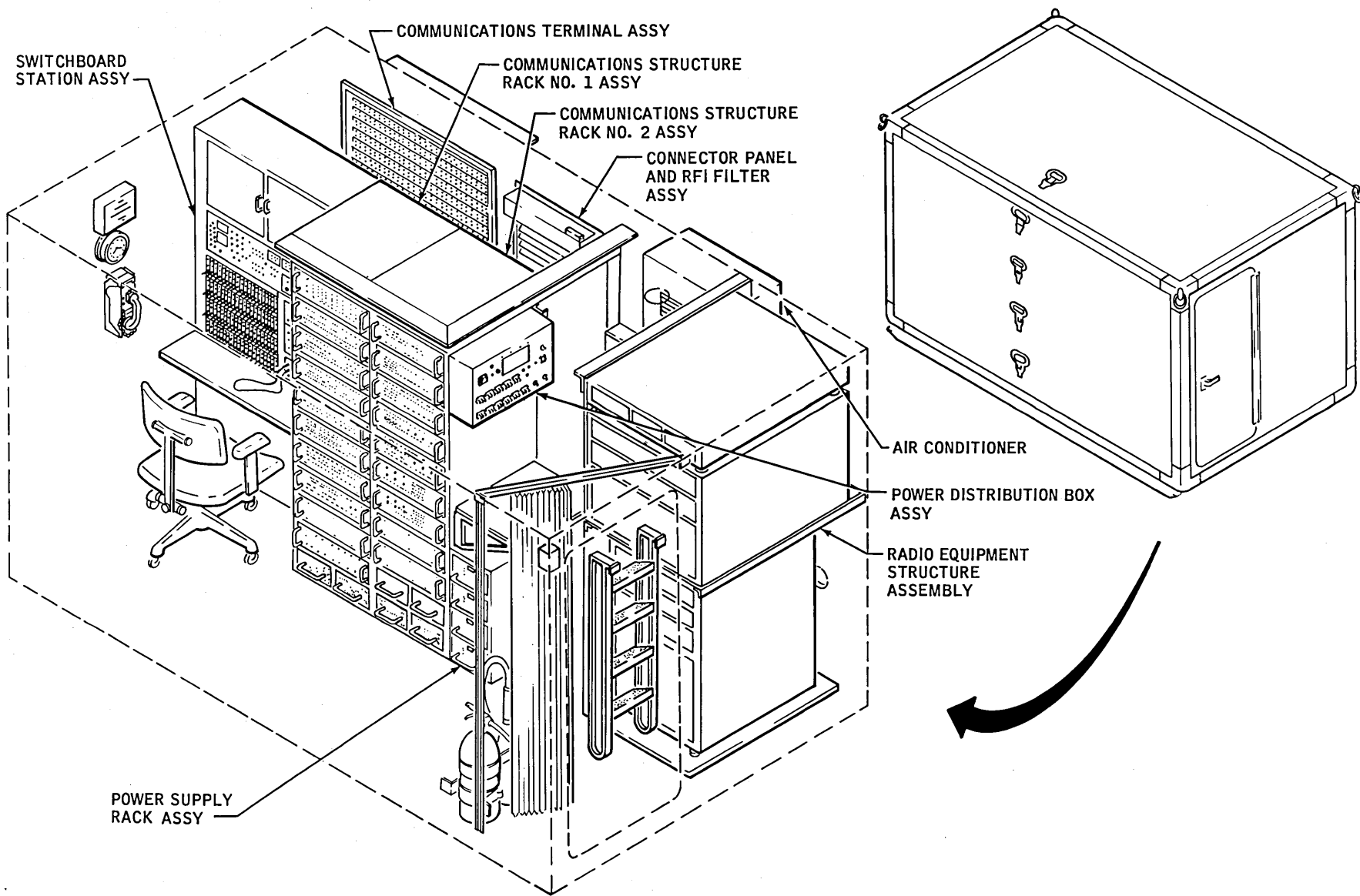
115/208 vac, 400 cps, 3 ph, 15.5 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



COMMUNICATION GROUP AN/TYA-12

ANCILLARY GROUP AN/TYA-26

FUNCTIONAL DESCRIPTION

The Ancillary Group AN/TYA-26 is a transportable shelter containing the consoles and displays of associated radars and radio direction finding equipment which, used in conjunction with several related equipment groups comprise the Tactical Air Operations Central AN/TYQ-2 (TAOC).

The Ancillary Group contains interface equipment to make the AN/TPS-37 height finder radar and range height indicator (RHI) console compatible with the TAOC system. The Ancillary Group also contains the Direction Finder Set AN/TRD-12 which provides instantaneous visual direction finding information.

In addition, the Ancillary Group contains power supplies, field telephones, personnel facilities, air conditioning, lighting, power distribution panel, and a fire extinguisher.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 134 in. Height: 73.5 in.
Width: 76 in. Volume: 433.0 cu. ft.

WEIGHT

Operational: 3945 lbs. (total equipment)
Transport: 3495 lbs. (total equipment)

POWER REQUIREMENTS

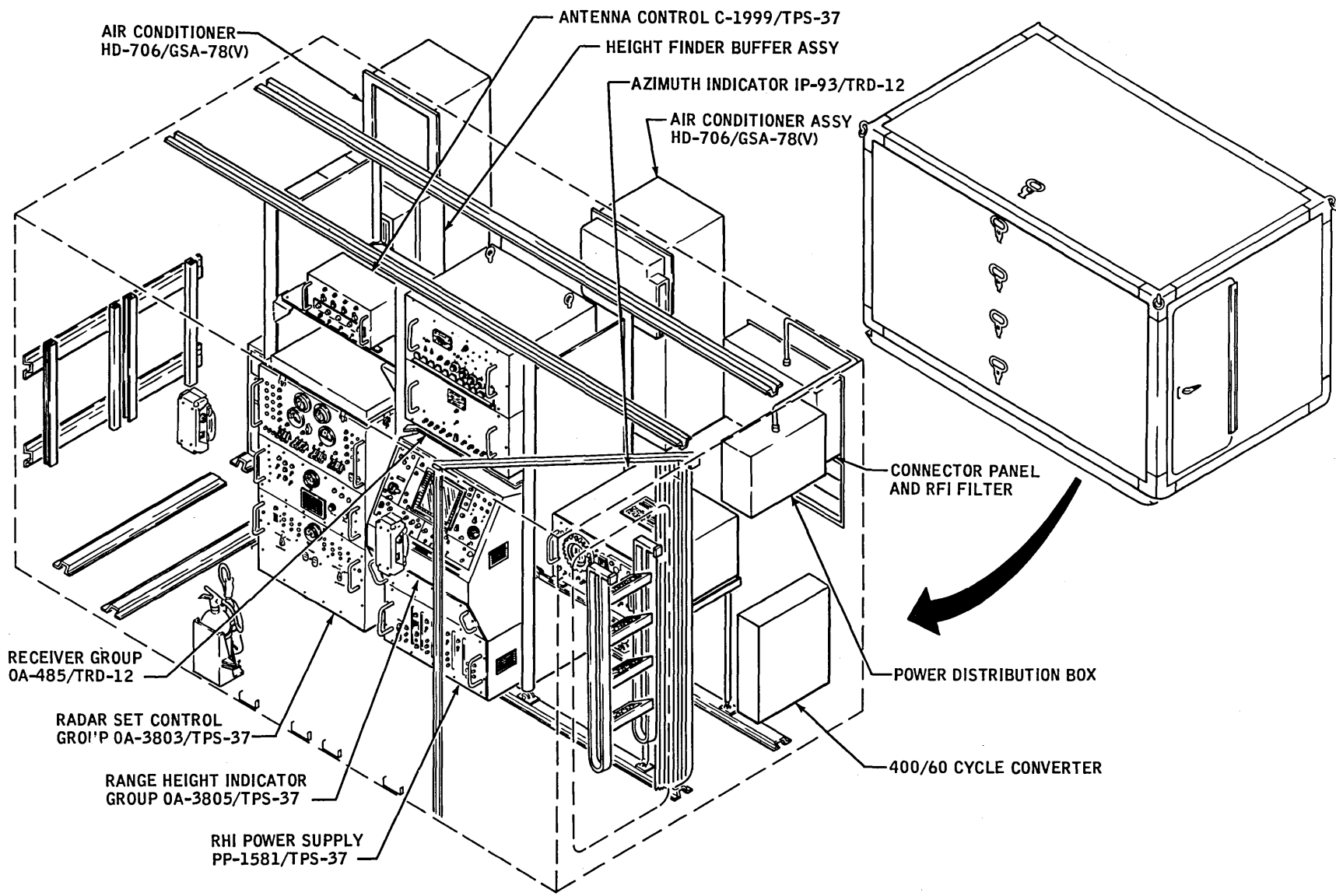
115/208 vac, 400 cps, 3 ph, 12.7 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



ANCILLARY GROUP AN/TYA-26

DISTRIBUTION BOX J-2573/TYQ-2

FUNCTIONAL DESCRIPTION

The Distribution Box J-2573/TYQ-2 is used to control distribution of 115/208 volt, 400 cycle, single phase and three phase prime power to all of the TAOC shelters. The distribution box is equipped with connectors for attaching cables and associated circuit breakers. Power is accepted from nine portable diesel generator sets with provisions to operate them individually or in parallel to supply power to all of the TAOC shelters.

The distribution box has input circuit breakers to protect power input to the parallel busses and output circuit breakers to protect individual outputs to the TAOC shelters.

TECHNICAL DESCRIPTION

OVERALL DIMENSIONS

Length: 76.75 in. Height: 38.0 in.
Width: 41.75 in. Volume: 79.9 cu. ft.

WEIGHT

Operational: 1250 lbs. (total equipment)
Transport: 1250 lbs. (total equipment)

POWER DISTRIBUTION CAPABILITIES

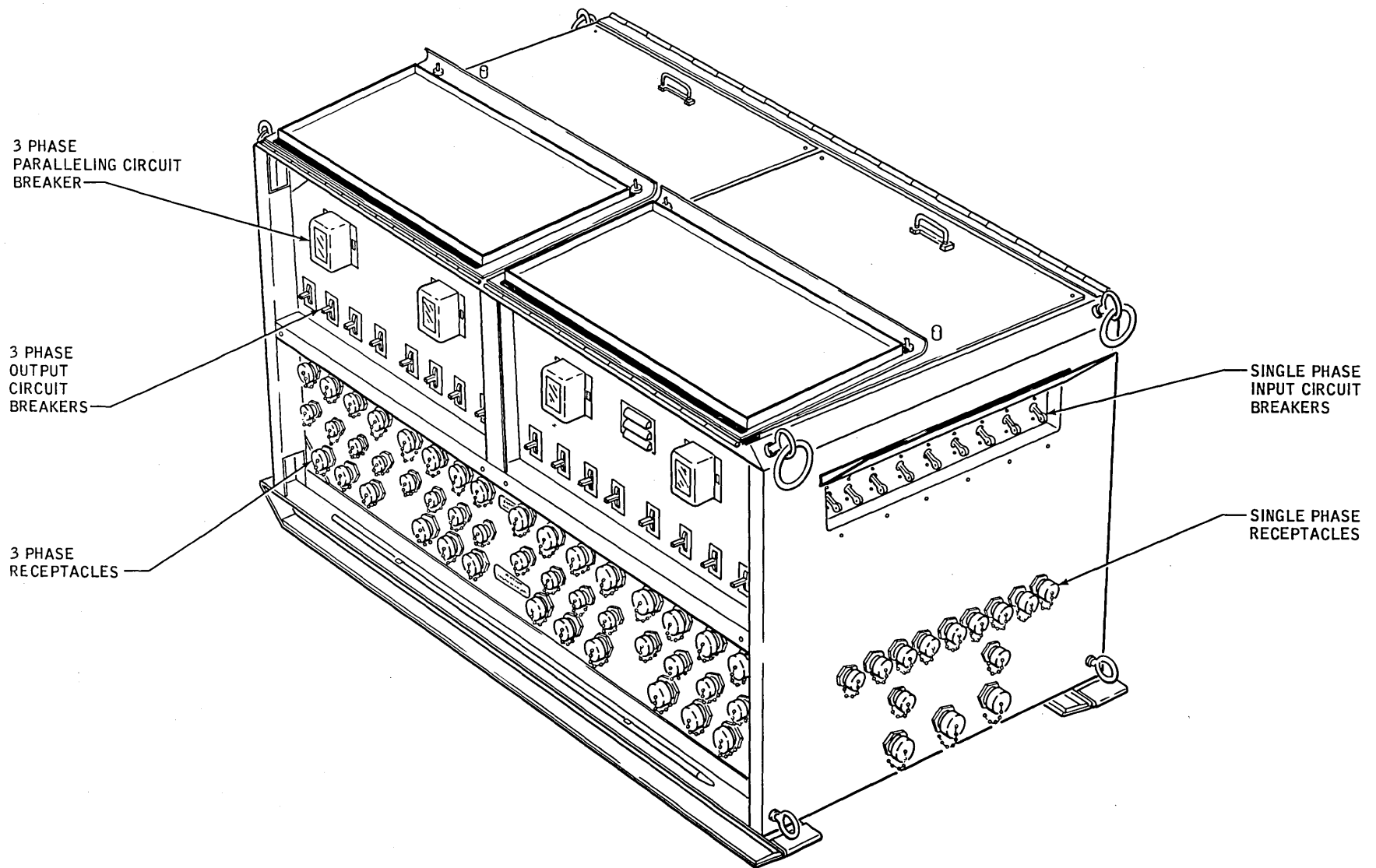
115/208 vac, 400 cps, 3 ph, 350 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



DISTRIBUTION BOX J-2573/TYQ-2

MAINTENANCE GROUP AN/TYA()

FUNCTIONAL DESCRIPTION

The Maintenance Group AN/TYA() is one of two transportable shelters that comprise the maintenance facility for the Tactical Air Operations Central AN/TYQ-2 (TAOC).

The maintenance group is the primary facility for test and repair of the magnetic drum assembly, micropositioner, power supplies, and communications modules. It also contains the special and standard test equipment, tools, repair parts, and necessary work spaces for this function.

Bench work space is provided around most of the periphery by means of fixed and folding tables. Racks over the benches are for commonly used auxiliary test equipment and the space below the benches is used for storage of tools, power supplies, and miscellaneous test equipment. The large bins are provided for storage of repair parts, blueprints, manuals, and other maintenance documents. Included are a complete repair parts location file and a maintenance data log.

The maintenance group also contains terminal assemblies, air conditioning, lighting, and a fire extinguisher.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 134 in. Height: 73.5 in.
Width: 76 in. Volume: 433.0 cu. ft.

WEIGHT

Operational: 3632 lbs. (total equipment)
Transport: 3457 lbs. (175 lbs. removed,
no system
degradation)

POWER REQUIREMENTS

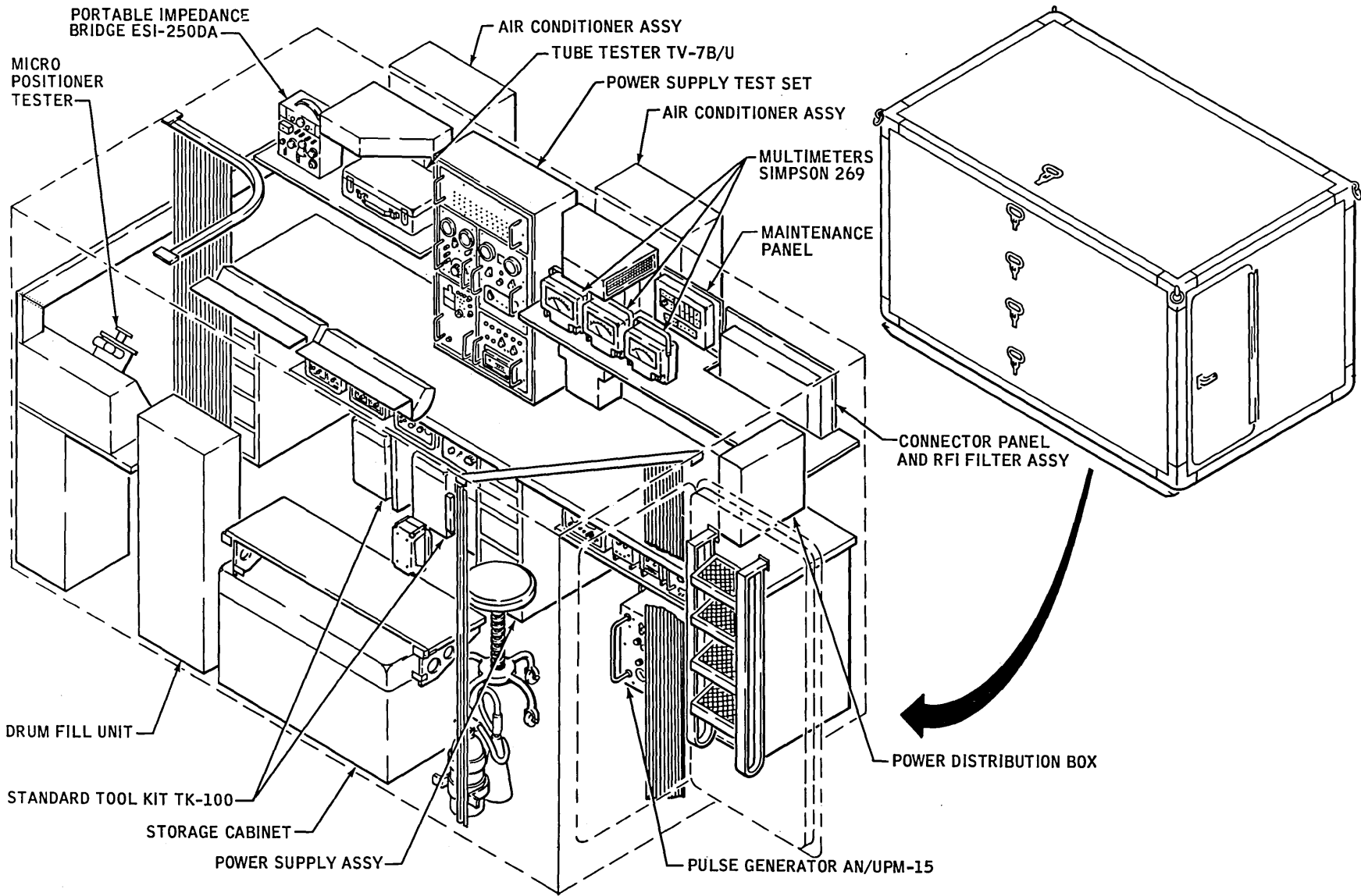
115/208 vac, 400 cps, 3 ph, 12.2 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



MAINTENANCE GROUP AN/TYA()

UNIT TEST GROUP AN/TYA-23

FUNCTIONAL DESCRIPTION

The Unit Test Group AN/TYQ-23 is one of two transportable shelters that comprise the maintenance facility for the Tactical Air Operations Central AN/TYQ-2 (TAOC).

The unit test group is the primary facility for test and repair of circuit plug-in cards and analog modules and contains the special and standard test equipment, tools, repair parts, and necessary work spaces for this function.

Bench work space is provided around most of the periphery by means of fixed and folding tables. Racks over the benches are for commonly used auxiliary test equipment and the space below the benches is used for storage of tools, power supplies, and miscellaneous test equipment. Large bins are provided for storage of repair parts, blueprints, manuals, and other maintenance documents. In addition, two hand-carry transit cases are provided to permit maximum protection of cards when carried between shelters.

The unit test group also contains terminal assemblies, air conditioning, lighting, and a fire extinguisher.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 134 in. Height: 73.5 in.
Width: 76 in. Volume: 433.0 cu. ft.

WEIGHT

Operational: 3667 lbs. (total equipment)
Transport: 3492 lbs. (175 lbs. removed,
no system
degradation)

POWER REQUIREMENTS

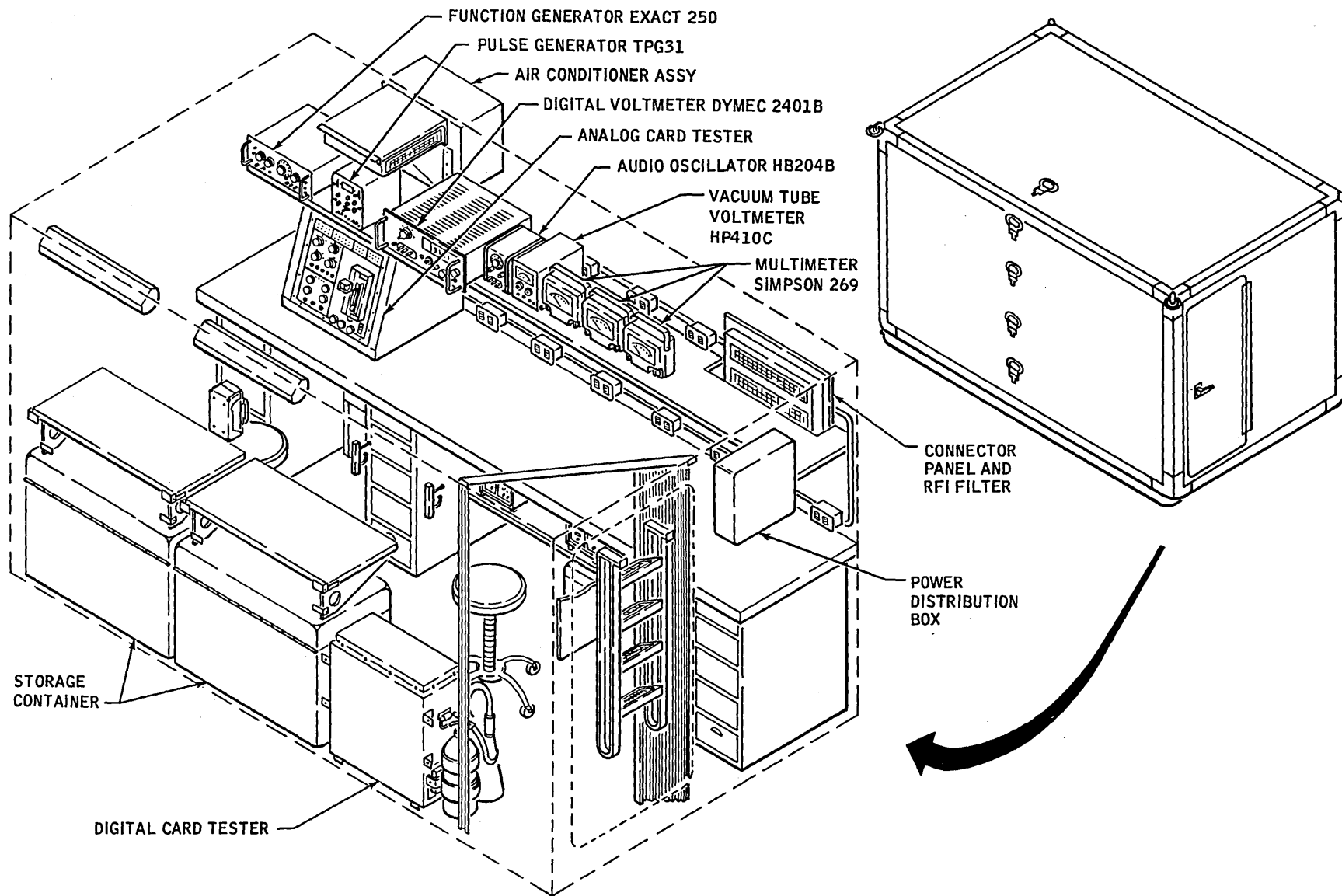
115/208 vac, 400 cps, 3 ph, 8.0 kw

ENVIRONMENTAL EXTREMES

Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



UNIT TEST GROUP AN/TYA-23

PHOTOGRAPHIC/TRANSPORT GROUP AN/TYA-25

FUNCTIONAL DESCRIPTION

The Photographic/Transport Group AN/TYA-25 is a transportable shelter containing commercial photographic equipment and developing facilities which, used in conjunction with several related group facilities, comprise the Tactical Air Operations Central AN/TYQ-2 (TAOC).

The photographic/transport group permits preparation in the field of new masks for the various censor mappers in the Geographical Display Generation Group AN/TYA-7. The group has space for transporting equipment modules that have to be removed from the other TAOC groups to reduce their weight for transport by light-load UH-34-type helicopters.

The group also contains a power distribution panel, terminal assemblies, personnel access and facilities including a work bench and a drafting table, air conditioning, lighting, maintenance outlets, fire extinguisher, water tank, and storage provisions for camera and light stands.

TECHNICAL DESCRIPTION

OVERALL INTERNAL DIMENSIONS

Length: 134 in. Height: 73.5 in.
Width: 76 in. Volume: 433.0 cu. ft.

WEIGHT

Operational: 2284 lbs.

POWER REQUIREMENTS

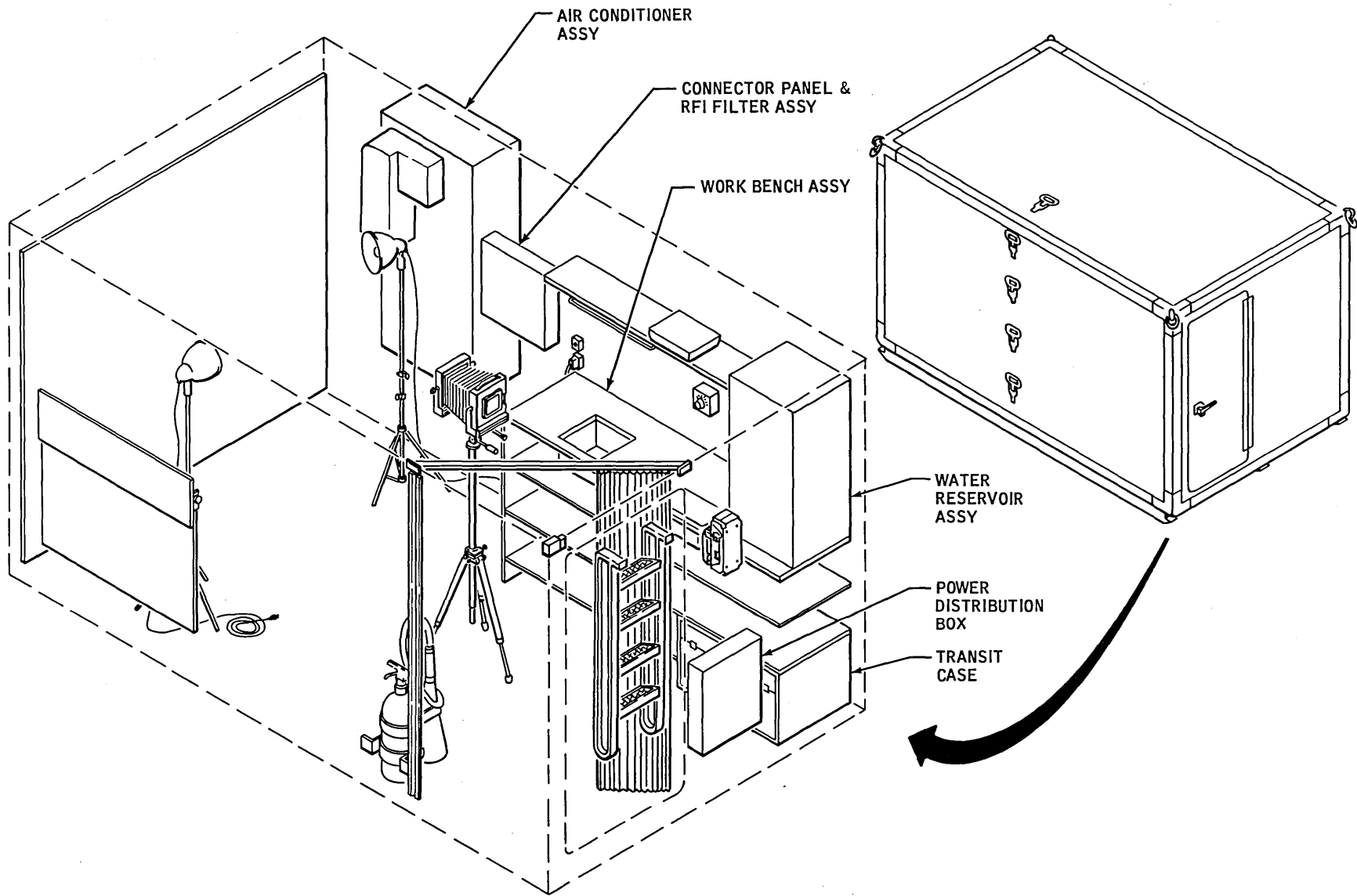
115/208 vac, 400 cps, 3 ph, 7.9 kw

ENVIRONMENTAL EXTREMES

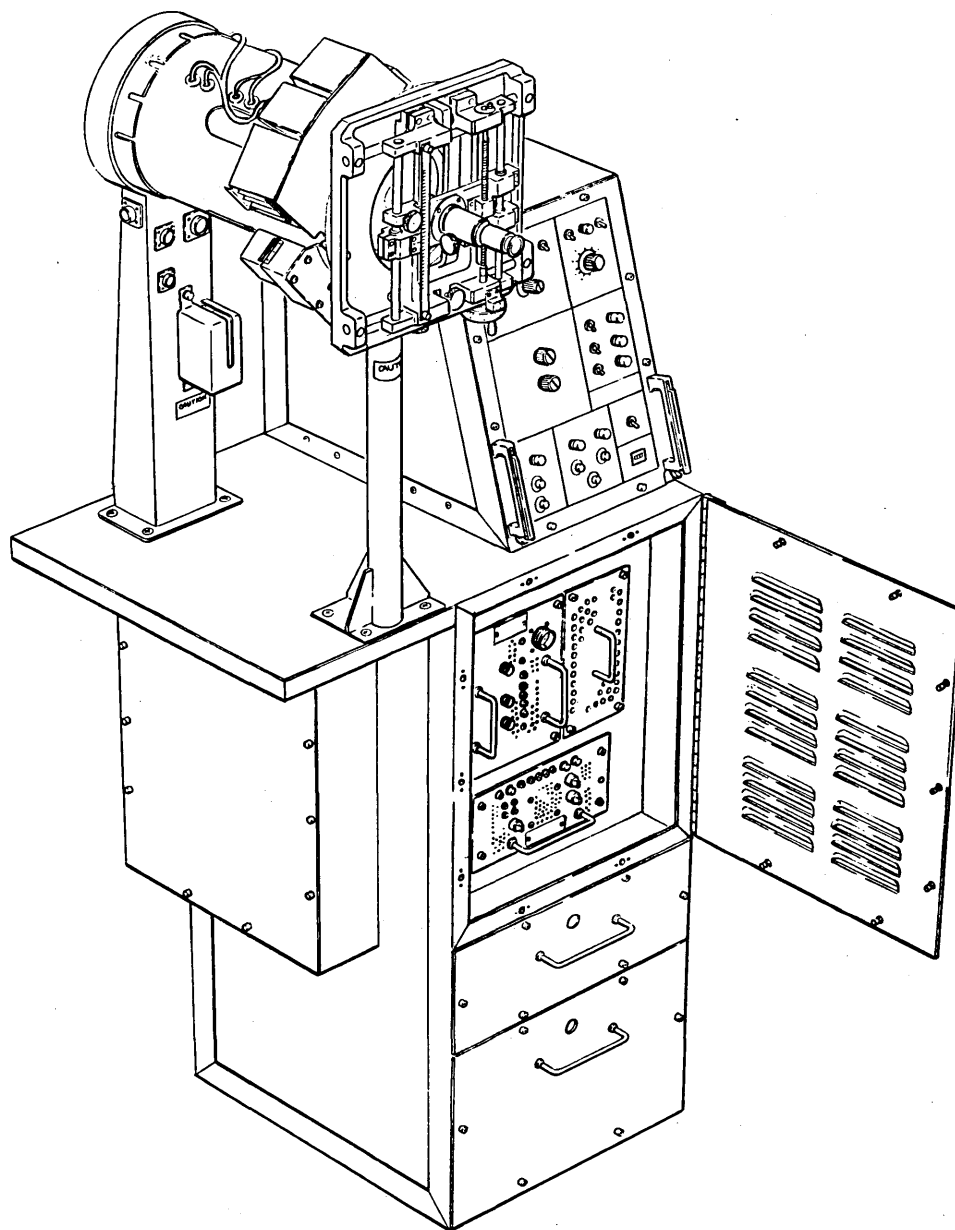
Operating temperature: -40° F to +122° F
Non-operating temperature: -65° F to +167° F
Operational altitude: 12,000 ft. max. (SL)
Transport altitude: 40,000 ft. max. (SL)

MILITARY TRANSPORT MODES

Fork lift, towing and fording provisions
M-35 Military Truck
Fixed Wing Aircraft (C-119, C-124, C-130, C-131)
Helicopter



PHOTOGRAPHIC/TRANSPORT GROUP AN/TYA-25



MICROPOSITIONER TEST SET

The Micropositioner Test Set is a special purpose test set permanently housed in the Maintenance Group Shelter and is used for aligning and testing the Micropositioner Assembly. (Part of the Geographic Display Generation Group.)

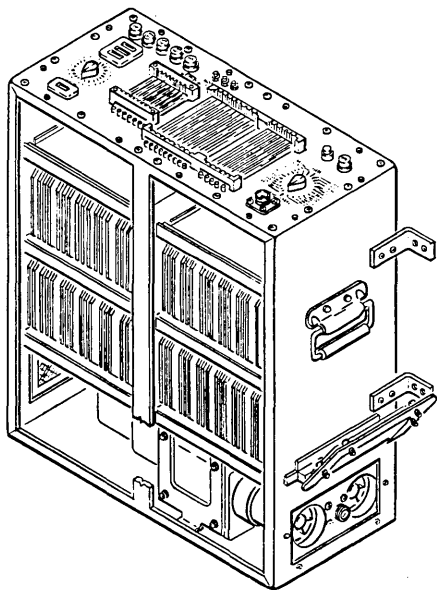
This test set supplies the necessary voltages and currents to test and align the Micropositioner Assembly.

MICROPOSITIONER TEST SET

DIGITAL TEST SET

The Digital Module Test Set is a portable, special purpose test set used for testing the common-use digital printed circuit cards of the TAOC System.

This test set has an automatic card test feature which quickly and accurately gives a GO, NO-GO read-out. This automatic test fault isolates to a single circuit on the card under test. Further isolation is accomplished in the manual mode utilizing external test equipment.

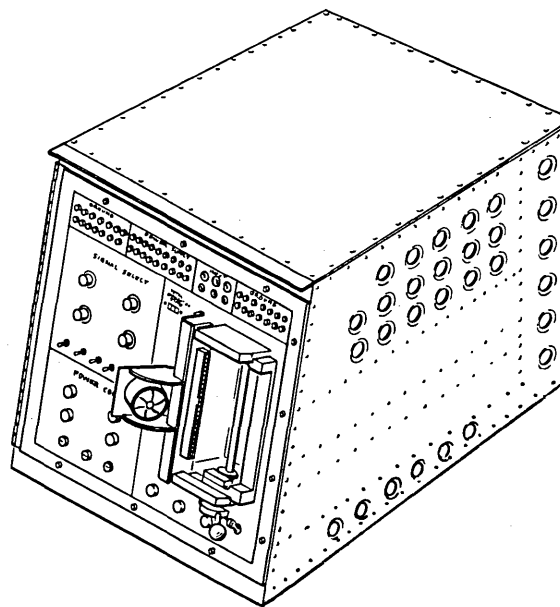


DIGITAL TEST SET

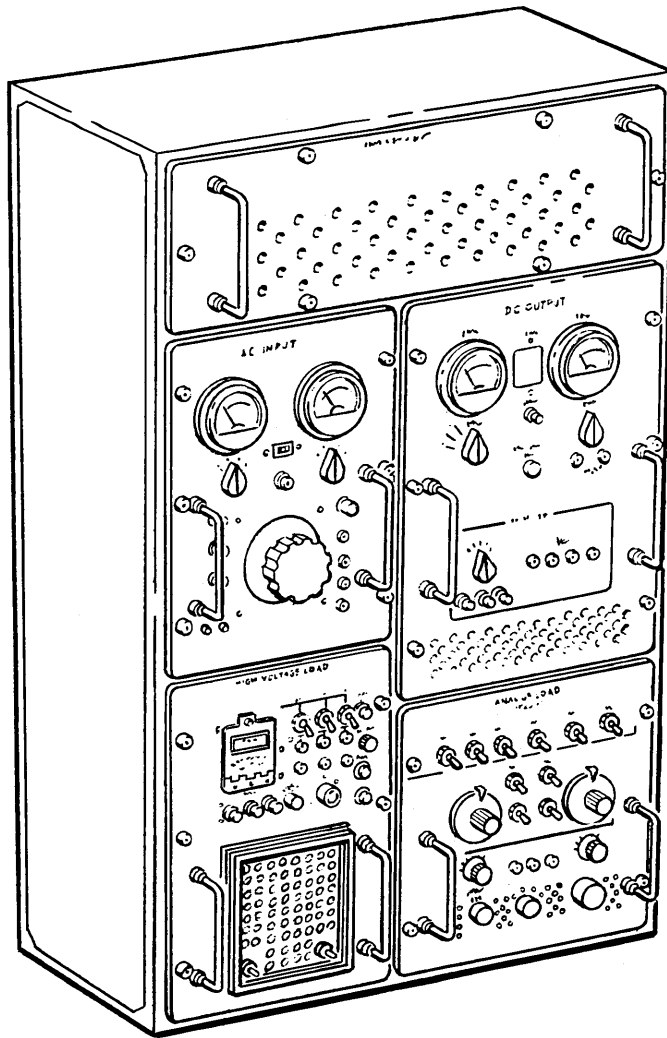
ANALOG TEST SET

The Analog Module Test Set is a special purpose test set permanently housed in the Unit Test Group Shelter. Plug-in adapters automatically program the power supplies for dynamic test of the analog printed circuit cards of the TAOC. Signal selection is programmed from the front panel by switch positioning.

Circuit descriptions, waveforms and step by step test procedures are provided for each analog circuit card within the TAOC.



ANALOG TEST SET



POWER SUPPLY TEST SET

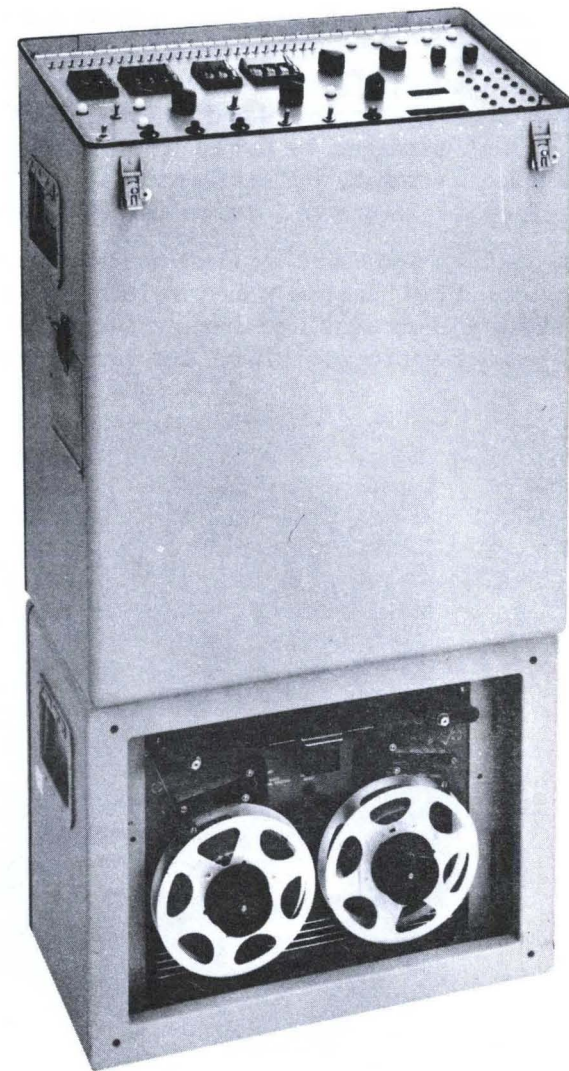
The Power Supply Test Set is a special purpose test set permanently housed in the Maintenance Group Shelter. Eight plug-in modules furnish the dynamic conditions for test and fault isolation of the various TAOC power supplies.

The Power Supply Test Set contains the necessary meters and monitoring points, when combined with external common test equipment, can measure all the power supply parameters.

POWER SUPPLY TEST SET

DRUM FILL UNIT

One of the several items of special maintenance equipment included in the TAOC is the Drum Fill Unit. This unit can be used to record timing tracks and permanent programs on the Central Computer Drum, the Data Processor Drum and the 3D Radar Processor Drum. It can also be used to make a comparison of the program on the drum against the program on the punched paper tape. The Drum Fill Unit breaks down into two pieces for moving from shelter to shelter. It can be mounted in the Maintenance Group for servicing of spare drums, or in the Central Computer Group for rapid refilling or repair of the in-use drum. The complete stored program can be recorded on the Central Computer Drum in less than fifteen minutes.

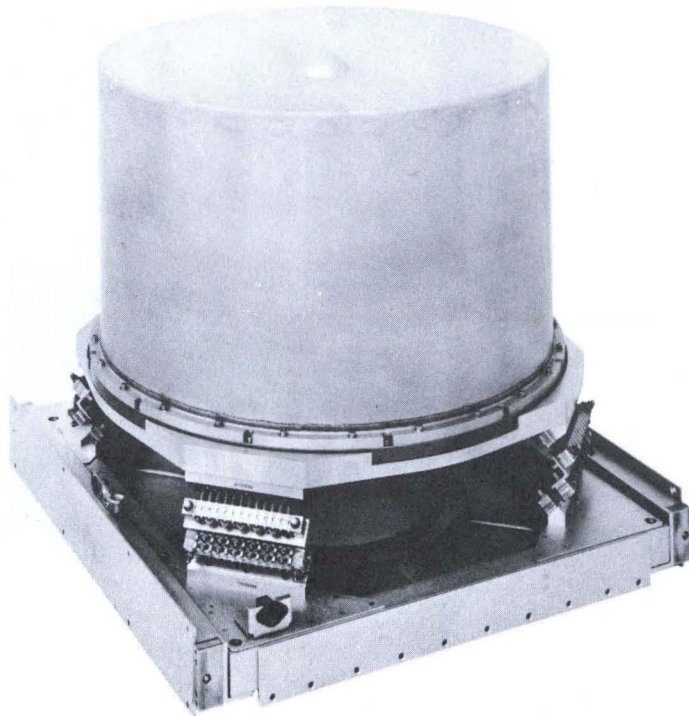


DRUM FILL UNIT

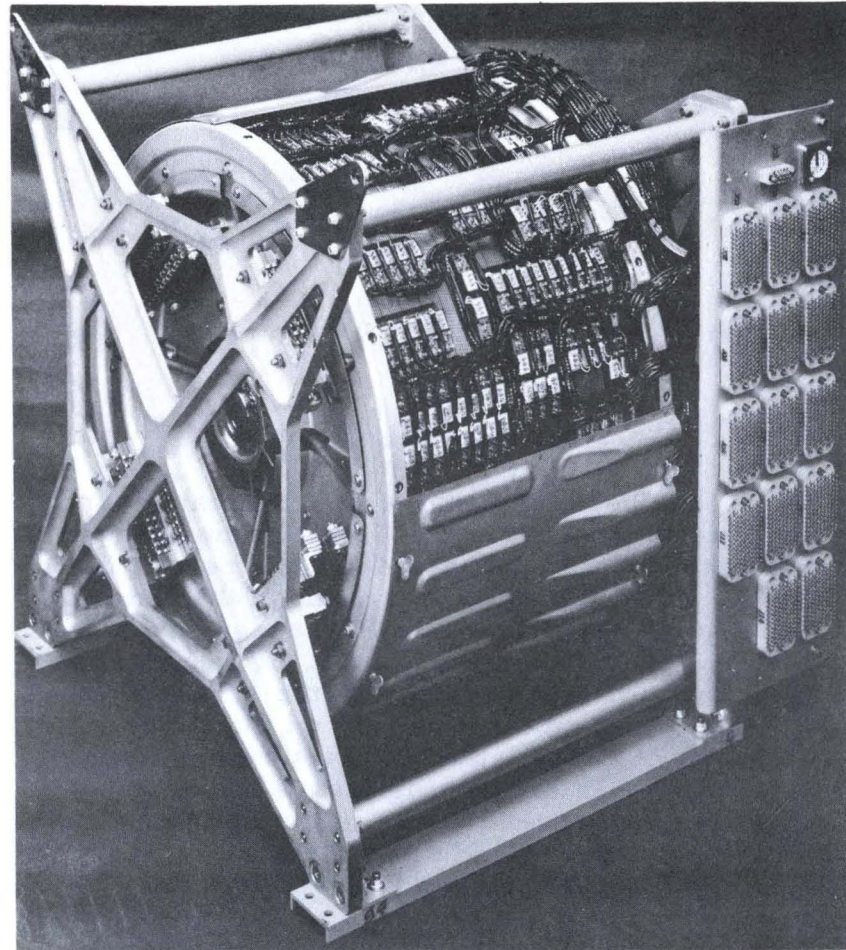
MEMORY DRUMS

Memory drums are used as the digital storage elements and system clock pulse generators in the Central Computer Group and each of the Radar and Identification Data Processors (RIDP). The memory drums used in the TAOC are basically similar to those used in the Service Test Equipment, but reflect major structural changes to improved drum memory reliability.

The new drums are sealed units whereas the Service Test drums were relatively open. By sealing the drums, drum surfaces and heads are protected from moisture condensation and dirt,

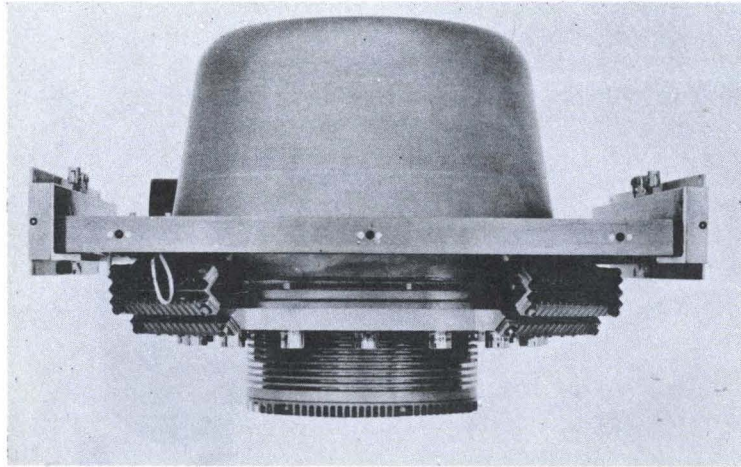


MAGNETIC DRUM, DATA STORAGE MU-507/TYA-5
FOR PRODUCTION TAOC



CENTRAL COMPUTER DRUM MEMORY
FOR SERVICE TEST TAOC

thereby reducing possible malfunctions from these factors. The production Central Computer drum has a capacity of 1,123,200 bits, operates at a speed of 2667 rpm, and generates a clock frequency of 333 kcs. The drum rotor diameter is 15.8 inches and provides 150 tracks of 7488 bits each. This drum memory unit has a total of 457 heads.

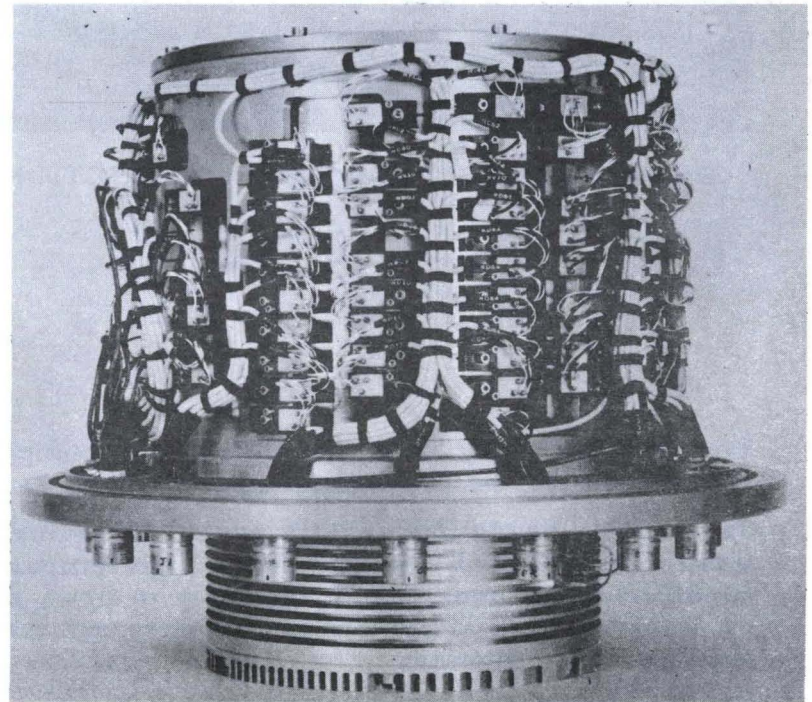


MAGNETIC DRUM, DATA STORAGE
MU-506/TYA-6
FOR PRODUCTION TAOC

The new RIDP drums, in addition to the mechanical improvements, employ a simpler speed control system. Whereas the Service Test units employed a magnetic brake to synchronize rotational speed with the associated radar PRF, the new drums use silicon controlled rectifiers to provide variable drive power directly to the drum motor windings. Less heating results, and the control is more stable and positive.

The memory drum for the 2D RIDP has a capacity of 192,000 bits on 48 tracks of 4,000

bits each. The controllable speed range is from 2250 rpm to 6000 rpm which produces clock pulses over the range of 150 kc to 400 kc. This drum uses a rotor having a diameter of 8.4 inches and includes 144 heads.



2D RIDP DRUM MEMORY
FOR PRODUCTION TAOC
(With Cover Removed)

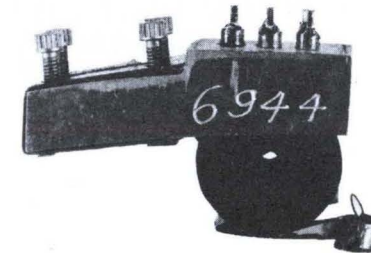
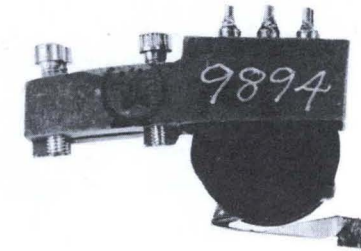


DRUM MEMORY HEADS FOR PRODUCTION TAOC

The drum memory heads have also been completely redesigned for the production units.

The earlier heads had certain parts, including the pick-up coil, set in epoxy. Under high temperature conditions, the epoxy had a tendency to flow, thereby disturbing the alignment of the parts and the phasing of the signals.

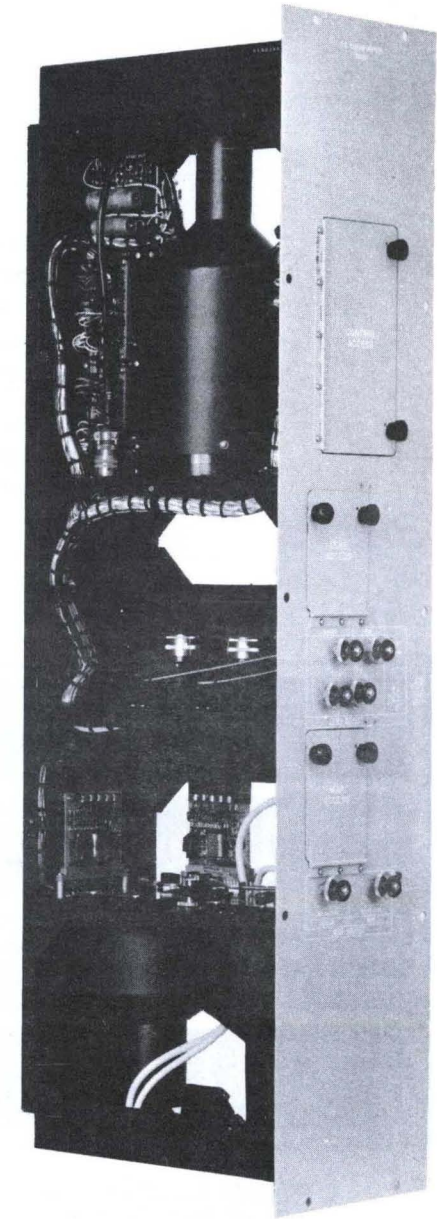
The new heads have the pick-up coil and arm mechanically attached to the body, thereby maintaining alignment even under temperature extremes.



DRUM MEMORY HEADS
FOR SERVICE TEST
TAOC

VIDEO CONVERTERS

The TAOC incorporates four Video Converters, CV-1930/TYA-7 (radar censor-mapper units), a Video Converter, CV-1929/TYA-7 (crosstell mapper) and a Video Converter, CV-1928/TYA-7 (clearplot mapper), all located in the Geographic Display Generation Group AN/TYA-7 (censor-mapper hut). These items are basically flying spot scanners using a CRT as the light source and a photo-multiplier tube as the light detector. Masks for generating video maps or computer control signals are inserted between the light source and the light detectors. Each Radar Censor-Mapper Unit is associated with a separate radar. It provides video for an electronic map that is presented on the Operator Console CRT along with the radar video. The same mapper also generates control signals which inhibit automatic acquisition of targets in the masked area regardless of noise level and inhibits target reporting in the area if the noise level is high.

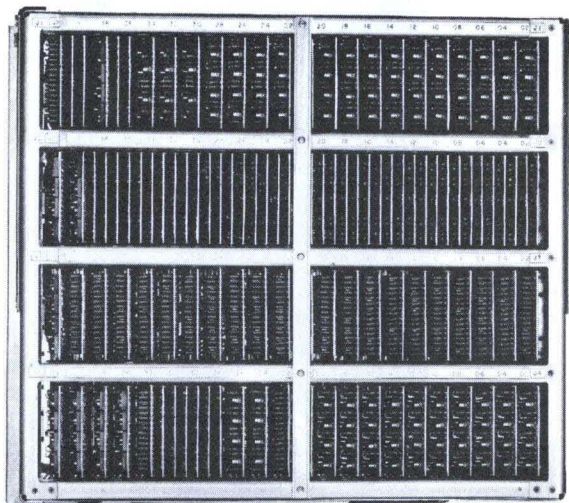


RADAR CENSOR MAPPER
SERVICE TEST TAOC
(Delivered in 1961)

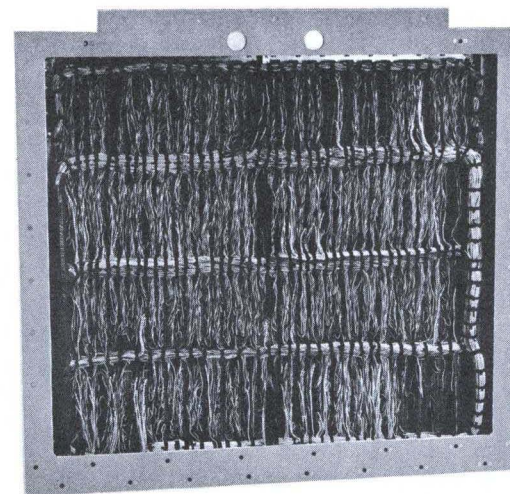
TAOC CONSOLE CARD RACKS

To facilitate maintenance of the consoles, the production TAOC consoles are made up of a number of individual chassis and racks. These chassis and racks can be withdrawn or removed for individual servicing. Typical of these units is the upper card rack which hinges upward from the main console chassis.

The upper card rack contains cards and wiring which accomplish the digital range scaling, X and Y sweep counting, and various other digital functions for the display.



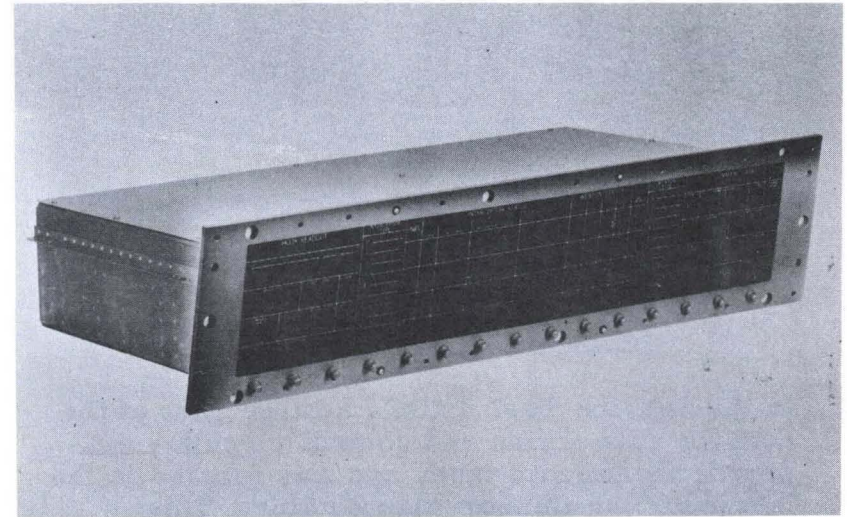
UPPER CARD RACK
(FRONT VIEW)



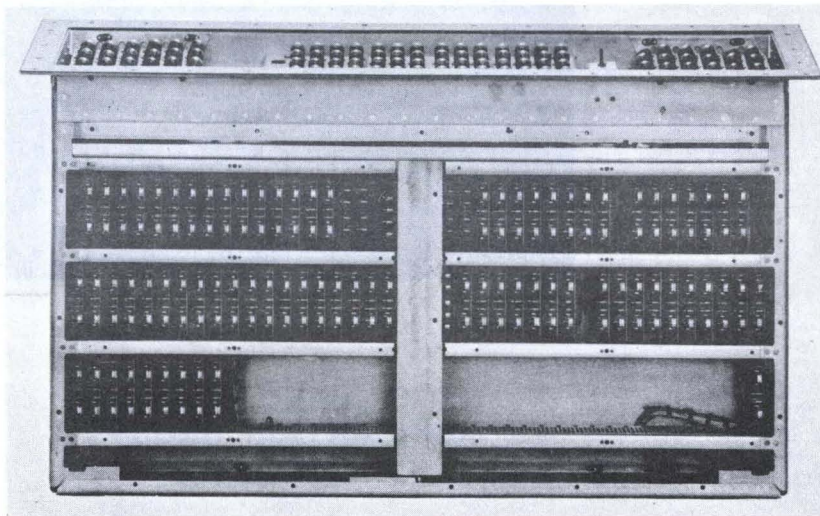
UPPER CARD RACK
(REAR VIEW)

TAOC AUXILIARY DISPLAY UNIT

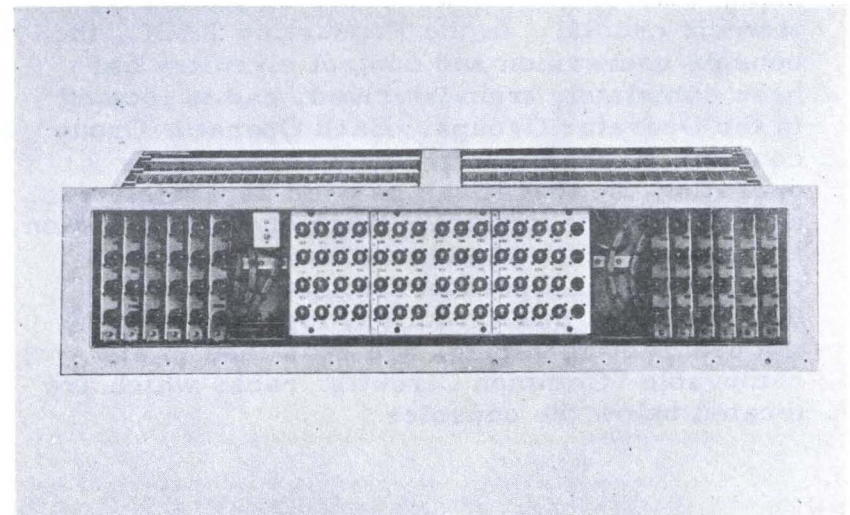
The Auxiliary Display Unit contains the nixie lights and driving circuitry for operator read-out of selected computer data. One Auxiliary Display Unit is located above each Operator Console, thus fifteen units are included in a complete system. Readout information includes data on hooked targets, trial intercept results, weapon status, and command data for controlled aircraft. All nixie driving circuitry in the Auxiliary Display Unit is packaged on 3 by 3 inch plug-in printed circuit cards.



AUXILIARY DISPLAY UNIT



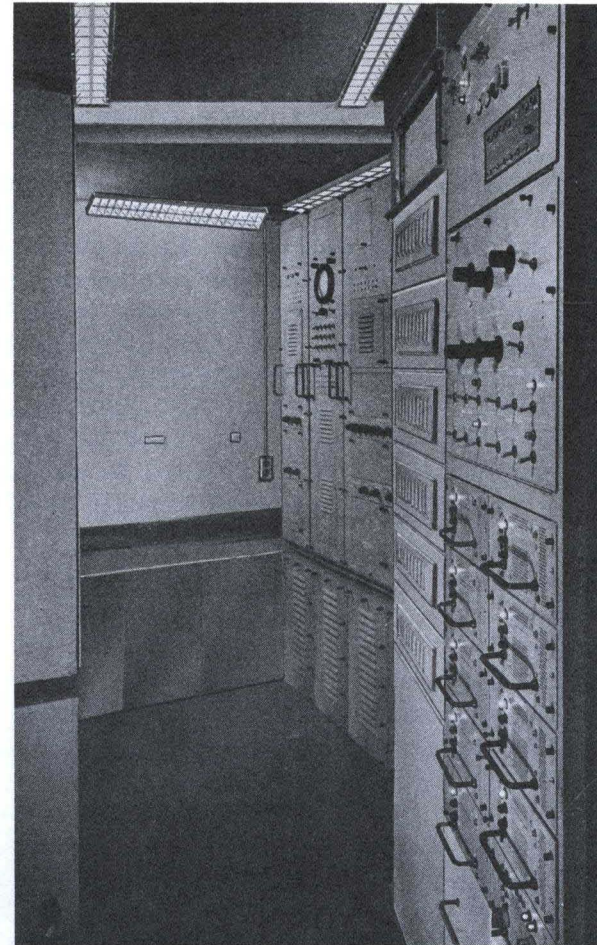
AUXILIARY DISPLAY UNIT
(Bottom View)



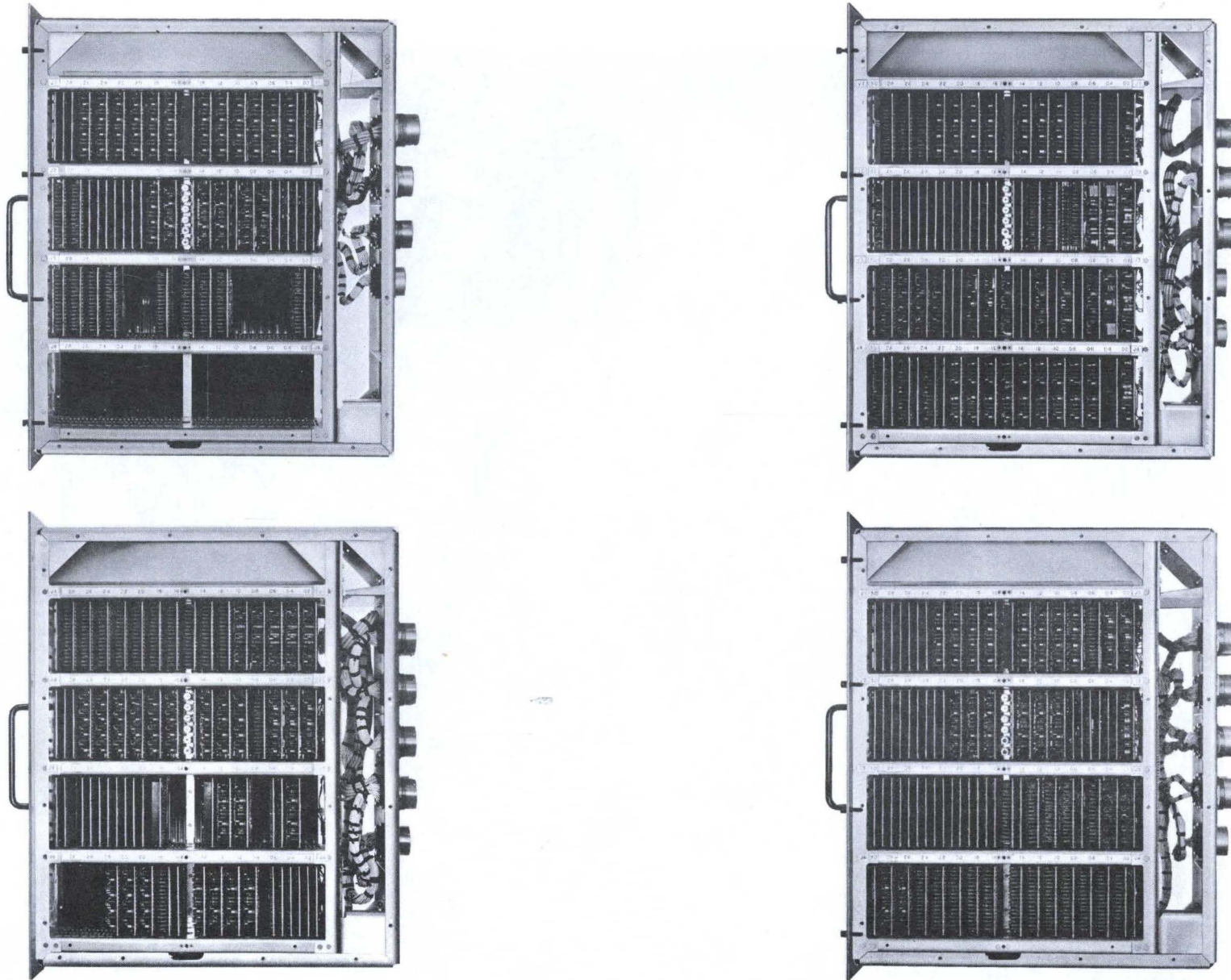
AUXILIARY DISPLAY UNIT
(Front Panel Removed)

CONSOLE COMMON CIRCUITS

In the Service Test TAOC, a large part of the console conversion and control circuitry employed thermionic tubes and was located in the "Type III" or Censor-Mapper Hut. This mechanization was consistent with the state of technology at that time, but resulted in noticeable symbol jitter. Moreover, without the Type III Hut, the Operator Consoles could not be used, thereby making the loss of this single hut extremely crucial. In the Production TAOC, the console conversion and control circuitry has been completely transistorized, and is located in the Operator Groups. Each Operator Group contains all the circuitry necessary for its operation, so that it can be used separately or as a part of the system. Much of the conversion and control circuitry is common to the three consoles in the Operator Groups. The cards that comprise this circuitry, together with the interconnecting wiring, are contained in six removable "Common Circuits" racks which are located below the consoles.

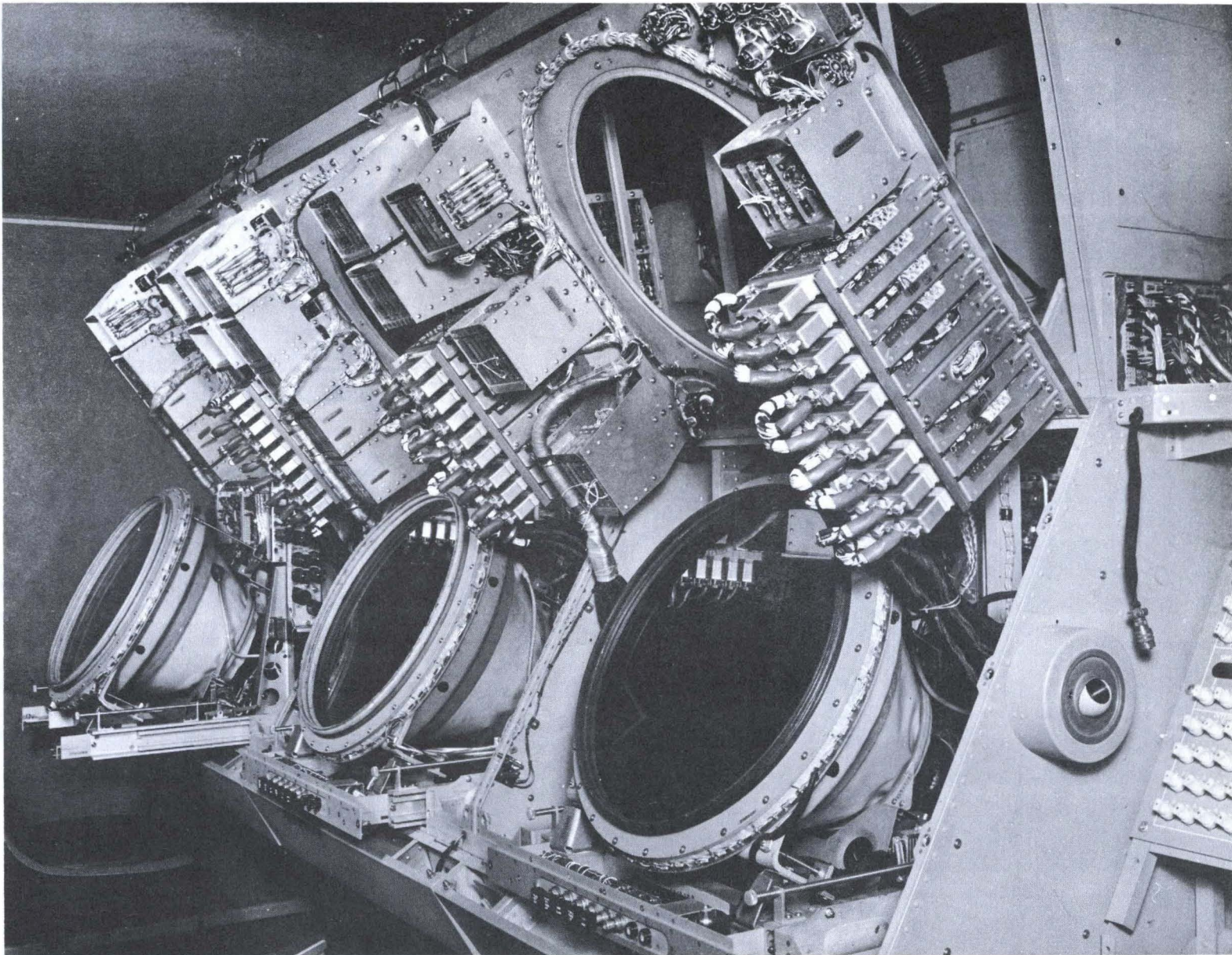


GEOGRAPHIC DISPLAY
GENERATION GROUP

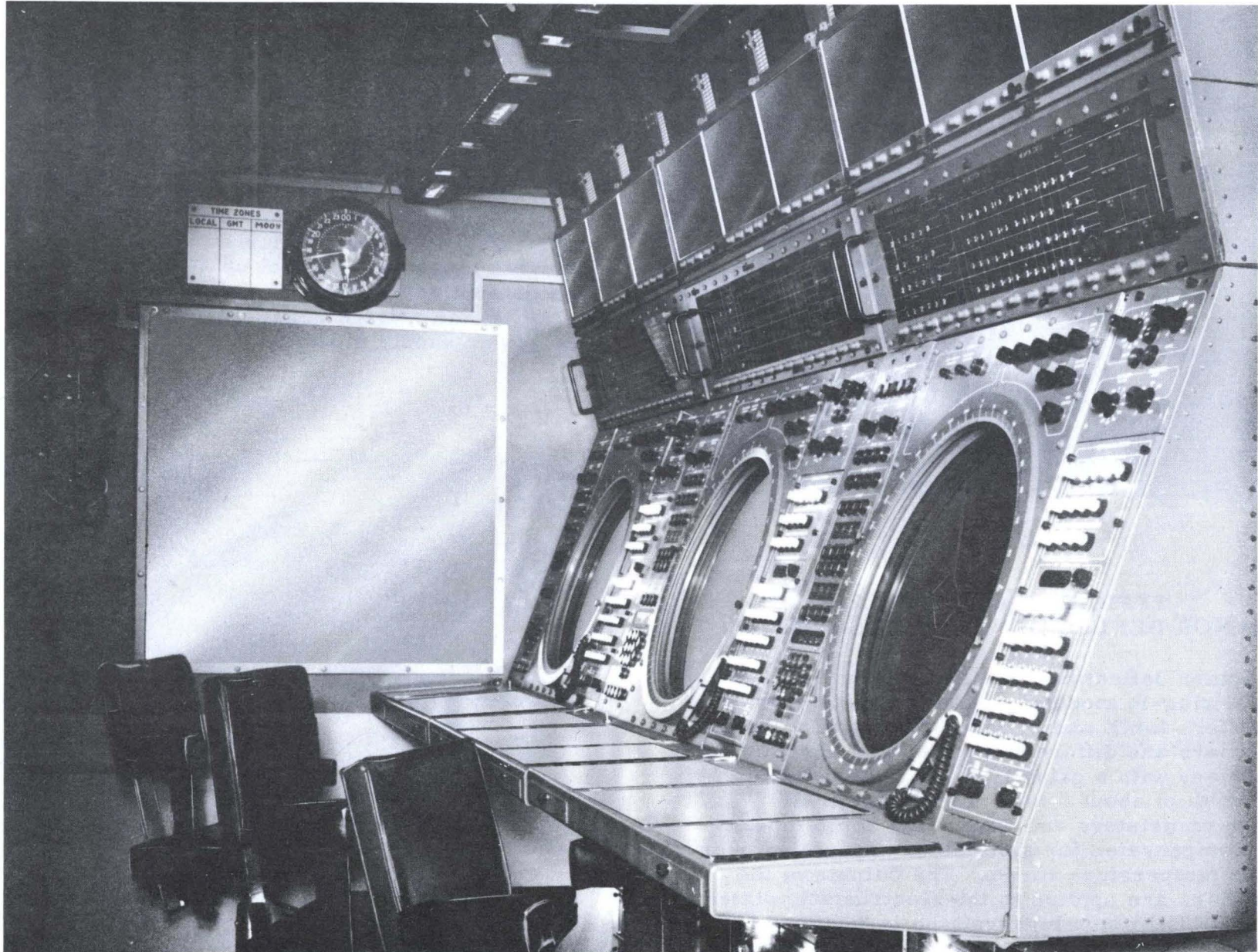


COMMON CIRCUIT RACKS

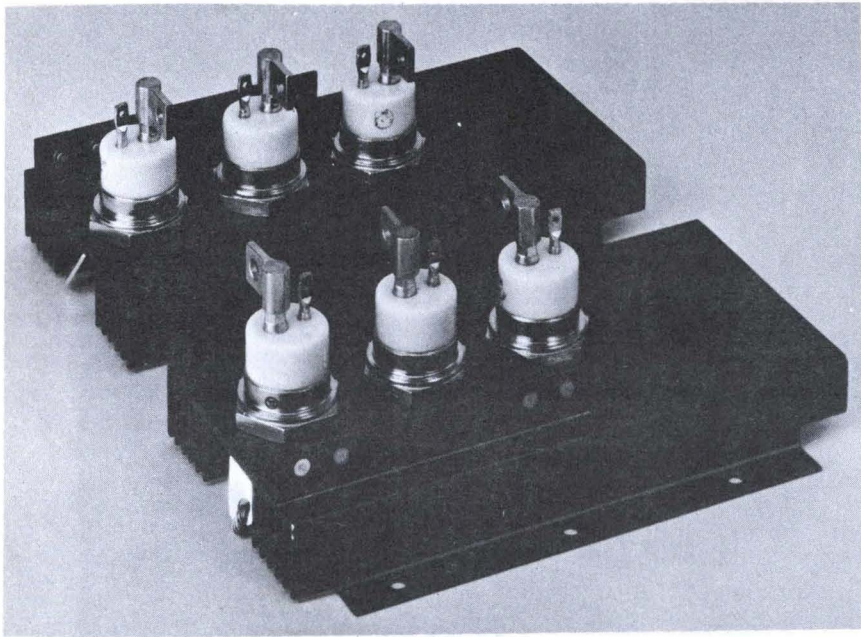
Four of the six racks located in each TAOC Production Operator Group to house conversion conversion circuitry for the consoles in the shelter.



SERVICE TEST CONSOLES
Showing access for maintenance
(Delivered in 1961)



PRODUCTION TAOC CONSOLES

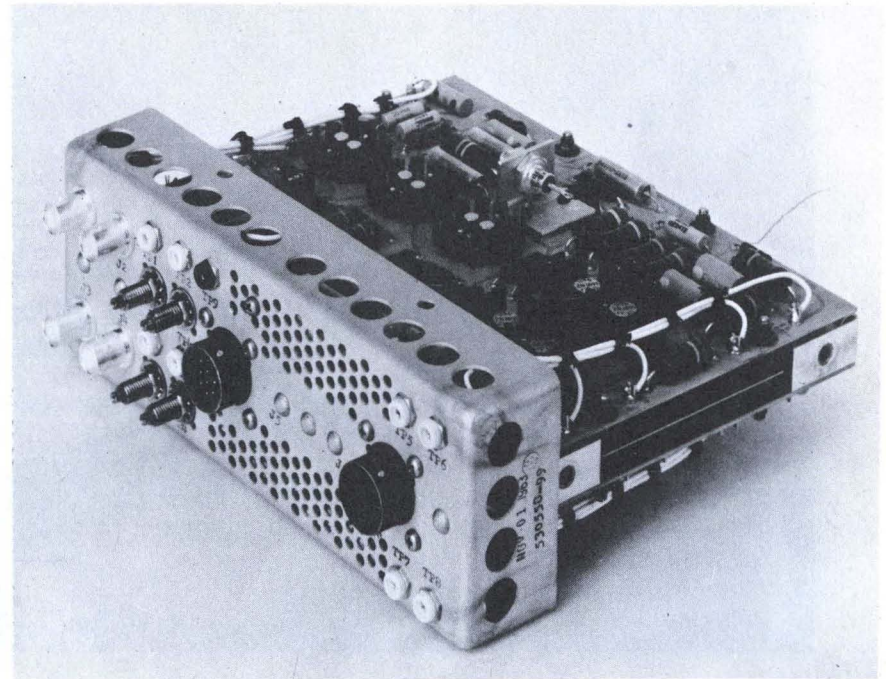


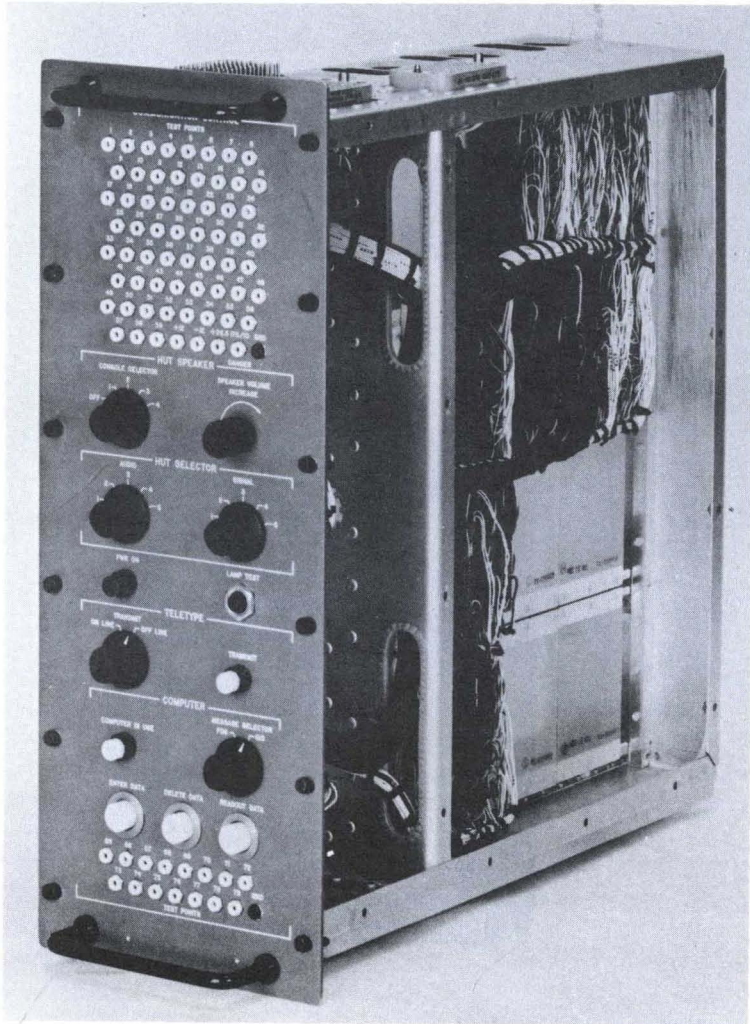
TYPICAL TAOC MODULE
(MINOR DEFLECTION AMPLIFIER UNIT)

The minor deflection amplifier unit which is a typical plug-in module, contains independent amplifiers for X and Y minor deflection. These amplifiers are differential wide band operational amplifiers with a gain of 50 and a closed-loop bandwidth of about 2 mc. They contain all silicon transistors and diodes and are temperature compensated for satisfactory operation over a wide temperature range. The outputs of the amplifiers are applied to the electrostatic plates of the CRT through high-voltage capacitor assemblies called electrostatic couplers and furnish the signals which generate the symbols.

SILICON CONTROLLED RECTIFIERS

A recent component development that has assisted in the improved design for TAOC is the silicon controlled rectifier (SCR). This item, which operates much as the thyatron tube, affords stable, reliable, and straightforward electronic control of AC power. A major application for these units in Production TAOC is the voltage regulation circuitry for the power supply modules.

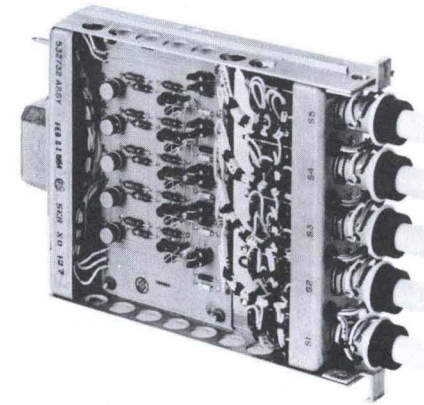




TAOC INTERNAL COMMUNICATION CONTROL STATION UNIT (OPERATOR GROUP)

TAOC COMMUNICATION MODULES

A large number of different communication circuits terminate within the Production TAOC

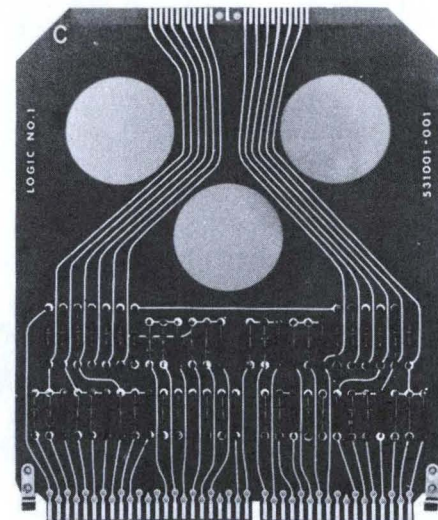
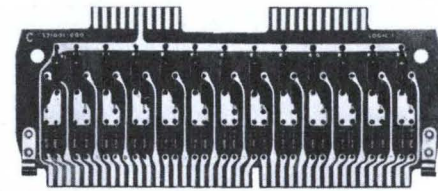


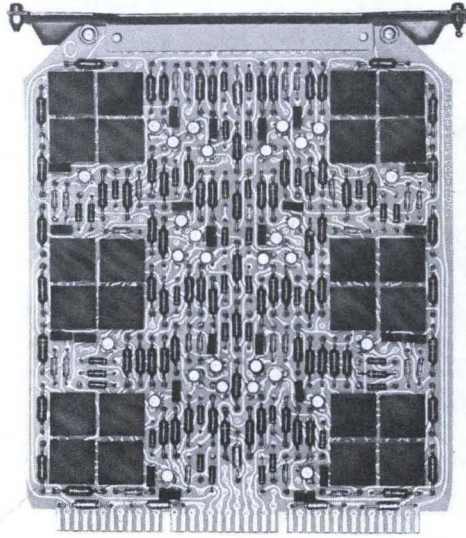
INTERNAL COMMUNICATION MODULE (PART OF INTERCOM ASSEMBLY ON CONSOLE)

equipment, or are contained within it. These include, an intercom system, internal and external communication circuits, teletype circuits, voice UHF radio circuits, data UHF radio circuits, FSK center-to-center data circuits, and high-speed data circuits. Elements of the communication complex within the TAOC are located in nearly all of the shelters. Construction techniques for the various communication items vary depending upon each individual application. However, the "plug-in" concept is used extensively. Intercom modules which include the operator control switches are used in several applications on the consoles. Separate communication drawers house most of the data terminal, teletype, and voice equipment in the Communication Group. Standard military field telephone switchboard modules are used in the manual switchboard. And standard-size TAOC plug-in circuit cards are used throughout the entire system.

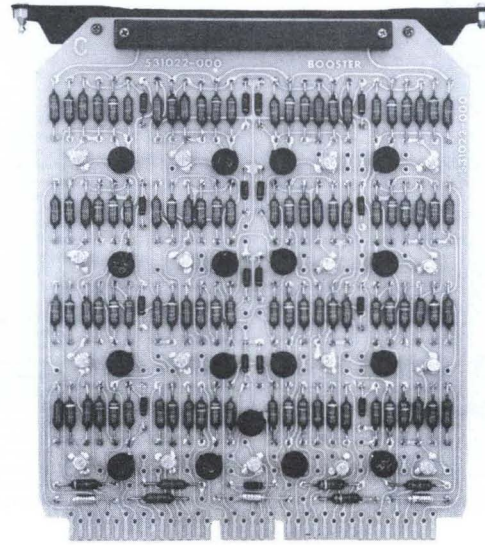
LOGIC CARDS

The logic cards shown are typical of those used in the Central Computer Group, Data Processor Group, and the 3D Radar Processor Group. The two cards shown are functionally and electrically identical. The small card, approximately 2 by 6 inches, is employed in the first model of the TAOC and is similar to those used in the service test equipment. The larger card, approximately 6 by 7 inches, will be used in subsequent TAOC equipment to facilitate maintenance by making the test points more readily available. 1386 of these logic cards are used in the Central Computer Group and 1074 in the Data Processor Group, and the 3D Radar Processor Group, and 109 in the Geographic Display Generation Group.

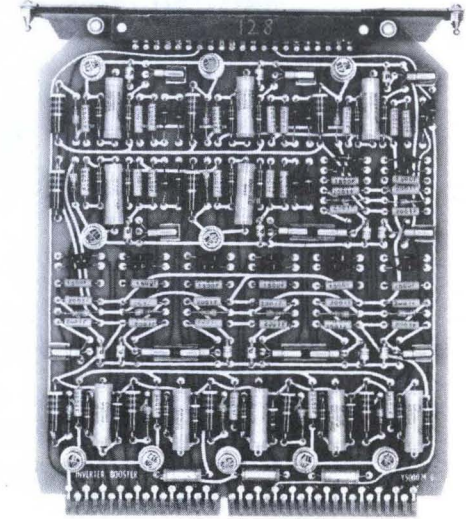




PRODUCTION AOC SHIFT REGISTER CARD EMPLOYING MICROCIRCUIT MODULES



PRODUCTION TAOC BOOSTER CARD

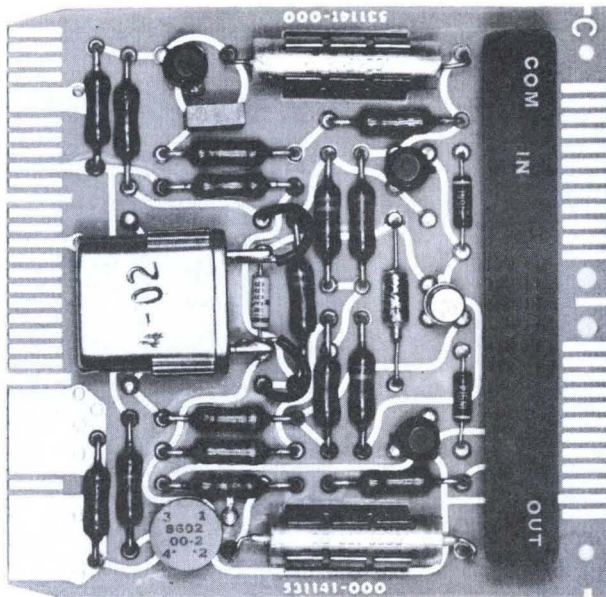


SERVICE TEST TAOC INVERTER BOOSTER CARD

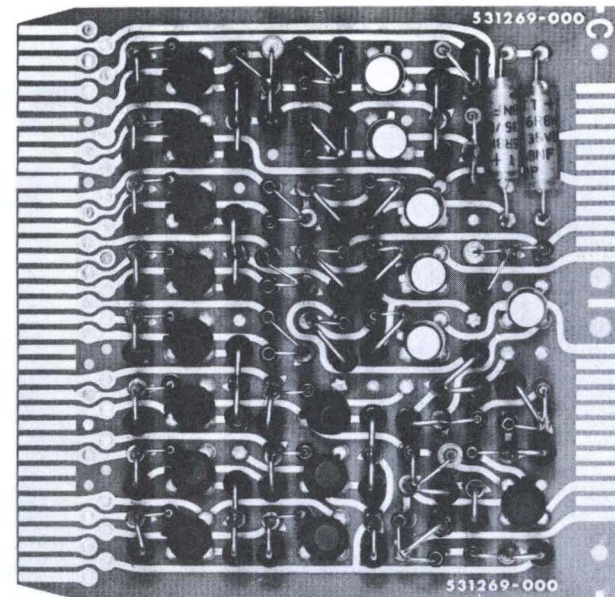
PRINTED CIRCUIT CARDS

Except for the 2 by 6 inch logic cards which are deliverable with system one, only two sizes of printed circuit cards are used in the Production TAOC. These are the 6 by 7 inch cards and the 3 by 3 inch cards. The 6 by 7 inch cards are used in the Central Computer, both Radar Processor Group, the Data Processor Group and the main rack of the Geographic Display Generation Group whereas the 3 by 3 inch cards are used in the Operator Groups, the Communication Group and the Censor-Mapper assemblies of the Geographic Display Generation Group. Both conventional components and microcircuit modules are mounted on the printed circuit cards. All components on the 6 by 7 inch cards are mounted with their long axis parallel to the board.

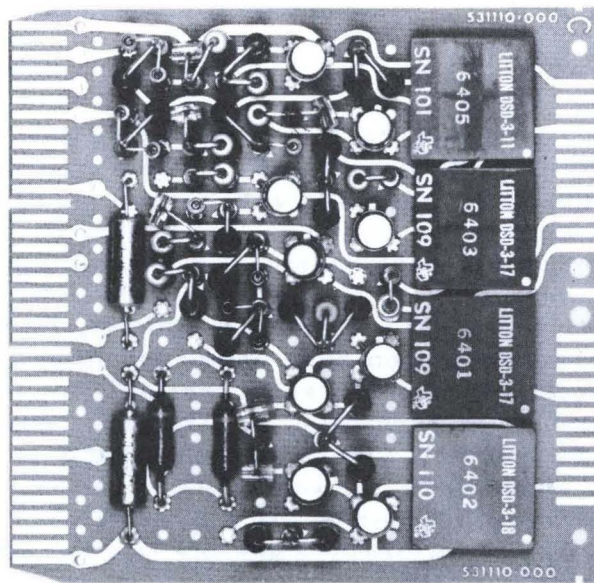
In the 3 by 3 inch card construction, some of the components are mounted in this manner and others are mounted with their long axis perpendicular to the board. This technique permits greater component density. Both common card sizes were used in the Service Test Equipment as well as the Production Equipment. However, all cards have been redesigned for improved producibility, for increased reliability, the use of standard components, to eliminate "jumpers" or to satisfy new functional requirements. 4300 6 by 7 inch cards, including logic cards, and 8900 3 by 3 inch cards, or a total of 13,200 cards of 170 different types are used in the Production TAOC.



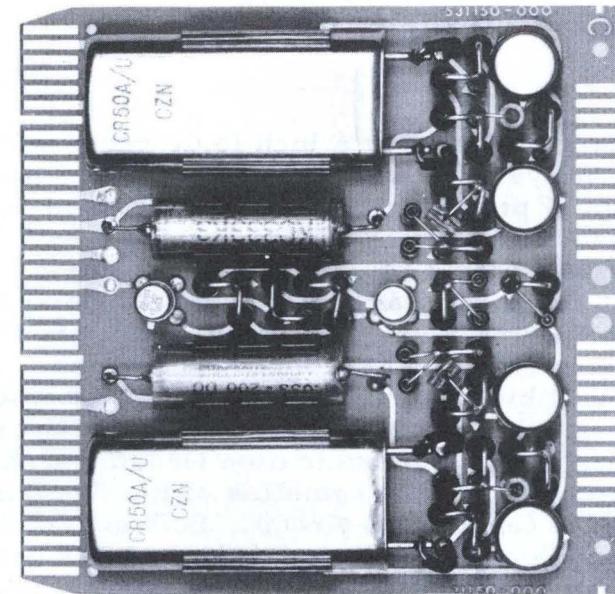
DATA TERMINAL
OSCILLATOR CARD



2 AXIS SYMBOL
GENERATOR CARD



NOR SHIFT
REGISTER CARD

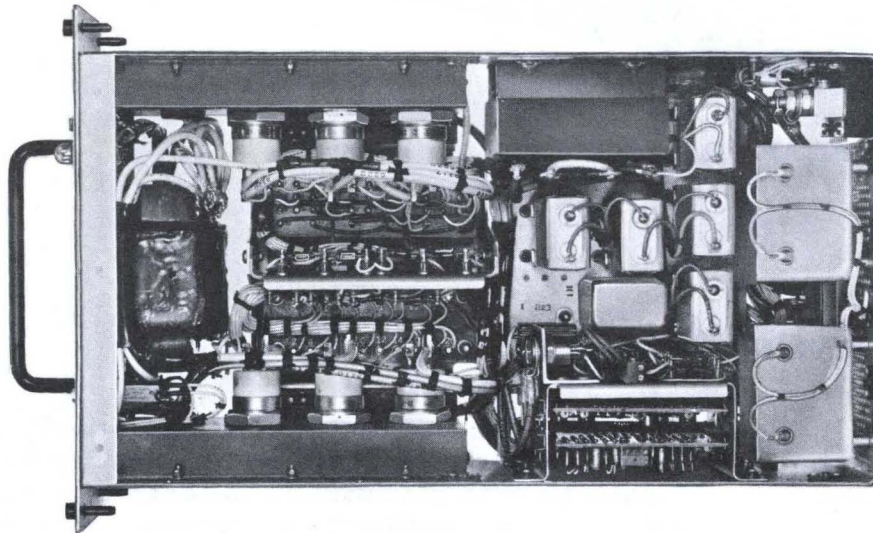


ELECTRONIC
SYNCHRONIZER CARD

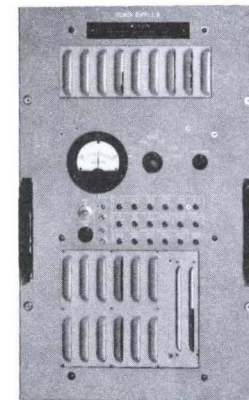
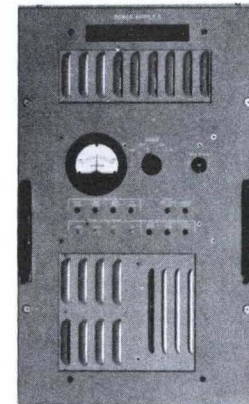
TYPICAL PRODUCTION TAOC 3 BY 3 INCH CARDS

POWER SUPPLIES

The basic power supply concept is changed extensively between the Service Test Equipment and the Production TAOC. In the Service Test TAOC, a number of relatively large and complex power supplies were used, each of which provided a number of different voltages of both negative and positive polarity. In the production equipment, except for special purpose supplies, smaller, simplified power supply modules are used, each of which provides only a single voltage and which can be used in either polarity. Most of the modules are of a standard size and employ the same construction techniques. Like units are interchangeable in different applications throughout the system. Shear pin keying prevents modules from being fully inserted into a wrong position. A total of 206 of the power supply modules are used in the TAOC.



TYPICAL POWER SUPPLY MODULE
FOR PRODUCTION TAOC



TYPICAL POWER
SUPPLIES FOR
SERVICE TEST TAOC
(Delivered in 1961)

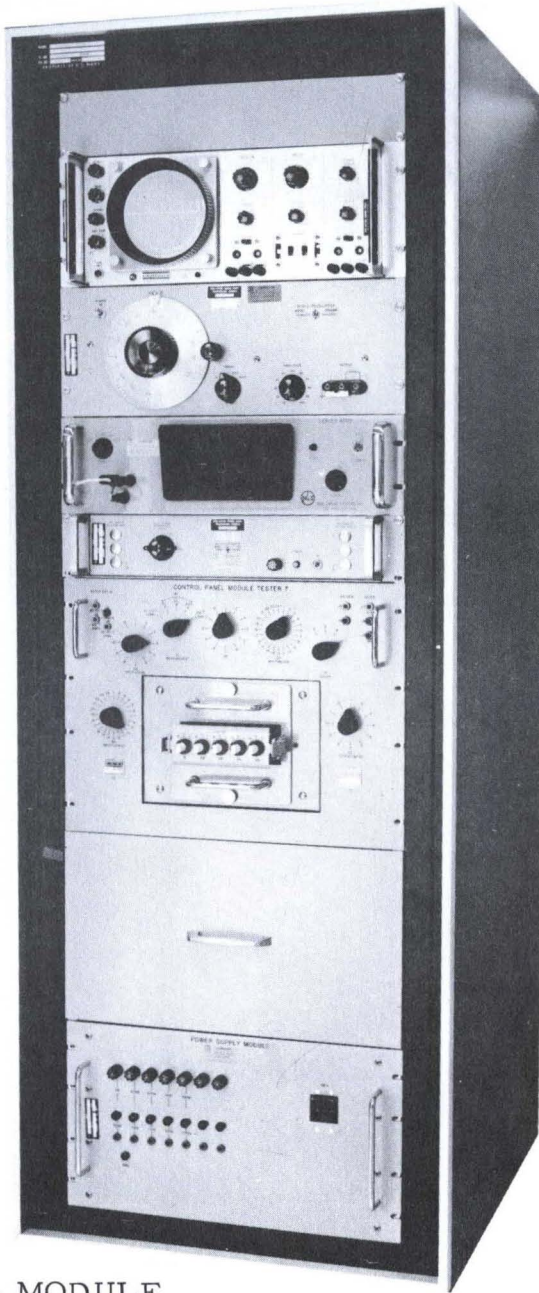


RADAR SIMULATOR

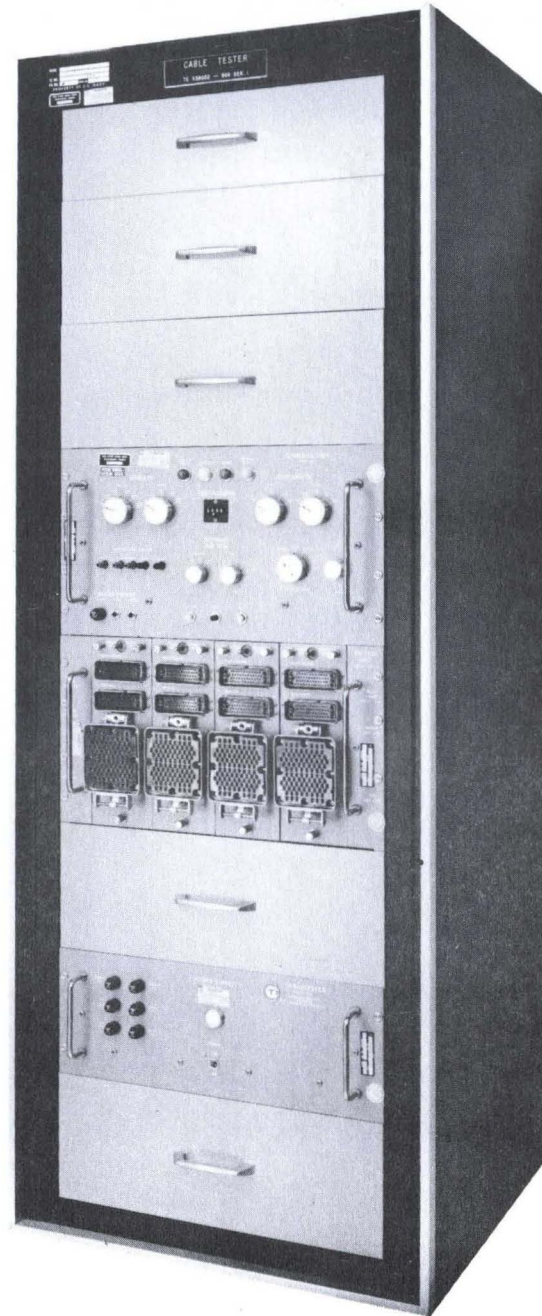
PRODUCTION TEST EQUIPMENT

To provide adequate equipment to verify satisfactory operation and ensure interchangeability of the various cards, modules, assemblies, and subsystems which comprise the Production TAOC, approximately 73 types of major special production test equipment units have been designed and built. This test equip-

ment covers the range from a relatively simple cable tester to a highly complex radar simulator. Each item is specifically tailored to the items it is to test, and to the projected rate of testing that will be necessary. Construction is to best commercial standards, and extensive use is made of proven commercial sub-units.



TYPICAL MODULE
TESTER



CABLE TESTER

PRODUCTION TEST EQUIPMENT

MARCH 1965