COPY NO. 191

SYSTEM MANUAL

U.S. NAVY TRANSPORTABLE COMMUNICATION SYSTEM AN/TSC-35

VOLUME II OF III
RECEIVING CENTRAL AN/TSR-1

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TMCS-6411-15 25 November 1964

LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
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SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of the Bureau of Ships Manual or superseding instructions on the subject of radio-safety precautions to be observed.

This equipment employs voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

While all practicable safety precautions have been incorporated in this equipment, the following rules must be strictly observed.

KEEP AWAY FROM LIVE CIRCUITS:

Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustments inside equipment with high voltage supply on. Under certain conditions, dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualties, always remove power and discharge circuits prior to touching them.

DO NOT SERVICE OR ADJUST ALONE:

Under no circumstances should any person reach within or enter an enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

DO NOT TAMPER WITH PROTECTIVE COVERS:

Panels of equipment carrying high voltages are fitted with doors or removable protective covers. Under no circumstance should any protective cover be removed, short-circuited, or tampered with in any way, by other than authorized maintenance personnel. All protective covers should be replaced immediately upon completion of the maintenance operation which required their removal.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION SHOULD BE PROMINENTLY DISPLAYED IN EACH ROOM. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

PREFACE

This volume contains a detailed description of Receiving Central AN/TSR-1 containers, provides installation details of Receiving Central Antennas, ground system and primary power system, describes the overall operation of the AN/TSC-35 Communication System, and contains a technical description of the special circuits employed at the Receiving Central.

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DESCRIPTION OF AN/TSR-1 CONTAINERS

1-1. INTRODUCTION.

This section contains a detailed description of the equipment installation in the containers at the Receiving Central AN/TSR-1 which is part of the U.S. Navy Transportable Communication System AN/TSC-35. The Receiving Central is comprised of 26 containers which are installed at the site as illustrated in figure 1-1.

1-2. GENERAL.

The construction details of a basic AN/TSC-35 container and typical installation of equipment in the containers are discussed in Volume I of this manual. The installation methods that pertain to the Receiving Central containers, where both RED and BLACK signal wiring and signal ducting is installed, are reviewed in the following paragraphs. The remainder of this section is then devoted to a detailed description of each Receiving Central container.

1-3. RACK BASE DUCT. All rack bases, except where otherwise noted, are standard AN/TSC-35 steel bases that are divided into three compartments which are used for signal and AC wiring duct. The middle compartment of the base is used for the AC power duct, the other compartment (along the wall) and the inner compartment (along the aisle) for the signal duct. Where RED and BLACK signal wiring is run in the same base, the outer duct is used for the RED signal cables and the inner duct for the BLACK. All rack bases are bolted to steel tapping plates embedded in the container floor.

1-4. RACK AND EQUIPMENT MOUNTING. Equipment racks are bolted to rack bases and to steel tapping plates installed in the container walls. Other equipment and furniture that are mounted on rack bases are installed in the same way as the equipment racks. Equipment, furniture and storage cabinets that mount directly on the floor are bolted to tapping plates in the floors and walls.

1-5. When an item of equipment or furniture is not mounted flush against a container wall, it is supported by brackets which are bolted to the wall tapping plates and to the rear of such equipment or furniture. This does not apply to those items which are mounted in the center of a container. Centrally mounted equipment is provided special bracing during shipment of the containers.

1-6. RACK WIRING. Two methods of wiring equipment racks are employed at the Receiving Central.

1-7. In racks housing equipment associated with RED and BLACK circuits, RED signal cables, BLACK signal cables, and the AC wiring is carried in separate flexible ferrous conduit from the base ducts to the racks then in rigid conduit up the rear of the rack, and again in flexible ferrous conduit to the individual equipment that is mounted in the rack. The separation between the RED, BLACK, and AC conduit is maintained throughout the rack.

1-8. In racks housing equipment associated with BLACK circuits only, signal wiring from outside the rack is generally terminated in a coaxicon connector block that is installed in the rack base. Inside the rack, signal pairs as required are brought out from each equipment, harnessed along a side of the rack, and the harness is terminated in a coaxicon connector block that mates with the base mounted coaxicon block. There are some exceptions to the above method, such as in racks which are adjacent to an SDF rack where the rack signal harness terminates directly on the SDF. The AC power wiring is carried in flexible ferrous conduit to 2100 raceway mounted vertically along the rear of the rack. The raceway is equipped with power receptacles for distributing the AC power through plugs and power cords to the rack mounted equipment.

1-9. CONTAINER WIRING. Where RED and BLACK signal wiring is installed in a container, the RED and the BLACK signal cables are run in completely separated ferrous duct and conduit throughout the container and the cables are terminated in separate signal junction boxes. The separation between RED and BLACK signal ducting is maintained in the intercontainer ducting throughout the Receiving Central.

1-10. DETAILED DESCRIPTION OF AN/TSR-1 CONTAINERS.

The following paragraphs describe the equipment layout in each Receiving Central container, and outline the function or purpose of the equipment. The descriptions are supplemented by isometric drawings of the containers.

1-11. RECEIVING CENTRAL GROUP OA-3887/TSR-1 (CONTAINER RA1).

Receiving Central Group OA-3887/TSR-1 (Container RA1) is the HICOM/ASC relay area of Receiving Central AN/TSR-1, providing an 18-line torn-tape relay facility with 12 receive page-copy monitoring positions. Equipment installed in the container includes an AN/FGC-59 torn-tape relay system which consists of three TT-331 teletype receive groups, six TT-333

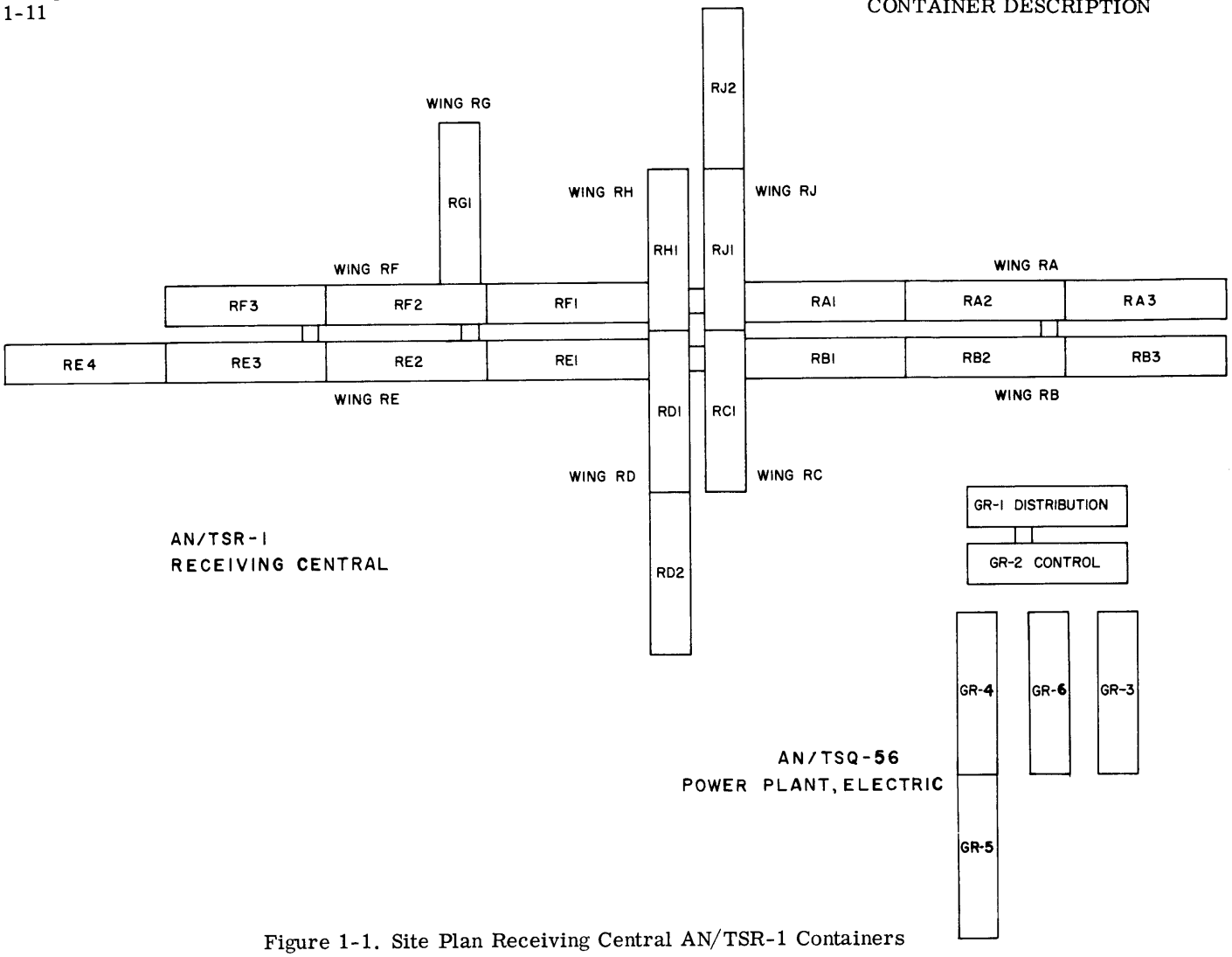


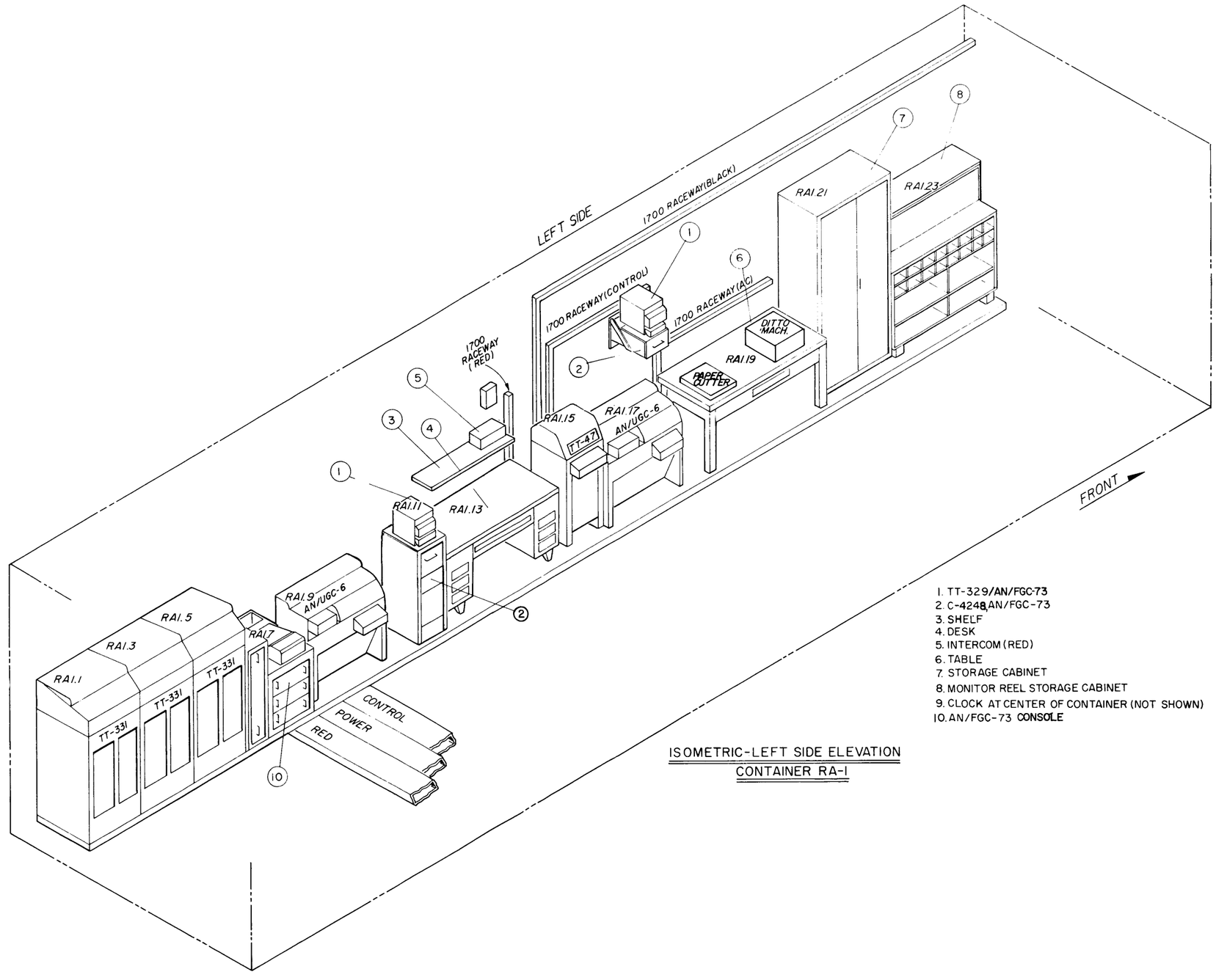
Figure 1-1. Site Plan Receiving Central AN/TSR-1 Containers

teletype transmitter groups equipped for tandem operation, and three TT-332 transmitter monitor groups; an AN/FGC-73 programmable multiple-addressee processing system consisting of a routing console, eight TT-329 high-speed tape punches (reperforators) and associated C-4248/FGC-73 punch control units; twelve TT-176A receive-monitor page printers; a monitor patch panel; two AN/UGC-6's one TT-47; and a RED INTERCOM unit. Tone converter units are provided for all teletype equipment. Furniture includes a message storage cabinet, a supervisor's desk, a Make-Up table and two large metal storage cabinets. A dual-readout digital clock unit of the electronic clock system is suspended from the ceiling at approximately the middle of the container. This container is equipped with one air conditioning unit.

1-12. LEFT SIDE EQUIPMENT. (See figure 1-2). All equipment on the left side of the container is mounted on standard rack base. Three TT-331 teletype receive groups are installed in rack positions RA1.1, 3 and 5. Each receive group contains six typing reperforators. The AN/FGC-73 system control console is mounted in rack position RA1.7. An AN/UGC-6 teletype machine, used for correcting messages, is mounted in rack position RA1.9. A TT-329 high-speed reperforator and associated C-4248/FGC-73 punch-control unit, used for overflow traffic, are floor mounted in rack position RA1.11.

1-13. A supervisors desk is mounted in position RA1.13. Bolted to the wall directly above the supervisors desk is a shelf that mounts the RED INTERCOM unit. A TT-47 station order-wire teletype is mounted in rack position RA1.15. The AN/UGC-6 teletype equipment in rack position RA1.17 is a Run-Off machine used for preparing page copy from punched tape and for preparing new tapes. A TT-329 high-speed reperforator which furnishes tapes of messages that are addressed to the station, is wall-mounted above the AN/UGC-6 at position 17. The Make-Up table in position RA.19 provides space for a ditto machine and a paper cutter. A large metal storage cabinet, equipped with shelves and doors, is mounted in position RA1.21. The storage cabinet in position RA1.23 is equipped with slots, pigeon-holes, and shelves that are used for storing monitor reels, broadcast tapes, and page copy, respectively.

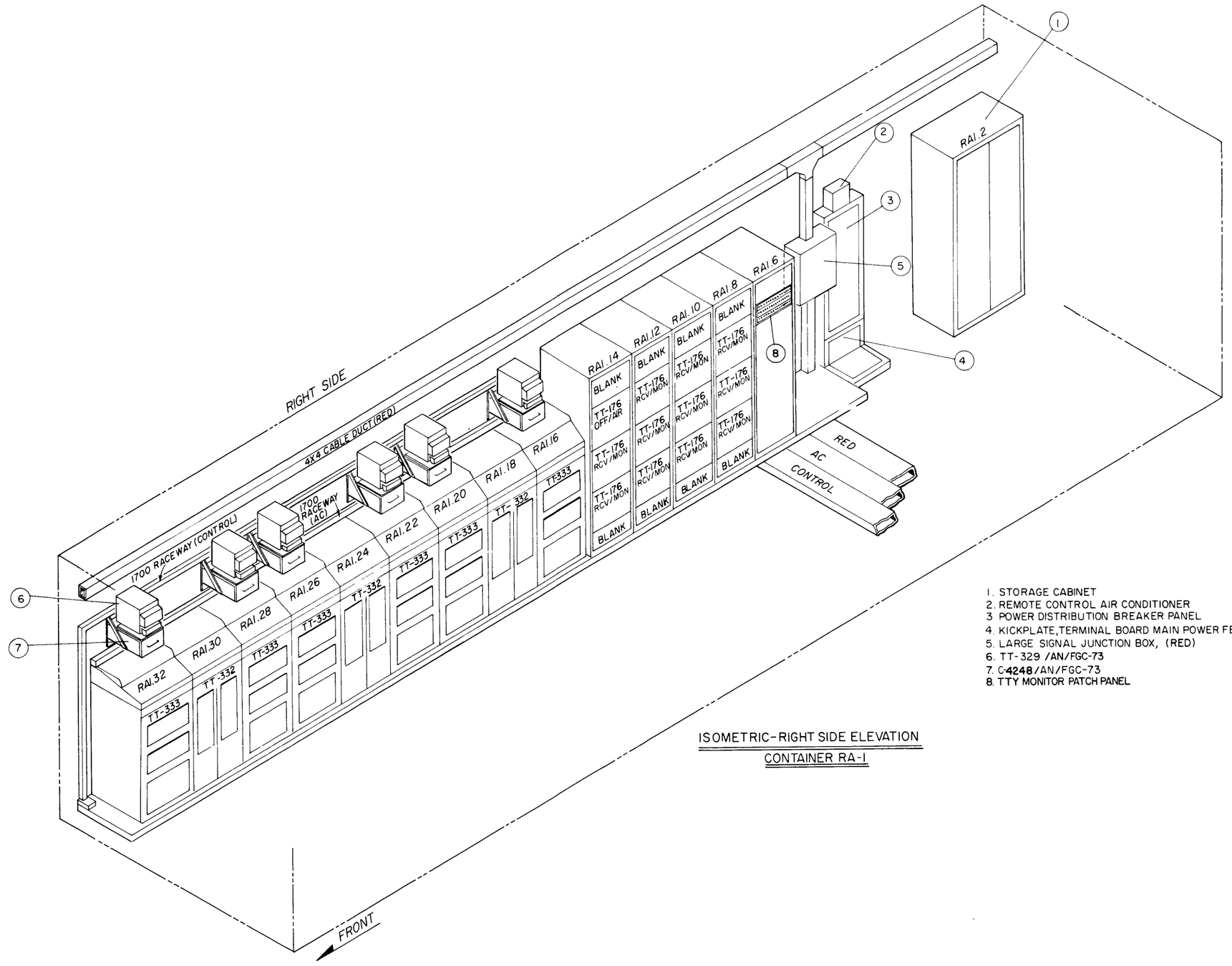
1-14. RIGHT SIDE EQUIPMENT. (See figure 1-3) Rack spaces RA1.32, 28, 26, 22, 20, and 16 mount six



1. TT-329/AN/FGC-73
2. C-4248/AN/FGC-73
3. SHELF
4. DESK
5. INTERCOM (RED)
6. TABLE
7. STORAGE CABINET
8. MONITOR REEL STORAGE CABINET
9. CLOCK AT CENTER OF CONTAINER (NOT SHOWN)
10. AN/FGC-73 CONSOLE

ISOMETRIC-LEFT SIDE ELEVATION
CONTAINER RA-1

Figure 1-2. Receiving Central Group OA-3887/TSR-1 (Container RA1-HICOM/ASC Left Side)



1. STORAGE CABINET
2. REMOTE CONTROL AIR CONDITIONER
3. POWER DISTRIBUTION BREAKER PANEL
4. KICKPLATE, TERMINAL BOARD MAIN POWER FEED THRU
5. LARGE SIGNAL JUNCTION BOX, (RED)
6. TT-329 /AN/FGC-73
7. C-4248/AN/FGC-73
8. TTY MONITOR PATCH PANEL

ISOMETRIC-RIGHT SIDE ELEVATION
CONTAINER RA-1

Figure 1-3. Receiving Central Group OA-3887/TSR-1 (Container RA1-HICOM/ASC Right Side)

TT-333 teletype transmitter groups, and three associated TT-332 teletype transmitter-monitor groups are installed in positions 30, 24, and 18, thus locating a monitor group between two associated transmitter groups. Each transmitter group contains six transmitter-distributor (TD) equipments which operate in tandem (sets of two TD's operating alternately) to provide three send circuits. Each monitor group contains six typing reperforators and six take-up reels which monitor and store the traffic transmitted by the two adjacent TT-333 equipments. A TT-329 high-speed reperforator and an associated punch control unit are located directly above each TT-333. The reperforator and control units are supported by wall-mount brackets which are bolted to tapping plates installed in the wall for this purpose.

1-15. Rack spaces RA1.14, 12, 10, and 8 mount standard equipment racks that house twelve TT-176A monitor-teletype machines and associated tone converter units. This equipment is used to monitor received messages and can be patched to any incoming receive line by use of the patch panel mounted in position RA1.6. A metal clothes locker with doors is installed in rack position RA1.2. A portable CO_2 fire extinguisher is mounted on the wall to the left of the clothes locker.

1-16. TYPICAL OPERATION, TORN-TAPE RELAY. The operation of the torn-tape relay involves both the AN/FGC-59 and the AN/FGC-73 equipment installed in this container. The AN/FGC-73 system performs routing line segregation and high speed delivery of teletype tapes to the appropriate send positions. Incoming messages are received on the TT-331 typing reperforators which produce punched tapes of the messages. Each punched tape is torn off the TT-331 and manually transferred to the AN/FGC-73 console which causes an indentical tape to be produced by one or more of the TT-329 high-speed reperforators. Selection of the TT-329 unit to receive a particular message is accomplished by programming in the console which routes each message according to its address or addressees. Station traffic is removed from the TT-329 at position 17 and processed at this location, using the AN/UGC-6 and the adjacent make-up table.

1-17. Each tape of a completed message to be relayed is removed (torn-off) from the TT-329 unit and manually inserted in the appropriate TT-333 transmitter-distributor which transmits the message to a distant address or addressees. At the same time, a TT-332 reperforator punches a copy of the transmitted message on tape for the station file, and the tape is wound on a take-up reel in the TT-332. When a monitor tape take-up reel is full, it is removed and the full reel is placed in a slot at the top of the monitor reel storage cabinet. The pigeon holes below the reel storage are used for tapes intended for broadcast, while the bottom shelves are for storage of page copy messages.

1-18. SIGNAL DUCT AND CABLE INSTALLATION. RED signals in RA1 include the 10-kc phase-shifted teletype signals to and from the RED MDF in container RB1, the DC control signals from the AN/FGC-73 console to the TT-329 punch control units, and the RED INTERCOM signals. The BLACK signals in RA1 are the 10-kc internal order-wire signal to the TT-47 order-wire machine and the clock signals to the dual readout digital clock unit. The cables are contained in a section of 1700 raceway (see figure 1-2) which is installed along the left front wall and drops down the wall behind the TT-47 equipment at position RA1.15. The clock cables leave the 1700 raceway at the 90 degree elbow near the front and enter the overhead area to reach the clock.

1-19. RED SIGNAL DUCT AND CABLING. The 10-kc audio signal cables from the TT-333 equipments are run in the RED base duct and up the right-wall 4 x 4 cable duct to a signal junction box where they terminate on coaxicon connectors. (See figures 1-2 and 1-3 for duct locations.) The 10-kc signal cables from the TT-331 equipments are run in the RED base duct to the RED cross-container duct, cross over to the right side base duct and into the patch panel rack at position RA1.16. Each receive pair connects to a jack on the patch panel and a parallel connection at the jack is then extended to the signal junction box.

1-20. The DC control signal cables are run in duct designated CONTROL in this container. From the AN/FGC-73 console, the control cables are run in the left-side base duct where two cables branch off to service the TT-329 units at positions 11 and 17. For the right-side equipments, the cables are run in the cross-container duct and the right side base duct to the front of RA1. At this point, the control cables enter 1700 raceway that runs up the wall then forward behind the TT-329 units. From the raceway, the control cables to the punch control units are run in flexible ferrous conduit.

1-21. The RED INTERCOM cables enter the RED duct system through flexible conduit and the adjacent 1700 raceway. The INTERCOM cables do not terminate at the signal junction box but pass through the box into the RED inter-container duct system.

1-22. POWER DISTRIBUTION. A power distribution panel that houses circuit breakers for all equipment, lighting, air-conditioner unit, and utility outlets in RA1 is mounted on the right wall at approximately position 4. Power cables from the panel are run into the AC base duct to all right side equipment, and to the left side equipment through the AC cross container duct and left side base duct. 1700 raceway and flexible conduit extends the AC duct to the wall mounted equipment. The air conditioner power cable is terminated in a receptacle that is mounted inside the left-side AC base duct near the location of the air-conditioner unit. A capacitive power line filter is mounted on the right side of the power panel.

1-23. RECEIVING CENTRAL GROUP OA-4936/TSR-1 (CONTAINER RA2)

Container RA2 provides the Off-Line cryptographic area and a classified repair facility at the Receiving Central. The container is divided into two sections by a partition in the center. (See figure 1-4). The Off-Line operating area is located in the rear portion of the container while the repair area is in the front.

1-24. OFF-LINE AREA. The equipment on the right side of the operating area includes an AN/GGA-1; a rack containing two HW-19/10 units and a tone converter drawer; and a floor mounted TT-171A teletype. The left side operating equipment includes an AN/GGA-1, two AN/UGC-6, and two TT-171A equipments. A large safe, which is provided for storage of classified material, is mounted at the right rear of the container. Additional facilities in this area include shelves above each AN/GGA-1 unit, a signal junction box and a power distribution panel mounted on the right wall; and an air conditioner control unit mounted on the power panel.

1-25. The AN/UGC-6 and TT-171A in positions 7 and 5 are hardwired to the HW-19/10 providing a full-duplex circuit. The reperforator of this AN/UGC-6 is wired in series with the DC loop of the TT-171A in order to provide a receive monitor tape. Tone converter equipment is provided for the input and output circuits of the HW-19/10 and the remaining TTY equipment. The TT-171A in position 4 monitors the send side of the HW-19/10 duplex circuit. The AN/UGC-6 and TT-171A in positions 2 and 1 are used for send and receive pony circuits that are wired to the RED MDF via the signal junction box.

1-26. REPAIR AREA. The left wall of the repair area is occupied by three workbenches and a test equipment shelf that is mounted above the benches. Each workbench is equipped with eight drawers that provide storage for tools and test equipment. The RED INTERCOM unit is mounted at the rear end of the test equipment shelf. Three large metal cabinets, having shelves and bins for storage of parts and components, are installed on the right side. A door leading to an enclosed walkway into RB2 is located in the right front wall of the repair area. A fire extinguisher is wall mounted at the left of this door. Two portable test carts and a service cart for use in the classified areas are stored in the repair area.

1-27. TEST EQUIPMENT SUPPLIED, OA-4936/TSR-1 (CONTAINER RA2). The test equipment furnished for classified repair facility in RA2 is listed in Table 1-1.

TABLE 1-1. TEST EQUIPMENT SUPPLIED, OA-4936/TSR-1 (CONTAINER RA2)

MODEL	QUANTITY	NAME
ZM-11/U	1	Impedance Bridge
2-16	1	Impedance Bridge
410B	2	VTVM
400D	1	VTVM
Model 260	3	Multimeter
Model 535A	2	Oscilloscope
Type CA	1	Dual-Trace Preamplifier
Model LA-80B	2	Frequency Counter
Model LA-915A	1	Converter
Model 4514	1	Relay Test Set
Model 752	1	Tube Tester
1890-M	1	Transistor Test Set
Model 500A	1	Scopemobile
161	3	Service Cart

1-28. SIGNAL DUCT AND CABLE INSTALLATION. RED and BLACK 4 x 4 signal duct and 1700 raceway are installed in container RA2 for the RED and BLACK signal cables runs.

1-29. RED Signal Duct. A section of 4 x 4 RED signal duct that joins the RED duct in container RA1 is installed on the right wall of container RA2, extending from the rear to the right side of the HW-19/10 rack. Within this section, a vertical duct connects to the signal junction box, a section of wall mounted 1700 raceway services the TT-171A equipment at position 4, and an overhead 4 x 4 duct crosses over to the left side to connect with a wall mounted 4 x 4 duct that extends to join container RA3 RED signal duct. A section of RED 1700 raceway is installed along the left wall above the workbench extending through the partition and behind the teletype equipment to the cross-container signal duct near the rear of the container. This raceway services the workbench and the teletype equipment along the left wall. Six test jacks are mounted on the front of the raceway above the workbenches. The jacks are wired to trunks that terminate at the RED signal junction box and then extend to the RED MDF in container RB1.

1-30. BLACK Signal Duct. BLACK overhead 4 x 4 cable duct is installed on the right wall from the front of the container to the left side of the HW-19/10 equipment rack. A TEE connection at the front above the door joins this duct with the inter-container BLACK duct in RB2 through 4 x 4 duct installed in the side-to-side walkway. The forward end of the BLACK duct connects with the BLACK duct in RA3. A section of 1700 raceway connects to the 4 x 4 duct forward of the partition, crosses to the left side, and extends to the rear of the container to mate with the BLACK raceway in container RA1.

1-31. POWER DISTRIBUTION. The power distribution panel on the right rear wall houses circuit breakers for all equipment, lighting, air-conditioner units, air-conditioner control unit, and utility outlets in container RA2. A power line filter is mounted on the left side of the panel.

1-32. Power cables to the right side equipment are run in floor-mounted 4 x 4 AC duct along the right wall. Power cables to the left side are run through the cross-container AC duct and 4 x 4 floor-mounted duct that extends forward to the partition. From the partition,

1. STORAGE CABINET
2. WORK BENCH
3. CROSS CONTAINER CABLE DUCT
4. AC POWER ENTRY KICKPLATE
5. AC POWER BREAKER PANEL
6. AIR CONDITIONER CONTROL
7. SIGNAL JUNCTION BOX
8. SAFE
9. INTERCOM AND INTERCOM TERMINAL BOX
10. TEST CARTS%
    A. MOD.535A OSCILLOSCOPE
    B. LA-80B FREQUENCY COUNTER
    C. BASIC SERVICE CART
11. FIRE EXTINGUISHER, CO_2

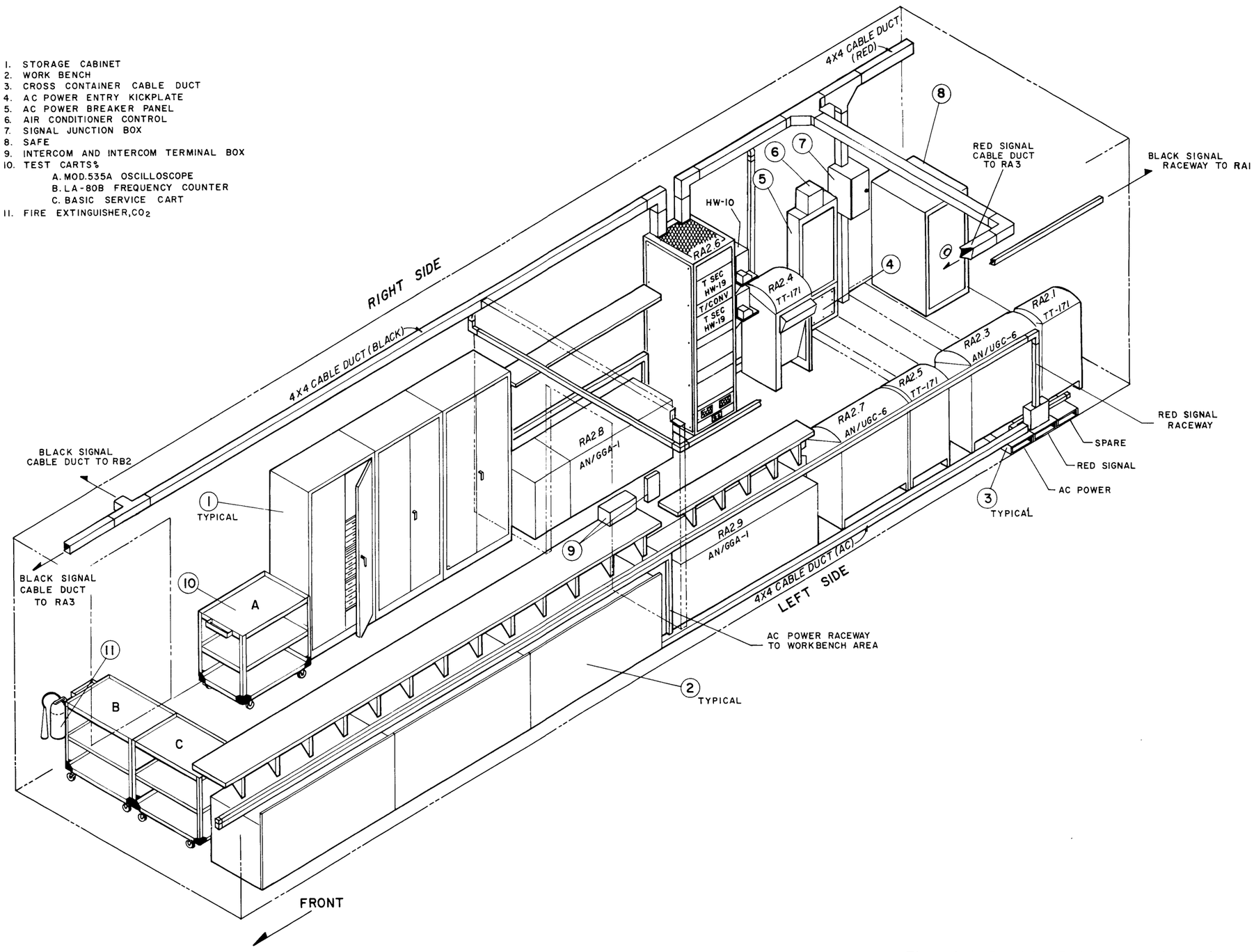


Figure 1-4. Receiving Central Group OA-4936/TSR-1 (Container RA2, Off-Line and Crypto Repair)

1700 raceway extends the power duct up the wall and forward above the workbenches. The raceway above the workbenches is equipped with eight duplex utility outlets.

1-33. RECEIVING CENTRAL GROUP OA-7041/TSR-1 (CONTAINER RA3).

Container RA3 is a complete communication facility that is used for special equipment operations at Receiving Central AN/TSR-1. Facilities provided in RA3 include a full-duplex on-line cryptographic equipment; separate audio and DC patching facilities for both RED and BLACK circuits; antenna patching and RF distribution equipment; repair and storage area; and separate RED and BLACK primary power distribution. Both audio and DC patching facilities are installed in RA3 so that this container can be used at other communication sites if required. The DC patching facilities allow RA3 to be utilized without rewiring at sites which are not equipped for tone conversion but which employ DC patching of binary signals. A set of special test equipment is furnished for use in this container. Two air conditioner units are installed on the outside right wall.

1-34. SPECIAL CONSTRUCTION FEATURES. Container RA3 is equipped with insulated and soundproofed walls at both ends. (See figures 1-5 and 1-6). The rear wall is fitted with an entrance door that has a latch type lock. The entrance door can be opened from the inside with a knob located on the latch, and from the outside with a key. An L-shaped partition that extends from the floor to the ceiling is installed in the entrance area, creating a small vestibule at the entrance to the container. The section of the partition that is in front of the door is hinged and can be swung inward toward the right side when moving large objects through this door. The wall at the front end of the container is fitted with a door that can be opened only from the inside. This door is an emergency exit that can also be used to move equipment or supplies into or out of the container.

1-35. EQUIPMENT INSTALLATION. Equipment installation methods in RA3 are the same as those used in other containers at the site that house RED and BLACK equipment and circuitry.

1-36. Right Side Equipment. The equipment mounted on the right side, beginning at the entrance area, (see figure 1-5) include a file safe installed against the rear wall; a work cabinet equipped with shelves and sliding doors at position 6; two TT-171A teletype units at positions 8 and 12; two AN/UGC-6 units at positions 10 and 14; a RED control rack in position 16; a KW-26 rack in position 18; a red AC power distribution panel at position 20; three spare parts cabinets at positions 22, 24, 26; a storage cabinet with shelves in position 28; and a clothes locker in position 30. A BLACK signal junction box is installed on the right rear wall above the safe. The RED control rack and the KW-26 rack are mounted on one standard AN/TSC-35 rack base. The remaining equipment is floor or wall mounted.

1-37. Left Side Equipment. Equipment mounted along the left wall (see figure 1-6) includes a floor safe, two filing cabinets and a desk in positions 5, 7, 9 and 11; a TT-47 internal order-wire teletype in position 13; a BLACK control rack in position 15; a BLACK AC power distribution panel adjacent to the control rack; and a workbench at the front end of the container. A rack base, designed to mount one standard rack and four special racks, is installed 29 inches from the left wall at positions 19, 21, 23, 25 and 27. The rack in position 19 is a standard rack that houses antenna patching and RF distribution equipment while the remaining four rack spaces in this group are to be used for special receiving and test equipment to be installed on site. A RED signal junction box and a fire extinguisher are mounted on the left wall in the vestibule area. Shelves are installed above the desk and the workbench. An electric clock is mounted on the wall above the desk.

1-38. KW-26 EQUIPMENT. The rack in position 18 contains a full-duplex, single-channel, on-line, KW-26 equipment. The top of the rack houses the receive unit and the lower portion houses the send unit. A storage drawer is installed between the receive and send units. A screened ventilation panel, and a utility panel which contains a duplex AC utility outlet, are mounted at the bottom of the rack.

1-39. RED CONTROL RACK. Equipment and facilities installed in the RED control rack RA3.16 include a model 120F meter unit; a RED INTERCOM unit; DC and audio patchfields; a special distribution frame for RED audio and DC circuits; a tone converter drawer; two loop supply drawers; and an AC utility panel. A screened ventilation panel is installed near the bottom to permit air circulation through the rack.

1-40. The special distribution frame (SDF) in the RED control rack is the central point for RED signal distribution in container RA3, and between RA3 and the RED areas of Receiving Central AN/TSR-1.

1-41. Special Distribution Frame. The RED SDF is comprised of 27 RED coaxicon connector blocks mounted on a hinged frame inside the control rack. Each block contains twelve RED tip-ring-sleeve coaxicon connectors. The frame is divided into two sections, a DC section containing eighteen coaxicon connector blocks at the top and an audio section having nine coaxicon connector blocks at the bottom. All RED circuits and equipment in container RA3 are terminated on the RED SDF. The RED circuits include the clear text input and output of the KW-26, all signal wiring from the TTY equipment on the right side of RA3, tone converter and loop supply wiring in the control rack, and the DC and audio jacks in the control rack patch-fields. In addition, twelve RED signal trunks are installed between the SDF and the RED signal junction box in the container. On site, the trunks are extended to the RED MDF in container RB1. One-hundred shielded program patchcords, equipped with red coaxicon connectors, are furnished for programming circuits on the RED SDF. Typical circuit programming is illustrated in the operators section of this manual.

1-42. DC Patchfield. The DC patchfield consists of one row of 24 DC patching positions, each position

having LOOP (1), LOOP (2), SET 1, SET 2, and MISCELLANEOUS jacks in that order from top to bottom. A LOOP, two SET, and a MISCELLANEOUS jack from each position are wired to separate coaxicon connectors on the SDF.

1-43. Audio Patchfield. The audio patchfield consists of 24 MONITOR-LINE-EQUIPMENT patching positions. The MONITOR jacks are parallel connected across the LINE jacks. Each LINE and EQUIPMENT jack is wired to a separate coaxicon connector on the audio SDF.

1-44. The patchfields are generaly used for testing and trouble-shooting. They can also be used to temporarily by-pass an inoperative component. On both patchfields, the send circuits appear on the first twelve jack positions on the left of jackstrips, and the receive circuits on the last twelve jack positions at the right of jackstrips. The two center jack positions, 13 and 14, are unused and are equipped with dummy plugs with the exception of the bottom jackstrip which contains two metering jacks at these positions. Twenty-four red patchcords having tip-ring-sleeve plugs are furnished for use on the RED patchfield.

1-45. Tone Converter Drawer. The tone converter drawer is mounted below the SDF and contains four 6002-1 modulators, four 6002-2 demodulators and four 6004-2 trip control demodulators. The DC and audio signal cables from the tone converter units are terminated on coaxicon connectors at the DC and audio sections of the SDF. The drawer is slide mounted for easy access to tone converter units.

1-46. Loop Supply Drawers. Two loop supply drawers are slide mounted below the tone converter. The upper drawer contains six 6006 loop supply units that are strapped for 20-ma operation. The 20-ma units are intended for use with the RED DC signal circuits from the KW-26 units and the teletype equipment. The lower loop supply drawer contains four 6006 loop supply units strapped for 60-ma operation. The 60-ma units are intended for use in the trip control circuits of the AN/UGC-6 equipment.

1-47. Meter Unit. A model 120F meter unit and an associated 126A power supply are mounted on a 139 shelf installed at the top of the control rack. The meter unit is modified to accept 10-kc phase shift keying signals by the addition of a 6002-2 demodulator unit to the M/S INDICATOR input. The meter measures VU levels and indicates MARK/SPACE keying on 10-kc tone loops. The VU meter and the MARK/SPACE INDICATOR inputs are wired to two jacks that are mounted in the center of the bottom jackstrip of the audio patchfield.

1-48. RED INTERCOM Unit. A RED voice INTERCOM unit, which is part of the Receiving Central RED voice INTERCOM network, is installed below the meter unit in the RED control rack. Signal cables from the INTERCOM unit are terminated on two coaxicon connector blocks in the RED signal junction box. On site, the INTERCOM cables are extended to the RED INTERCOM IDF in container RB1 to connect this unit into the Receiving Central RED voice INTERCOM network.

1-49. BLACK CONTROL RACK. The BLACK control rack is identical in construction and physical layout to the RED control rack. The equipment and facilities installed in this rack are for use on BLACK circuits and are identical to those in the RED control rack with the following exceptions. The tone converter drawer is not equipped with 6004-2 trip control demodulator units; the four unit loop supply drawer is used for signal circuits and is wired for 20-ma operation; the coaxicon blocks are BLACK; the INTERCOM unit is part of the BLACK voice INTERCOM network and it is wired to the BLACK signal junction box. The BLACK INTERCOM cables are extended to the BLACK INTERCOM IDF located in container RE1 at the Receiving Central. Twelve BLACK signal trunks are provided from the SDF in this rack to the BLACK signal junction box. These trunks are extended to the BLACK MDF in container RE1 at the site. One-hundred shielded program patchcords, equipped with white coaxicon connectors, are furnished for circuit programming on the BLACK SDF. Twenty-four black patchcords, equipped with tip-ring-sleeve plugs, are furnished for use on the BLACK control patchfield.

1-50. TELETYPE EQUIPMENT. The TT-171A and AN/UGC-6 equipment is intended for use with the receive and send KW-26 units respectively. They are wired to the RED DC SDF. One signal pair for each TT-171A and three for each AN/UGC-6 are provided. The three AN/UGC-6 signal pairs are a send line for TD, keyboard and page printer; a reperforator line; and a trip control line. Each AN/UGC-6 has been modified by the addition of a relay in the trip control circuit. The contacts of the relay are wired in series with the trip control circuit and when the relay is energized with a 130-volt, 60-ma MARK signal, the AN/UGC-6 is placed in the ON or running condition. The TT-47 teletype equipment is used in the Receiving Central internal order wire system and is wired to a BLACK SDF in the BLACK control rack.

1-51. RF DISTRIBUTION. The equipment and facilities installed in the RF distribution rack RA3.19 include two SPP-40416 antenna patch panels, three CU-656/U multicouplers, a utility panel and a screened ventilation panel mounted on the front of the rack. Six stuffing tubes for antenna inputs are located in the base of the rack. Coaxial cables from antennas at the site are brought in through the stuffing tubes which extend through the floor, and are then terminated on the top antenna patch panel. Three of the stuffing tubes will accomodate coaxial cable with an outside diameter of 1.125 inches and three will accomodate 0.66-inch diameter coax. Nine RG-59/U coaxial cables are installed between each multicoupler unit and the antenna patch panel. The rack is equipped with a rear door.

1-52. TEST EQUIPMENT SUPPLIED, OA-7041/TSR-1 (CONTAINER RA3.)

Table 1-2 lists the test equipment which is furnished for use in container RA3.

1-53. SIGNAL DUCT INSTALLATION. Both RED and BLACK signal duct is installed in this container. The main signal duct runs are 4 x 4 standard duct, and 1700 raceway that is used to extend the duct to teletype equipments.

1. AC BREAKER PANEL, RED
2. RED SIGNAL CABLE DUCT, 4 X 4
3. RED SIGNAL RACEWAY
4. AC POWER RACEWAY
5. BLACK SIGNAL JUNCTION BOX
6. BLACK SIGNAL CABLE DUCT, 4 X 4
7. RED SIGNAL JUNCTION BOX
8. CROSS CONTAINER CABLE DUCT
9. AC POWER ENTRY KICKPLATE
10. RED POWER LINE FILTERS
11. HINGED PANEL
12. INSULATED PERMANENT PANEL WITH DOOR OPERABLE WITH KEY FROM INSIDE ONLY

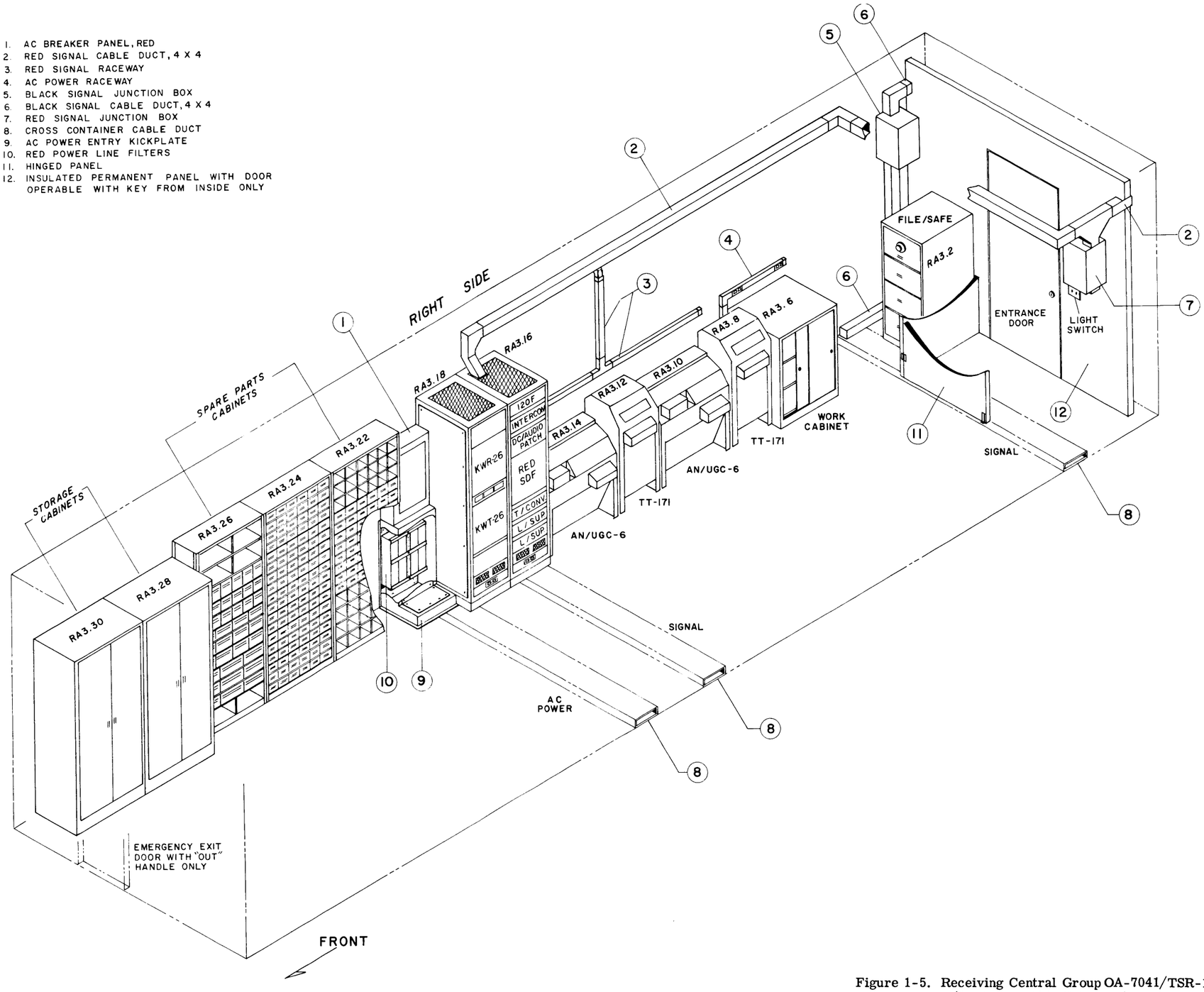


Figure 1-5. Receiving Central Group OA-7041/TSR-1 (Container RA3 Right Side)

1. FIRE EXTINGUISHER, CO_2
2. RED SIGNAL CABLE DUCT, 4 X 4
3. RED SIGNAL JUNCTION BOX
4. BLACK SIGNAL CABLE DUCT, 4 X 4
5. AC POWER RACEWAY
6. AC POWER ENTRY KICKPLATE
7. AC POWER BREAKER PANEL, BLACK
8. AIR CONDITIONER CONTROL
9. CROSS CONTAINER CABLE DUCT
10. HINGED PANEL
11. INSULATED PERMANENT PANEL WITH DOOR OPERABLE WITH KEY FROM INSIDE ONLY
12. EMERGENCY EXIT DOOR WITH 'OUT' HANDLE ONLY
13. FOOT SWITCH, ORDER/WIRE

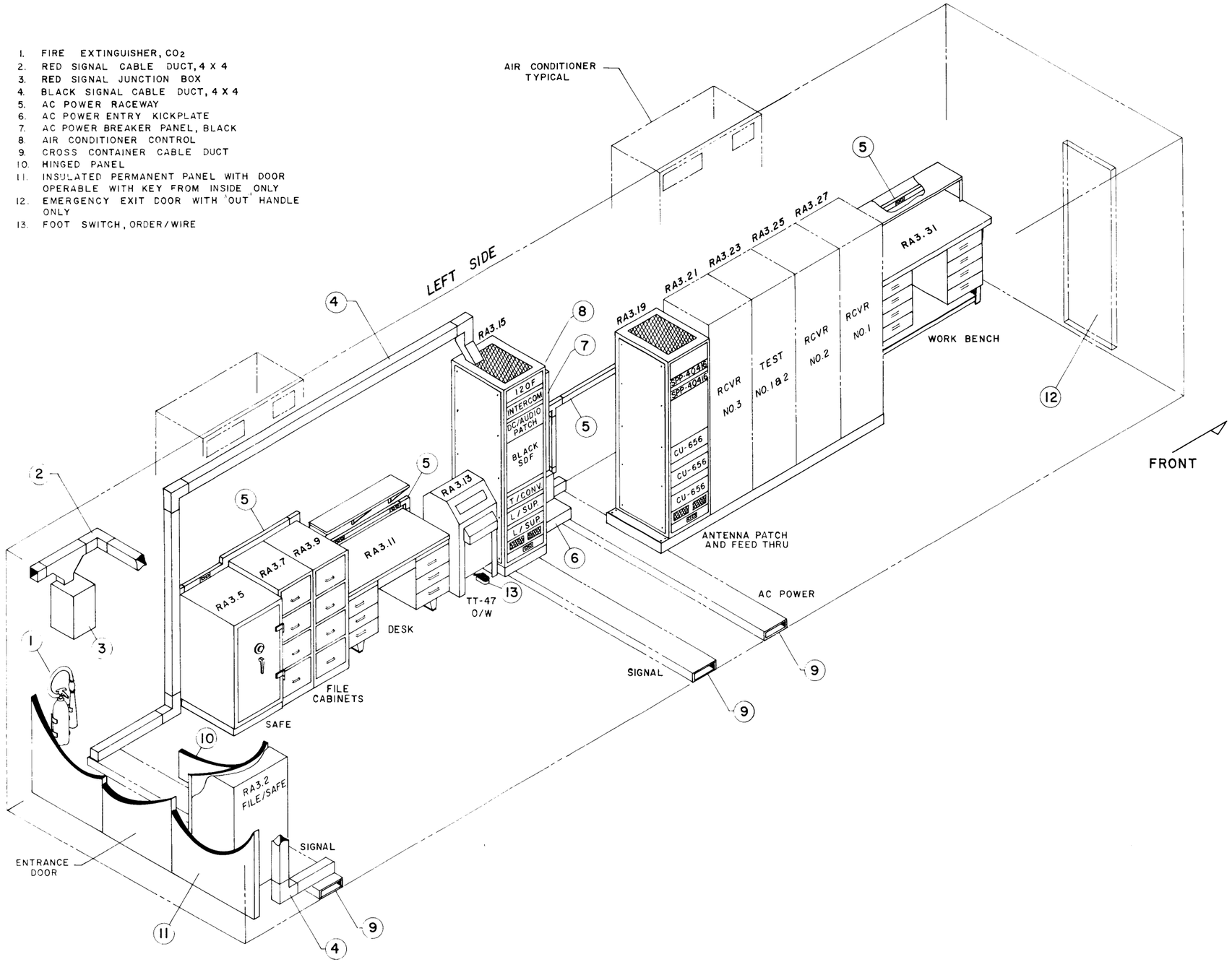


Figure 1-6. Receiving Central Group OA-7041/TSR-1 (Container RA3 Left Side)

TABLE 1-2. TEST EQUIPMENT SUPPLIED, OA-7041/TSR-1 (CONTAINER RA3)

Model	Quantity	Name
Type 606A	1	H. F. Signal Generator
524D	1	Frequency Counter
525A	1	Frequency Converter
335A	1	Precision Attenuator
335B	1	Precision Attenuator
Type 254D	1	R. F. Voltage Standard
314	1	Radio Frequency Voltmeter
526B	1	Time Interval Unit
1750A	1	Sweep Drive
W10MT	1	Transformer and Auto-Transformer Variac
WV-98C	1	Senior Voltohmist Meter
WC-301A	1	Crystal Probe
Type 180A	1	Time-Mark Generator
541A	1	Oscilloscope
107	1	Square Wave Generator
211A	1	Square Wave Generator
270	1	VOM Meter
100	1	Voltage Calibrator
CA	1	Dual Trace Pre-Amplifier
752A	1	Tube Tester
500A	1	Scopemobile

1-54. RED Signal Duct. Red 4 x 4 signal duct extends from a scoop-fitting at the top of the RED control rack along the right wall and then crosses to the left side just at the rear of the partition. The duct then joins a TEE fitting that connects with the RED signal junction box and with a connecting piece into container RA2. A section of 1700 raceway mounted on the right wall above the TTY equipments drops down from the 4 x 4 duct and then extends in both directions to service the equipments along the right wall. The KW-26 RED signal cables enter the RED control rack through the common base duct.

1-55. BLACK Signal Duct. The BLACK 4 x 4 signal duct extends along the left wall from a scoop-fitting at the top of the BLACK control rack to just beyond the safe where it drops down to the floor level. A 4 x 4 section along the wall then joins a cross-container duct at the rear of the container. On the right side, another 4 x 4 section joins the cross-container duct, runs on the floor to the rear and then vertically to the BLACK signal junction box. A 90-degree fitting then connects the BLACK signal junction box with the 4 x 4 BLACK duct in RA2.

1-56. The BLACK signal cables from the KW-26 equipment rack are run through the rack base duct, then through cross container duct to the left side and into the BLACK control rack where they are terminated on the DC SDF.

1-57. POWER DISTRIBUTION. Separate RED and BLACK power distribution panels are installed in container RA3. A primary power feeder from the power distribution container GR1 is brought into the BLACK power panel on the left side through a power feed-thru stuffing tube installed in the kickplate area below the BLACK power panel. The BLACK power panel houses circuit breakers for all BLACK equipment and utility outlets, container lighting circuits, air-conditioner control unit, and two air-conditioner units. In addition to these circuit breakers, the BLACK power panel contains a 100-amp breaker that feeds the RED power panel. Power lines from the BLACK to the RED power panels are run in the cross-container AC cable duct.

1-58. The RED power panel is mounted on the right wall, on the opposite side of the container from the BLACK power panel. The RED power panel is equipped with four screen-room filters that are designed to filter all RF signals from the power lines. Circuit breakers for all RED equipment and the RED utility outlets in container RA3 are housed in the RED power distribution panel.

1-59. TELETYPE CENTRAL AN/TGC-16 (CONTAINER RB1).

Container RB1 is the classified facility control area of Receiving Central AN/TSR-1. This container houses the RED Main Distribution Frame (MDF), on-line KW-37 equipment, a group of order-wire and monitor teletype equipment, a RED and a BLACK INTERCOM unit, the RED INTERCOM IDF, a twenty-channel "Fox" distribution amplifier, and a teletype distortion measuring unit. Additional facilities installed in this container include a digital clock dual-readout unit; two standard racks for installation of KG-14 units; one standard rack and one MDF rack base for expansion of the RED MDF; a desk and a file safe; a power distribution panel; a BLACK signal junction box; and a fire extinguisher. This container is equipped with two air conditioners installed on the right-outside wall.

1-60. All RB1 operating equipment is installed on the right side of the container. (See figure 1-7). Standard rack base duct is installed along the wall for mounting all right side equipment except the KW-37 units which are installed on a specially designed mounting frame.

1-61. MAIN DISTRIBUTION FRAME, RED. The RED Main Distribution Frame (2016 System AF Patching and Monitoring Facility) is the central distribution point for RED signals at the Receiving Central. All tone-converted RB1 RED signal circuits and all Receiving Central RED inter-container signal circuits are terminated on the program board at this main distribution frame. Here they are programmed to produce the desired circuit configurations. The RED MDF consists of four racks installed in positions RB1.4 through 10 at the right rear of the container with adjoining positions 2 and 12 provided for future expansion of the 2016 system. The racks in positions 4 and 6 house the RED program board while racks in positions 8 and 10 house associate monitor patchfields and meters used for monitoring and troubleshooting programmed circuits.

1-62. RED Program Board. The RED program board is contained in two adjacent racks in positions 4 and 6, each rack housing 1440 RED coaxicon female connectors. These racks are approximately six inches wider than standard AN/TSC-35 racks. The connectors are mounted on a hinged frame that permits access to the rear of the connectors for trouble shooting or cable installation purposes. The frames are recessed in the racks. There is no sidewall between the two racks, allowing program patchcords to extend from one frame to the other. The frames are hinged to swing toward each other so that program patchcords need not be removed when the frames are swung open. Hinged doors equipped with latches are installed on the front of the racks. One-thousand shielded program patchcords equipped with RED male connectors are furnished for use on the RED program board.

1-63. RED Audio Patchfield. The RED audio patchfield is installed in two standard racks in positions 8 and 10. Each rack houses a meter panel at the top, six hinged groups of jacks below the meter panel, and a jackstrip containing 48 MISCELLANEOUS jacks and two METER jacks below the hinged jack groups. The RED INTERCOM distribution frame (IDF) is mounted in the bottom of rack RB1.8.

1-64. The meter panel contains a model 120F meter unit, an associated 126A power supply and one 6002-2 demodulator unit. The meter provides MARK/SPACE (M/S) keying indication and VU level measurements. The meter is modified to accept 10-kc phase-shift keying signals by the addition of the demodulator unit to the M/S INDICATOR input. Both meter input circuits, M/S and VU, are wired to jacks located on the extreme right of the miscellaneous jackstrip.

1-65. Each hinged jack group contains 24 normal-through MONITOR-LINE-EQUIPMENT jack circuits with a green (REMOTE) and a red (ALARM) indicator lamp associated with and installed above each jack circuit. Each jack, except the MONITOR jacks, and each indicator lamp is wired to a separate coaxicon connector on the MDF. The MONITOR jacks are connected in parallel with the LINE jacks directly below. All the jacks are tip-ring-sleeve type with the sleeve wired to the shell of the associated coaxicon connector. The top row of MISCELLANEOUS jacks are designated TEST and the bottom row TRUNK.

1-66. The indicator lamp circuits are programmed in the same manner as operating equipment. The lamps provide classified facility control operators with an indication of the current status of associated cryptographic equipment.

1-67. KW-37 FACILITY INSTALLATION. The KW-37 installation includes a special frame designed for mounting four send-receive KW-37 units, a KW-37 tone-converter rack, a rack housing KW-37 order-wire and monitor teletype equipment, and two racks in position 28 and 30 for installation of KG-14 equipment that will extend the capabilities of the KW-37 equipment.

1-68. KW-37 Mounting Frame. Four KW-37's mount in a frame that is installed approximately twenty-two inches from the right wall in positions 34 through 40 at the front end of the container. The frame is approximately eight feet long, six feet high, and two feet wide. It is constructed with a 4-inch high base, angle supports at both ends, and completely separated ferrous ducts for RED, BLACK and AC cables at the rear of the frame.

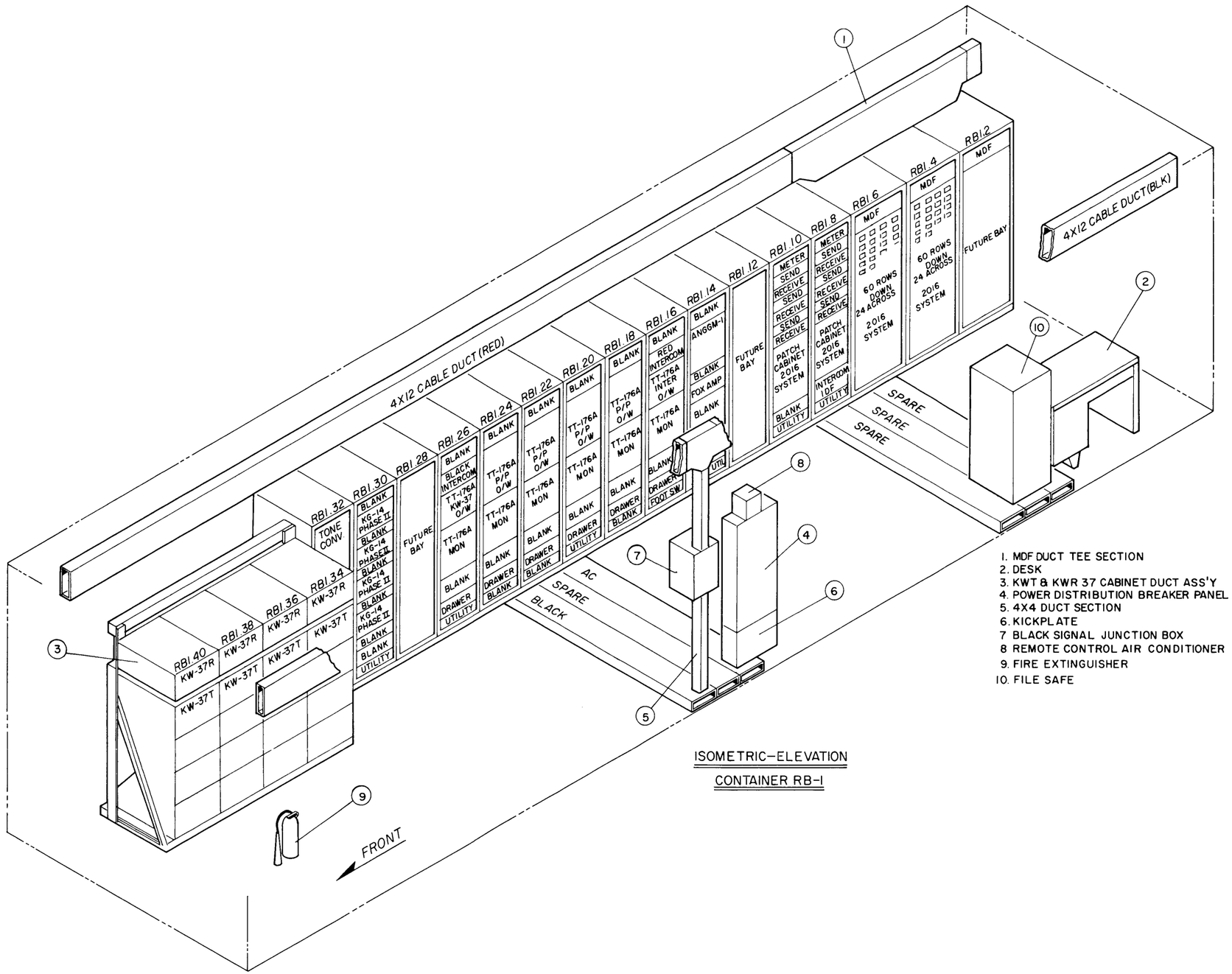
1-69. Each duct is 2-1/2 inches square and is run at two levels. Vertical duct sections connect the horizontal sections forming U-shaped ducts that provide RED, BLACK and AC duct service for the KWT-37 units at the bottom of the frame and for the KWR-37 units at the top. The top duct section is RED and is equipped with a tip-ring-sleeve jack. The jack is DC wired to a KW-37 order-wire teletype equipment which is used for making KW-37 starts. The start circuit is completed by a patchcord connected from the jack installed in the duct to a jack on the front of a KW-37 send unit.

1-70. KW-37 Tone Converter Rack. The rack housing KW-37 tone converters and loop supplies is installed in position 32, adjacent to the right end of the KW-37 mounting frame. The rack houses RED and BLACK tone converter and loop supply units that are used in conjunction with the KW-37 equipment.

1-71. The rack is divided into BLACK and RED ferrous-shielded sections by a steel plate installed horizontally at the middle of the rack. The upper section of the rack mounts a BLACK tone converter drawer and a BLACK loop supply drawer. The lower section contains a RED tone converter drawer, a RED loop-supply drawer, and four DC relays.

1-72. The RED KW-37 tone-converter drawer mounts four 6002-1 modulators, four 6002-2 demodulators, and four 6004-1 trip control modulators. The BLACK tone converter drawer is identical to the RED, except it is not equipped with trip control modulator units. The RED and BLACK loop supply drawers each mount eight 6006 loop-supply units. The DC relays are installed at the rear of the rack and are associated with send KW-37 alarm circuits. The coils are wired to the alarm circuit in the send units, and the contacts of the relays are wired to the RED MDF where they can be programmed to an alarm indicator lamp on the RED audio patchfield.

1-73. TELETYPE EQUIPMENT. Twelve slide-mounted TT-176A teletype units are installed in the



ISOMETRIC—ELEVATION

CONTAINER RB-I

Figure 1-7. Teletype Central AN/TGC-16 (Container RB1 Classified Control)

six racks at positions 16 through 26. The top unit in position 26 is the KW-37 send order-wire machine and it is hardwired to the jack installed in the RED duct above the KW-37 equipments. The remaining eleven units are equipped for tone conversion and are wired to the RED MDF. Their functions are as follows: the top units in positions 18, 20, 22 and 24 and the bottom units in positions 18 and 20 are full-duplex, point-to-point order-wire machines; the bottom units in positions 16, 22, 24 and 26 are monitors; the top unit in position 18 is a station internal order-wire machine that is equipped with a foot switch. The foot switch is located at the bottom of the rack

1-74. Each of the teletype racks described above is equipped with a storage drawer. Utility outlet panels are installed in rack positions 20 and 26. A BLACK INTERCOM unit is installed at the top of rack RB1.26, and a RED INTERCOM unit at the top of RB1.16. The INTERCOM units are wired directly to their respective INTERCOM IDF's.

1-75. TTY TEST EQUIPMENT. An AN/GGM-1 teletype distortion measuring set and a 20-channel "Fox" distribution amplifier are installed in the rack at position 14. The distortion measuring set input and output circuits are equipped for tone conversion and both circuits appear on the RED MDF. The AN/GGM-1 is used to measure distortion on the 10-kc phase-shift teletype circuits appearing on the RED audio patchboard, and also to generate a test message or test words. The test message can be patched to send operating circuits during frequency shift periods or circuit checks.

1-76. The "Fox" distribution amplifier input and twenty output channels are wired to the RED MDF where they are programmed to the audio patchboard for use as required. The input and ten output channels appear on the program board in position 4 and the remaining ten output channels on the program board in position 6.

1-77. SIGNAL DUCT AND CABLE INSTALLATION. Both RED and BLACK 4 x 12 signal duct is installed the full length of container RB1. The RED duct is wall-mounted above the equipments on the right side. This duct is equipped with a special scoop section that feeds RED inter-container cables into the top of the racks housing the program board. BLACK duct is mounted on the left wall and connects with a BLACK signal junction box through 4 x 4 vertical duct. Another vertical 4 x 4 duct section joins the signal junction box with BLACK cross-container duct. Both the RED and the BLACK duct runs connect with 4 x 12 signal duct in adjoining containers RB2 and RC1.

1-78. RED signal cables from the operating equipments in RB1 are run to the RED MDF in the RED base duct. The RED signal cables from the KW-37 equipments are run through a short section of 2-1/2-inch duct into the side of the adjoining tone converter rack, then down through the RED section of the rack into the RED base duct. BLACK signal cables to the KW-37 equipment are run directly into the right-side base duct through a floor-mounted transition piece at the right end of the KW-37 frame.

1-79. POWER DISTRIBUTION. The container power distribution panel is mounted on the left wall, the air-conditioner control unit is mounted on the power panel, and a capacitive power line filter is mounted on the side of the power panel. Circuit breakers for all equipment, lighting, air-conditioner units, the air-conditioner control unit, and all utility outlets in container RB1 are housed in the power panel. Power cables for the right side equipments are run through the AC cross-container duct into the AC section of the rack base duct. AC power wiring to the KW-37 equipment runs directly from the AC base duct into the AC duct of the KW-37 frame through a floor mounted transition piece.

1-80. RECEIVING CENTRAL GROUP OA-4937/TSR-1 (CONTAINER RB2).

Container RB2 is one part of a single-channel on-line CRYPTO area which includes containers RB2 and RB3 at Receiving Central AN/TSR-1. The facilities installed in this container include racks and ancillary equipment for twenty-eight KW-26 and one KW-7 single-channel on-line cryptographic units. All racks in this container are standard AN/TSC-35 equipment racks which mount on standard rack base duct. Utility outlet panels are provided at the bottom of racks at approximately three rack intervals. The container is equipped with three air-conditioner units. A door installed on the left side near the front leads to a side-to-side walkway into container RA2.

1-81. RIGHT-SIDE EQUIPMENT. The equipment installed on standard rack base duct on the right side of RB2 (see figure 1-8) includes two order-wire equipment racks in positions 8 and 24; one KW-7 rack in position 2; a file safe in position 36; and fourteen KW-26 racks in the remaining positions. A supervisors desk is installed on the floor near the front end and a RED INTERCOM unit is shelf-mounted above the desk. A RED signal-junction box and a fire extinguisher are mounted on the wall at the rear.

1-82. LEFT SIDE EQUIPMENT. The equipment installed on the left side rack base duct (see figure 1-9) includes two KW-26 order-wire equipment racks in position 13 and 29 and fourteen KW-26 racks in the remaining positions. A file safe is mounted on the floor at the front. A BLACK signal junction box, two power distribution panels and an air conditioner control unit are wall-mounted at the rear.

1-83. TYPICAL KW-26 RACK. Each KW-26 equipment rack contains, from top to bottom, a KWR-26 receive unit, a card holder, a KWT-26 send unit, a tone converter drawer, and a screened ventilation panel.

1-84. Equipment Mounting. The KW-26 units are mounted on angle brackets that support them when front panel screws are removed. The card holder is supported by its panel screws. The card slots are slanted downward toward the rear to effectively retain program cards. The tone converter drawers are slide mounted providing service access from the front.

1-85. Rack Construction. Completely separated rigid ferrous conduit is installed at the rear of the rack for

RED signal cables, BLACK signal cables, and AC wiring. The conduit is mounted vertically and extends from the bottom of the rack to the receive KW-26 near the top; RED conduit is on one side, BLACK on the other, and AC conduit in the middle. Flexible ferrous conduit is installed between the rack base duct and the rigid conduit, and between the rigid conduit and rack equipments. Ferrous cover plates installed over the rack base ducts provide RF shielding.

1-86. Approximately one half of the KW-26 racks are constructed with RED conduit on the right side and BLACK conduit on the left, while the remaining racks have BLACK conduit on the right side and RED on the left. The racks are installed to place the RED conduit of one rack adjacent to the RED conduit in an adjoining rack, and the BLACK conduit adjacent to the BLACK conduit of the next adjoining rack, maintaining maximum separation between RED and BLACK signal runs in each instance.

1-87. KW-26 Tone Converter Drawer. Each KW-26 tone converter drawer is equipped with two 6002-1 modulators, two 6002-2 demodulators, and one 6004-1 trip-control modulator. The modulator, demodulator and trip control modulator that are associated with the RED or clear text circuits are mounted on one side of the drawer, while the modulator and demodulator associated with the BLACK or cipher circuits are mounted on the opposite side of the drawer. The AC power input to all units is in the middle section of the drawer. The bottom of each drawer is separated into RED, AC, and BLACK ferrous shielded sections by steel separators welded to the inside of the chassis. A removable steel plate is fastened to the entire bottom, effectively providing three ferrous shielded sections for the chassis wiring. The tone converter drawers, like the KW-26 racks, are configured for either right or left installation. Approximately one half of the drawers are constructed with the RED circuit units on the right side, and the remaining drawers with the RED circuit units on the left side.

1-88. The 6002-1 modulators convert KWT-26 MARK-SPACE DC output signals to 10-kc phase-shift tones, and the 6002-2 demodulators convert incoming 10-kc phase-shift tones to MARK-SPACE DC inputs to the KWR-26 units. The 6004-1 trip-control modulator converts the MARK and SPACE outputs of the KWT-26 clutch-control circuit to 2167.5 cycles and 2082.5 cycles respectively. The MARK signal is used to release the clutch of an associated transmitter-distributor allowing the TD to transmit, while the SPACE signal "locks-up" the clutch preventing transmission.

1-89. KW-26 ORDER WIRE RACK ASSEMBLY. Each KW-26 order-wire rack contains, from top to bottom, an order-wire control panel, two TT-176A full-duplex order-wire TTY's, and a storage drawer. The order-wire control panel is supported by its panel screws; the TTY equipment and the storage drawer are slide mounted. The TT-176A units are not equipped for tone conversion, but are DC wired to switches on the control panel which in turn are DC wired to the KW-26 LOCAL TTY INPUT and LOCAL TTY OUTPUT circuits.

1-90. KW-26 Order-Wire Control Panel. The KW-26 order-wire control panel contains two 18-position pushbutton selector switches, two 2-position lever switches, and two DC relays that are associated with the two TT-176A order-wire units in the rack. The TT-176A units provide page copy of both receive and transmit order-wire traffic. Each selector switch is used to connect one of the TT-176A units to any one of the KW-26 units that are wired to the switch. In container RB2, fourteen KW-26's are wired to each selector switch as is noted in paragraph 1-95. The lever switch and relay provide a "lock-up" function that prevents garbles of transmitted page copy when the receive side of the circuit is breaking up. For a detailed description and circuit analysis of a typical order-wire control panel, refer to paragraph 4-24 in section 4 of this volume.

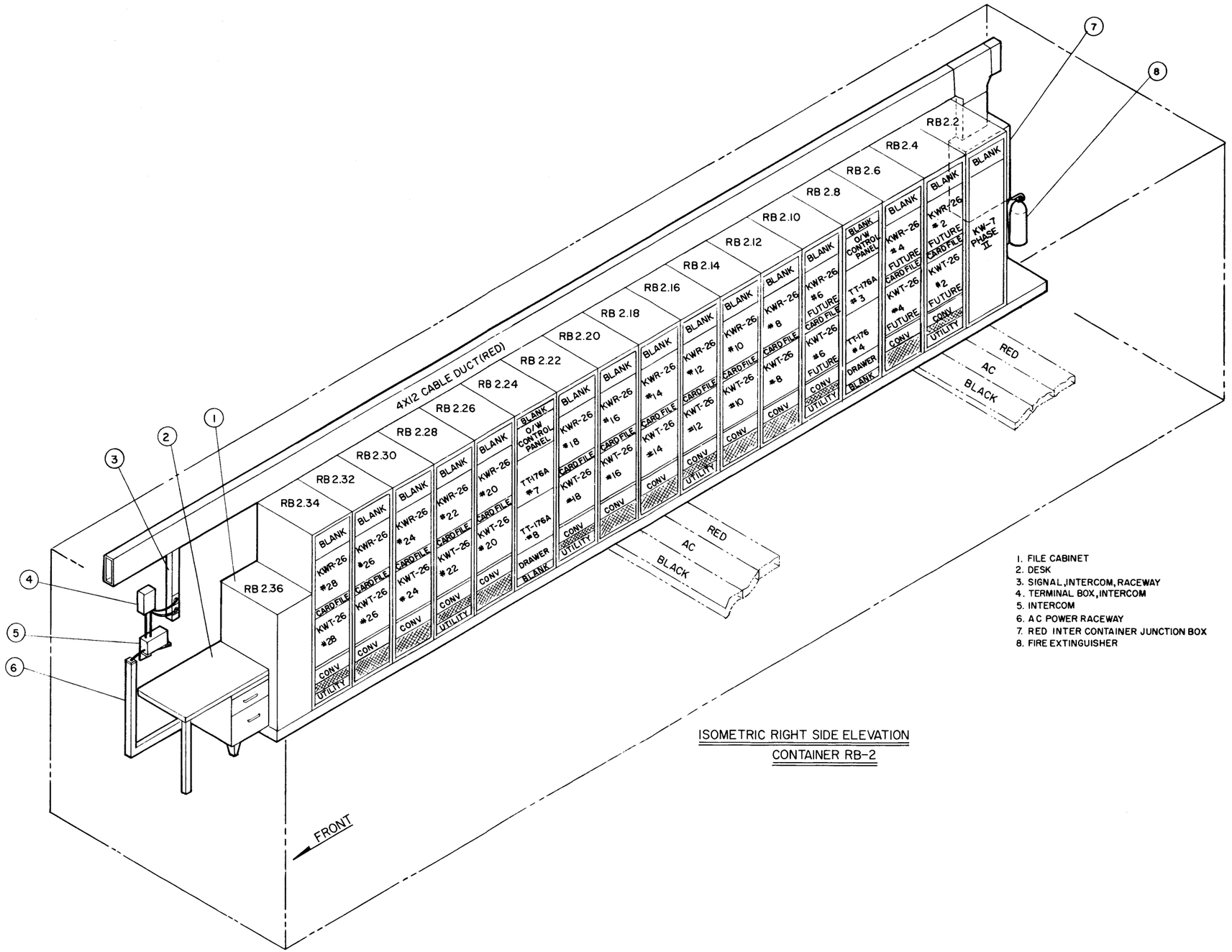
1-91. KW-7 RACK ASSEMBLY. The KW-7 rack in position 2 is equipped with an AC utility outlet panel and a screened ventilation panel at the front, and with an AC junction box in the base for equipment power. The junction box is wired to a circuit breaker in the container power distribution panel. No other facilities are provided in this rack since the final configuration of the equipment was not known at the time of installation.

1-92. RB2 SIGNAL DUCT AND CABLE INSTALLTION. Both RED and BLACK 4 x 12 signal duct is installed the full length of this container, and both duct runs connect with similar duct in adjacent containers RB1 and RB3. The RED duct is mounted on the right wall above the equipment. At the rear of the container, 4 x 12 vertical duct connects the overhead duct with a RED signal junction box. Another 4 x 12 duct section is installed between the signal junction box and the rack base duct. At the front of the container, the RED INTERCOM cables are run through a short section of 1700 raceway to the 4 x 12 duct.

1-93. The BLACK signal duct is mounted above the equipment on the left wall and connects with the BLACK signal junction box and the base duct at the rear through 4 x 12 duct sections. Near the front of container RB2, a 4 x 4 to 4 x 12 duct transition piece is installed in the 4 x 12 duct above the door that leads into the side-to-side walkway into RA2. This transition piece connects the RB2 BLACK duct with RA2 BLACK duct through a 4 x 4 duct section installed along a wall of the walkway between the containers. All equipment in RB2, except the INTERCOM unit, connects with inter-container cables at the signal junction boxes. INTERCOM cables are run directly to the RED INTERCOM IDF in RB1.

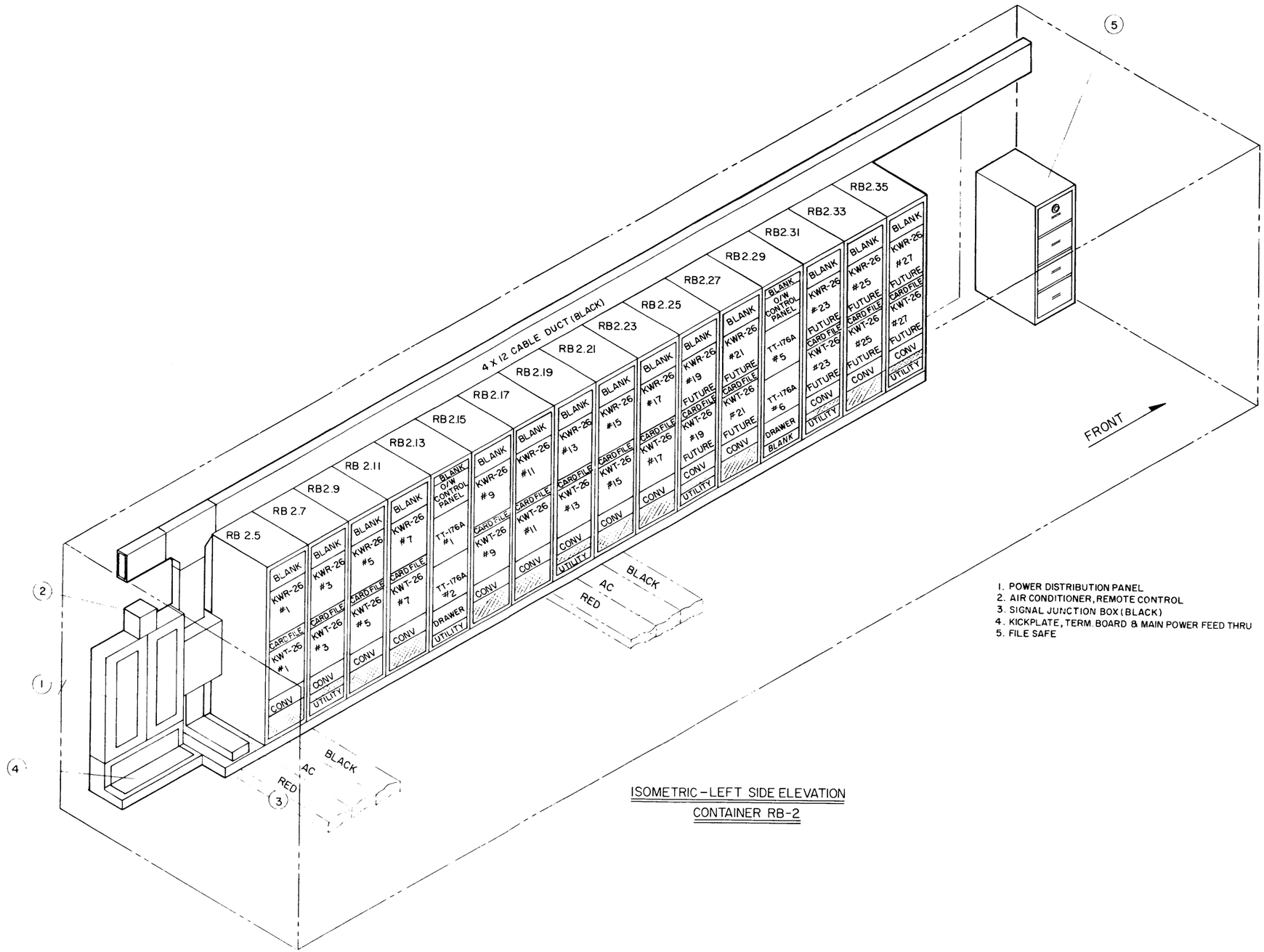
1-94. KW-26 Signal and Indicator Lamp Cabling. The KW-26 RED 10-kc input and output signal circuits, and the remote and alarm indicator lamp circuits, terminate at the RED signal junction box and from there extend to the RED MDF in container RB1. The order-wire circuits are wired directly to order-wire control panels in RB2. The BLACK KW-26 receive input and send output circuits terminate at the BLACK signal junction box and from there extend to the BLACK MDF in container RE1.

1-95. KW-26 Order Wire Cabling. In each KW-26 order-wire rack, the top TTY unit is connected to the



ISOMETRIC RIGHT SIDE ELEVATION
CONTAINER RB-2

Figure 1-8. Receiving Central Group OA-4937/TSR-1 (Container RB2 - Crypto, Right Side)



1. POWER DISTRIBUTION PANEL
2. AIR CONDITIONER, REMOTE CONTROL
3. SIGNAL JUNCTION BOX (BLACK)
4. KICKPLATE, TERM. BOARD & MAIN POWER FEED THRU
5. FILE SAFE

ISOMETRIC – LEFT SIDE ELEVATION
CONTAINER RB-2

Figure 1-9. Receiving Central Group OA-4937/TSR-1 (Container RB2 - Crytpo, Left Side)

top 18-position pushbutton selector switch, and the bottom TTY unit to the bottom selector switch. The 18-positions of both switches are interconnected. The order-wire control panels in rack positions 8 and 13 are interconnected through cross container cables. Both panels are also connected to the LOCAL send and receive circuits of the KW-26 units numbered 1-thru 14. This arrangement enables any one of the KW-26 units that are numbered 1 through 14 to be connected with any one of the four TTY units numbered 1 through 4 (in racks 8 and 13) by depressing the associated pushbutton of the 18-position switch. Four of the switch positions are not used. The order-wire control panels in rack positions 24 and 29 are interconnected in the same manner and are connected to the KW-26 equipment numbered 15 through 28. This allows any one of the fourteen KW-26 units to be connected to any one of the four TT-176A units numbered 5 through 8.

1-96. In each group of four pushbutton switches, only one pushbutton associated with a particular KW-26 can be used at any one time because depressing two or more pushbuttons having the same number would parallel the DC loops of two or more TTY units causing the machines to run open or print intermittently.

1-97. POWER DISTRIBUTION, RB2. Two container power distribution panels are mounted on the left wall, the air-conditioner control unit is centered on the power panels, and a capacitive power line filter is provided for each power panel. Circuit breakers for all equipment, lighting, air-conditioning units, the air-conditioner control unit, and all AC utility outlets in container RB2 are housed in the power panels. Power cables for the right side equipment are run through the AC cross-container duct into the AC section of the rack base duct.

1-98. RECEIVING CENTRAL GROUP OA-4938/TSR-1 (CONTAINER RB3).

Container RB3 is the second part of the single-channel on-line CRYPTO area of the Receiving Central, as was indicated in the description of container RB2. The front of the container is equipped with a weatherproof, removable end panel. An emergency exit door, which can only be opened from the inside, is installed in the end panel. Three air-conditioning units are installed on the outside right wall. All equipment racks are standard AN/TSC-35 racks mounted on standard rack base duct. A dual-readout digital clock unit of the electronic clock system is suspended from the ceiling at the rear and is readable from both containers RB3 and RB2.

1-99. RIGHT-SIDE EQUIPMENT. Right-side equipment installed in RB3 (see figure 1-10) includes two KW-26 order-wire racks in positions 12 and 30 and eighteen KW-26 equipment racks in the remaining positions on the rack base duct; a wall-mounted RED signal junction box at the rear; and a fire extinguisher mounted on the front right wall.

1-100. LEFT SIDE EQUIPMENT. Equipment installed on the left side of RB3 (see figure 1-11) includes KW-26 order-wire racks in positions 15 and 35 and seventeen KW-26 equipment racks in the remaining positions on the rack base duct. A BLACK signal junction box and two power distribution panels are wall mounted at the rear. One air-conditioner control unit, which controls all three of the container air conditioning units, is centered on top of the power distribution panels.

1-101. KW-26 EQUIPMENT RACKS. The thirty-five KW-26 equipment racks installed in RB3 are identical in construction to those installed in RB2, and are mounted in a similar manner with RED conduit adjacent to RED conduit and BLACK conduit adjacent to BLACK conduit in adjoining racks. The tone converter drawers installed in these racks, like those in RB2, are designed for left or right installation. In addition, six of the left-hand type drawers are modified to provide super-encryption capability for selected circuits at the Receiving Central.

1-102. Since the equipment in this container and in RB2 comprise one single-channel, on-line CRYPTO area, KW-26 equipment numbering in RB3 is a continuation of the numbering on RB2. The KW-26's are numbered 29 through 63. This arrangement facilitates programming of the KW-26 signal circuits on both the RED and the BLACK program boards.

1-103. MODIFIED KW-26 TONE CONVERTER DRAWER. Modified KW-26 tone converter drawers are installed in the KW-26 racks located in positions 7, 11, 19, 23, 27 and 31 in container RB3. The modified tone converters are equipped with a two-position switch mounted on top of the chassis just behind the front panel. The switch positions are designated NORMAL and SUPER-ENCRYPT. When this switch is in the SUPER-ENCRYPT position, the encrypted output and input of the associated KW-26 equipment are switched to two signal pairs which are routed from the BLACK side to the RED side of the modified tone converter drawer, and then connected through the RED signal cable system to the RED program board, RB1.4. These signal pairs can then be programmed to the clear text input of a second encryption device for additional encryption. When the switch is in the NORMAL position, the function of the modified KW-26 tone converter drawer is identical to other KW-26 drawers.

1-104. For typical circuit programming and circuit description of a modified KW-26 tone converter, refer to paragraph 3-56 through 3-79 and paragraphs 4-21 through 4-23, respectively, of this volume.

1-105. KW-26 ORDER-WIRE RACKS. The four KW-26 order-wire rack assemblies installed in this container are identical in construction to those installed in RB2. The order-wire TTY equipment is wired to the control panels, and the control panels are wired to the KW-26 equipment as described in paragraph 1-107.

1-106. RB3 SIGNAL DUCT AND CABLE INSTALLATION. RED 4 x 12 signal duct is installed on the right wall above the equipment. At the rear of the containers, 4 x 12 vertical duct pieces connect the duct with a RED signal junction box, and the signal junction box with rack base duct. BLACK 4 x 12 signal duct is installed above the equipment on the left wall. Vertical

4 x 12 duct sections at the rear of the container connect the BLACK duct with a BLACK signal junction box, and the signal junction box with BLACK rack base duct. The KW-26 tone-converter signal cables and the indicator lamp wiring terminate at the RED signal junction box. The cipher inputs and outputs terminate at the BLACK signal junction box. From the signal junction boxes, the cables are extended to their respective MDF program patchboards.

1-107. KW-26 ORDER WIRE CABLING. The installation and operation of the order-wire control racks is basically the same as those installed in RB2. The order-wire control panels in rack positions 12 and 15 are interconnected through cross-container cables and are also connected to the local send and receive circuits of eighteen KW-26 units which are numbered 29 through 46. The TT-176A order-wire units are numbered 1 through 4 since they are associated with the container and do not have signal appearances on the main distribution frames. The order wire control panels in rack positions 30 and 35 are also interconnected in the same way and connected to seventeen KW-26 units which are numbered 47 through 63. The associated TT-176A order-wire equipment is numbered 5 through 8.

1-108. POWER DISTRIBUTION. The two power distribution panels installed on the rear left wall house circuit breakers for all equipment, lighting, air-conditioning units, the air-conditioner control unit, and all utility outlets in container RB3. A capacitive power line filter is mounted on the sides of the distribution panels. Equipment power cabling is run in the AC section of the rack base duct and the AC cross container duct. Power cables for the air-conditioning units are terminated on receptacles in the AC section of the rack base duct on the right side of the container.

1-109. RECEIVING CENTRAL GROUP OA-4939/TSR-1 (CONTAINER RC1).

Container RC1 is the multi-channel on-line cryptographic area at the Receiving Central AN/TSR-1. This container houses equipment and facilities for the operation of three KW-22 cryptographic devices and three associated AN/UGC-1A four-channel, time-division multiplex units.

1-110. The front of the container is equipped with an end wall that is bolted to the end frame. The rear of the container is open and is butted against the rear of container RJ1. Doors installed in both sidewalls near the rear provide access directly into container RB1 on the left side, and through a side-to-side walkway into container RD1 on the right side. Two air-conditioning units are mounted on the outside left wall.

1-111. EQUIPMENT INSTALLATION. All operating equipment in container RC1 (see figure 1-12) is installed on standard rack base duct which is mounted down the center of the container. Five standard AN/TSC-35 equipment racks are installed on the rack base at regular intervals. The three racks in positions 8, 11, and 14 nearest the front of the container house AN/UGC-1A multiplex equipment, tone converters, and order wire teletype units that are associated with KW-22 operations. The two racks in positions 2 and 5 towards the rear of the container are for the installation of future equipment. Facilities are provided for the installation of a KWT-22 send unit on the left side and a KWR-22 receive unit on the right side of each AN/UGC-1A equipment rack in positions 8, 11 and 14. These facilities include the rack base duct, complete signal wiring, and AC power wiring.

1-112. Additional equipment and facilities installed in RC1 include a BLACK signal junction box, a power distribution panel and a fire extinguisher mounted on the right wall; a RED signal junction box on the left rear wall; and a single-readout unit of the electronic clock system suspended from the ceiling at the rear center.

1-113. AN/UGC-1A RACK ASSEMBLY. Each AN/UGC-1A (MUX) equipment rack houses, from top to bottom, a RED tone converter drawer; a RED loop supply drawer; a TT-176A teletype unit; an AN/UGC-1A consisting of a Transmitter Group OA-3445; a Receiver Group OA-3444, and an Oscillator-Power Supply Group O-872; a BLACK tone converter drawer; and a utility panel containing a duplex utility AC outlet. Rack RC1.8 also houses a RED INTERCOM unit in the top panel space.

1-114. The tone converter drawers, loop supply drawer, and TT-176A are slide mounted, and the AN/UGC-1A components are mounted on angle-iron support brackets. Separate rigid conduit runs for the RED, the BLACK, and the AC cables are installed at the rear of the rack. Flexible ferrous conduit carries the cables and wiring between the rigid conduit and the rack equipment, the KW-22 equipment, and the rack base duct.

1-115. AN/UGC-1A Equipment. The AN/UGC-1A is a transistorized four-channel time-division multiplex (MUX) equipment consisting of three units; a transmitter group, a receiver group, and an oscillator-power supply group. The transmitter group accepts four teletype channel inputs, compresses the four channels into approximately the time required for the transmission of one channel, and multiplexes the four channels into one composite channel for transmission. The receive group accepts a multiplexed four-channel composite signal, demultiplexes the composite signal into four individual channels, expands each channel in time, and provides four teletype channel outputs to receive TTY equipment. The oscillator-power supply group furnishes timing pulses and operating voltages to the transmitter and receiver groups.

1-116. The AN/UGC-1A furnishes multiplexed signals and timing pulses to the KW-22 send and receive units Cables between the AN/UGC-1A and the associated KW-22 equipment are run in flexible ferrous conduit. These cables are installed and need only to be connected at the KW-22 equipment end.

1-117. AN/UGC-1A RED Tone Converter Drawer. The RED tone converter drawer used with the AN/UGC-1A and KW-22 equipment contains four 6002-1 modulator units, four 6002-2 demodulator units, four 6004-1 trip-control modulator units, one DC relay, and a front panel switch.

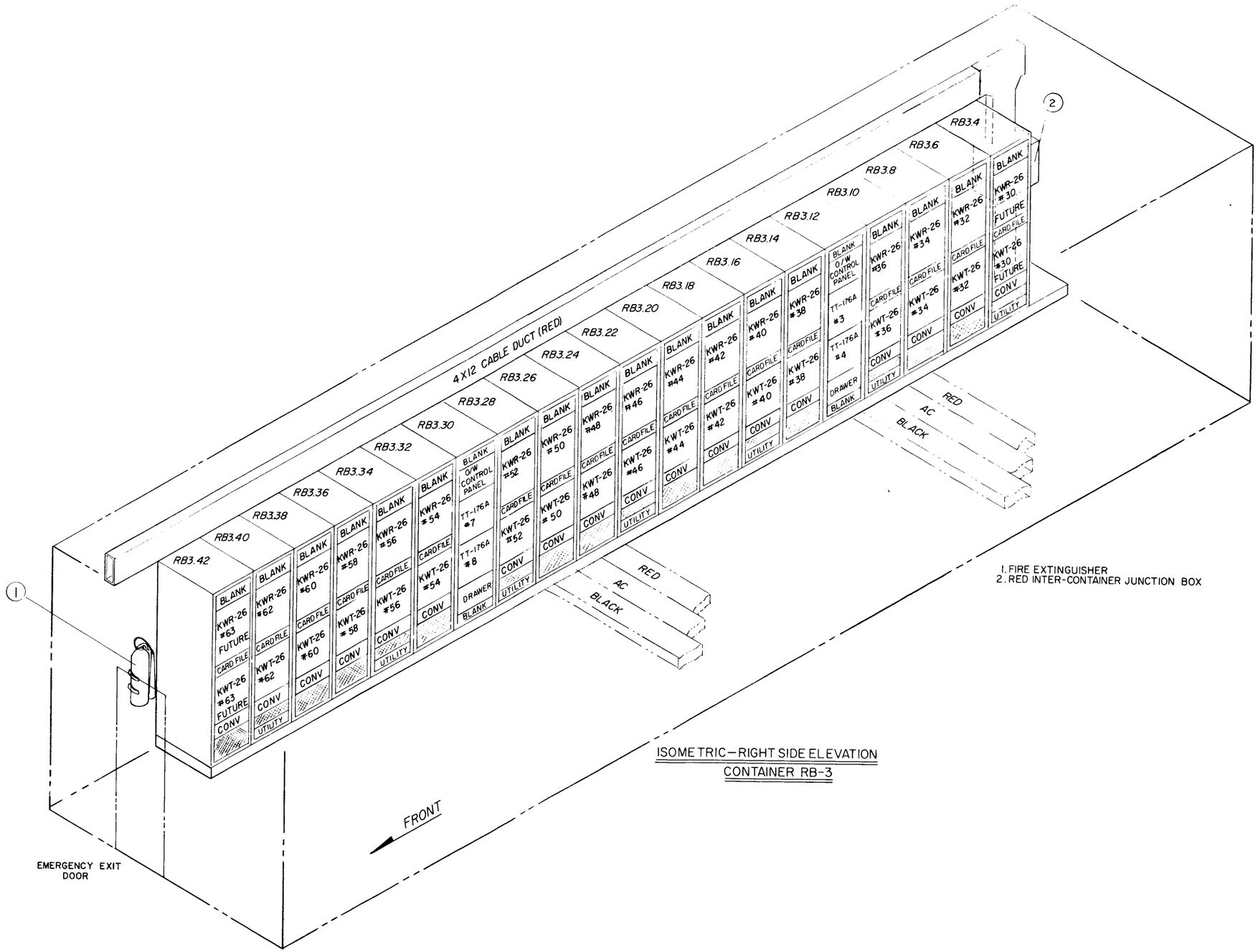
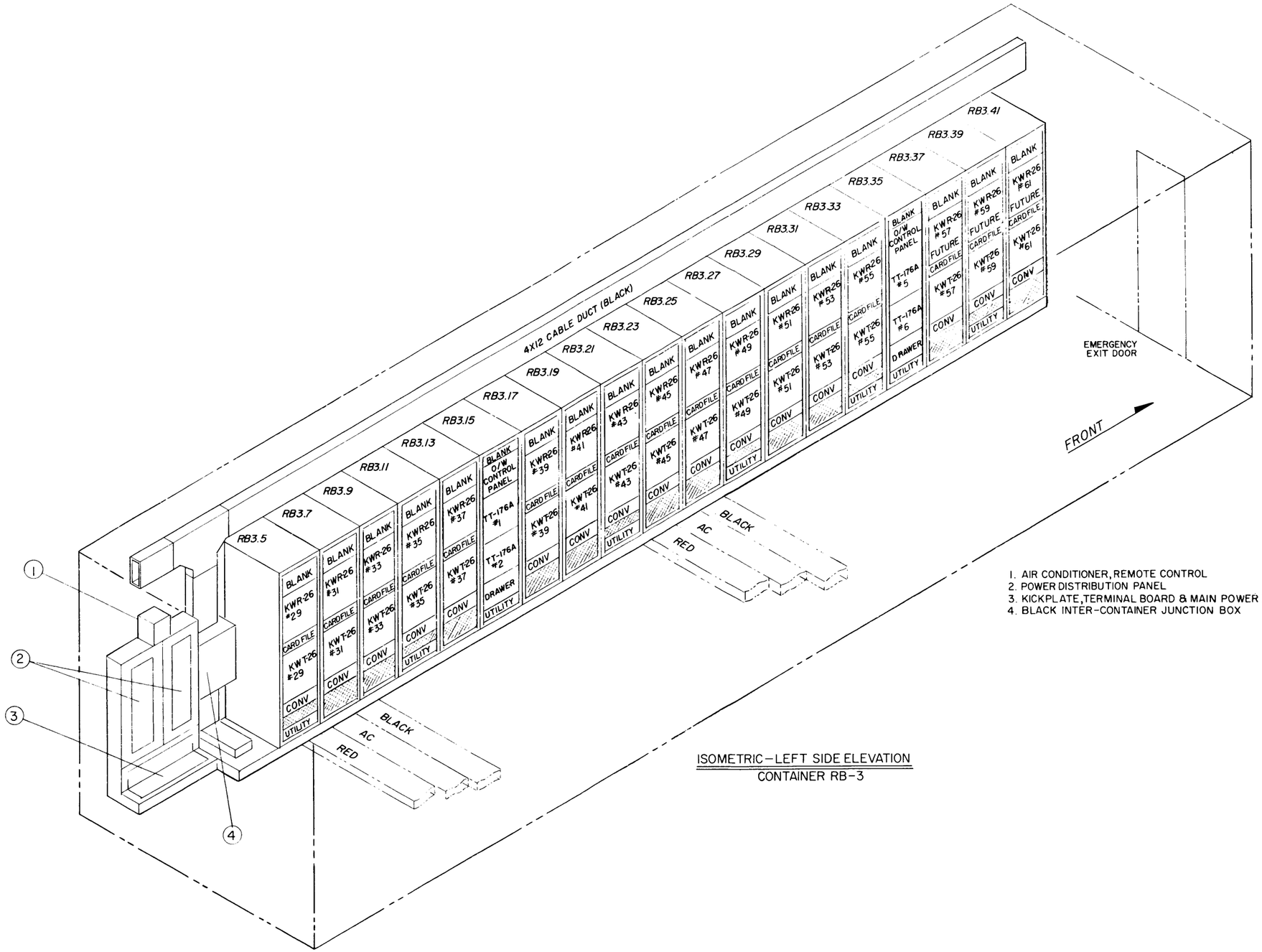


Figure 1-10. Receiving Central Group OA-4938/TSR-1 (Container RB3 - Crypto, Right Side)



1. AIR CONDITIONER, REMOTE CONTROL
2. POWER DISTRIBUTION PANEL
3. KICKPLATE, TERMINAL BOARD & MAIN POWER FEEDTHRU
4. BLACK INTER-CONTAINER JUNCTION BOX

ISOMETRIC – LEFT SIDE ELEVATION
CONTAINER RB-3

Figure 1-11. Receiving Central Group OA-4938/TSR-1 (Container RB3 - Crypto, Left Side)

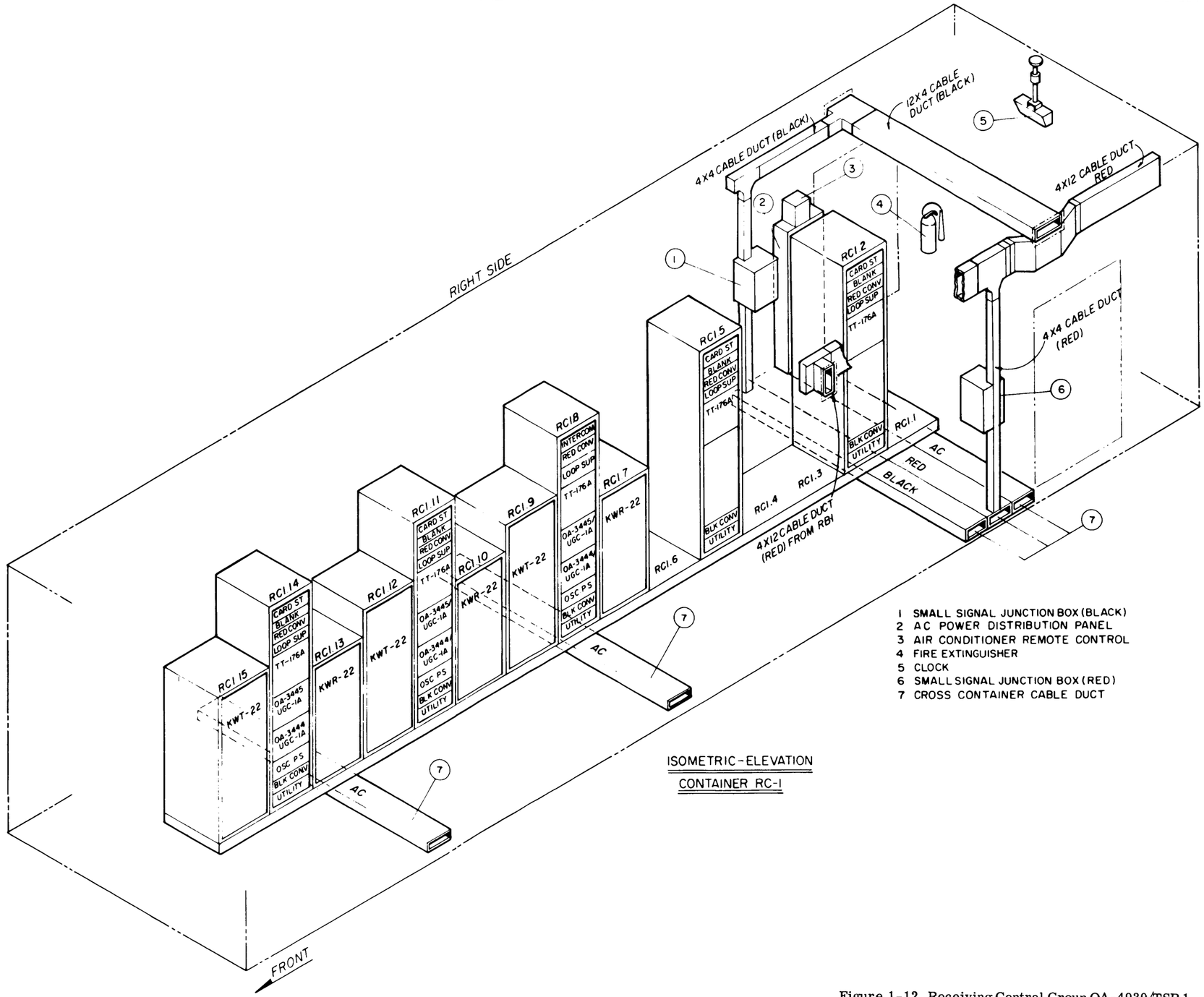


Figure 1-12. Receiving Central Group OA-4939/TSR-1 (Container RC1, Multi-Channel Crypto)

1-118. The 6002-1 modulators convert the RED DC output signals of the four receive multiplex channels to 10-kc phase-shift tones, and the 6002-2 demodulator units convert 10-kc phase-shift input signals into DC keying input signals to the four send channels. The 6004-1 trip-control modulators furnish a frequency-shift 2167. 5-cycle signal for a MARK input or a 2082. 5-cycle signal for a SPACE input. The MARK or SPACE tones release or "lock-up", respectively, an associated transmitter distributor unit.

1-119. The relay and front panel switch are used in the order-wire channel, usually channel Alpha of the MUX, to provide page copy of transmitted order wire messages on the TT-176A order wire machine in the rack. The normal position of the switch places the receive selector magnet of the TT-176A in series with the receive order wire loop in order to monitor the receive order wire channel. The "lock-up" position of the switch places the selector magnet in series with the send order-wire loop in order to provide a copy of transmitted order-wire traffic during the time when the receive loop is not on a steady mark.

1-120. AN/UGC-1A RED Loop Supply Drawer. The loop supply drawer in each AN/UGC-1A equipment rack contains eight 6006 loop-supply units. These units supply the loop current for the AN/UGC-1A four input and four output channels. One unit is used in each send loop and one in each receive loop.

1-121. AN/UGC-1A BLACK Tone Converter Drawer. The BLACK tone converter drawer in each AN/UGC-1A equipment rack contains one 6002-1 modulator, one 6002-2 demodulator, and two 6006 loop supply units. The modulator converts the multiplexed DC output of the Transmitter Group to a 10-kc phase shift tone. The demodulator converts a receive multiplexed 10-kc signal to a DC keying signal that is applied to the receiver group input. The loop supply units furnish loop current for the send and receive multiplex signal circuits.

1-122. SIGNAL DUCT AND CABLE INSTALLATION. RED 4 x 12 signal duct is installed on the left wall at the rear of the container and extends forward for a short distance. At the forward end of this duct, a 4 x 12 Tee section joins it with 4 x 12 duct in container RB1 through a cutout in the wall. Just aft of this Tee, vertical 4 x 4 duct sections connect another 4 x 12 Tee with a RED signal junction box, and the signal junction box with cross-container RED duct. At the rear of the container, the 4 x 12 RED duct joins with the RED duct in RJ1. A transition piece installed above the door on the left side drops the level of the RED duct below a 4 x 12 section of BLACK overhead duct which is fastened to the ceiling and crosses the container from side to side.

1-123. The BLACK 4 x 12 overhead duct extends through both sidewalls connecting with BLACK duct in RB1 on the left side and with BLACK duct installed in the side-to-side walkway into RD1 on the right side. Sections of 4 x 4 duct on the right wall connect the BLACK signal junction box with the overhead duct, and another 4 x 4 section connects the signal junction box with the BLACK cross-container duct.

1-124. RED and BLACK signal cables from the operating equipment are run in the rack base duct toward the rear of the container where they enter their respective RED or BLACK cross-container ducts and then up vertical ducts to terminate at their respective signal junction boxes. The INTERCOM cables are run in the RED duct and are continuous to the RED INTERCOM IDF in container RB1.

1-125. POWER DISTRIBUTION. The power distribution panel contains circuit breakers for all equipment, lighting, air-conditioning units, the air-conditioner control unit, and AC utility outlets in container RC1. Power cables from the panel are run into the AC cross container duct, then into the AC section of the base duct to the equipment. The air-conditioner power cables are terminated in receptacles which are mounted in the left side of the AC cross-container ducts that are near the location of the air-conditioning units.

1-126. MAINTENANCE EQUIPMENT GROUP OA-4941/TSR-1 (CONTAINER RD1). Container RD1 (see figure 1-13) is the electronic repair area of the Receiving Central. A side door is installed in each wall at the rear of the container. The left-side door leads to a side-to-side walkway into RC1 and the right side door leads directly into container RE1. The rear and front ends of the container are open at the site. The rear of the container is jointed to the rear of RH1 and the front is joined to the rear of RD2. One air-conditioning unit is mounted on the right outside wall.

1-127. LEFT SIDE EQUIPMENT. Equipment and facilities installed on the left side of RD1 include four workbenches, a wall-mounted shelf above the workbenches, a BLACK INTERCOM unit at the left end of the shelf, a BLACK signal junction box, a power distribution panel, an air-conditioner control unit mounted on the power panel, and 3400 raceway above the workbenches for AC wiring and BLACK signal cable runs. The three adjoining workbenches are equipped with drawers on each end. The workbench at the front is equipped with a storage space fitted with a door at each end. The top of this bench has a four-inch vise mounted on the left end and an electric bench grinder on the right end. Twelve tip-ring-sleeve jacks are installed in the signal raceway and fourteen duplex utility outlets are installed in the AC raceway above the workbenches.

1-128. RIGHT SIDE EQUIPMENT. Equipment installed along the right side of container RD1 includes a fire extinguisher, three storage units equipped with bins for small parts storage, a wall mounted electric clock, a floor-mounted drill press, and a large storage cabinet equipped with doors. The open area at the rear is used to store three test equipment carts furnished with the container.

1-129. TEST EQUIPMENT SUPPLIED. Table 1-3 lists the test equipment supplied for use in container RD1.

1-130. SIGNAL DUCT AND CABLE INSTALLATION. All signal duct in container RD1 is BLACK. A 12 x 4 overhead duct crosses the container at the rear, joining BLACK duct in RE1 through the right wall and overhead BLACK duct installed in the walkway into RC1 through the left wall. A 4 x 4 duct run joins the overhead duct with the signal junction box. A short

TABLE 1-3. TEST EQUIPMENT SUPPLIED, OA-4941/TSR-1 (CONTAINER RD1)

Model	Quantity	Name
LA-80B	2	EPUT Meter Frequency Counter
LA-915A	1	10-to 100-mc Converter for LA-80B
NF-105	1	Field Intensity Meter
SG-25	2	Signal Generator
SG-1000	1	Megger
ZM-11/U	1	Impedance Bridge
2-16	1	Impedance Bridge
200-CD	2	Test Oscillator
200-CDR	1	Oscillator
260	6	Volt-ohm-milliammeter
304A	2	Oscilloscope
304AR	1	Oscilloscope
400D	2	VTVM
410B	3	VTVM
535A	2	Oscilloscope
738AR	1	Voltmeter Calibrator
752A	1	Vacuum Tube Tester
1890M	1	Transistor Test Set
8150B	1	EPUT Counter
90651	1	Grid Dip Meter
185A-500-FN	1	Average-Reading Termination Wattmeter
500A	1	Scopemobile
161	3	Service Cart

section of 4 x 4 ducts connects the workbench signal raceway with the signal junction box. Twelve signal trunks from the twelve jacks installed in the signal raceway are terminated in the signal junction box and then extended to the BLACK MDF in container RE1 at the site.

1-131. POWER DISTRIBUTION. Power wiring for the AC raceway above the workbenches and the bench grinder is run directly into the raceway from the right side of the power distribution panel. Power to the right side of the container is run into the AC cross-container duct then into a 4 x 4 floor-mounted AC duct that extends to the first storage unit. From this point, 1700 raceway is run up and across the storage units, then down the wall to service the drill press. Another section of raceway equipped with duplex utility outlets is installed above the 4 x 4 duct and run back to the right rear door area. Circuit breakers for all the equipment, lighting, air conditioner, air conditioner control unit, and utility outlets in container RD1 are housed in the power distribution panel.

1-132. SUPPLY CENTER OA-4942/TSR-1 (CONTAINER RD2).

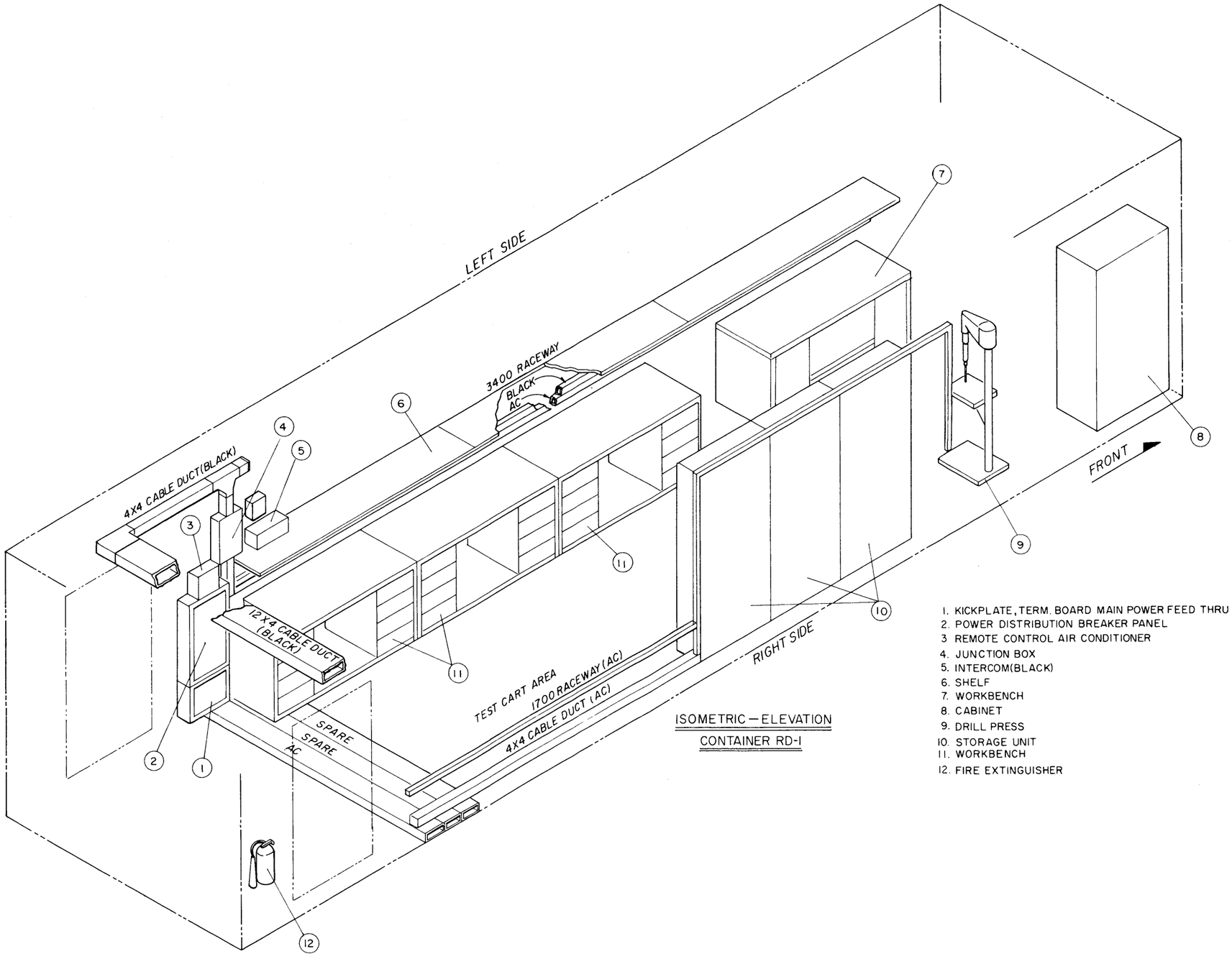
Container RD2 (see figure 1-14) is the supply area of the Receiving Central. Equipment installed in this container consists primarily of bin and shelf storage units. The container is equipped with a door in each sidewall at the rear. The rear wall is installed inside the container, just forward of the side doors, forming a vestibule area for supply issue. A Dutch door is installed in the rear wall, and the lower half of the Dutch door has a shelf which is used for issuing the supplies. A wall with a door for loading supplies into the container is installed at the front end. The area between the two end walls is used as the supply storage area. The container is equipped with one air-conditioning unit that mounts on the outside right wall. No signal ducting is installed in this container since signal cabling is not required.

1-133. EQUIPMENT INSTALLATION. All equipment installed in this container is located in the supply storage area, except for a fire extinguisher mounted on the right wall in the vestibule area. Nine storage units equipped with bins for small parts storage are installed along each sidewall. Seven storage units having shelves for larger items are mounted down the center of the storage area. A desk for the storekeeper is installed at the right side wall near the issue door at the rear, and a shelf and electric clock are wall-mounted above the desk. The shelf is provided for the supply catalogue.

1-134. POWER DISTRIBUTION. A power distribution panel containing circuit breakers for lighting, the air conditioner, and the air-conditioner control unit is mounted on the power panel. The air-conditioner power and control wiring is terminated on a receptacle which is installed on the right side of a cross-container AC duct located in the middle of the container. The cable is run in 1700 raceway from the side of the power panel to a kickplate on the floor above the cross-container duct.

1-135. TELETYPE CENTRAL AN/TGC-17 (CONTAINER RE1).

Container RE1 is the unclassified facility control area and houses the BLACK Main Distribution Frame (MDF) of the Receiving Central AN/TSR-1. Additional equipment and facilities installed in this container



ISOMETRIC — ELEVATION
CONTAINER RD-I

1. KICKPLATE, TERM. BOARD MAIN POWER FEED THRU
2. POWER DISTRIBUTION BREAKER PANEL
3. REMOTE CONTROL AIR CONDITIONER
4. JUNCTION BOX
5. INTERCOM(BLACK)
6. SHELF
7. WORKBENCH
8. CABINET
9. DRILL PRESS
10. STORAGE UNIT
11. WORKBENCH
12. FIRE EXTINGUISHER

Figure 1-13. Maintenance Equipment Group OA-4941/TSR-1 (Container RD1-Electronic Repair)

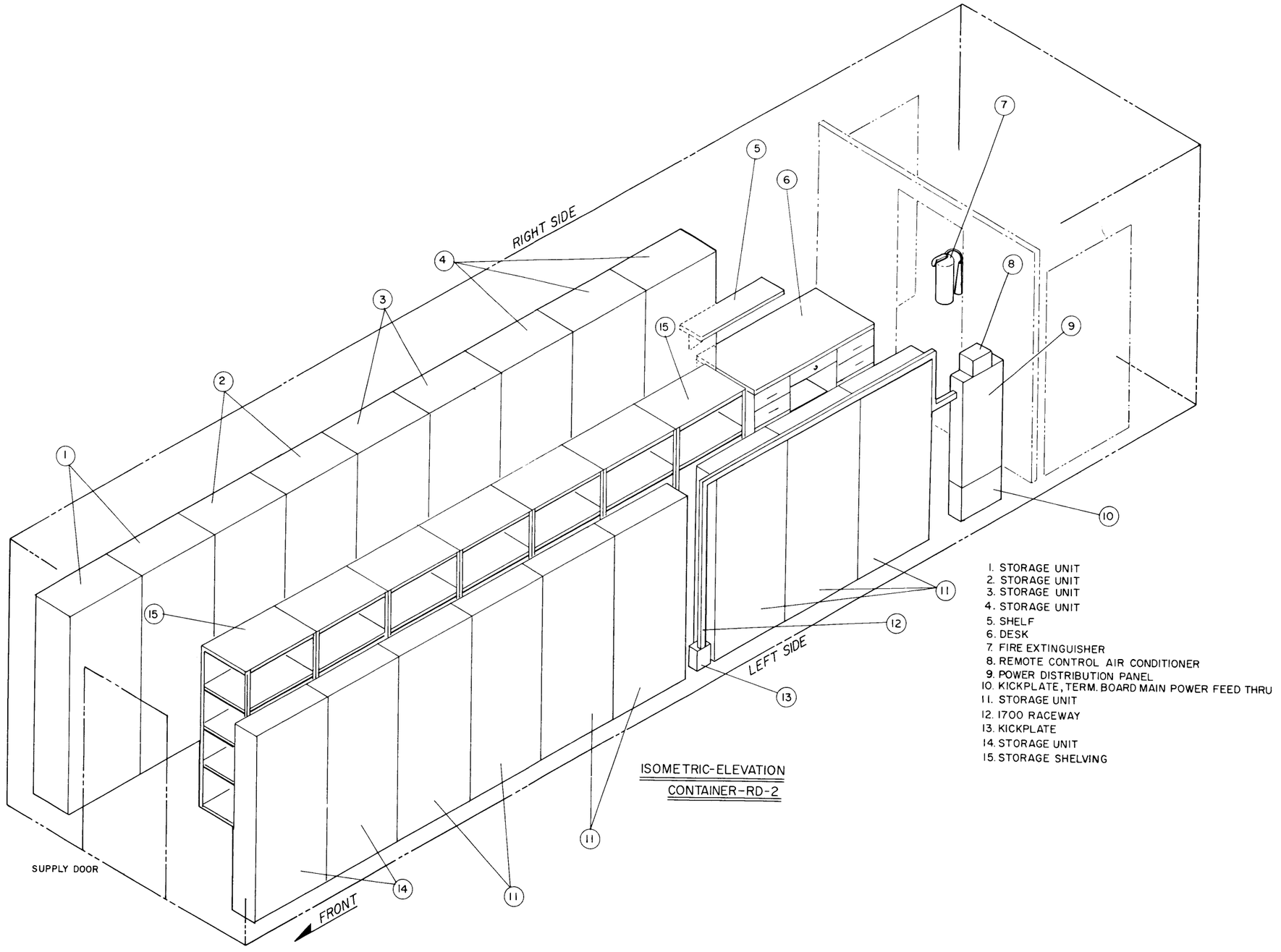


Figure 1-14. Supply Center OA-4942/TSR-1 (Container RD2 - Supply)

includes fourteen AN/FGC-60(V) tone-telegraph terminals, order-wire and monitor teletype equipment, teletype and audio distortion measuring equipment, a 20-channel "Fox" distribution amplifier, an audio oscillator, a BLACK INTERCOM unit, a desk and storage cabinet. All equipment is installed in standard AN/TSC-35 equipment racks except the MDF program patchboards which are housed in the 26-inch wide MDF racks. All racks are mounted on standard rack base duct. Two air-conditioning units are mounted on the outside left wall. A dual readout digital clock unit is suspended from the ceiling at the front center of the container.

1-136. LEFT SIDE EQUIPMENT. The ten racks in positions RE1.1 through position 19 house the BLACK MDF (2031 System AF Patching and Monitoring Facility) and associated test equipment racks. (See figure 1-15). Positions 21 and 23 house a BLACK INTERCOM unit and four TT-176A teletype units used for point-to-point order-wire, internal order-wire, and monitors. A supervisors desk and wall-mounted shelf are adjacent to position 23. Two AN/FGC-60/22 tone-telegraph terminals are installed at the front of the container in positions 30 and 41. A distribution frame for the Receiving Central BLACK INTERCOM system is installed in the bottom of a TTY-patch rack in position RE1.11.

1-137. RIGHT SIDE EQUIPMENT. The equipment installed on the right side of container RE1 (see figure 1-16) includes two AN/FGC-60/22 full-duplex, 16-channel, non-diversity tone telegraph terminals in positions 32 and 34; one AN/FGC-60/23A system comprised of two 12-send-channel non-diversity tone telegraph terminals in position 30; one AN/FGC-60/19 full-duplex, 12-channel, non-diversity tone telegraph terminal in position 28; and eight AN/FGC-60/24 full-duplex, 16-channel, diversity tone-telegraph terminals in the remaining sixteen rack positions on the right side. Each AN/FGC-60/24 system is housed in two standard AN/TSC-35 equipment racks while each of the remaining four AN/FGC-60 systems is housed in one standard rack. A power distribution panel and a remote control unit for the air conditioners are installed at the front end; a fire extinguisher is wall-mounted on the rear right wall.

1-138. MAIN DISTRIBUTION FRAME, BLACK. The BLACK Main Distribution Frame (MDF) in container RE1 is the central distribution point for the BLACK signals at the Receiving Central. All Receiving Central tone-converted BLACK signal circuits, and all voice-band (3-kc band) signal circuits are terminated on program boards at this MDF where they can then be programmed to provide complete circuits. The BLACK MDF contains facilities for both TTY and audio programming, patching and monitoring. The TTY facilities are for 10-kc phase-shift tone signals, and the audio facilities for voice circuits and other 3-kc signal circuits such as the aggregate tone signals of the AN/FGC-60 systems and the AN/FCC-17 audio channels.

1-139. The TTY program board is contained in three racks in positions RE1.3, 7 and 9, and the associated monitoring patchfields are in positions RE1.1, 11 and 13. To avoid extremely long program patchcords, twenty-four inter-bay trunks are installed between program boards in positions 3 and 7, and twenty-four trunks between positions 3 and 9. The audio program board is contained in one rack in position RE1.5, and its associated audio monitoring patchfield is in position 17.

1-140. BLACK Program Board. The construction of the BLACK program boards is identical to the RED program boards in container RB1 except that the female coaxicon connectors are white and are installed in BLACK coaxicon blocks. Each rack houses 1440 white coaxicon female connectors providing a total of 4320 TTY and 1440 audio circuit terminations at the BLACK MDF.

1-141. BLACK TTY and Audio Patchfields. Each TTY and audio patchfield rack contains, from top to bottom, a meter panel, four hinged groups of jacks, a jackstrip containing 48 MISCELLANEOUS jacks designated TEST and TRUNK, and two METER jacks designated VU and M/S IND. The meter panel is modified for tone conversion and is identical to the meter panel installed in the patchfield racks of the RED MDF in container RE1. The M/S and VU meter inputs are wired to the two METER jacks located on the extreme right side of the MISCELLANEOUS jackstrip.

1-142. Each hinged jackgroup contains twenty-four SEND and twenty-four RECEIVE normal-through MONITOR-LINE-EQUIPMENT jack circuits. Each MONITOR jack is connected in parallel with the LINE jack directly below, and each LINE and EQUIPMENT jack is wired to a separate coaxicon connector on a program board of the MDF. All the jacks are tip-ring-sleeve types, and the sleeves are wired to the shell of the associated coaxicon connector through the shield of the signal pair.

1-143. The TTY patchfield in position 1 is wired to the program board in position 3, the patchfield in position 11 to the program board in position 7, and the patchfield in position 13 to the program board in position 9. The audio patchfield in position 17 is wired to the audio program board in position 5. There are no indicator lamp circuits associated with the BLACK signal circuits.

1-144. TTY EQUIPMENT RACKS. The TTY equipment rack in position 21 contains two slide-mounted TT-176A's, a receive lock-up switch and a storage drawer. The top TT-176A is a full-duplex point-to-point order wire machine. The bottom unit is a page-printer monitor. The TTY equipment rack in position 23 contains, from top to bottom, a BLACK INTERCOM unit, two slide mounted TT-176A units, a storage drawer, and an AC utility outlet panel. The top TT-176A unit is an internal order-wire machine, and the lower unit is a monitor. The INTERCOM is wired directly to the INTERCOM IDF in position 11. All teletype equipment is wired to the program board in position 7.

1-145. TEST EQUIPMENT RACK RE1.15. The equipment installed in rack RE1.15 includes, from top to

bottom, a BSP-2 dual speaker-amplifier unit, an AN/GGM-1 distortion measuring set, a 20-channel "Fox" distribution amplifier, and an O-450/U audio oscillator. A screened ventilation panel is installed at the bottom of the rack.

1-146. The AN/GGM-1 input and output circuits are equipped for tone conversion and both circuits appear on the BLACK program board in position 7. The distribution amplifier input channel is wired to the program board in position 7, and the output channels are programmed to various patchboards as required. Both speaker input circuits and the audio oscillator output are wired to the program board in position 7.

1-147. TEST EQUIPMENT RACK RE1.19. Test equipment rack RE1.19 contains three components of an LP-1A spectrum analyzer at the top and a screened ventilation panel at the bottom. The spectrum analyzer consists of the LP-1A sonic analyzer unit, an SW-1 signal alternator unit, and a PS-1C power supply unit.

1-148. The spectrum analyzer can display a band of frequencies that ranges from 20 cycles to 22,500 cycles for quick analysis of complex waveforms. 200-cps, 1000-cps or 5000-cps portions of the frequency spectrum can be selected for more detailed analysis of waveforms. The signal alternator unit SW-1 is an electronic switch that allows observation of two independent inputs on the spectrum analyzer, such as a SSB signal and a calibrated frequency when measurements of the various portions of the SSB frequency are desired. The SW-1 normal and alternate inputs are wired to the audio program board RE1.5. Power supply PS-1C furnishes all operating voltages for the operation of the spectrum analyzer.

1-149. SIGNAL DUCT AND CABLE INSTALLATION. Black 4 x 12 signal duct is installed the full length of container RE1 above the equipment on the left side. The signal duct connects with 4 x 12 duct in container RE2 at the front and in container RD1 at the rear. This duct is equipped with two special duct scoop sections that feed inter-container cables into the top of the racks housing the program boards, one duct scoop in position 3 and one in positions 5, 7 and 9. Cross container signal ducts are provided at both ends and at the middle of the container.

1-150. All RE1 equipment, except the BLACK INTERCOM unit, are wired to the BLACK MDF program board; the left side equipment through the signal base duct and the right side equipment through base duct and cross-container duct.

1-151. Tone-Telegraph Terminal Equipment Wiring. All TTY input and output channels of the AN/FGC-60 systems are equipped for tone conversion and are wired to the TTY program boards. The TTY channels of the CCL telegraph terminals, which include the 60/23A and 60/19 systems in positions 30 and 28 and two 60/22 systems in positions 30 and 41 are terminated on the program board in position 3. The remaining AN/FGC-60 systems are point-to-point terminals and their TTY channels appear on the program boards in position 7 and 9. The aggregate tones of all systems appear on the audio program board in position 5.

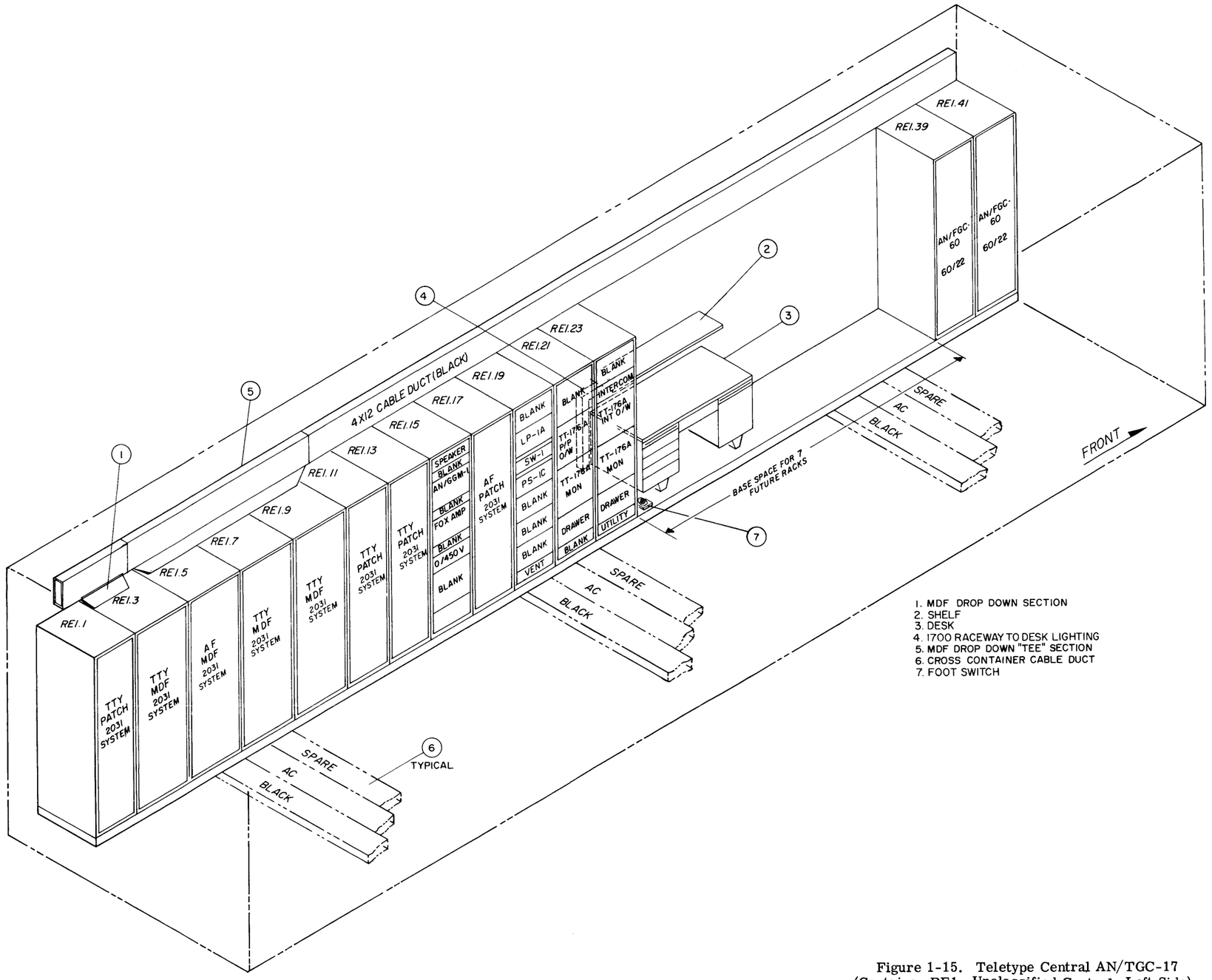
1-152. POWER DISTRIBUTION. The power distribution panel on the front right side of the container houses circuit breakers for all equipment, lighting, air-conditioner units, the air-conditioner control unit, and all utility outlets in container RE1. Power wiring enters the right side AC base duct through a kickplate below the power panel to service all right side equipment, and is run through the cross-container AC ducts for left side equipments. Air-conditioner power and control cables are terminated on receptacles mounted in the left side of the AC cross container ducts that are located at the front and at the rear of the container.

1-153. RECEIVING CENTRAL GROUP OA-4943/TSR-1 (CONTAINER RE2).

Container RE2 is the HICOM Voice and Microwave area of Receiving Central AN/TSR-1. An operating position is provided in this container for the operation of Hicom Voice and Point-to-Point voice circuits. Equipment installed in this container includes microwave transmitters, receivers, and VF terminal equipment; VHF and UHF transmitters and receivers; HF receivers; SSB converters; a voice operating position; telephone terminal equipment; a voice counter; speech processing equipment; radio teletype terminal equipment; a BLACK INTERCOM unit; a special distribution frame; and a dehydrator unit. One air-conditioning unit, which is mounted on the left outside wall, is provided for this container. All operating equipment in container RE2 (see figure 1-17) is installed on the left side and mounted on standard rack base duct.

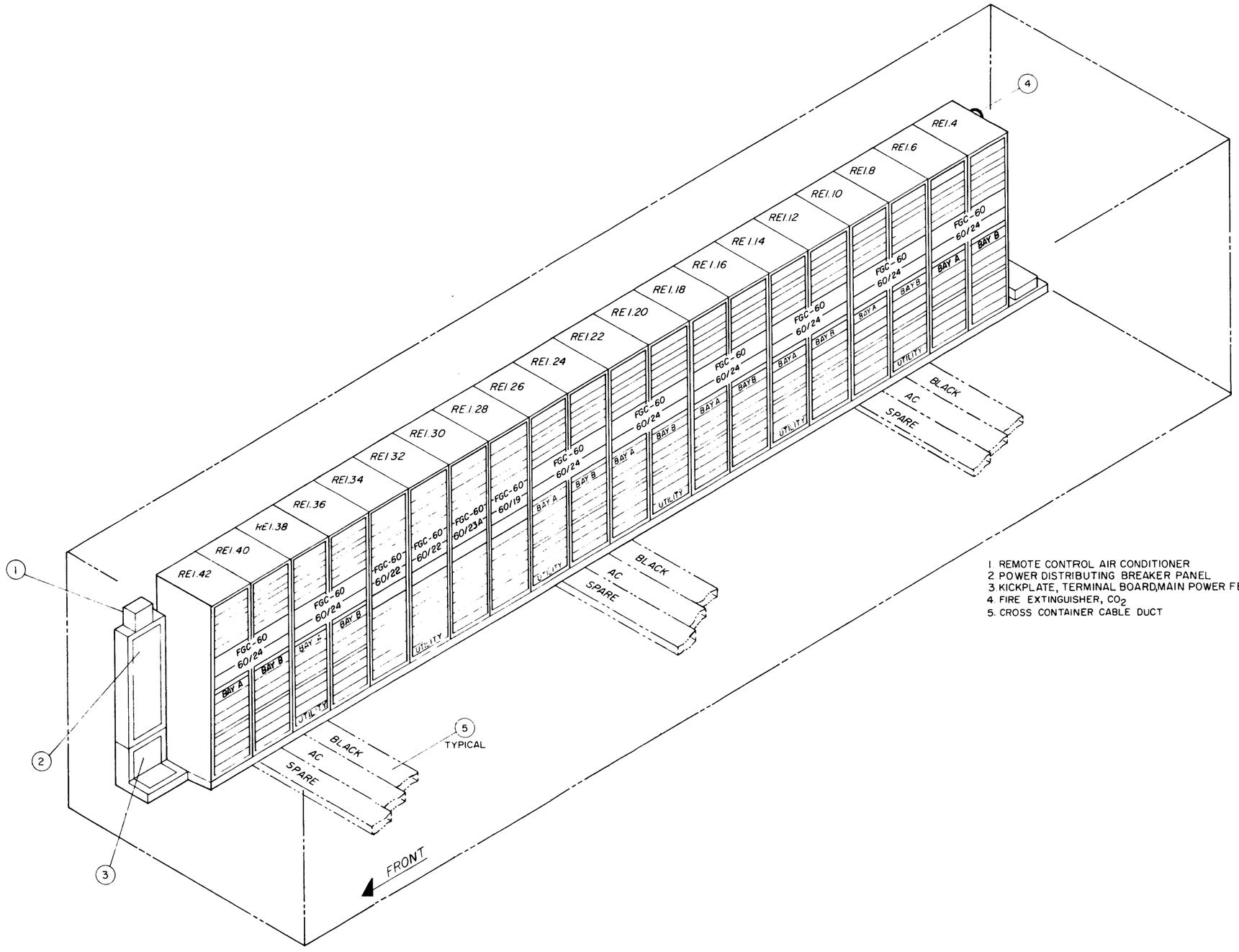
1-154. VOICE OPERATING POSITION RE2.23. The voice operating position consists of an operating desk and a special 30-inch high dual rack mounted on the top of the desk. The dual rack houses two R390A receivers, two CV-591A SSB converters, a BSP-2 dual speaker-amplifier unit, a transmitter control panel and a receiver control panel. The desk is constructed of wood with a formica top and has a typewriter well in the center, paper storage shelves on the left side, a microphone storage cubicle on the right side, and a drawer on each side of the typewriter well. Mounted below the drawers are a microphone control unit on the right side and two parallel headphone jacks on the left. A desk microphone, a boom microphone with chest harness, and a 600-ohm headphone set are provided for this position. An adjustable cushioned chair equipped with casters is furnished for this operating position.

1-155. The microphone control unit is equipped with a desk microphone receptacle, a boom microphone receptacle, a microphone selector switch, and a foot-operated push-to-talk switch that is wired through flexible conduit to the boom microphone receptacle. The headphone circuit is parallel-wired from the jacks to two pins on the boom microphone receptacle, and the boom microphone extension cord has a microphone jack and a headphone jack. Either the desk microphone or the boom microphone can be selected for use by the switch on the control unit. The operation of the equipment and the control panels at this position is described in section 3 of this volume.



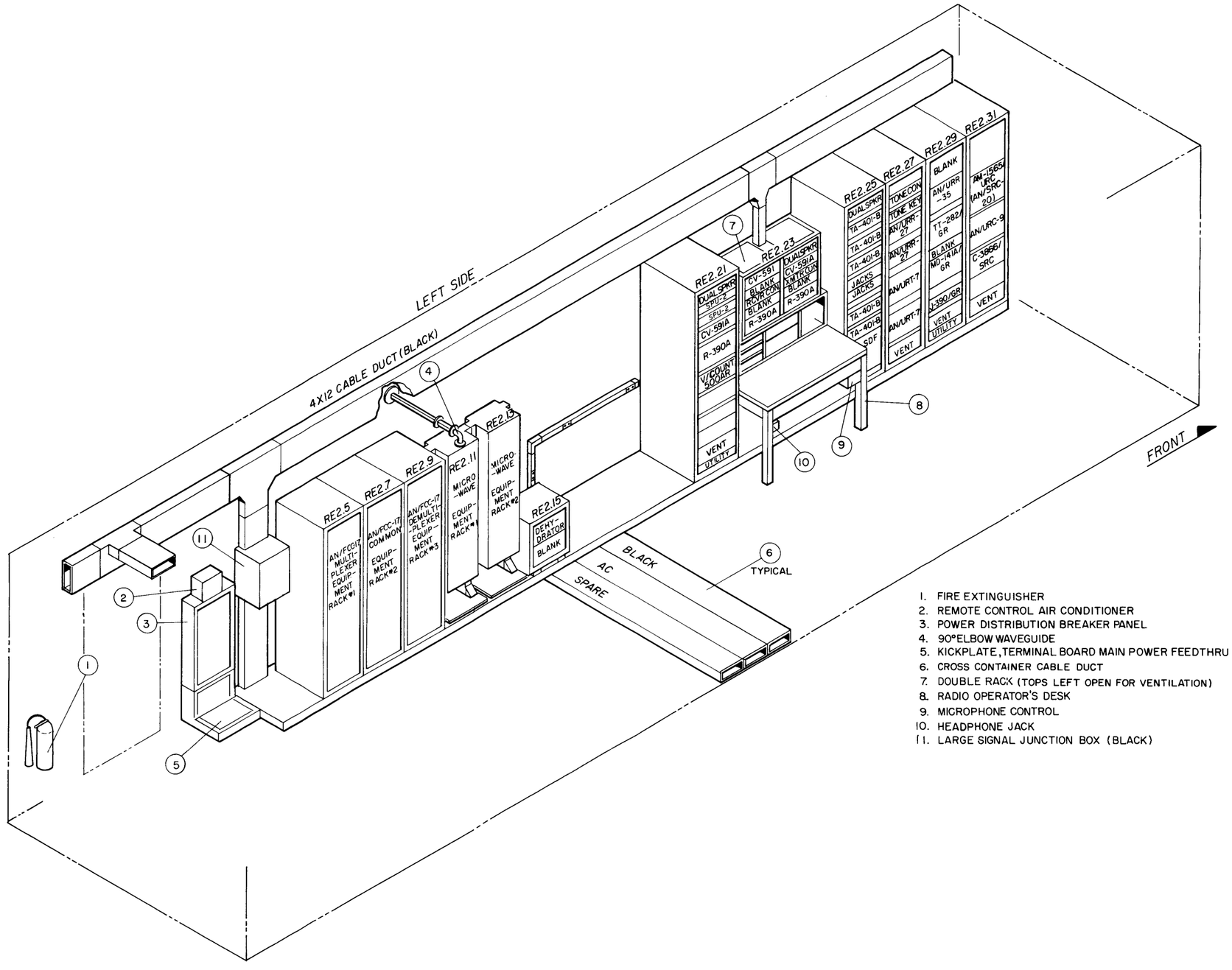
1. MDF DROP DOWN SECTION
2. SHELF
3. DESK
4. 1700 RACEWAY TO DESK LIGHTING
5. MDF DROP DOWN "TEE" SECTION
6. CROSS CONTAINER CABLE DUCT
7. FOOT SWITCH

Figure 1-15. Teletype Central AN/TGC-17 (Container RE1, Unclassified Control, Left Side)



1. REMOTE CONTROL AIR CONDITIONER
2. POWER DISTRIBUTING BREAKER PANEL
3. KICKPLATE, TERMINAL BOARD,MAIN POWER FEED THRU
4. FIRE EXTINGUISHER, CO_2
5. CROSS CONTAINER CABLE DUCT

Figure 1-16. Teletype Central AN/TGC-17, (Container RE1, Unclassified Control, Right Side)



1. FIRE EXTINGUISHER
2. REMOTE CONTROL AIR CONDITIONER
3. POWER DISTRIBUTION BREAKER PANEL
4. 90°ELBOW WAVEGUIDE
5. KICKPLATE, TERMINAL BOARD MAIN POWER FEEDTHRU
6. CROSS CONTAINER CABLE DUCT
7. DOUBLE RACK (TOPS LEFT OPEN FOR VENTILATION)
8. RADIO OPERATOR'S DESK
9. MICROPHONE CONTROL
10. HEADPHONE JACK
11. LARGE SIGNAL JUNCTION BOX (BLACK)

Figure 1-17. Receiving Central Group OA-4943/TSR-1 (Container RE2, HICOM Voice & Microwave)

1-156. VOICE EQUIPMENT RACK RE2.21. Equipment installed in this rack includes, from top to bottom, a BSP-2 dual speaker-amplifier unit, two SPU-2 speech processing units, two 6002-1 modulators, a CV-591A single-sideband converter, an R-390A HF receiver, a model 500AR tape recorder unit, a BLACK INTERCOM unit, a ventilation panel, and an AC utility outlet panel. The SPU-2 speech processing units are transistorized, constant-level audio amplifiers that prevent overloading of transmitters or "singing" on voice channels. The voice-operated relay output circuits of the SPU-2's are wired to the 6002-1 tone-converter modulators which are mounted at the rear of the rack. The tape recorder provides a station call sign for point-to-point circuits during frequency shifts or poor signal conditions.

1-157. VOICE EQUIPMENT RACK RE2.25. This voice equipment rack houses, from top to bottom, a BSP-2 dual speaker-amplifier,three TA-401B 2-wire 4-wire telephone terminal units, the SDF monitor patchfield, two TA-401A units, and the SDF program board. All voice operating equipment installed in rack positions RE2.21 through RE2.25, including receiver and transmitter control panels, is terminated on the SDF program board.

1-158. Audio trunk lines installed between the SDF and the BLACK MDF include 24 trunks to the AF program board RE1.5 and 12 trunks to the TTY program board RE1.9. The monitor patchfield is equipped with 24 send and 24 receive MONITOR-LINE-EQUIPMENT jack circuits and 48 MISCELLANEOUS jacks.

1-159. MICROWAVE EQUIPMENT. The microwave facility installation includes two model 74B-1 transmitter/receiver racks in position 11 and 13; three racks housing an AN/FCC-17 voice terminal in positions 5, 7, and 9; a dehydrator unit in position 15; and a microwave antenna installed on an outdoor 40-foot tower located near the left side of the container. The microwave system includes redundant microwave units and is equipped with automatic switching to the "hot standby" back-up units. The RF transmission line between the microwave equipment and the antenna is rectangular waveguide. Dehydrated air at low pressure is fed to the waveguide through flexible tubing from the dehydrator unit in position 15.

1-160. The AN/FCC-17 is a 60-channel voice frequency (VF) terminal that is equipped with plug-in modules for sixty 3-kc send channels and twenty-four 3-kc receive channels. Wiring for 60-send and 60-receive channels is installed between the microwave equipment and the audio program board RE1.5 of the BLACK MDF. By the addition of plug-in modules, the system can be expanded to provide thirty-six more receive channels.

1-161. VHF EQUIPMENT RACK RE2.27. The VHF equipment rack houses two AN/URT-7 VHF transmitters and associated push-to-talk circuit 6002-1 modulators; two AN/URR-27 VHF receivers; a 2067 system two-tone telegraph keyer; and an associated 2067 tone converter drawer. The 2067 system is a transistorized version of, and is compatible with, an AN/SGC-1A tone telegraph keyer. It furnishes a 500-cycle tone for a SPACE input and a 700-cycle tone for a MARK input. The associated tone converter drawer contains two 6002-1 modulators, one 6002-2 demodulator and two 6006 loop supply units. One modulator is used with the receive TTY side of the 2067 system and the other for transmitter control. The demodulator and loop supply units are wired in series with the send TTY loop. All audio circuits of equipment installed in this rack are wired to the BLACK MDF in container RE1 via the RE2 signal junction box.

1-162. UHF EQUIPMENT RACKS RE2.29, RE2.31. UHF equipment rack RE2.29 houses an AN/URR-35C UHF receiver and an AN/GRT-3 UHF transmitting equipment. A utility panel is installed at the bottom of this rack. The UHF equipment rack in position RE2.31 houses all the components of an AN/SRC-20 UHF transceiver equipment. Audio signal and 10-kc control circuits from both UHF equipment racks are wired to the BLACK MDF in container RE1 via the RE2 signal junction box. The UHF audio input and output circuits appear on the audio program board RE1.5 and the push-to-talk circuits, which are equipped with 6002-1 modulators, appear on the TTY program board RE1.9.

1-163. SIGNAL DUCT AND CABLE INSTALLATION. BLACK 4 x 12 signal duct extending the full length of the container is installed on the left wall above the equipment. Connecting pieces join this duct with similar duct in RE1 and RE3. Vertical 4 x 12 duct sections connect the duct with a large signal junction box, and the signal junction box with the rack base duct. A 4 x 4 duct section connects the operating position dual-rack with the wall mounted duct. Additional ducting installed includes three cross-container ducts in the middle and an overhead duct at the rear of the container. The overhead duct crosses the container and extends through a side-to-side walkway into container RF2. The cross-container ducts are provided for future equipment that may be installed on the right side of RE2.

1-164. All signal circuits associated with the voice operating position terminate on the SDF and are then extended via the BLACK signal junction box to the BLACK MDF in container RE1, using the audio and TTY MDF trunks provided. Signal cables from all other equipment in RE2, except the voice INTERCOM unit, terminate at the signal junction box and are then extended to the BLACK MDF. The INTERCOM cables by-pass the signal junction box and are continuous from the INTERCOM unit to the INTERCOM IDF in container RE1.

1-165. POWER DISTRIBUTION. The power distribution panel mounted on the left wall near the rear side door houses circuit breakers for all equipment, lighting, the air conditioner and its control unit, and all AC utility outlets in container RE2. Power wiring enters the AC base duct through a kickplate installed below the power panel. The air-conditioner power and control cables terminate on a receptacle installed in the left side of the cross-container AC duct.

1-166. RECEIVING CENTRAL GROUP OA-4944/TSR-1 (CONTAINER RE3).

Container RE3 with adjacent container RE4 comprise the primary Receivers area of the Communication

System. Container RE3 houses forty-one radio receivers, twenty-eight frequency-shift TTY converters, sixteen TD-411/UGC demultiplexers, a Very Low Frequency Comparator (VLFC), the master clock of the station digital clock system, six Rotatable Log Periodic Antenna (RLPA) control units, the receivers Intermediate Distribution Frame (IDF), two TT-176A teletype machines, tone converter modulators and demodulators, a BLACK INTERCOM unit, and a supervisor's desk.

1-167. Radio receivers include six dual-diversity, synthesized SSB AN/FRR-60's, sixteen high-frequency R-390's, four low-frequency R-389's and fifteen monitor R-5007/FRR-502's. Frequency shift converters include twenty-four Model D-3 demodulators, three CFA-1LB's, and one CFA-1.

1-168. All operating equipment with the exception of the AN/FRR-60 receivers are installed in standard AN/TSC-35 equipment racks that are mounted on standard rack base duct. The IDF, consisting of a 26-inch program board rack and a standard rack housing a monitor patchbay, is mounted on standard rack base duct. The AN/FRR-60's are housed in their own cabinets which are mounted on special bases designed for this installation. Two air-conditioning units are mounted on the outside left wall. A door in the right-rear wall opens into a side-to-side walkway that leads into Container RF3.

1-169. RIGHT SIDE EQUIPMENT. Equipment and facilities installed along the right side of RE3 (see figure 1-18) include the six AN/FRR-60 receivers in positions 14 through 36 and a TTY rack in position 12. Two power-distribution panels, an air-conditioner control unit, a supervisor's desk, and a BLACK INTERCOM unit (mounted on a shelf above the desk) are to the right of the TTY rack. An RLPA control rack is in position 2.

1-170. AN/FRR-60 INSTALLATION. The AN/FRR-60 diversity receiver cabinet is mounted on a special 12-inch high base that is equipped with two built-in air ducts at the top and space for cable runs at the bottom. The air ducts extend from the front to the rear of the base, then vertically to the air-intakes at the rear of the receiver bays. Reusable air filters are installed at the front of the base. The AN/FRR-60 bases are mounted approximately four inches from the wall of the container to allow for the vertical section of the air duct. The bases are secured to tapping plates installed in the floor. The tops of the receiver racks are bolted to 4-inch brackets which are secured to wall tapping plates. Cables from the AN/FRR-60 bases are fed into cross-container ducts through floor cutouts at receiver positions 18-20 and 30-32.

1-171. Since the AN/FRR-60 receivers are mounted against a wall, they are modified to provide access to the AC line filters from the front of the equipment. The AC line filter of the dual-diversity receivers was removed from the rear center of the cabinet and fastened to the rear of the blank panel mounted in the bottom panel space at the front of receiver bay number 2.

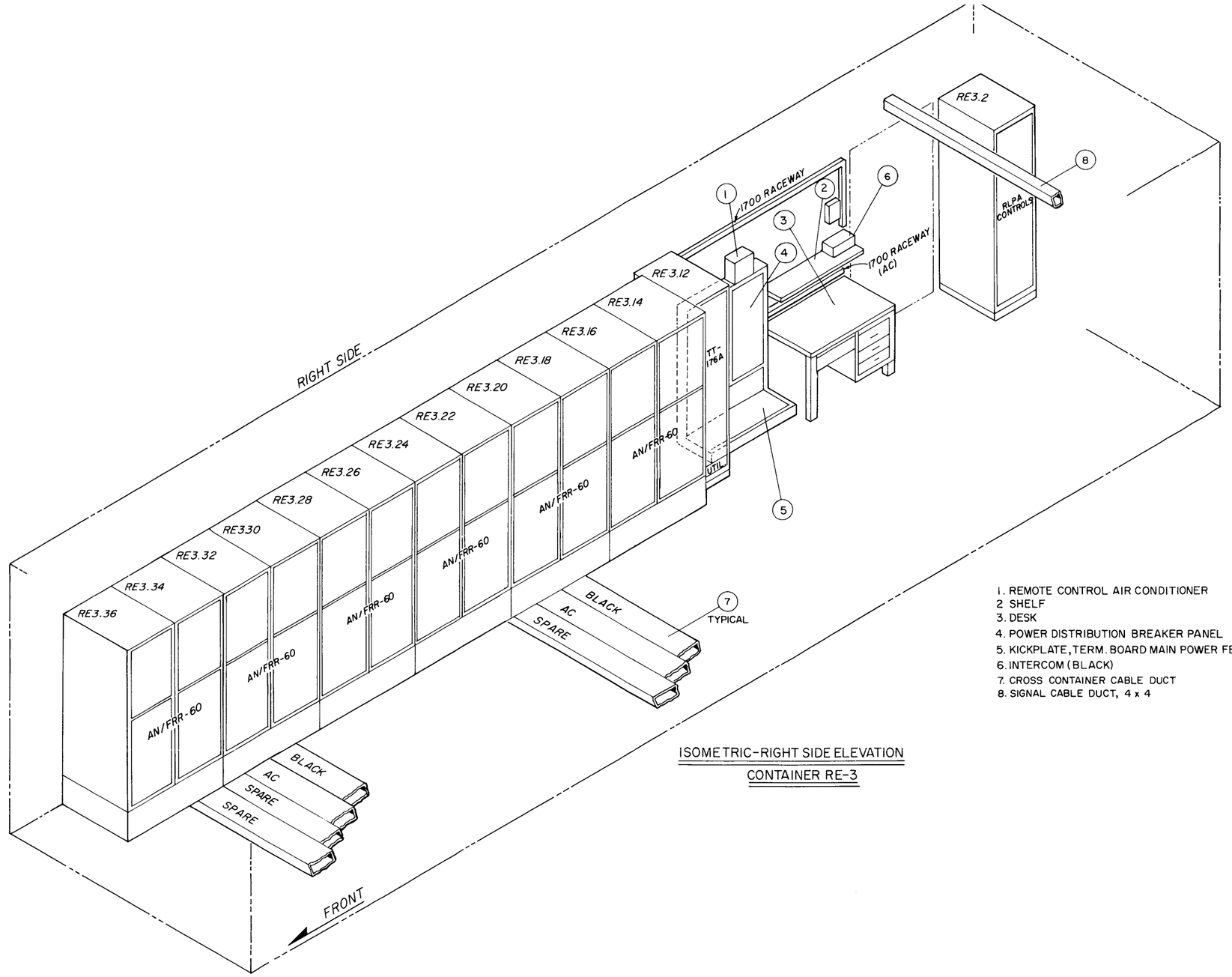
1-172. TTY, RACK RE3.12. This rack houses two TT-176A TTY's and their associated tone converter panels; a jack box containing three tip-ring-sleeve jacks; a storage drawer; and a foot operated switch that is mounted on the base. The TTY's and the storage drawer are slide mounted. The top TTY unit is an internal order-wire machine and the bottom unit is a monitor.

1-173. The DC circuits of both TTY's are wired to patchcords that plug into the jacks to complete the TTY circuits, providing for quick disconnect when the machines must be removed for overhaul. The tone converter panels mount at the rear of the rack behind their respective TTY's, and their DC circuits are wired to the jacks. The order-wire TTY tone converter contains a 6002-1 modulator, a 6002-2 demodulator, and a 6006 loop supply. The modulator is in the send order-wire loop circuit and is wired to the top jack in the jack box. The demodulator and loop supply are wired in series with the receive order-wire loop circuit which is wired to the second jack. The foot switch is wired in series with the send order-wire circuit at the tone converter unit. When the switch is closed, the 10-kc output of the modulator is connected to the internal order-wire circuit.

1-174. RLPA, CONTROL RACK, RE3.2. The six RLPA control units are installed in the middle portion of this rack with blank panels between the units and the top and bottom. Twelve stuffing tubes extend through the floor of the container inside the rack base area. The RLPA control cables are type PCP suitable for direct burial, having twelve pairs of number nineteen conductors. One control cable is run from each control unit through a stuffing tube and then directly to its associated rotatable log periodic antenna location. The remaining six stuffing tubes are provided for possible future RLPA installation.

1-175. LEFT SIDE EQUIPMENT. Equipment and facilities installed along the left wall of RE3 (see figure 1-19) include a large signal junction box and a fire extinguisher at the rear; three racks in positions 1, 3, and 5 for future equipment; the receivers 2013 system IDF in positions 7 and 9; a 2030 system rack housing TD-411/UGC demultiplexers in position 11; a Very Low Frequency Comparator (VLFC) and the master electronic digital clock in rack position 13; eight high-frequency FSK racks in positions 15 through 29; one low-frequency FSK rack in position 31; one rack in position 33 housing spare FSK equipment and associated tone converters primarily for use with AN/FRR-60 receivers that are on RATT circuits; and three monitor receiver racks in positions 35, 37 and 39. The rack provided for future equipment in position 1 is equipped with an AC utility panel, and the racks in positions 3 and 5 with ventilation panels.

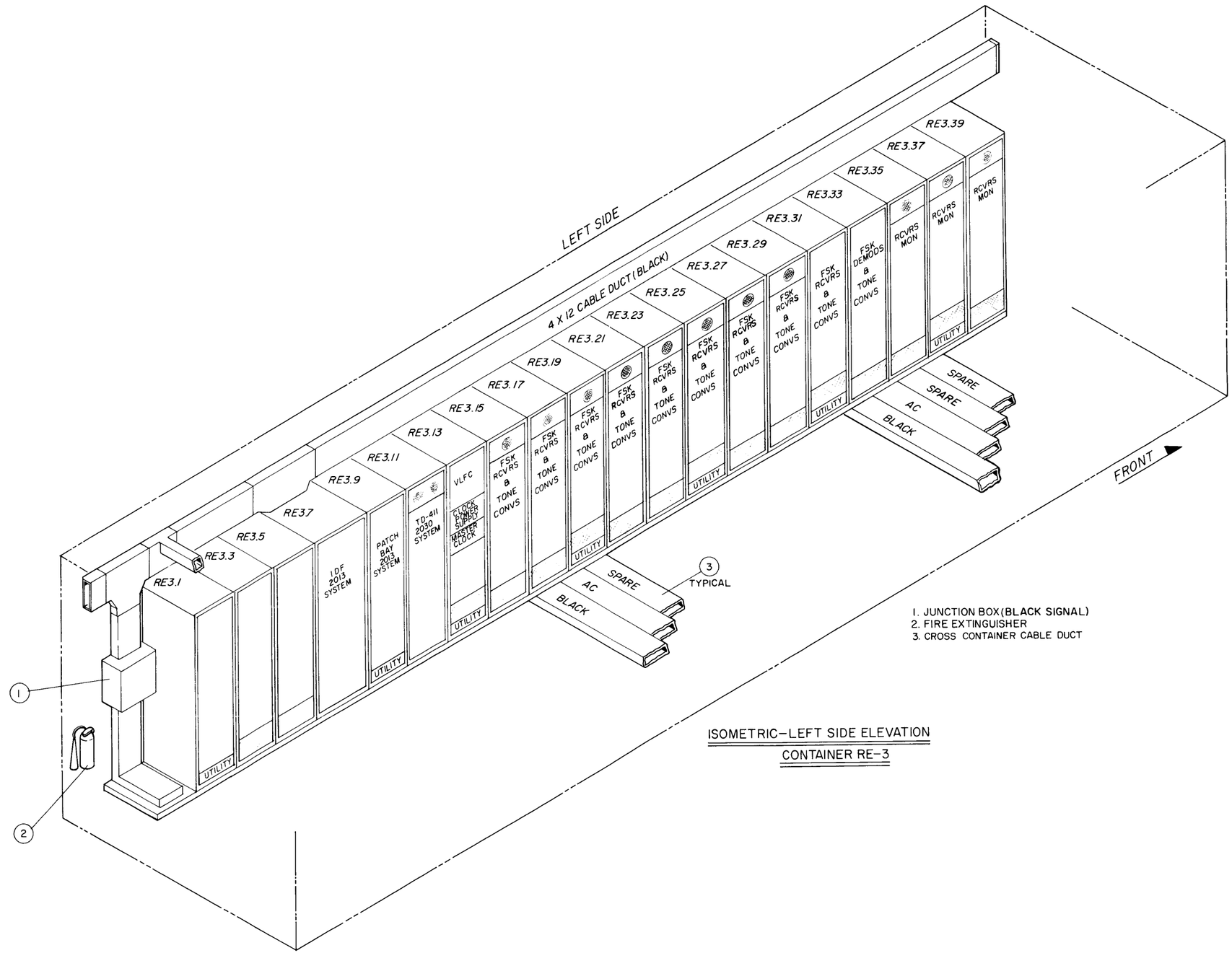
1-176. RECEIVERS IDF. The IDF audio program board is installed in position 7 and the associated monitor patchbay in position 9. The program board contains one-hundred-twenty BLACK coaxicon connector blocks each equipped with twelve white tip-ring-sleeve female coaxicon connectors. Thirty-six of these coaxicon blocks are wired to jacks in the monitor patchbay and eight of the blocks are used for trunks to the



1. REMOTE CONTROL AIR CONDITIONER
2. SHELF
3. DESK
4. POWER DISTRIBUTION BREAKER PANEL
5. KICKPLATE, TERM. BOARD MAIN POWER FEED THRU
6. INTERCOM (BLACK)
7. CROSS CONTAINER CABLE DUCT
8. SIGNAL CABLE DUCT, 4 x 4

ISOMETRIC-RIGHT SIDE ELEVATION
CONTAINER RE-3

Figure 1-18. Receiving Central Group OA-4944/TSR-1 (Container RE3, Receivers, Right Side)



ISOMETRIC—LEFT SIDE ELEVATION
CONTAINER RE-3

Figure 1-19. Receiving Central Group OA-4944/TSR-1 (Container RE3, Receivers, Left Side)

MDF program board in RE1. The remaining seventy-six blocks provide circuit terminations for programming the equipment installed in the primary Receivers area which includes containers RE3 and RE4. Circuits terminated on this IDF include all receiver audio outputs, demultiplexer inputs and outputs, tone-converted FSK and TTY signals, and facsimile signals.

1-177. The monitor patchbay houses a Model 120F meter unit modified for tone conversion, an audio patchfield, a drawer-shelf, and a model 122C AC power distribution panel. The patchfield consists of four hinged groups of jacks, each containing twenty-four send and twenty-four receive MONITOR, LINE, and EQUIPMENT jacks, and one fixed jack-strip containing forty-eight MISCELLANEOUS and two METER jacks. The LINE and EQUIPMENT jacks are normal through circuits and a MONITOR jack is connected in parallel with each LINE jack. All jacks except the MONITOR and the METER jacks are wired to the IDF program board. The METER jacks are mounted on the right end of the MISCELLANEOUS jack-strip and are wired to the VU and M/S INDICATOR inputs of the 120F meter unit. The M/S INDICATOR input circuit is equipped with a 6002-2 demodulator unit.

1-178. Construction details of the receivers IDF, including coaxicon connector and jack wiring details, are contained in Section 2, Volume 1 of this manual.

1-179. TD-411/UGC DEMULTIPLEXER RACK RE3.11. The 2030 system demultiplexer rack houses sixteen TD-411/UGC demultiplexer units, a BSP-2 dual speaker-amplifier unit, and a 122C power distribution panel. The 6-KC input and 3-KC outputs of all demultiplexer units, and the inputs to the speaker-amplifiers are terminated on five male coaxicon connector blocks that mate with female coaxicon blocks which are installed in the base of the rack. The 122C power distribution panel provides AC power to all equipment installed in the rack. The front panel of the 122C is equipped with EQUIPMENT and UTILITY power switches, a duplex utility outlet, and an equipment line fuse.

1-180. VLFC RACK RE3.13. This rack houses the VLFC unit, the station master electronic clock unit, a master clock power supply unit, and an AC utility outlet panel. The VLFC furnishes timing pulses that control the master clock which, in turn, provides timing pulses to all digital clock readout units distributed throughout the Receiving Central. All clock readout units display both ZULU and local time in hours and minutes. A special twenty-four pair cable is installed between the master clock and each clock readout unit.

1-181. HIGH-FREQUENCY FSK RACKS. The high-frequency FSK equipment racks installed in positions 15 through 29 are similar in construction. Each rack contains two R-390A/URR high-frequency communication receivers, two model D3 frequency-shift demodulator units, one tone converter panel, one LSP-4 speaker panel, and a screened ventilation panel. Additional equipment installed in several of these racks includes a spare R-389 low-frequency receiver in position 29; a utility panel in each rack in positions 19 and 25; and a storage drawer in rack position 15. The receivers and D3 demodulator units are supported by angle brackets and front panel screws; the speaker, ventilation and utility panels by their front panel screws; and the storage drawer is slide-mounted. The tone converter panels are bolted to U-channels installed at the rear of the racks. The inter-rack signal wiring of each rack is terminated on a female coaxicon connector block which is mated with a male connector block installed in the rack base. An eight-pair inter-rack signal cable connects each male block with the receivers IDF program board.

1-182. Each tone converter panel is equipped with two 6002-1 modulator units. The modulators are wired for dry-contact keying supplying a six-volt keying potential to associated D3 units. The tone converter panels are also equipped with wiring and plugs for two 6006 loop supply units which, however, are not used with the D3 demodulators. Each LSP-4 speaker panel contains a four-inch PM speaker, a 600/3.5-ohm impedance maching transformer, a 600-ohm T-pad volume control, and a 2-pole, 4-position rotary switch. The local audio output of each receiver in the rack is wired to a position on the selector switch.

1-183. Two R-390 receivers, two D3 demodulators, and two 6002-1 tone-converter modulators in each rack are inter-connected within the rack for diversity teletype operation, and provide two identical 10-kc tone converted, frequency shift TTY signals to the IDF program board. Two D3 demodulator units are interconnected to provide diversity capability and their DC outputs are identical when they are operated in diversity. The IF output of each R-390 receiver is wired directly to the IF input of a D3 demodulator unit, and the DC output of the D3 demodulator is wired directly to the input of a 6002-1 modulator. The 10-kc outputs of both 6002-1 units are identical 10-kc tone-converted FSK signals, and are wired through the rack coaxicon connectors to the IDF program board.

1-184. Additional signal wiring from each FSK rack to the IDF program board includes the LINE audio outputs of the receivers and the AUDIO inputs to the D3 demodulators. These circuits may be used in place of the internally wired circuits described above by removing the IF connections between the receivers and D3 demodulators and then programming the audio circuits on the IDF program board.

1-185. Wiring Diagrams for each type of FSK rack configuration are contained in section 4 of this volume.

1-186. LOW-FREQUENCY FSK RACK RE3.31. This FSK rack is equipped with three low-frequency R-389 communication receivers, two CFA-1LB frequency shift converters, a tone converter panel, an LSP-4 speaker panel, an AC utility outlet panel, and a screened ventilation panel. The receivers and frequency shift converters are mounted on angle brackets. The tone converter panel, which contains two 6002-1 modulator units and two 6006 loop supply units, is mounted at the rear lower portion of the rack.

1-187. The DC output circuit of each CFA-1LB unit is hardwired to the DC input of a 6002-1 modulator unit and series connected with a 6006 loop supply unit

which furnishes loop current for this circuit. The LINE audio outputs of the R-389 receivers, the two audio inputs to each CFA-1LB unit, and the 10-kc outputs of the 6002-1 modulator units are wired to a female coaxicon connector block that is mated with a male block installed in the rack base. These circuits are extended to the Receivers IDF where they may be programmed as required. The LOCAL audio output of each R-389 receiver is hardwired to the LSP-4 speaker panel selector switch.

1-188. FSK CONVERTER RACK RE3.33. This rack contains five D3 demodulator units, one CFA-1 frequency shift converter unit, three tone converter panels, and a screened ventilation panel. The D3 and CFA-1 units are supported by angle brackets and fastened to the front panel with screws. The tone converter panels are fastened to mounting hardware installed at the rear of the rack and located at the top, center, and bottom areas of the rack. Two male coaxicon blocks, which are wired to the IDF program board, are installed in the rack base.

1-189. Each tone converter panel contains two 6002-1 modulator units and the bottom tone converter panel is also equipped with two 6006 loop supply units. The loop supply units are wired in series with the DC inputs of the 6002-1 modulators to provide loop current ("wet-keying") for the CFA-1 and D3 frequency shift converters in the bottom of the rack. The remaining four 6002-1 modulator units on the top two panels are wired for dry-contact keying, and each modulator is wired to the DC output of one D3 demodulator unit. Signal circuits wired to the receivers IDF from this rack include six 10-kc phase-shift (FSK) output signals from the 6002-1 modulators, an audio input to each model D3 unit, and two audio inputs to the CFA-1 unit. These circuits are terminated on two female coaxicon connector blocks that mate with male blocks installed in the base, and the circuits are then extended to the Receivers IDF.

1-190. MONITOR RECEIVER RACK RE3.35. This monitor receiver rack contains five R-5007/FRR-502 monitor receivers, one CFA-1LB frequency shift converter, one D3 demodulator unit, a tone converter panel, an LSP-4 monitor speaker panel, a monitor switch panel, and a screened ventilation panel. A male coaxicon connector block is installed in the base of the rack and the rack signal harness is terminated on a mating female coaxicon connector block. The receivers and frequency shift converters are supported by angle brackets and the tone converter panel is mounted at the rear of the rack.

1-191. The tone converter panel is equipped with two 6002-1 modulator units and two 6006 loop supply units and is wired for "wet keying" in the same manner as the dual battery units previously described in paragraph 1-189.

1-192. The monitor switch panel in this rack is equipped with two 8-position rotary switches and one 6-position rotary switch. One 8-position switch is wired to the audio input of the D3 demodulator and the other to the audio input of the CFA-1LB converter. These switches are used to connect the output of any one of the five monitor receivers, or two trunk lines from the IDF, to the input of one of the respective frequency shift converters. The 6-position switch is used to connect the audio output of any one of the five monitor receivers to the LSP-4 monitor speaker panel. The audio output of each monitor receiver is also parallel connected to a trunk line that appears on the receivers IDF program board. The connection from the receiver to the trunk line is through resistors that limit the signal level on the line to zero DBM.

1-193. MONITOR RECEIVER RACKS RE3.37 AND RE3.39. These monitor receiver racks are constructed in the same manner and house the same number and type of components as rack RE3.35 except that no CFA-1LB frequency shift converter is provided, and rack RE3.37 is equipped with a utility panel installed in the bottom rack space. The tone converter in each of these racks is equipped with one 6002-1 modulator unit wired for dry-contact keying and connected to the DC input of the D3 demodulator. The monitor switch panel is equipped with one 8-position switch associated with the D3 demodulator, and one 6-position switch associated with the speaker panel. The function of the switches is the same as their counterparts in rack RE3.35 and the rack is wired internally and to the IDF in the same manner as rack RE3.35.

1-194. SIGNAL DUCT AND CABLE INSTALLATION. BLACK 4 x 12 signal duct is wall-mounted above the equipment on the left side of RE3. The duct extends the full length of the container. A scoop fitting feeds inter-container cables from the duct into the top of the program board rack at position 7. Vertical 4 x 12 duct sections join the duct with the large signal junction box, and join the signal junction box with the rack base duct. Cross-container ducts for right side equipment cables are provided at the front and the center of the container. A 4 x 4 overhead duct is joined to the 4 x 12 duct above rack position RE3.1. The 4 x 4 duct crosses the container, passes through the right wall above the side door, and extends through a side-to-side walkway into container RF3.

1-195. Signal cables from RE4 enter the 4 x 12 duct at the front of the container and are fed to the IDF program board through the scoop fitting. All trunk-line cables from the IDF to the MDF are first terminated on coaxicon connector blocks in the signal junction box and then extended to the MDF in container RE1. Signal cables from the voice INTFRCOM unit are continuous to the INTERCOM IDF in container RE1 and are run in a section of 1700 raceway into the TTY rack, and then into rack base and cross-container ducts to reach the 4 x 12 cross-container duct.

1-196. POWER DISTRIBUTION. The two power distribution panels mounted on the left wall house circuit breakers for all equipment, lighting, air conditioning units, the air conditioner control unit, and utility outlets in the container. Power wiring enters the rack base duct through a kickplate installed below the distribution panels and then feeds into cross-container AC ducts for the left side equipment through cutouts inside the rack base duct. Power and control wiring to the air conditioner units is terminated on a receptacle installed in the left side of the cross-container AC duct. A section of 1700 raceway extends from the

right side of the power distribution panels to service the INTERCOM unit.

1-197. RECEIVING CENTRAL AN/TSR-2 (CONTAINER RE4).

Container RE4, as noted previously, is part of the primary Receivers area of the Communication System. RE4 houses the Receivers RF distribution facility, additional radio receivers, a facsimile installation, and facilities for the installation of additional equipment in the future. Two air conditioning units are mounted on the outside left wall. The front end of RE4 is equipped with a weather-proof, removable end panel that is bolted to the container end frame. The rear of the container is open and mates with the open forward-end of container RE3 providing one large primary Receivers area.

1-198. RF distribution equipment and facilities presently installed include one LFD-1 low-frequency antenna distribution unit, ten SPP-40416 RF switching patch panels, fifteen CU-656/U RF multicouplers, an antenna entry box for bringing receiving antenna coaxial cables into the container, and equipment racks completely wired for the installation of thirteen additional SPP-40416 RF switching patch panels and twenty-one additional CU-656/U RF multicouplers. Radio receivers installed in RE4 include three AN/FRR-60 dual-diversity synthesized SSB receivers, one AN/FRR-60 non-diversity SSB receiver, and one R390A/URR receiver. The facsimile installation includes a TT-321 transceiver, an AN/UXH-2 continuous page recorder, an MD-168/UX Modulator, a CV-1066/UX Converter, a large facsimile equipment table and facsimile patching facilities. Three standard equipment racks, with signal and AC wiring installed, are provided for future equipment installation.

1-199. LEFT SIDE EQUIPMENT. Equipment and facilities installed along the left wall of RE4 (see figure 1-20) include the antenna entry box in position 1; an RF patchfield in two racks at positions 5 and 7; six multicoupler racks in positions 9 through 19; three future equipment racks in positions 21, 23, and 25; a facsimile rack containing the R390A/URR radio receiver, CV-1066/UX converter and MD-168/UX modulator in position 27; a large signal junction box adjacent to the facsimile rack; and the TT-321/UX transceiver, its associated rectifier power unit model PP-86D/TXC-1, and an AN/UXH-2 continuous page recorder mounted on a large facsimile equipment table in positions 31 and 33 near the front of the container. All equipment racks on the left side of RE4 are standard AN/TSC-35 racks and are mounted on standard rack base duct.

1-200. RIGHT SIDE EQUIPMENT. Equipment and facilities installed along the right wall of RE4 (see figure 1-21) include the three dual-diversity and one non-diversity AN/FRR-60 receivers in positions 4 through 16; two wall mounted power distribution panels and a power-entry kickplate in positions 1 and 2; an air-conditioner control unit mounted on the left power panel; and a wall-mounted fire extinguisher at the front end of the container. Each dual-diversity receiver occupies two rack positions and the non-diversity receiver occupies one.

1-201. AN/FRR-60 INSTALLATION. The AN/FRR-60 receivers are equipped with their own cabinets and are mounted on special AN/FRR-60 bases in the same manner as the AN/FRR-60 receivers that are installed in container RE3. The dual-diversity receivers are also modified to provide front access to the AC line filters in an identical manner.

1-202. The non-diversity AN/FRR-60 receiver cabinet is approximately half the width of a dual-diversity AN/FRR-60 cabinet, and is mounted on a correspondingly narrower base which is fabricated the same as one-half of a dual-diversity receiver base. The non-diversity receiver is modified to provide front access to the AC line filter by relocating the filter from the rear of the cabinet to a sidewall just behind the HPP-1 Power Panel at the bottom of the cabinet.

1-203. SPP-40416 RF SWITCHING PATCH PANEL. Each SPP-40416 RF switching patch panel contains sixteen coaxial switching assemblies mounted on a two-unit standard rack panel. Each coaxial switching assembly is equipped with two BNC jacks at the rear and two QDS jacks at the front. The two BNC jacks are connected "normal-thru" by means of two coaxial switches inside the assembly. When a patch-cord is inserted into a QDS jack, the "normal-thru" connection between the two BNC jacks is opened and the QDS jack is simultaneously connected to the BNC jack directly opposite, that is, top QDS to top BNC or bottom QDS to bottom BNC.

1-204. CU-656/U RF MULTICOUPLER. The CU-656/U RF multicoupler operates over the medium and high frequency range and provides eight isolated outputs for one RF input signal.

1-205. LFD-1 LOW-FREQUENCY ANTENNA DISTRIBUTION UNIT. The LFD-1 is a passive antenna distribution unit that operates in the frequency range of 15 kilocycles to 2 megacycles and provides four isolated outputs for one RF input.

1-206. ANTENNA ENTRY BOX. The antenna entry box is equipped with forty-nine 1/2-inch and seven 7/8-inch stuffing tubes for bringing receiving-antenna coaxial cables into container RE4. The box has a cover plate equipped with quick-disconnect fasteners for easy access to the inside.

1-207. RECEIVERS RF DISTRIBUTION FACILITY. The receivers RF distribution facility is installed on the left side of RE4 in positions 1 through 19, and includes the RF patchfield, the six multicoupler racks, and the antenna entry box. All Receiving Central antennas (except the VHF, UHF, microwave, and RA3 antennas) and the inputs and outputs of all multicouplers in RE4 are terminated on the RF patchfield in racks RE4.5 and RE4.7. Here the antennas are programmed to the multicoupler inputs, and the multicoupler outputs are programmed to receivers throughout the Receiving Central.

1-208. RF Patchfield. The LFD-1 low frequency antenna distribution unit and the ten SPP-40416 RF switching patch panels are installed in the RF patch rack in position RE4.5. The panels are supported

by their front panel screws. This rack is equipped for the installation of one additional SPP-40416 patch panel at the bottom, and the adjoining RF patch rack RE4.7 is equipped for the installation of twelve SPP-40416 RF switching patch panels. The frames of both RF patch racks have been modified to allow personnel to walk behind the RF switching patch panels when programming RF circuits or performing maintenance. A removable side skin is fastened to the left side of rack RE4.5, providing access to the rear portion of the racks.

1-209. CU-656/U Multicoupler Racks. Six CU-656/U RF multicoupler units are installed in rack RE4.9, six units in rack RE4.11, and three units in rack RE4.13. The multicouplers are supported on angle brackets and secured with front-panel screws. All multicoupler racks are equipped with screened ventilation panels, and racks RE4.11 and RE4.17 are also equipped with AC utility outlet panels. Rack RE4.13 is equipped with angle brackets, coaxial cabling, and AC wiring for the installation of three additional multicoupler units, and racks RE4.15, 17 and 19 are similarly equipped for the installation of six multicoupler units in each rack. The coaxial cables are terminated in BNC connectors and appropriately marked with cable numbers. All that is required to install additional CU-656/U multicouplers is to connect the RF and AC cables, and then fasten the units to the front panel.

1-210. RF DISTRIBUTION FACILITY CABLING. The receiving antennas are terminated on one of the five SPP-40416 RF switching patch panels that are installed at the top half of rack RE4.5. Fifty-six RG-59/U coaxial cable runs are installed between the antenna entry box in position 1 and the five antenna patch panels. All the cables are equipped with UG-603A/U N-type connectors in the entry box, and with UG-260/U BNC-type connectors at the antenna patch panels. The antenna coaxial cables are cut so that they can reach any connector on any one of the five antenna patch panels. The top row of BNC connectors at the rear of the patch panels are used for terminating the antennas and the bottom row for multicoupler inputs. The LFD-1 input and four outputs are cabled to the bottom antenna patch panel. Thirty-six RG-59/U coaxial cables are installed between the top four antenna patch panels and the multicoupler inputs in rack positions 9 through 19. All multicoupler cables are equipped with UG-260/U BNC connectors at the patch panel and with UG-627A C-type connectors at the multicoupler input and outputs.

1-211. The outputs of the first ten CU-656/U multicouplers from rack positions 9 and 11 are cables to the five SPP-40416 patch panels at the bottom of rack position 5, two multicouplers to one patch panel. The multicoupler output cables connect to the top row of BNC connectors at the rear of the RF switching panels, and receiver coaxial cables to the bottom rows. The remaining multicouplers installed and to be installed are cabled to the remaining SPP-40416 patch panel positions in the two patch racks. A total of 288 RG-59/U coaxial cables, terminated at both ends with appropriate connectors, are installed to accommodate the outputs of the thirty-six CU-565/U multicouplers. All multicoupler input and output coaxial cables are secured to tie bars that are installed in the racks behind multicoupler and patch panel units. The antenna and receiver cables are not secured since they must be free to reach any connectors in their respective areas.

1-212. The QDS connectors on the front of the RF patchfield are used for trouble shooting or temporarily by-passing defective antennas or multicouplers. Front panel patchcords supplied are type CA-480-70 in various sizes, and equipped with QDS plugs at both ends.

1-213. FACSIMILE INSTALLATION. The facsimile equipment table is floor mounted near the front of RE4 and is secured to tapping plates that are in the floor and the wall. The table is equipped with a shelf below the table top for mounting the PP-86D/TXC-1 power unit and with a storage area on the left side for facsimile paper supplies. The TT-321/UX transceiver and AN/UXH-2 continuous page recorder are equipped with shock mounts and are bolted to the hardwood top of the table. The PP-86D/TXC-1 power unit is equipped with a power cable terminated in a large Jones plug which connects to the TT-321/UX transceiver. To accommodate this plug, an oblong hole is provided at the rear of the table top.

1-214. The TT-321 and the AN/UXH-2 signal circuits are connected to patchcords terminated in tip-ring-sleeve plugs. The plugs are patched into wall mounted jacks to complete facsimile circuits to the IDF. Two facsimile SEND and two RECEIVE circuit jacks are installed in a section of 1700 raceway behind the facsimile equipment. The raceway extends up the wall and joins the 4 x 12 wall mounted duct. The facsimile sned and receive jacks are wired to the receivers IDF program board through coaxicon connectors in the RE4 signal junction box.

1-215. Facsimile Equipment Rack RE4.27. The R390A/URR radio receiver installed in this rack is supported on angle brackets and fastened to the rack with front panel screws. The CV-1066/UX converter and MD-168/UX modulator are supported by their front panel screws. A male coaxicon connector is installed in the rack base and cabled to the container signal junction box. The rack wiring is harnessed and terminated on a mating female coaxicon. The receive audio output, and the input and output circuits of the modulator and demodulator are wired to the female coacicon block, and then extended to the Receivers IDF program board through the container signal junction box.

1-216. SIGNAL DUCT AND CABLE INSTALLATION. BLACK 4 x 12 signal duct is installed above the equipment racks on the left wall extending from the rear of the container to just beyond position 27. A Tee fitting is installed at the end of the duct to allow for extending the duct to the front of the container should the need arise in the future. Vertical sections of 4 x 12 duct join the wall-mounted duct with the signal junction box, and the signal junction box with the rack base duct. At the rear of the container, another vertical 4 x 12 duct section connects the wall mounted duct with the rack base duct adjacent to the RF patch rack RE4.5. This duct section is installed to accommodate the receiver coaxial cable runs from other containers. Three cross-container ducts are installed near each end of the container. The signal and RF cables from

1. SIGNAL CABLE DUCT, 4 X 12
2. SIGNAL RACEWAY TO FAX FACILITY EQUIPMENT
3. SIGNAL JUNCTION BOX
4. AC POWER RACEWAY TO FAX FACILITY EQUIPMENT (MOUNTED UNDER BENCH)
5. ANTENNA FEED THRU ENTRY BOX
6. CROSS CONTAINER CABLE DUCT

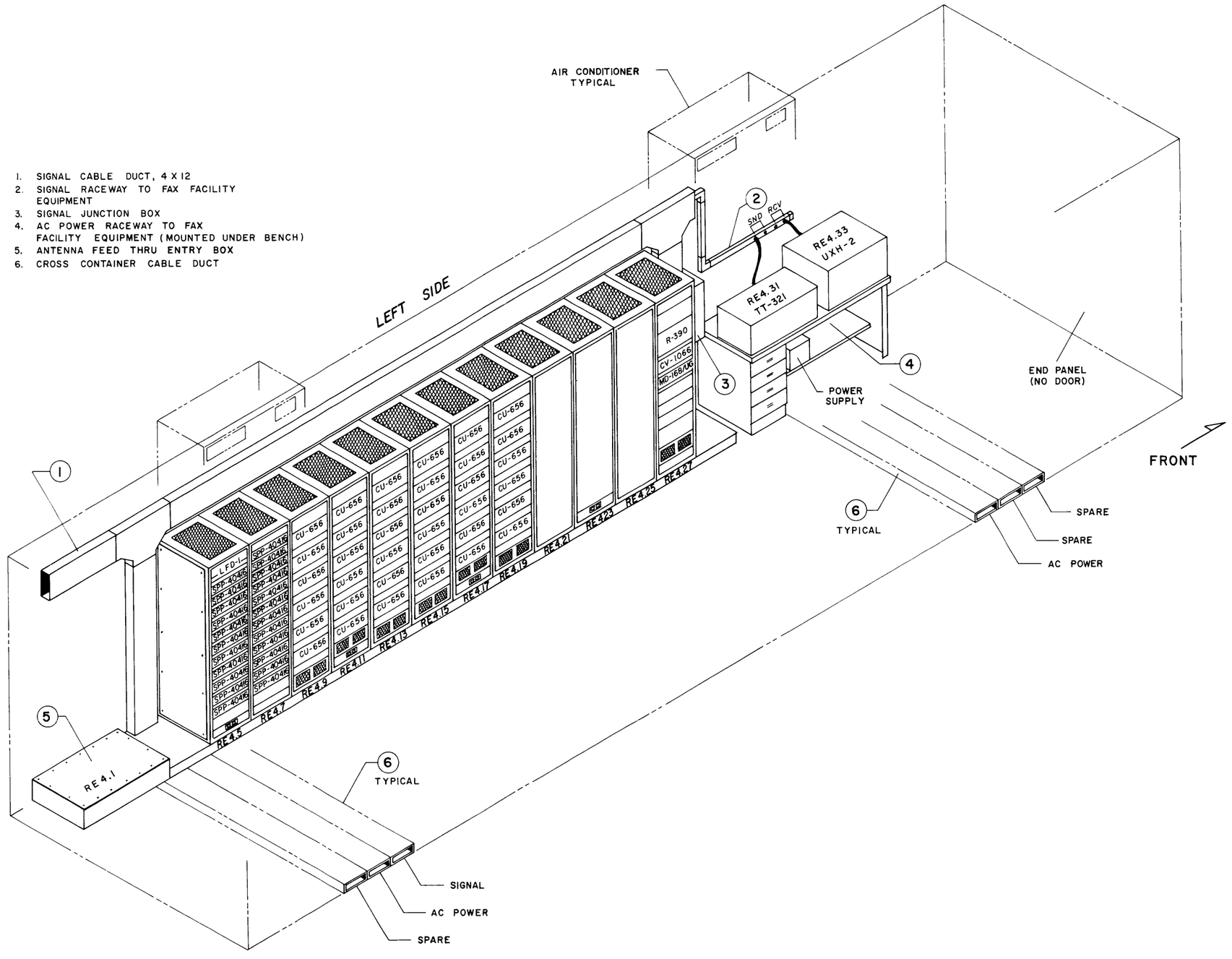


Figure 1-20. Receiving Central AN/TSR-2 (Container RE4, Receivers, Left Side)

1. FIRE EXTINGUISHER, CO_2
2. AC POWER ENTRY KICKPLATE TO CROSS CONTAINER CABLE DUCT
3. AC POWER RACEWAY
4. AN/FRR-60 MOUNTING BRACKET
5. AIR CONDITIONER CONTROL
6. AC POWER BREAKER PANELS
7. AC POWER ENTRY KICKPLATE
8. AIR INTAKE FILTER FRAME
9. AIR INTAKE DUCT FROM BASE TO EQUIPMENT
10. CROSS CONTAINER CABLE DUCT

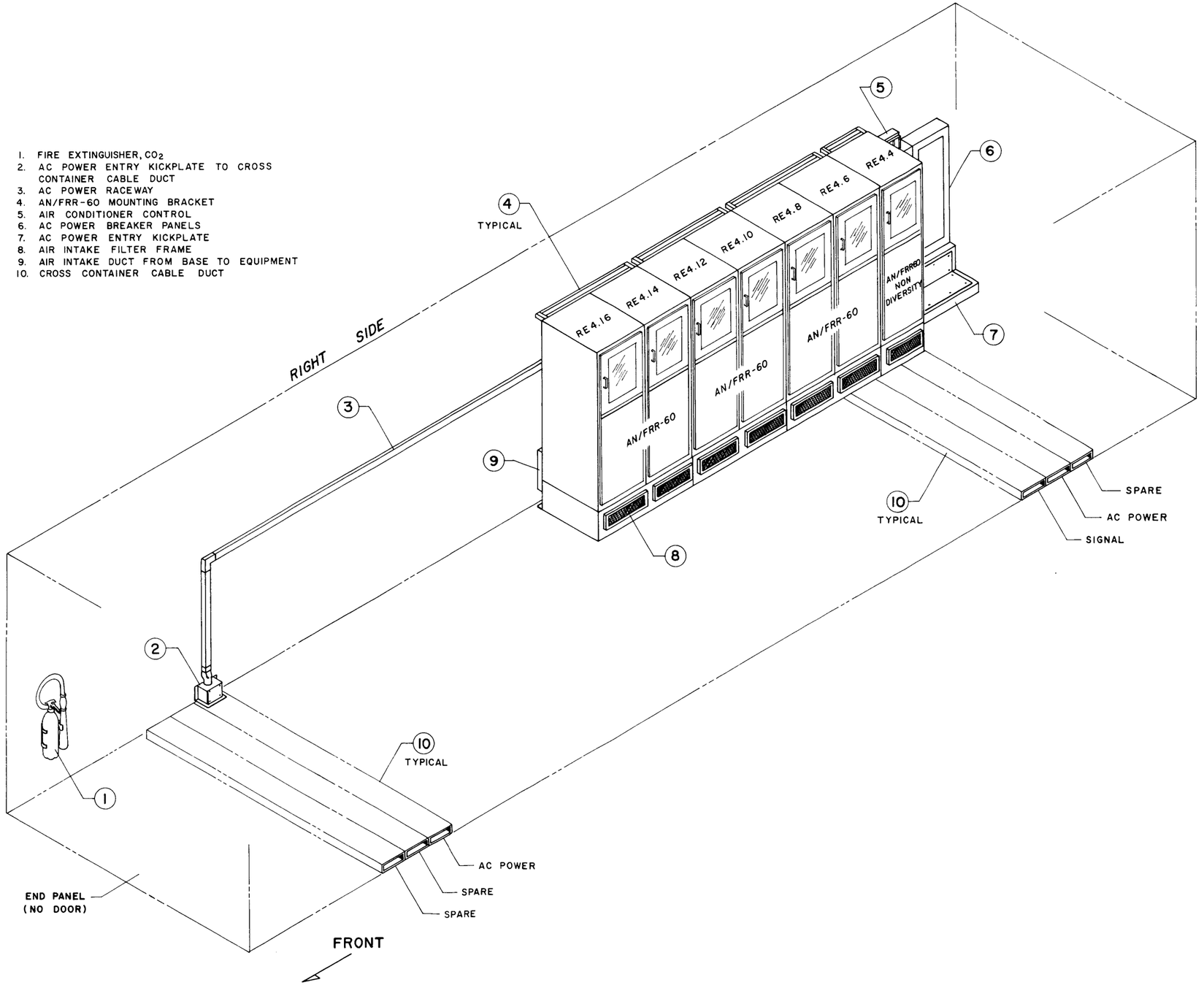


Figure 1-21. Receiving Central AN/TSR-2 (Container RE4, Receivers, Right Side)

the AN/FRR-60 receivers on the right side of the container are run in the cross container duct at the rear to reach the signal junction box and RF patchfield on the left side.

1-217. POWER DISTRIBUTION, RE4. Circuit breakers for all equipment, lighting, air conditioning units, air-conditioner control unit, and utility outlets in container RE4 are housed in the two power distribution panels installed on the right rear wall. Two power cables from the power distribution container are brought into RE4 through stuffing tubes provided in the power kickplate below the distribution panels. Each cable is terminated on a melamine terminal board in the kickplate area, and then connected to its respective power distribution panel.

1-218. Power wiring from the distribution panel enters the right-side rack base duct through the power kickplate and is run through the rear AC cross-container duct to all the left side equipment except the forward air conditioning unit. Power and control wiring for this unit is run in 1700 raceway that is wall-mounted behind the AN/FRR-60 receivers, extending from the left side of the power distribution panel to a small power kickplate installed above the forward AC cross container duct. The wiring crosses the container and is terminated in a receptacle on the left side of the cross container duct.

1-219. RECEIVING CENTRAL GROUP OA-4945/TSR-1 (CONTAINER RF1).

Container RF1 is the message center of Receiving Central AN/TSR-1 housing equipment and facilities for the routing and checking of all Communication Station AN/TSC-35 traffic. Message Center facilities installed in this container include desks for the Communication Watch Officer (CWO), the Traffic Supervisor, the Traffic Checker, and two Traffic Routers; teletype equipment for Broadcast, In-House send and receive circuits, Off-Air Monitoring, message Make-Up, message Run-Off, and Internal Order-Wire; cabinets for Locator and Routing files, monitor-reel and traffic storage, and paper supplies; and a table for duplicating page-copy messages. Additional facilities installed in RF1 include two RED INTERCOM units, a digital clock single-readout unit, a large RED signal junction box, utility shelves above each desk, a fire extinguisher, and a power distribution panel. One air conditioning unit is installed on the right outside wall at approximately the middle of the container.

1-220. RIGHT SIDE EQUIPMENT. Equipment and facilities installed along the right wall of RF1 (see figure 1-22) include a desk and a shelf mounted RED INTERCOM unit for the CWO in position 2; office supply and paper storage locker in position 4; a large cabinet in position 10 that is equipped with slots for storing full monitor reels of message tapes, with pigeon holes for filing broadcast tapes, and with shelves for storing standard traffic binders; a message Make-Up AN/UGC-6 teletype unit in position 14; a message Run-Off AN/UGC-6 unit in position 16; a duplicating table in position 18; two file cabinets in positions 20 and 22 for Routing and Locator files; a desk and a shelf mounted RED INTERCOM unit in position 26 for the Traffic Supervisor; and a TT-47 Internal Order-Wire unit in position 30 at the front of the container. All teletype units and furniture on the right side of RF1 are floor mounted and are secured to floor and wall tapping plates. A single-readout digital clock unit is suspended from the center of the ceiling at the rear of the container.

1-221. LEFT SIDE EQUIPMENT. The equipment and facilities installed along the left wall of RF1 (see figure 1-23) include the power distribution panel, a power kickplate, an air-conditioner control unit mounted on the power panel, and a fire extinguisher installed at the rear of the container; two equipment racks housing three TT-176A teletype units, one in position 5 and one in position 25; a 3-line AN/FGC-59 torn-tape facility consisting of a TT-333 Teletype Transmitter Group in position 7, its associated TT-332 Teletype Monitor Group in position 9, and a TT-331 Teletype Receive Group in position 23; an AN/UGC-5 teletype unit in position 11 and one in position 13; a Traffic Routing desk in position 15 and one in position 19; a desk for the Traffic Checker in position 27; and a utility shelf mounted on the wall above each desk.

1-222. The TT-176A teletype units are installed in standard equipment racks that are mounted on standard rack base duct. All remaining teletype units and the desks on this side of the container are floor mounted. The AN/FGC-59 torn-tape facility in this container is not equipped for tandem operation.

1-223. TELETYPE EQUIPMENT. The three TT-176A teletype units in rack position RF1.25 provide page copy of In-House receive traffic. The middle TT-176A unit in rack position 5 is an off-air monitor for broadcast circuits, and the top and bottom TT-176A units are used for general monitoring purposes. Both AN/UGC-5 teletype units are used for In-House send circuits. The TT-333 transmitter group is used on send broadcast circuits and the adjacent TT-332 unit monitors the send broadcast traffic. Tape copy of In-House receive traffic is provided by the TT-331 Teletype Receive Group. All above teletype units are used on secure circuits and each is provided with 10-kc tone conversion equipment. The AN/UGC-6 teletype units in position 16 and 14 are local operating positions used for message Run-Off and message Make-Up, respectively, and require no external signal wiring or tone conversion equipment.

1-224. TT-176A Equipment Racks. Both TT-176A equipment racks that are installed in rack positions RF1.5 and 25 are identical in construction. The TT-176A units are mounted on shelves that are slide mounted in the racks. Each rack is equipped with three monitor tone converter panels, one panel mounted behind each TT-176A unit at the rear of the rack. A 6002-2 demodulator unit and a 6006 loop supply unit are mounted on each tone converter panel. Signal and AC wiring in these racks is installed in rigid and flexible ferrous conduit and the rack bases are equipped with base cover plates.

1-225. AN/FGC-59 Equipment. The TT-333 cabinet contains three transmitter distributor (TD) units, each

used on a separate send broadcast circuit. Three tone converter panels and one loop supply-relay panel are installed in this cabinet. Each tone converter panel mounts a 6002-1 modulator unit and a 6004-2 trip-control demodulator unit. The loop supply-relay panel mounts three 6006 loop supply units and three DC relays. The TT-332 cabinet houses three typing reperforator units, each wired in series with the DC loop of a TT-333 TD unit. A complete broadcast send circuit consists of a TT-333 TD unit, a 6006 loop supply unit, a 6002-1 modulator unit, and a TT-332 typing reperforator wired in series. The trip control circuit for each transmitter distributor consists of a 6004-2 trip control demodulator, the coil of a DC relay, and the TT-333 DC power supply wired in a series loop. The contacts of the relay are wired in series with the clutch control magnet of the TD and the TT-333 DC power supply.

1-226. The TT-331 cabinet houses three typing reperforators, each used on a separate In-House receive circuit. One tone converter panel equipped with three 6002-2 demodulator units and three 6006 loop supply units is installed in this cabinet. The receive DC loop consists of the DC output of a 6002-2 demodulator, a 6006 loop supply, and the selector magnet of the typing reperforator. The tone converted 10-kc teletype signals are run in flexible ferrous conduit between the RED signal duct and the AN/FGC-59 cabinets.

1-227. AN/UGC-5 Equipment. Each AN/UGC-5 unit is equipped with one tone converter panel mounting a 6002-1 modulator unit and a 6006 loop supply unit. The AN/UGC-5, the loop supply unit, and the DC input to the modulator are wired in a series loop circuit within the AN/UGC-5 cabinet. The tone converted 10-kc teletype signals are run in flexible conduit between the AN/UGC-5 cabinet and RED signal duct that is wall-mounted behind the cabinets.

1-228. TT-47 Internal Order Wire Equipment. The TT-47 Internal order-wire unit is equipped with one tone converter panel and a foot switch. The tone converter panel contains a 6002-1 modulator unit, a 6002-2 demodulator unit, and a 6006 loop supply unit. The modulator is strapped for dry-contact keying and is wired in series with the TT-47 keyboard. The 6006 furnishes loop current for the series receive circuit consisting of the printer selector magnet and the DC output circuit of the 6002-2 demodulator. When the foot switch is closed, the TT-47 send tone-converted output is connected to the order-wire circuit. The internal order wire system is discussed in Section 3 of this volume.

1-229. SIGNAL DUCT AND CABLE INSTALLATION, RF1. Separate RED and BLACK signal duct-runs are installed in RF1. All signal circuits in this container, with the exception of the internal order wire, are RED. The internal order wire cable is run in 1700 raceway from behind the TT-47 unit (see figure 1-22), up the right wall and then forward into RF2. A BLACK 4x 12 cable duct is installed above the equipment racks along the left wall of the container. (See figure 1-23). This BLACK duct extends from one end of RF1 to the other and carries the clock signal cable to the digital readout unit at the rear. A cover plate is installed on the end of the duct at the rear of the container.

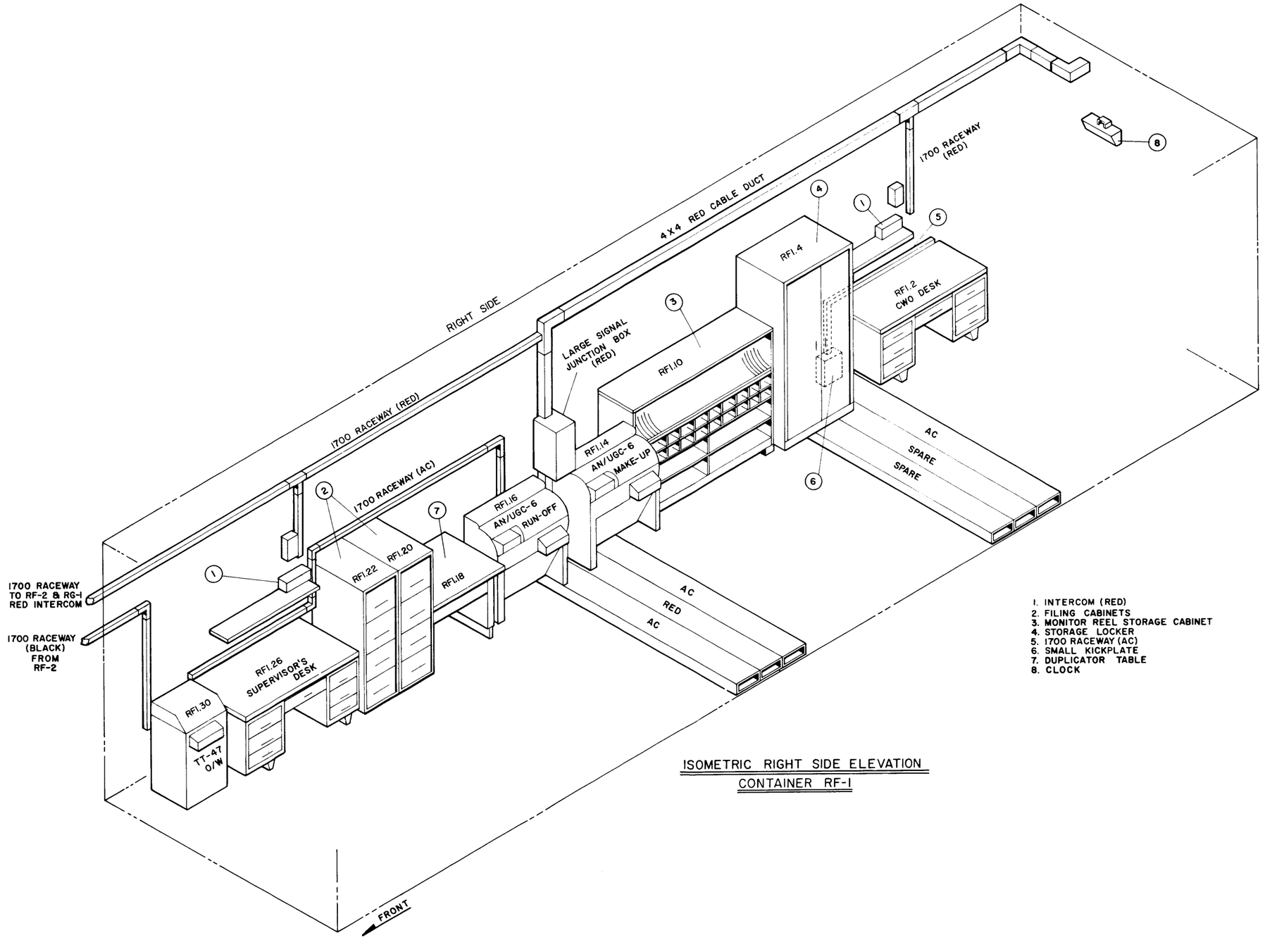
1-230. RED Signal Duct. Rather extensive RED signal duct is installed in RF1. A RED 4 x 4 overhead duct section enters the container at the rear (see figure 1-22) through the left wall of RH1, immediately takes a 90-degree turn to the right wall of RF1 then extends forward into a 90-degree elbow dropping down into the RED signal junction box between positions 14 and 16. From this elbow, a section of 1700 RED raceway extends forward into a Tee above the supervisors desk. At the Tee, a vertical section drops down to meet the supervisor's INTERCOM terminal box and a horizontal section extends forward into RF2. This section of raceway carries the RED INTERCOM cables from the Communication Office, container RG1, back into the RED signal ducting at the center of the complex. A short section of 1700 raceway connects with the 4x4 duct near the rear of the container to service the Communication Watch Officer's RED INTERCOM unit.

1-231. A 4 x 4 RED vertical duct section drops down the right wall from the bottom of the RED signal junction box and joins the RED cross-container duct. All RED cables from the left side of RF1 use this cross-container duct. On the left side of RF1 (see figure 1-23), a section of vertical 1700 raceway joins the cross-container duct and carries the RED cables up the left wall to a height just above the wall mounted shelves. Sections of horizontal 1700 raceway branch forward to service the TT-331 unit and TT-176A rack at the front of the container, and toward the rear to service the TT-333 unit and adjoining TT-176A rack at the rear of the container. Sections of 1700 raceway drop to the deck at both places and run forward a short distance to enter the TT-331 and TT-333 rack bases near the front of these equipments. Two additional vertical 1700 duct sections drop down from the horizontal duct and connect to flexible ferrous conduit in order to service the AN/UGC-5 units in positions 11 and 13.

1-232. POWER DISTRIBUTION, RF1. One power cable from the power distribution container GR1 enters RF1 through a stuffing tube installed in the floor inside the kickplate below the power distribution panel. Circuit breakers for all equipment, lighting, the air conditioner and its control unit, and the AC utility outlets in RF1 are housed in this power panel. A capacitive power line filter unit is installed on the left side of the panel.

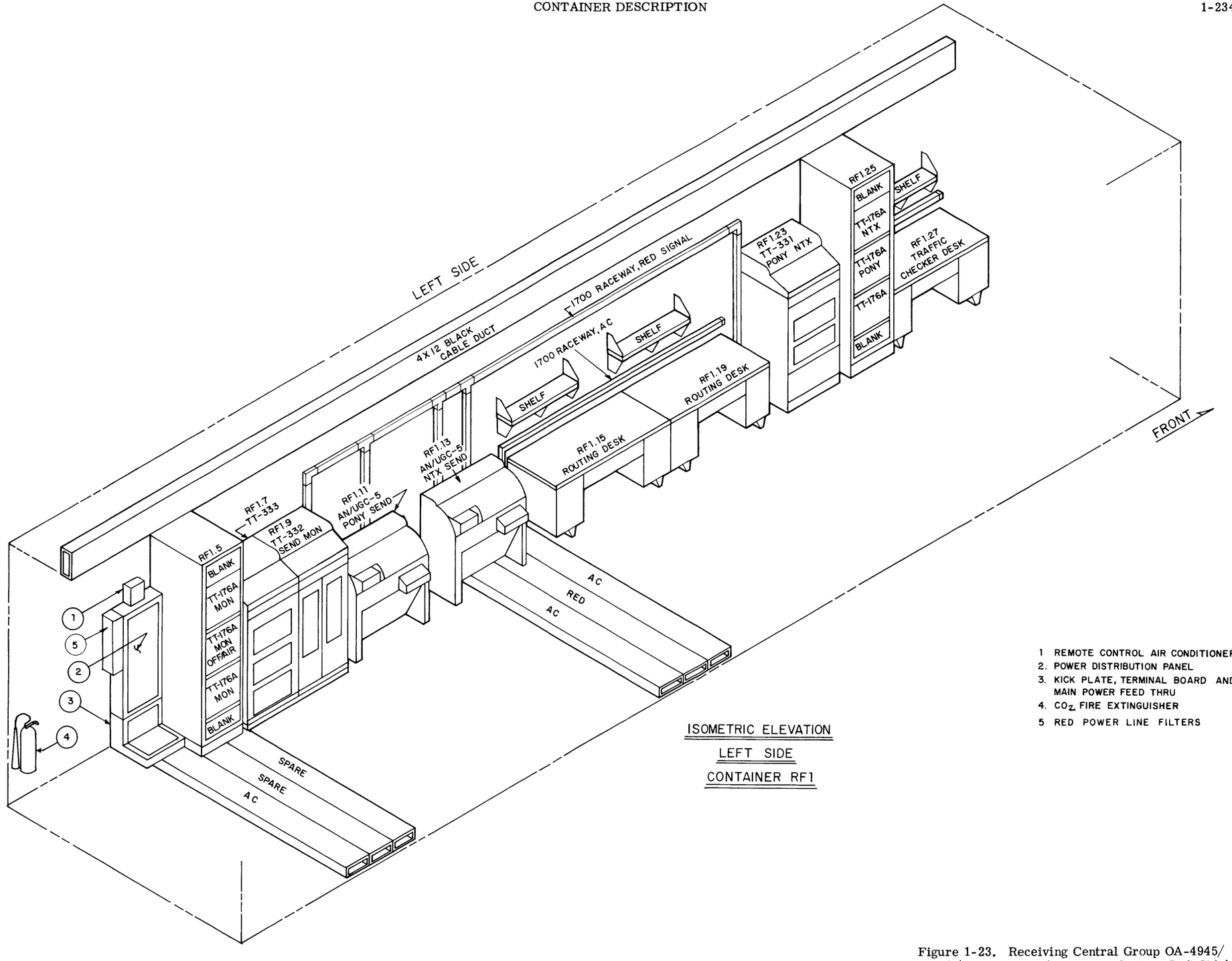
1-233. Power wiring for the left side equipment is run from the right side of the power kickplate into rack base duct in position 5, and then through the TT-333 and TT-332 bases. A section of 4 x 4 AC duct is mounted on the floor along the left wall connecting the right side of the TT-332 base to the left side of the TT-331 base to service the equipment and AC utility outlets at the front of the container. A section of 1700 raceway connects with the 4 x 4 AC duct, runs up the wall and forward above the Router's desks providing AC utility outlets at these positions. Another section of AC raceway is installed from the rack base at position 25, runs up the wall and forward to provide AC utility outlets at the Traffic Checker's desk.

1-234. AC power wiring for the RED INTERCOM unit and utility outlets at the CWO's desk (see figure



ISOMETRIC RIGHT SIDE ELEVATION
CONTAINER RF-1

Figure 1-22. Receiving Central Group OA-4945/TSR-1 (Container RF1-Message Center, Right Side)



ISOMETRIC ELEVATION
LEFT SIDE
CONTAINER RF1

1 REMOTE CONTROL AIR CONDITIONER
2. POWER DISTRIBUTION PANEL
3. KICK PLATE, TERMINAL BOARD AND MAIN POWER FEED THRU
4. CO_2 FIRE EXTINGUISHER
5 RED POWER LINE FILTERS

Figure 1-23. Receiving Central Group OA-4945/ TSR-1 (Container RF1-Message Center, Leit Side)

1-22) is run in the rear cross container duct from the power kickplate below the power panel. The wiring crosses the container and enters a power kickplate adjacent to the CWO's desk and is fed through 1700 raceway installed above the desk to service the INTERCOM unit and AC utility outlets. AC power wiring for equipment at the front of the container enters the forward AC cross-container duct from the floor mounted 4 x 4 duct on the left side, crosses the container to the right side and enters a power kickplate behind the AN/UGC-6 unit in position 16. Vertical 1700 raceway connects with the power kickplate, then runs forward across the file cabinets, drops down to service the Supervisor's desk, INTERCOM unit, and the TT-47 order wire unit. Flexible ferrous conduit is installed to carry the AC power wiring between the 1700 AC raceway and each INTERCOM and teletype equipment. The air conditioner power cables are terminated in a receptacle installed in the cross-container duct on the right side of RF1.

1-235. CONTROL MONITOR GROUP OA-4950/TSR-1 (CONTAINER RF2).

Container RF2 is the CW Ship/Shore operating area of Receiving Central AN/TSR-1. This container houses equipment and operating positions used for CW ship-to-shore communications, unclassified broadcasts, and weather circuits.

1-236. Container RF2 (see figure 1-24) has two side doors at the rear. The left side door provides access to RE2 through a side-to-side walkway. The right side door opens into a vestibule located at the rear of Communication Office RG1 which is joined end-to-side with RF2. A full partition that encloses the entire after-end of RF2 is installed just inside the end frame of the container. A door that provides access into RF1 is installed in the middle of this partition. The door is equipped with a lock that can be opened with a key from inside RF2. Two air conditioning units are installed on the outside right wall, one at the center and the other at the front. A single-readout digital clock unit is suspended from the ceiling at the front of the container.

1-237. All operating equipment and furniture except the wall mounted items are installed approximately six inches from the wall to allow for signal and AC duct installation along the wall. Equipment and furniture are bolted to floor tapping plates and secured to the wall tapping plates with 6-inch brackets.

1-238. LEFT SIDE EQUIPMENT. Equipment and facilities installed along the left wall of RF2 include three CW operating positions at the front of the container; two Code Format Converter systems consisting of two model 660A Teleprinter to Morse Code Converter units, a TT-176A monitor teletype unit and two tone converter drawers installed in a special rack in position 17, and two AN/UGC-6 broadcast teletype units in positions 13 and 15; a TT-47 Pony receive TTY unit in position 11; an AN/UGC-6 Pony send TTY unit in position 9; two AN/UGC-8 receive TTY units equipped with weather keyboards in positions 5 and 7; a small signal junction box mounted on the wall at position 5; and a long tape-storage cabinet which is wall mounted above the teletype equipment and extends from the signal junction box to the CW operating position number 1. The cabinet is equipped with slots for storing teletype message tapes used for broadcast operations.

1-239. RIGHT SIDE EQUIPMENT. Equipment and facilities installed along the right wall of RF2 include two AN/UGC-8 weather teletype units in positions 6 and 8; a TT-47 internal order-wire teletype unit in position 10; a supervisor's desk in position 12; a utility shelf mounted on the wall above the desk; a BLACK INTERCOM unit mounted on the shelf; a file cabinet to the left of the desk; and a power distribution panel mounting an air-conditioner control unit beside the file cabinet.

1-240. CW OPERATING POSITIONS. Each CW operating position consists of a desk with a raised shelf at the rear and a special 30-inch high dual-rack mounted on the shelf. The desk is constructed of wood with a formica top and has a typewriter well in the center, three shelves for paper storage on the left side, a hand-key on the right side, a 6002-1 modulator unit, a drawer on each side below the desk top, a headphone jack fastened to the desk leg on the left, and a headphone set. Each CW operating position is equipped with two R-390A/URR high-frequency receivers, a receiver control panel, a transmitter control panel, and an LSP-6 speaker panel which are mounted in the dual rack. The operating position nearest the front of the container is also equipped with an R-389/URR low-frequency receiver, and the center operating position with an additional LSP-6 speaker panel.

1-241. Receiver Control Panels, RF2. The receiver control panels installed in all three CW operating positions are equipped with identical component parts, each containing nine 3-position multi-contact lever switches, nine volume controls, and nine indicator lamps. Switches 1 through 6 are connected to the outputs of the six R-390A/URR receivers, 7 and 8 are not used, and switch number 9 is wired to the R-389/URR receiver. The center position of a switch connects its associated receiver output to a speaker. In the DOWN position, the switch connects the associated receiver output to the headphone jack in its respective operating position, and at the same time lights the indicator lamp associated with the switch position at each operating position. The UP position of the switch is an OFF position. All three receiver control panels are interconnected so that an operator at any one of the three positions may listen to any one of the seven receivers on the headphones at his position.

1-242. Transmitter Control Panels, RF2. Identical transmitter control panels, each equipped with nine lever switches, are installed in each of the three CW operating positions. The three control panels are interconnected so that an operator at any one of the three positions may key any one of the nine transmitter keying lines.

1-243. The handkey in each CW operating position is wired to the DC input of a 6002-1 modulator unit which is strapped for dry-contact keying, and the modulator 10-kc output is parallel-connected to the inputs of the nine lever switches mounted on the control panel. The

output contacts of each switch are connected to a transmitter control line and to the output contacts of a corresponding switch on the other two control panels. When a switch is placed in the UP position, it connects the modulator output to the corresponding transmitter control line.

1-244. MORSE CODE CONVERTER RACK RF2.17. The equipment installed in the code converter rack includes, from top to bottom, a TT-176A monitor teletype unit, two model 660A Teleprinter to Morse Code Converter units, a BSP-2 dual speaker amplifier unit, a tone converter drawer associated with the code converter systems, a tone converter drawer associated with the TT-176A monitor teletype unit, and an AC utility panel. The equipment housed in the Morse Code Converter rack and the two AN/UGC-6 teletype units installed in positions 13 and 15 comprise two teletype to Morse code converter systems used for either CW or RATT broadcast operations.

1-245. 660A Tone Converter Drawer. The 660A tone converter drawer is equipped with two 6002-1 modulator units, four 6006 loop supply units, two rotary switches and two toggle switches. A modulator provides a tone converted CW or TTY output to the transmit line for each system. CW or TTY operation is selected by the rotary switch. Each toggle switch connects a side-tone output from a 660A unit to a speaker amplifier for audible monitoring of the Morse code signal. The loop supply units furnish current for the signal and the AN/UGC-6 clutch control circuits. A detailed description of the Code Format Converter System is contained in Section 3 of this volume.

1-246. TT-176A Tone Converter Drawer. The TT-176A monitor teletype tone converter drawer contains a 6002-2 demodulator unit and a 6006 loop supply unit that are wired in series with the TT-176A selector magnet.

1-247. TELETYPE EQUIPMENT. All teletype equipment installed in RF2 is equipped with tone converter units and loop battery supply units. The broadcast AN/UGC-6 teletype units, which are used with the TTY to Morse code converter systems, are each equipped with one 6006 loop supply unit installed in their cabinets to supply loop current for the 660A input circuit loop. The tone converter modulator for each unit is a 6002-1 mounted on the 660A tone converter drawer.

1-248. AN/UGC-8 Tone Converter Panels. Each AN/UGC-8 teletype equipment is provided with a tone converter panel containing a 6002-2 demodulator and a 6006 loop supply unit that are wired in series with the selector magnet.

1-249. TT-47 Tone Converter Panels. The internal order-wire TT-47 tone converter contains a 6002-1 modulator, a 6002-2 demodulator, a 6006 loop supply unit, and a foot operated send-switch. The function of these units is described in section 4 of this volume. The TT-47 teletype unit in position 11 is equipped with a tone converter panel mounting one 6002-2 demodulator unit and one 6006 loop supply which are wired in series with the selector magnet.

1-250. AN/UGC-6 Pony Tone Converter Panel. The AN/UGC-6 teletype unit in position 9 is equipped with a tone converter panel containing a 6002-1 modulator unit and a 6006 loop supply wired in series with the send loop of the teletype unit.

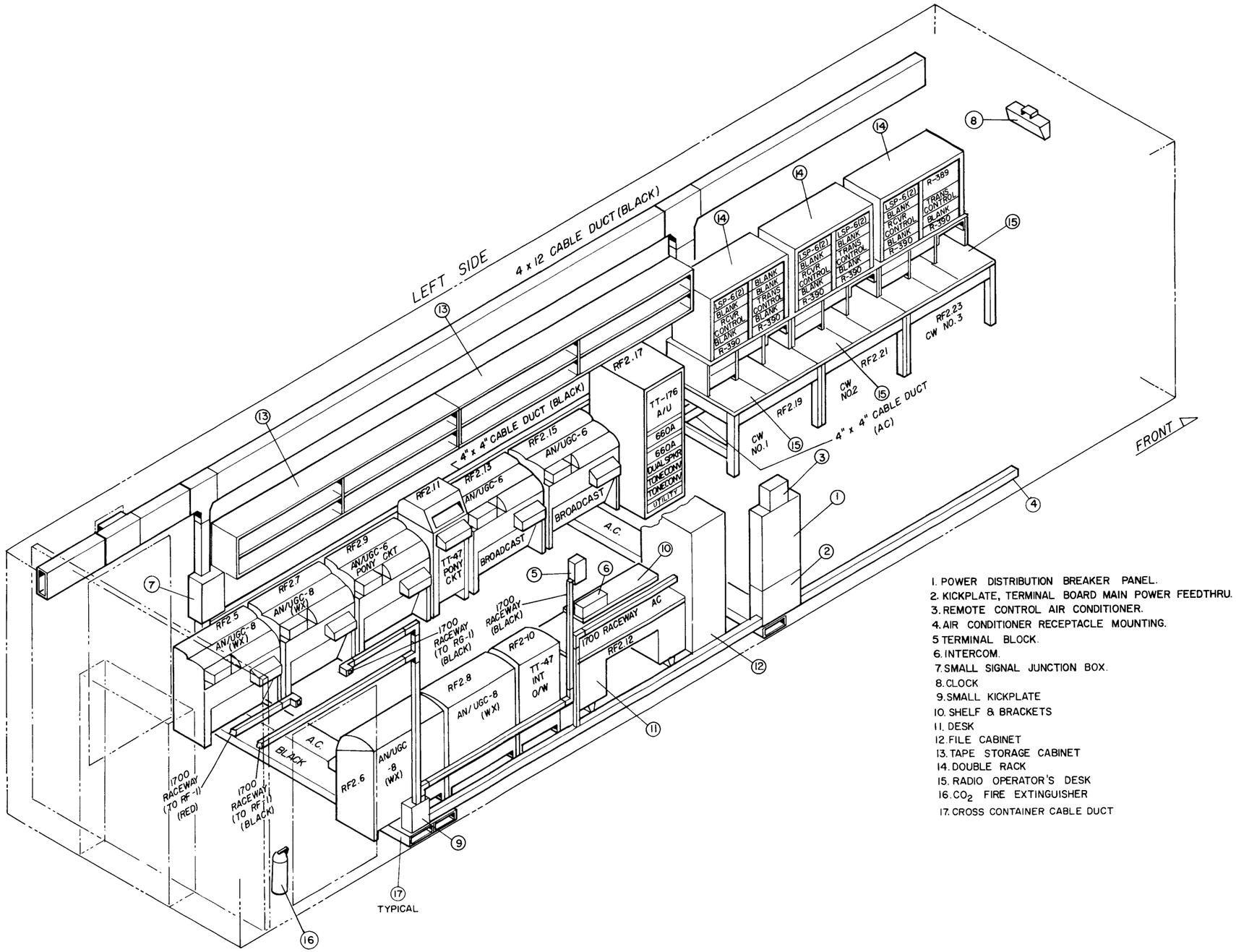
1-251. SIGNAL DUCT AND CABLE INSTALLATION. All signal duct in RF2 is BLACK except for a very short run of RED 1700 raceway on the rear right wall. The RED raceway is run through a cutout in the partition at the rear of the container, run forward several inches, then is connected to a 90-degree elbow above the right rear door. This raceway carries the cables from the RED INTERCOM unit in container RG1.

1-252. BLACK Signal Duct. A 4 x 12 signal duct is wall-mounted flush with the ceiling along the entire left side of RF2. A 4 x 12 vertical duct section is dropped down from this duct behind the CW operating position designated Number 1. Near the rear of the container, a 4 x 4 vertical duct section is dropped down to join the signal junction box, and another section connects the signal junction box with the cross container BLACK duct. A 4 x 12 transition connecting piece installed in the wall cutout that is centered above the left-side door connects the RF wing 4 x 12 duct with the RE wing 4 x 12 duct through a connecting piece that is fastened to the ceiling of the side-to-side walkway between RF2 and RE2. At the front of RF2, the 4 x 12 duct joins similar duct in RF3. A section of 4 x 4 signal duct is installed behind the left side teletype equipment at a height of approximately three feet from the floor. The duct joins the vertical duct below the signal junction box and extends forward just beyond the code converter rack. A section of 1700 DC raceway is installed approximately 18 inches from the floor extending from the left side of the code converter rack to the AN/UGC-6 unit in position 13. This raceway carries the DC signal circuits between the 660A units and the associated AN/UGC-6 equipment.

1-253. BLACK signal duct installed on the right wall of RF2 includes a section of vertical 1700 raceway that connects to a kickplate above the BLACK cross-container duct. This raceway has two branches that extend toward the rear above the right-side door; one that extends through the partition and joins the internal order wire duct in RF1, and another that extends through the right sidewall into RG1 to carry BLACK INTERCOM cables from the Communication Office. A third branch is installed a short distance above the deck extending forward to the right side of the supervisor's desk then vertically to the BLACK INTERCOM terminal box.

1-254. POWER DISTRIBUTION, RF2. Entrance for one primary power cable from power distribution container GR1 is provided by a stuffing tube installed in the floor below the power distribution panel. Circuit breakers for all equipment, lighting, air conditioning units, air-conditioner control unit, and AC utility outlets in RF2 are housed in the power distribution panel.

1-255. Power wiring is distributed for the right side equipment by a floor mounted 4 x 4 duct that extends from the rear AC cross-container duct to the power panel. The 4 x 4 duct continues from the panel to a



1. POWER DISTRIBUTION BREAKER PANEL.
2. KICKPLATE, TERMINAL BOARD MAIN POWER FEEDTHRU.
3. REMOTE CONTROL AIR CONDITIONER.
4. AIR CONDITIONER RECEPTACLE MOUNTING.
5 TERMINAL BLOCK.
6. INTERCOM.
7. SMALL SIGNAL JUNCTION BOX.
8. CLOCK
9. SMALL KICKPLATE
10. SHELF & BRACKETS
11. DESK
12. FILE CABINET
13. TAPE STORAGE CABINET
14. DOUBLE RACK
15. RADIO OPERATOR'S DESK
16. CO_2 FIRE EXTINGUISHER
17. CROSS CONTAINER CABLE DUCT

Figure 1-24. Control Monitor Group OA-4950/TSR-1 (Container RF2, CW, Ship/Shore)

point approximately eight feet from the front of the container to service the forward air conditioning unit. The power receptacle for the air conditioning power and control wiring is installed inside the 4 x 4 duct and extends through the floor of the container. The receptacle for the center air conditioning unit is installed in the same way just to the right of the power panel. A section of 1700 AC raceway services the supervisor's desk and the BLACK INTERCOM unit.

1-256. Power wiring for the left side of the container is run in both AC cross-container ducts, one located just below the power distribution panel and the other just forward of the BLACK signal cross-container duct near the rear of the container. A 4 x 4 AC duct is installed along the left wall, from the rear AC cross-container duct to the front of the container. A section of 1700 raceway joins the 4 x 4 AC duct behind CW operating position 1, runs up the wall and forward, providing AC power to the dual rack equipment.

1-257. CONTROL MONITOR GROUP OA-4951/TSR-1 (CONTAINER RF3).

Container RF3 houses the Air-Ground operations area and a message file storage area of the Receiving Central. A partition installed in approximately the middle of the container (see figure 1-25) divides the operations area from the storage area. Three CW-Voice operating positions are provided for Air-to-Ground, and Search and Rescue Control communications. The storage area contains three rows of metal shelves equipped with various sized bins that provide space for message file binders and supplies.

1-258. The front of the container is equipped with an end wall which has an emergency door that can be opened only from the inside. Two side doors are provided at the rear of the container. The left door leads to a side-to-side walkway into RE3, and the right door to the outside. A door equipped with a 5-pin tumbler lock is installed in the center partition providing access to the storage area and security for the message files.

1-259. One air conditioning unit is mounted on the right outside wall. The container power distribution panel is wall mounted just forward of the right side door, and a control for the air conditioning unit is installed on the power panel. A metal clothes locker is mounted next to the center partition on the right side of the operations area. A fire extinguisher is mounted on the right wall of the rear of the container.

1-260. AIR-GROUND OPERATING POSITIONS. The three Air-Ground operating positions installed along the left wall of RF3 occupy the space between the left side door and the center partition of the container. Each operating position consists of an operating desk mounting a 30-inch high dual-rack that are similar in construction to the operating positions installed in RF2. An adjustable cushioned chair equipped with casters is provided at each operating position.

1-261. Each dual-rack contains two R-390A/URR radio receivers, a CV-591A/URR Single-Side-band Converter unit, an SPU-2 speech processing unit, a receiver control panel, a transmitter control panel, a BSP-1 single speaker-amplifier unit, and an LSP-6 dual speaker unit. Each operating desk is equipped with a telegraph hand key, two 6002-1 modulator units, a desk stand microphone, a boom microphone-headset assembly, a foot operated switch for push-to-talk control, a 600-ohm headset, a microphone control unit, and a jack box mounting two parallel-connected tip-ring-sleeve jacks that can be used with either dual or single telephone plugs.

1-262. Either the desk or boom microphone at each position can be selected for operation by a switch on the microphone control unit. The selected microphone audio output and push-to-talk circuits are connected to the inputs of the SPU-2 unit. The SPU-2 also provides VOX operation. The push-to-talk output signal of the SPU-2 is tone converted by a 6002-1 modulator unit. The audio, receiver muting and tone-converted push-to-talk outputs of the SPU-2 are wired to voice control positions of the transmitter control panel. The telegraph handkey is wired to a 6002-1 modulator unit and the tone converted CW signal is connected to a CW control position of the transmitter control panel.

1-263. The signal circuits of all equipment in each operating position are terminated and completed on coaxicon connectors that are installed at the rear of the receiver and the transmitter control panels. Remote audio signal lines and remote control lines are terminated on additional coaxicon connectors provided on the control panels in operating position 1.

1-264. Receiver Control Panel RF3. Each receiver control panel contains nine multi-contact, 3-position lever switches, indicator lamps, and headphone volume controls. The first six switches on the left of the panel are associated with the six R-390A/URR receivers installed in RF3, and switches 7, 8 and 9 are associated with remote receivers that can be programmed to RF3 from container RE2.

1-265. The CENTER position of each switch connects the associated receiver output to a speaker, the DOWN position to the headphone jack circuit, and the UP position to the remote audio line that terminates on the MDF in RE1. In addition, all three control panels are interconnected so that an operator at any one of the three positions can select any of the six local or three remote receivers. An indicator lamp at each of the three operating positions lights whenever an associated switch at any position is placed in the headphone position.

1-266. One R-390A/URR receiver at each operating position is connected to a CV-591A unit for single-sideband operation, and the three SSB outputs appear on switch positions 1, 3 and 5 of the receiver control panels. The remaining R-390A/URR receivers are used for standard voice or CW communications and they appear on positions 2, 4 and 6 of the control panels.

1-267. Transmitter Control Panel, RF3. Each transmitter control panel installed in RF3 is equipped with nine 3-position multi-contact lever switches similar to

those installed at the CW operating positions in RF2 but wired to provide control of transmitters for both CW and voice operations. The UP position of each switch is used for CW control and the DOWN position for voice control. The center position of the switch is an OFF position.

1-268. The transmitter control panels are interconnected to provide identical functions at all three positions. Nine transmitter CW-control lines and nine voice lines are provided between the transmitter control panel in RF3 and the MDF in RF1. The CW or UP position of each switch connects the tone-converted handkey signal at the respective position to a transmitter keying line. The DOWN or voice position connects the audio output of the SPU-2 to a voice line, the tone-converted SPU-2 push-to-talk output circuit to the transmitter control line, and the muting circuit to the associated receiver.

1-269. SIGNAL DUCT AND CABLE INSTALLATION. 4 x 12 signal duct is installed flush against the ceiling along the left wall of RF3. An end plate encloses the forward end of the duct. A vertical 4 x 12 duct section drops down from this duct to service the operating positions. The RF3 intercontainer cables are terminated on coaxicon connectors installed at the rear of the receiver and transmitter control panels in the dual-rack of the first operating position. A transition piece installed in a cutout above the left-side door connects the 4 x 12 duct with a section of 4 x 4 duct that is fastened to the ceiling of the side-to-side walkway into RE3.

1-270. POWER DISTRIBUTION, RF3. One power cable from the power distribution container GR1 is brought into the container through a stuffing tube installed in the floor below the power distribution panel. The power panel houses circuit breakers for all RF3 equipment, lighting, air conditioning unit, air-conditioner control unit and AC utility outlets.

1-271. The air-conditioner power and control wiring is run through a section of 1700 raceway that extends from the left side of the power panel, up and over the clothes locker, through the partition and then down to a floor mounted kickplate. The cables are terminated in a receptacle installed inside this kickplate.

1-272. Power wiring to the operating positions is run through the cross-container AC duct and into a floor mounted power kickplate on the left side behind the first operating position. From the kickplate, the wiring is run in 1700 raceway up the wall and then forward behind the three dual racks.

1-273. RECEIVING CENTRAL GROUP OA-4966/TSR-1 (CONTAINER RG1).

Container RG1 is the Communications Office of Receiving Central AN/TSR-1. The front of the container (see figure 1-26) is a large built-in vault. The rear area is partitioned to provide an entrance foyer which serves as the main entrance to the Receiving Central. The foyer is equipped with two side doors to the outside and one into the Communications Office area. The after-end of RG1 is mated to the right side of RF2 providing an enclosed entrance to the foyer area from the RF wing. One air conditioning unit is installed on the left outside wall of the container.

1-274. The vault is constructed of 1/4-inch steel plates welded to the floor, wall, and ceiling cross-members. The steel vault door is equipped with a manipulation proof combination lock and with an internal safety release for the protection of personnel. Shelves for the storage of registered publications are installed on both sides and the rear wall of the vault.

1-275. The left side of the Communications Office area contains three desks, a BLACK INTERCOM unit, two filing cabinets and a table. The INTERCOM unit is mounted on a small shelf that is installed above the desk at the left front corner. Furniture and facilities installed along the right wall include four file cabinets, two desks, a RED INTERCOM unit, a drafting table, a power distribution panel and an air-conditioner control unit. The RED INTERCOM unit is installed on a shelf above the desk located on the right side near the rear of the container. A cushioned chair equipped with casters is provided for each desk. All items of office furniture except the chairs are secured to floor and wall tapping plates. An electric clock is installed above the vault door.

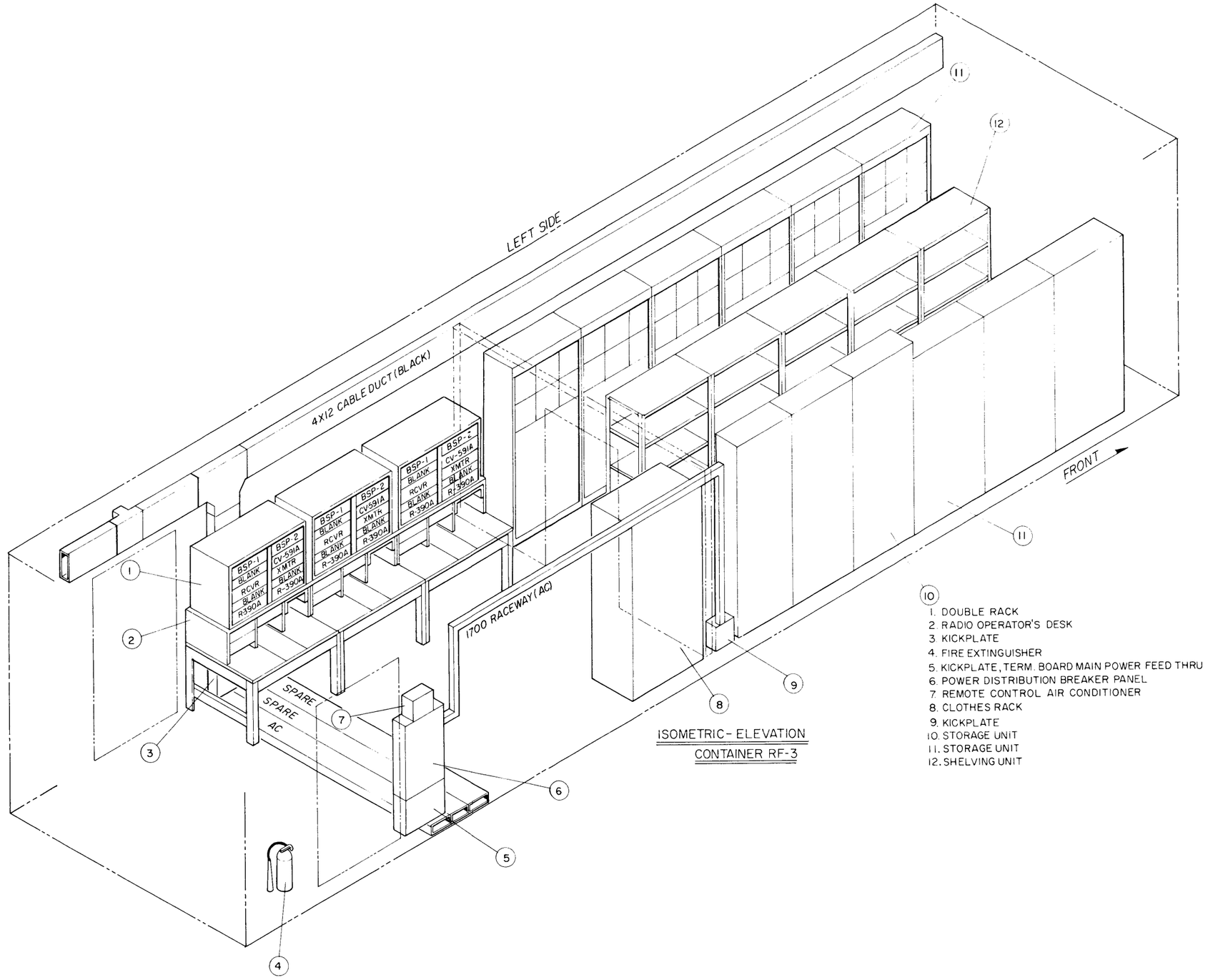
1-276. SIGNAL DUCT AND CABLE INSTALLATION. Two RED INTERCOM cables and two BLACK INTERCOM cables are installed in RG1. 1700 raceway is used for both cable runs. The RED raceway is installed on the right wall at the rear of the container, extending from a cutout above the door to RF2 through the foyer and then dropping down the wall at the RED INTERCOM unit location. The BLACK raceway extends from a second cutout above the door to RF2, to the left wall, then forward to the outside of the vault where it drops down to the BLACK INTERCOM unit location.

1-277. POWER DISTRIBUTION. One power cable from the power distribution container GR1 is brought into RG1 through a stuffing tube installed in the floor below the power distribution panel. The panel houses circuit breakers for the air conditioning unit, air-conditioner control unit, lighting and AC utility outlets.

1-278. Power wiring on the right side of container RG1 is run in 1700 raceway that extends from both sides of the power distribution panel to service the desk and drafting table at the front, and the desk at the rear. Power wiring for the left side of the container is run through the rear AC cross-container duct then in vertical 1700 raceway to a point above the desk tops, where it branches forward and aft to service the desks and INTERCOM unit on the left side. Duplex AC utility outlets are installed in the raceway at each desk and INTERCOM location. The air conditioning unit power and control wiring is run through the forward AC cross-container duct to the left side where the wiring terminates on a receptacle installed at the end of the duct.

1-279. MAINTENANCE EQUIPMENT GROUP OA-4967/TSR-1 (CONTAINER RH1).

Container RH1 is the Teletype Repair Shop of Communication System AN/TSC-35. Equipment and facilities furnished in this container include teletype repair



ISOMETRIC - ELEVATION
CONTAINER RF-3

1. DOUBLE RACK
2. RADIO OPERATOR'S DESK
3. KICKPLATE
4. FIRE EXTINGUISHER
5. KICKPLATE, TERM. BOARD MAIN POWER FEED THRU
6. POWER DISTRIBUTION BREAKER PANEL
7. REMOTE CONTROL AIR CONDITIONER
8. CLOTHES RACK
9. KICKPLATE
10. STORAGE UNIT
11. STORAGE UNIT
12. SHELVING UNIT

Figure 1-25. Control Monitor Group OA-4951/TSR-1 (Container RF3, Air-Ground)

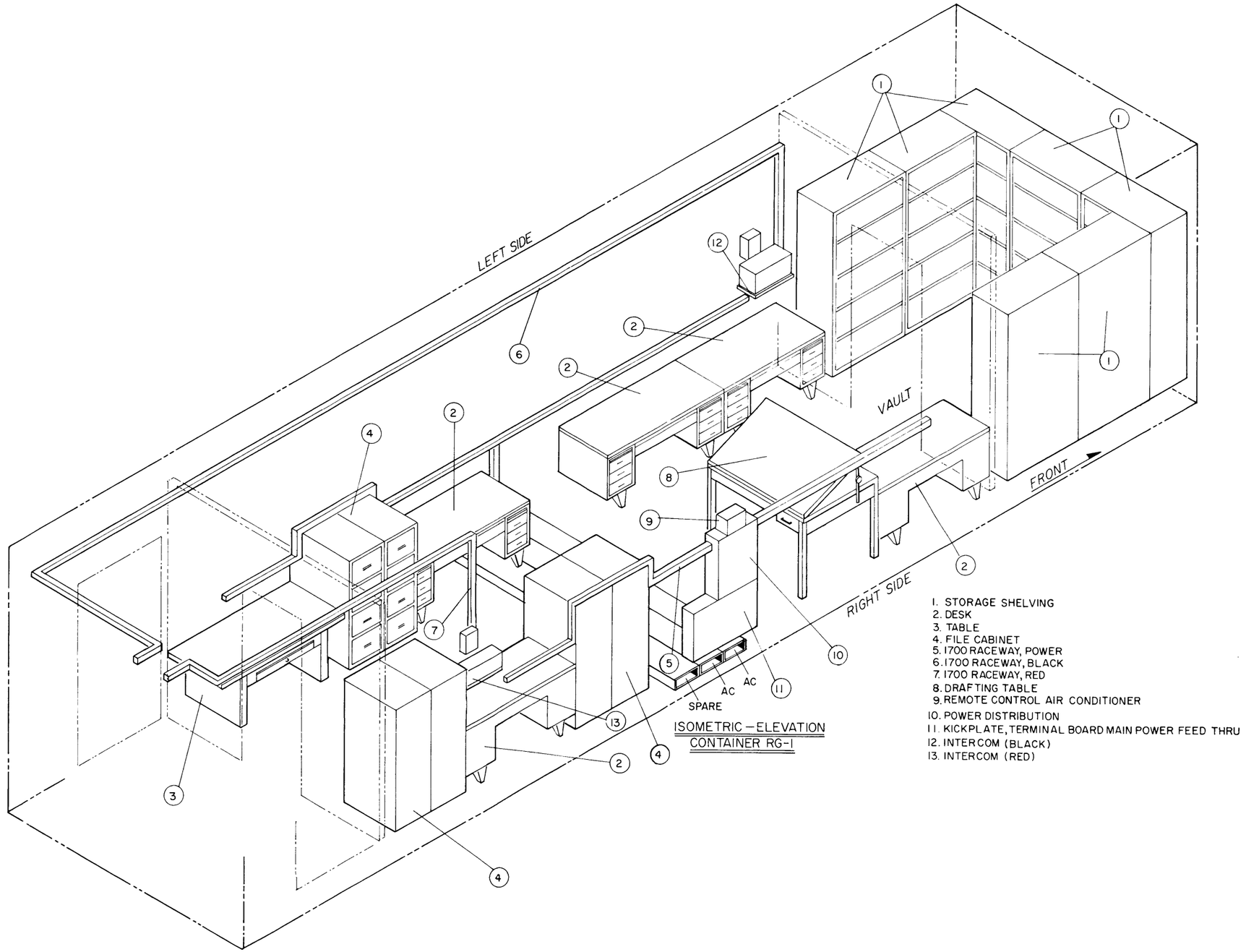


Figure 1-26. Receiving Central Group OA-4966/TSR-1 (Container RG1-Communication Office)

and test benches, teletype test equipment, a test cart, a sonic cleaner system, shelves for storing teletype units, spare parts storage bins, a desk, and a BLACK INTERCOM unit.

1-280. The front end of the container is enclosed with an end wall that is bolted to the end frame. At the rear of the container, a partition is installed approximatd y six feet from the end providing a foyer. (See figure 1-27). An entrance door to the teletype workshop is installed in the middle of the partition. Two side doors are provided in the foyer area. The left door leads into RF1, and the right door leads to the side-to-side walkway into RJ1. A fire extinguisher is mounted on the right wall beside the right door. One air conditioning unit is installed on the outside left wall.

1-281. LEFT SIDE EQUIPMENT. The left side of RH1 contains four test benches, an air compressor and a sonic cleaner system mounted on the floor. A test equipment shelf is installed along the wall at the rear of each test bench. Signal and AC raceway is installed on the wall between the shelf and the tops of the workbenches, extending across all four test benches. A BLACK signal junction box is wall mounted above the first test bench at the rear of the container.

1-282. RIGHT SIDE EQUIPMENT. The right side of RH1 contains two bin storage units for small parts in approximately the middle of the right wall, two sets of storage shelves to the left of the bin storage and two sets of storagd shelves at the rear of the repair area. A desk and shelf are installed in position 4, and a BLACK INTERCOM unit is mounted on the shelf. An electric clock is mounted on the wall above the shelf. The container power distribution panel is wall mounted on the right side of the bin storage. A maintenance cart equipped with rubber tired wheels is stowed at the front of the container. The rear wheels of the cart are swiveled for negotiating tight turns within the Receiving Central.

1-283. The storage bins are equipped with drawers of various sizes. The drawers have movable separators so they may be adjusted to accommodate all sizes of teltetype parts, and are equipped with stops to prevent accidental complete withdrawal and consequent spilling of parts. The shelves provide storage for teletype units awaiting repair, and storage for repaired units awaiting replacement in operating areas.

1-284. All equipment, test benches, and storage facilities on both sides of the container are securely bolted to floor and wall tapping plates.

1-285. TEST BENCHES. Four teletype test benches are installed side by side along the left wall of RH1 at the rear of the repair area. Each test bench is designed for a specific maintenance function and three benches are equipped to completely test teletype subassemblies prior to installation in an operating area. The test benches are installed in positions 1, 3, 5 and 7, and are designated, respectively, Printer Test Bench, Reperforator Test Bench, Transmitter Distributor (TD) Test Bench, and Repair Bench.

1-286. The test benches are steel with a hardwood top and each is equipped with eight drawers, four on each side. A test equipment shelf is installed against the wall on the top of each test bench. Two runs of 1700 raceway are mounted on the wall between the bench top and the shelf. One is a signal raceway equipped with tip-ring-sleeve jacks that are wired to the program board on the black MDF in RE1. The other raceway is for AC power and it is equipped with duplex AC utility outlets at each test bench.

1-287. Each test bench is provided with a control box which is equipped with jacks, patchcords and switches that are used to complete test setups. The control boxes are fastened to the tops of the workbenches. Tone converter panels are installed on the Printer, Reperforator and TD test benches. They are mounted on the rear walls of the benches under the hardwood top. The tone converter panels contain 10-kc tone converter units and loop supply units which are wired to the respective control boxes.

1-288. Printer Test Bench. The printer test BENCH is located in position RH1.1 next to the rear partition. An AN/UGC-6 base assembly and keyboard are mounted on top of the bench. The tone converter panel mounts one 6002-1 modulator unit, one 6002-2 demodulator unit, one 6004-2 trip-control demodulator unit, and one 6006 loop supply unit. The AN/UGC-6 base assembly, modulator and loop supply units are wired to the control box which is equipped with two switches, two jacks and two patchcords. Two trunk lines to the MDF are provided at this test position. A distortion analyzer and a telegraph word generator are provided on the shelf above the bench.

1-289. Reperforator Test Bench. The test bench in position RH1.3 is the reperforator test bench. An AN/FGC-59 reperforator shelf from a TT-332 monitor cabinet is mounted on the bench top. The tone converter unit is equipped with a 6002-2 demodulator unit and a 6006 loop supply unit which are wired to the control box. The control box mounts two switches, a jack and a patchcord on the front panel. Three trunk lines to the MDF are provided at this position. A telegraph word generator is mounted on the shelf above the workbench.

1-290. Transmitter Distributor Test Bench. The transmitter distributor (TD) test bench in position RH1.5 is equipped with an AN/FGC-59 numbering unit and a transmitter distributor shelf from a TT-333 transmitter group cabinet. The TD shelf is mounted on the top of the test bench. The TD test bench tone converter panel mounts a 6002-1 modulator unit, a 6004-2 trip-control demodulator unit, and a 6006 loop supply unit that are wired to the control box. The numbering unit is fastened to the underside of the test equipment shelf. The control box is equipped with two switches, a jack and a patchcord. Five trunk lines to the BLACK MDF are provided at this test bench. A distortion analyzer unit is mounted on the shelf above the test bench.

1-291. Repair Bench. The repair bench in position RH1.7 is used for general teletype maintenance. This bench is equipped with a control box and two jacks wired to the BLACK MDF. An air compressor equipped with a 25-foot hose and air gun is stored on the right side of the repair bench. The compressor is equipped with an air tank and can furnish dry air at pressures

up to 40 pounds per-square-inch. The compressor unit is mounted on wheels so that it may be moved wherever needed for maintenance. During transport, the compressor is secured with straps that are bolted to floor tapping plates.

1-292. SONIC CLEANER SYSTEM. The sonic cleaner system is installed on the left side at the front end of RH1. The system includes a sonic cleaner unit, a spray rinse unit, a hot air dryer unit, and a hot water heater. The water heater supplies hot water to the sonic cleaner and spray rinse units through 3/4-inch copper tubing. The sonic cleaner and spray rinse units are equipped with drain pipes that extend through the floor of the container and connect with a station drain connection. Hot air from the dryer unit is exhausted through an 8-inch duct that is installed between the rear of the dryer and the left wall. The duct extends through the wall and is provided with a screen to keep out foreign materials and dirt. All of the sonic cleaner system units are installed approximately six inches from the wall to provide clearance behind the units for the plumbing and an AC cable duct.

1-293. TEST AND MAINTENANCE EQUIPMENT SUPPLIED. Table 1-4 lists the test and maintenance equipment supplied in the teletype repair shop RH1.

1-294. SIGNAL DUCT AND CABLF INSTALLATION. All signal ducting in RH1 is BLACK except a 4 x 4 section of RED duct that connects the RED duct in container RJ1 with the RED duct in container RF1. The 4 x 4 RED duct is fastened to the ceiling and passes through container RH1 foyer area. Cutouts are provided in each sidewall to accommodate this duct. A section of BLACK signal duct is installed on the left wall between the signal junction box and the rear of the container. A transition piece is used to drop the level of this duct below the RED duct. Another short section of 4 x 4 duct connects the bottom of the signal junction box with the test bench signal raceway. The BLACK INTERCOM cables are run in a section of 1700 raceway that extends from the top of the 4 x 4 wall mounted duct to the right wall, then runs forward and down to the INTERCOM terminal box.

1-295. POWER DISTRIBUTION. The power distribution panel is wall-mounted beside the bin storage cabinet in position RH1.6. The distribution panel houses circuit breakers for all equipment, lighting, the air conditioning unit and AC utility outlets in container RH1. Power wiring for the desk and the BLACK INTERCOM unit is run in a section of 1700 raceway that connects with the right side of the power panel and extends across the top of the desk. Power and control wiring for the air conditioning unit is run from the power panel into the center cross-container duct and terminates in a receptacle on the left side of the container.

1-296. Power wiring for the left side equipment is run in double 1700 raceway that connects with the left side of the power panel, runs vertically, then forward across the bin storage and shelf units and drops down to a power kickplate mounted on the floor above the forward cross-container duct. On the left side of the container, the power wiring enters a 4 x 4 floor mounted AC duct that extends from the front of the container to the repair bench. This section of AC duct services the sonic cleaner system units. A section of 1700 raceway joins the end of the 4 x 4 duct, runs up the wall, and then toward the rear below the signal raceway under the test bench shelves, providing AC service to the test benches. Four AC utility outlets are provided at each test bench position.

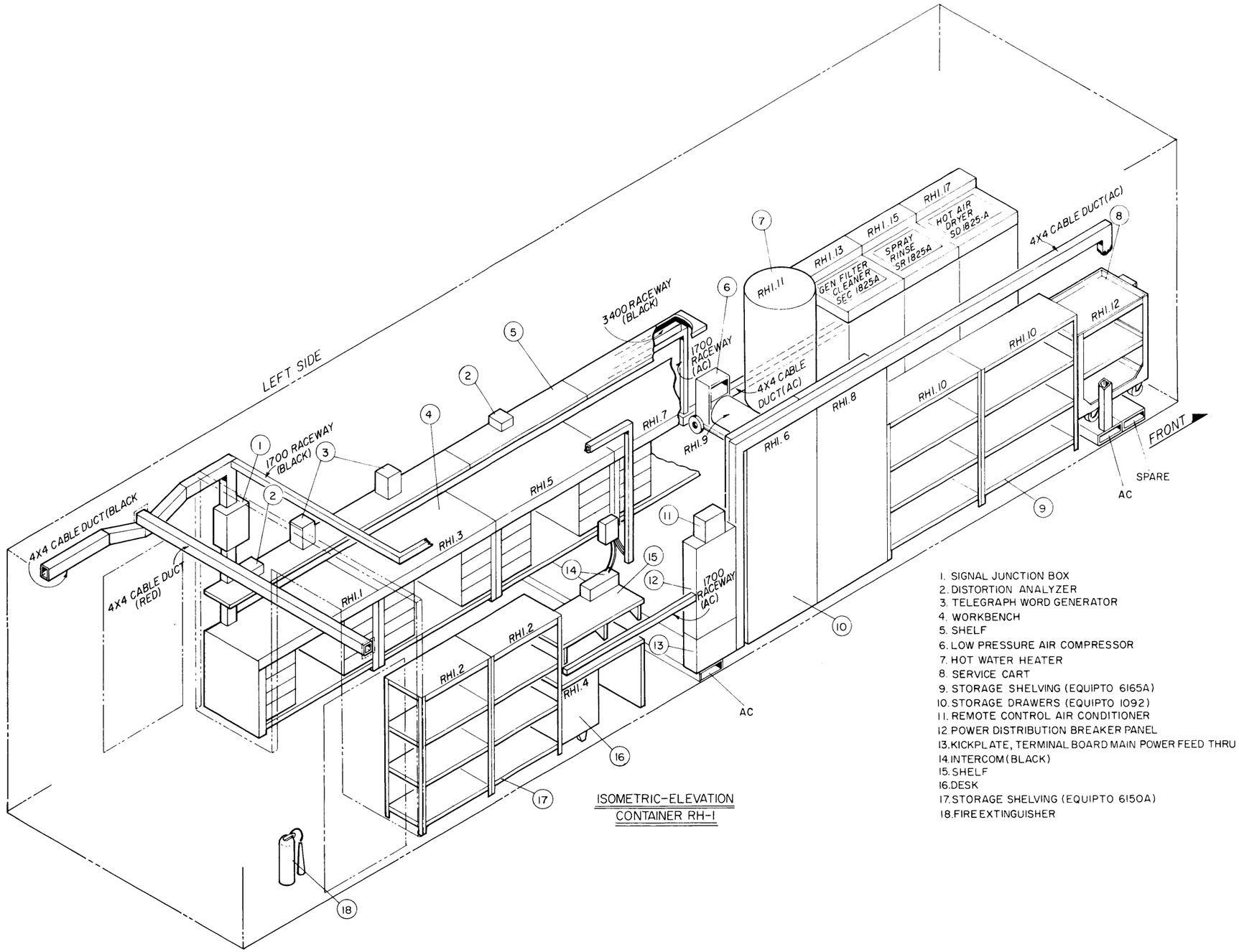
TABLE 1-4. TEST AND MAINTENANCE EQUIPMENT SUPPLIED, OA-4967/TSR-1 (CONTAINER RH1)

Model	Quantity	Name
SEC-1825A	1	Sonic Cleaner
SR-1825A	1	Rinse
SD-1825A	1	Dryer
DT-103B	2	Word Generator (TTY)
DT-104	1	Character Generator (TTY)
DT-603	2	Telegraph Signal Analyzer (TTY)
260	3	Volt-ohm Milliammeter
725A	1	Vacuum Tube Tester
161	1	Service Cart
TE50B	4	Tool Kit, TTY
	1	Air Compressor

1-297. TELETYPE CENTRAL AN/TGC-18 (CONTAINER RJ1).

Teletype Central AN/TGC-18, container RJ1, houses the NTX torn-tape receive relay facility of Receiving Central AN/TSR-1. The NTX send and receive relay facility is comprised of a 48-line AN/FGC-59 Torn-Tape System and an AN/FGC-73 Multiple Addressee Processing System.

1-298. The AN/FGC-59 system consists of eight TT-331 Teletype Receive Groups, sixteen TT-333 Teletype Transmitter Groups, and eight TT-332 Transmitter Monitor Groups. The AN/FGC-73 system consists of a Routing Console, seventeen TT-329 high-speed reperforator (tape punch) units, and seventeen C-4248 reperforator console (punch control) units. All of the TT-331 cabinets, the AN/FGC-73 routing console, one TT-329 high-speed tape punch and one C-4248 punch control unit are installed in container RJ1. The remaining units of the AN/FGC-59 and AN/FGC-73 systems comprise the send portion of the NTX torn-tape relay facility and are installed in adjacent container RJ2.



ISOMETRIC-ELEVATION
CONTAINER RH-1

1. SIGNAL JUNCTION BOX
2. DISTORTION ANALYZER
3. TELEGRAPH WORD GENERATOR
4. WORKBENCH
5. SHELF
6. LOW PRESSURE AIR COMPRESSOR
7. HOT WATER HEATER
8. SERVICE CART
9. STORAGE SHELVING (EQUIPTO 6165A)
10. STORAGE DRAWERS (EQUIPTO 1092)
11. REMOTE CONTROL AIR CONDITIONER
12. POWER DISTRIBUTION BREAKER PANEL
13. KICKPLATE, TERMINAL BOARD MAIN POWER FEED THRU
14. INTERCOM (BLACK)
15. SHELF
16. DESK
17. STORAGE SHELVING (EQUIPTO 6150A)
18. FIRE EXTINGUISHER

Figure 1-27. Maintenance Equipment Group OA-4967/TSR-1 (Container RH1-TTY Repair)

1-299. Nineteen TT-176A page copy monitor units are provided for the NTX receive facility and are installed in container RJ1. Typical operation of the NTX torn-tape relay facility is discussed in the description of container RJ2.

1-300. Two side doors are provided at the rear of container RJ1; the right side door leads directly into container RA1, and the left door leads into RH1 through a side-to-side walkway. Two air conditioning units are installed on the outside right wall of RJ1. During transport, the container is equipped with removable end walls that are bolted to the end frames. The end walls are removed prior to positioning the container on site.

1-301. LEFT SIDE EQUIPMENT. All equipment on the left side of RJ1, with the exception of wall mounted items, are mounted on standard AN/TSC-35 rack base duct. (See figure 1-28.) Four TT-331 teletype receive group cabinets, each housing six typing reperforators and a tone converter panel, are installed along the left wall in rack positions RJ1.7 through RJ1.13. The AN/FGC-73 routing console, a TT-329 high-speed reperforator and its associated C-4248 punch control unit are installed in rack position 15. A standard equipment rack in position 19 houses two TT-176A teletype units and associated tone converter panels. The top TT-176A is an internal order-wire machine and the bottom TT-176A is a page-copy monitor. The internal order-wire TTY is equipped with a foot switch that is installed on the base of the rack.

1-302. A desk for the relay Supervisor is installed in position 17, and a shelf mounting a RED INTERCOM unit is wall mounted above the desk. One file cabinet is installed on the right side of the TTY rack in position 19. A monitor reel storage cabinet equipped with one-hundred and fifty-nine slots for storing tape reels is installed near the rear of the container in position 5. The container power distribution panel is wall mounted on the left side of the tape reel storage cabinet. A power feed-thru kickplate is located below the power panel and an air-conditioner control unit is mounted on top of the panel. Suspended from the ceiling at the front end of the container is a dual-readout digital clock unit. A fire extinguisher is wall mounted at the rear of the container.

1-303. RIGHT SIDE EQUIPMENT. Standard rack base duct is installed along the right wall of RJ1 extending from the front of the container to within approximately fifteen inches of the right side door. (See figure 1-29.) A monitor patch panel is installed in rack position 28. The patch panel contains 72 tip-ring-sleeve jacks mounted on three jack strips. Five racks in positions 16 through 26 house eighteen TT-176A page copy monitors and associated tone converter panels. Three TT-176A units are slide mounted in each rack. Four TT-331 teletype receive group cabinets, each containing six typing reperforators and a tone converter panel, are installed in rack positions 8 through 14. A large monitor reel storage cabinet, which is equipped with two-hundred and one tape-reel slots, is installed in position 6. A large RED signal junction box is wall mounted to the right of the monitor reel cabinet. One file cabinet is floor mounted at the rear of the container.

1-304. TT-331 TONE CONVERTER PANEL. Each TT-331 teletype receive cabinet in RJ1 is equipped with a tone converter panel that contains six 6002-2 demodulator units and six 6006 loop supply units. A demodulator and a loop supply unit are used in the receive loop of each TT-331 typing reperforator. The demodulator converts the 10-kc phase-shift NTX receive signal to a DC MARK-SPACE signal, and the 6006 furnishes operating current to the receive loop circuit.

1-305. TT-176A TONE CONVERTER. Each TT-176A page copy monitor installed in RJ1 is equipped with a TTY monitor tone converter panel that is installed at the rear of the equipment rack directly behind the associated TT-176A equipment. The monitor tone converter panel contains one 6002-2 demodulator unit and one 6006 loop supply unit.

1-306. The tone converter panel for the TT-176A internal order-wire unit is equipped with a 6002-1 modulator, a 6002-2 demodulator and a 6006 loop supply unit. The modulator unit is dry-contact keyed by the send circuit of the order-wire teletype unit, and the demodulator and loop supply are used in the receive loop circuit. A detailed description of the order-wire circuit is contained in Section 3 of this volume.

1-307. SIGNAL DUCT AND CABLE INSTALLATION. All signal ducting in container RJ1 is RED with the exception of a BLACK raceway that carries the internal order-wire and digital clock signal cables. The BLACK signal raceway is installed along the left wall a few inches below the ceiling, extending from the rear of the container to a Tee fitting above the internal order-wire equipment rack in position 19. (See figure 1-28). 1700 raceway from the bottom of the Tee extends into the rack to service the order-wire TT-176A unit. Another section of 1700 raceway connects with the top of the Tee and extends into the air-conditioning duct in the ceiling to service the digital clock unit.

1-308. RED SIGNAL DUCT, RJ1. RED signal circuits installed in RJ1 consist of 10-kc phase-shift NTX receive circuits from the RED MDF in container RB1, and DC control signals from the routing console of the AN/FGC-73 system to the C-4248 punch control units installed in both RJ1 and RJ2. The audio signal cables are run in separate duct from the DC control signal cables.

1-309. Audio Signal Duct, RJ1. The RED audio inter-container signal duct enters RJ1 through a section of 4 x 12 duct installed on the rear right wall where it connects with a dual 4 x 4 transition connector above the right side door. One 4 x 4 duct section crosses the container, passes through a cutout in the left wall and enters the side-to-side walkway into container RF1. Another 4 x 4 section of RED duct is wall-mounted on the right side at ceiling level and extends forward into container RJ2. This section is equipped with a Tee fitting above the signal junction box. Sections of 4 x 4 duct connect the signal junction box with the wall mounted duct and with the rack base duct that services the right side equipment. Audio cable runs to the left side equipment use the RED cross-container signal duct at the center and rear of the container, and one section of the rack base duct installed along the left wall.

1-310. DC Signal Duct, RJ1. The RED DC control cables from the AN/FGC-73 master control console are run into the control section of the rack base duct on the left side of RJ1 and then forward to the front of the container where they enter a section of vertical 4 x 4 duct. The top of the vertical duct is equipped with an elbow that extends the control duct into container RJ2. One 8-pair signal cable is installed from the AN/FGC-73 routing console to each C-4248 punch control unit in RJ2. These cables are run directly from the console to the punch control units and do not terminate at a signal junction box as do the audio signal cables. A short section of 1700 raceway carries the RED INTERCOM cables from the INTERCOM terminal box to the RED signal duct in the rack base.

1-311. Audio Signal Wiring, NTX Receive. Forty-eight NTX receive lines are installed between the RED MDF program board RB1.6 and the 48-line NTX receive facility in container RJ1. The signal cables connect to their respective equipments through RED signal junction box connectors in the usual manner. To provide monitoring facilities for all NTX receive circuits, the signal cables are run from the signal junction box to the NTX monitor patch panel where they are terminated on the top two rows of jacks. Parallel connections from the jacks then extend the signal circuits to the TT-331 cabinets where the signal circuits are terminated on the tone converter panels installed in these cabinets. The bottom row of jacks on the monitor patch panel is used to terminate the 10-kc input circuits of all nineteen TT-176A page-copy monitor units installed in RJ1.

1-312. Tip-ring-sleeve patchcords are provided for patching the monitor teletype equipment to the NTX receive signal circuits at the patch panel. Using the patch-panel, any NTX receive circuit may be monitored on any one of the nineteen TT-176A page-copy monitors.

1-313. POWER DISTRIBUTION, RJ1. A stuffing tube installed in the floor below the power distribution panel provides entrance for one main power cable from power distribution container GR1. The power distribution panel is equipped with circuit breakers that distribute AC power to all equipment, air conditioning units, the air conditioner control unit, lighting, and AC utility outlets in container RJ1. A capacitive power-line filter unit is mounted on the left side of the power panel.

1-314. Power wiring to all equipment on the left side is run in the AC section of the rack base duct. A section of 1700 raceway is installed above the desk top to service the RED INTERCOM unit and the desk. This raceway is run to the left side of the desk and then down to the AC section of the rack base duct. Power wiring for the equipment on the right side and the two air conditioning units is run in the AC cross-container ducts located at the center and rear areas of the container. Power and control cables for the air conditioning units are terminated on receptacles which are installed at the right end of the AC cross-container ducts.

1-315. TELETYPE CENTRAL AN/TGC-19 (CONTAINER RJ2).

Teletype Central AN/TGC-19, container RJ2, is the NTX relay torn-tape send facility of Receiving Central AN/TSR-1. As was noted in the description of container RJ1, all the send units of the AN/FGC-59 torn-tape relay system and sixteen AN/FGC-73 TT-329 high-speed tape-punch units with their associated C-4248 punch-control units are installed in container RJ2. The send portion of the AN/FGC-59 system include sixteen TT-333 transmitter cabinets equipped for tandem operation and eight TT-332 transmitter monitor cabinets. Other equipment and facilities installed in container RJ2 include two AN/UGC-6 teletype units, three storage cabinets, a RED signal junction box and two power distribution panels.

1-316. The front of the container (see figure 1-30) is closed with an end wall which is provided with an emergency exit door that can be opened only from the inside of the container. Two air conditioning units are provided for RJ2. They are mounted on the outside right wall of the container.

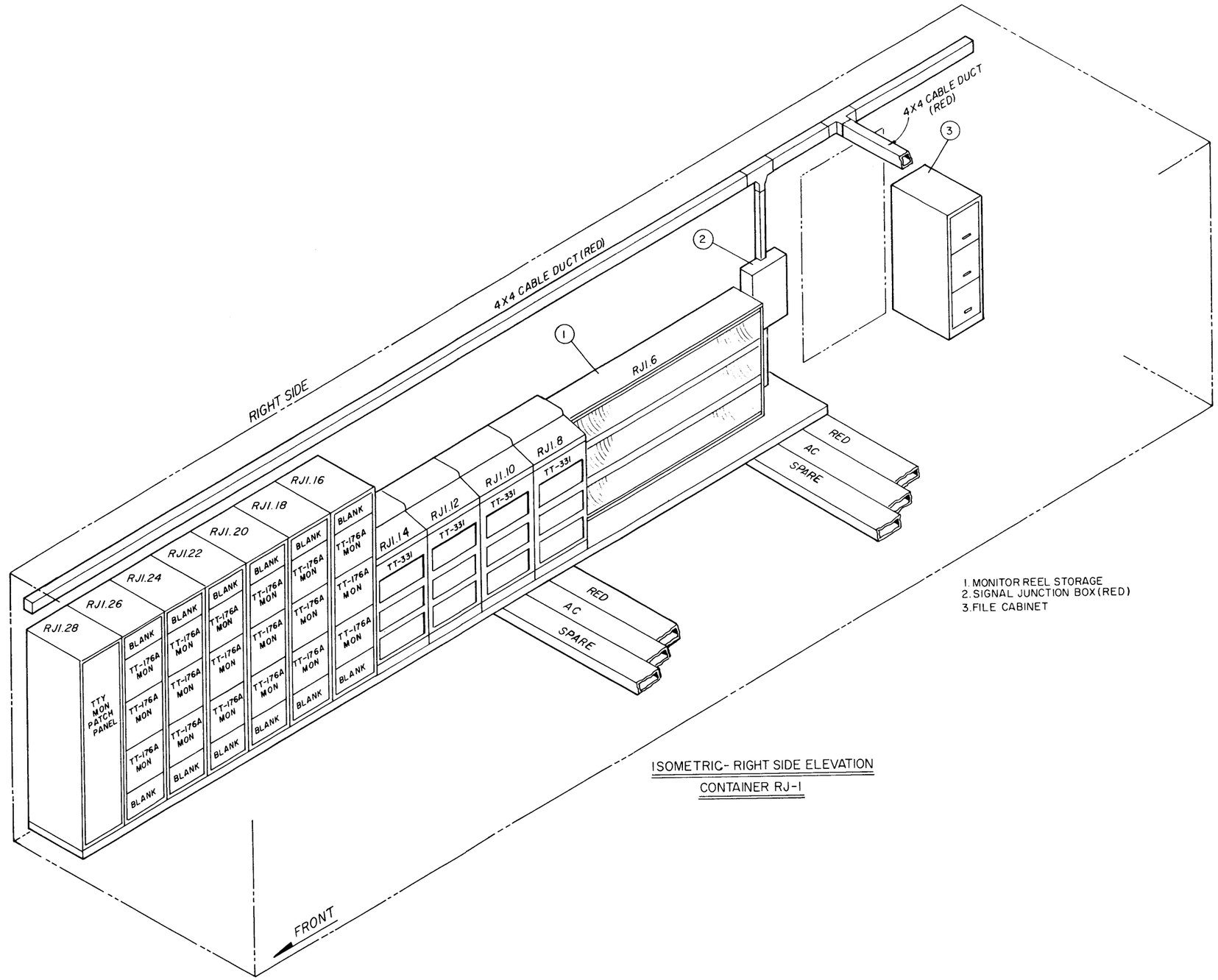
1-317. EQUIPMENT INSTALLATION RJ2. The components of the NTX send relay are installed along both sides of container RJ2. Standard rack base duct is installed along both walls (see figure 1-30) extending from the front of the container to within approximately four feet of the rear. Eight TT-333 transmitter group cabinets and four TT-332 transmitter monitor group cabinets of the AN/FGC-59 system are mounted on the rack base duct on each side of the container.

1-318. Near the rear of the container, a storage cabinet is mounted on the rack base duct in position RJ2.3, and two storage cabinets are mounted on the right side base duct in positions RJ2.4 and RJ2.6. Two power distribution panels are mounted on the left rear wall. A power feed-thru kickplate is installed below the power panels, and one air-conditioner control unit is mounted on top of the left panel. An AN/UGC-6 teletype unit used for Make-Up is installed on the floor at the left rear in rack position 1. A large signal junction box is mounted on the right wall, and an AN/UGC-6 teletype unit used for Run-Off floor-mounted at the right rear in rack position 2.

1-319. All TT-329 high-speed tape punch units and the C-4248 punch control units are mounted on special brackets installed above the TT-333 transmitter group cabinets. The brackets are secured to wall tapping plates provided for this purpose. The three storage cabinets installed in this container are used for storing teletype tapes and paper supplies.

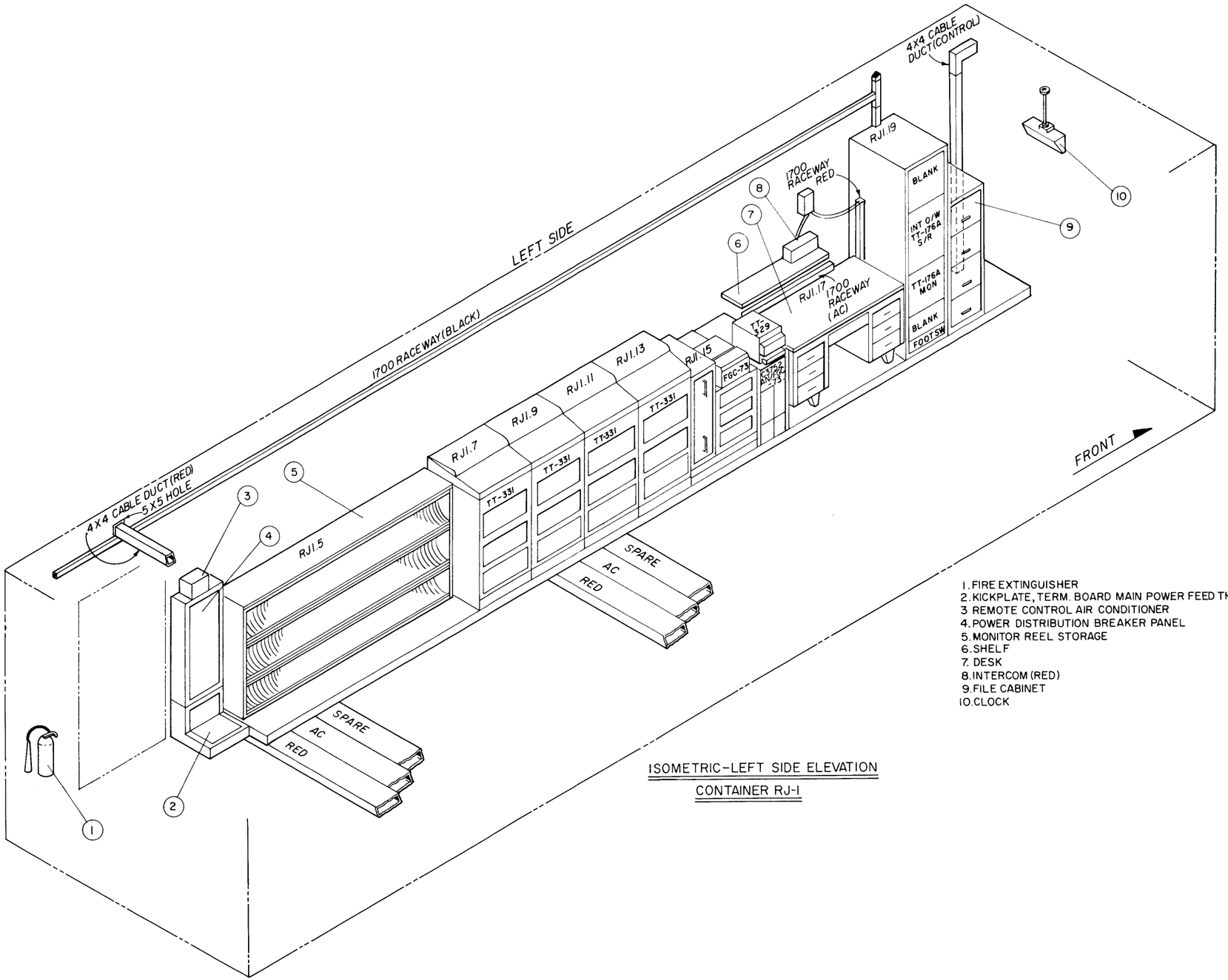
1-320. AN/FGC-59 EQUIPMENT. As may be noted in figure 1-30, each TT-332 transmitter monitor cabinet is flanked by two TT-333 transmitter cabinets, comprising a six-line send set. Four six-line send sets are installed on each side of container RJ2 providing a total of forty-eight NTX send lines.

1-321. Each TT-333 transmitter group contains six transmitter distributor (TD) units that are wired for tandem operation, providing three send channels for each transmitting group. Three tone converter panels and one loop supply-relay panel are installed in each TT-333 cabinet. Each tone converter panel contains one 6002-1 modulator unit and one 6004-2 trip-control demodulator unit. The loop supply-relay



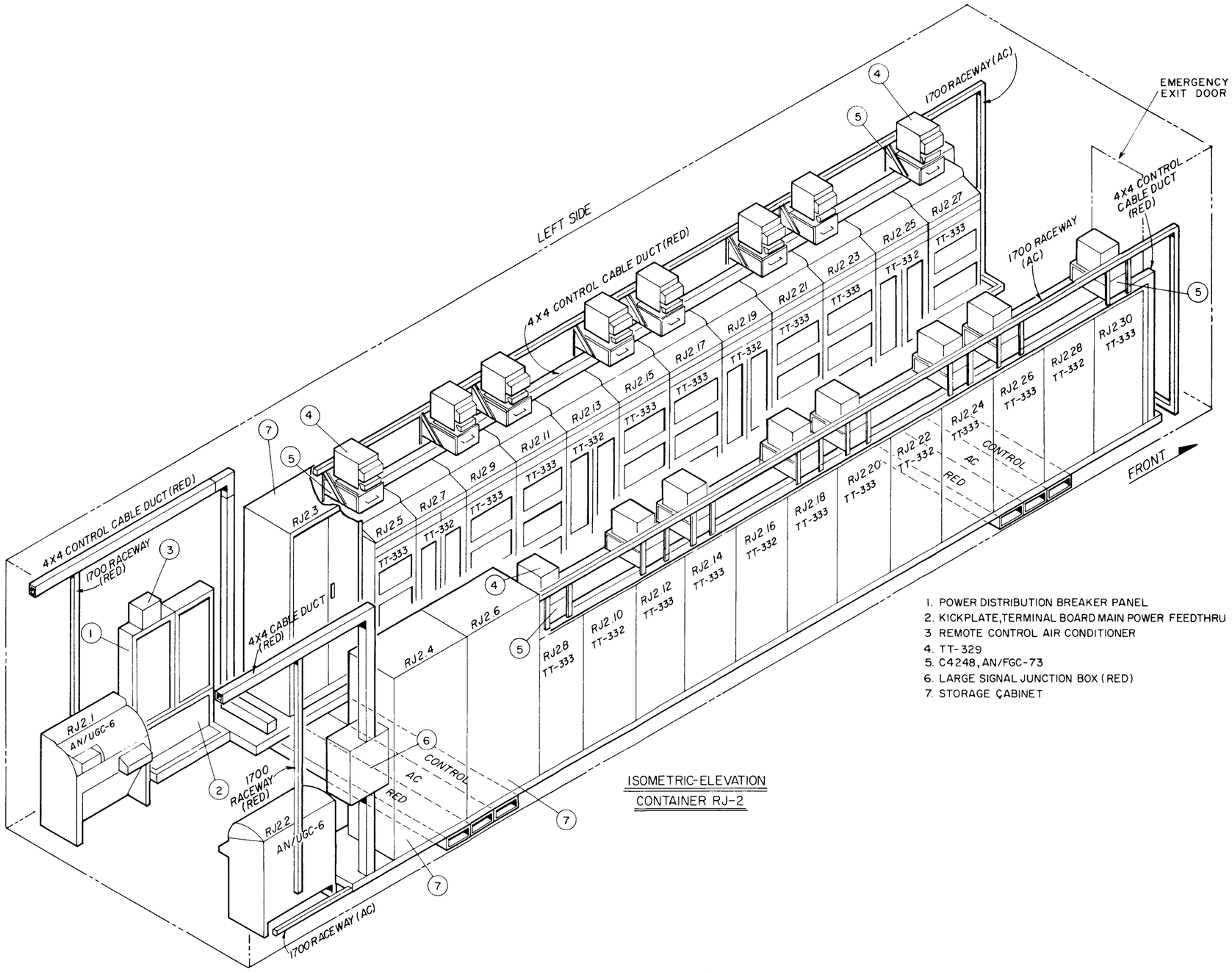
ISOMETRIC - RIGHT SIDE ELEVATION
CONTAINER RJ-1

Figure 1-28. Teletype Central AN/TGC-18, (Container RJ1 - NTX Receive, Right Side)



ISOMETRIC-LEFT SIDE ELEVATION
CONTAINER RJ-I

Figure 1-29. Teletype Central AN/TGC-18, (Container RJ1 - NTX Receive, Left Side)



1. POWER DISTRIBUTION BREAKER PANEL
2. KICKPLATE, TERMINAL BOARD MAIN POWER FEEDTHRU
3. REMOTE CONTROL AIR CONDITIONER
4. TT-329
5. C4248, AN/FGC-73
6. LARGE SIGNAL JUNCTION BOX (RED)
7. STORAGE CABINET

ISOMETRIC-ELEVATION
CONTAINER RJ-2

Figure 1-30. Teletype Central AN/TGC-19, (Container RJ2 - NTX Send)

panel contains three 6006 loop supply units and three DC relays. The 6002-1 modulators convert the DC outputs of the NTX send circuits to 10-kc phase shift tones. The 6004-2's, 6006's and DC relays are used in the trip-control circuits of the three tandem TD channels.

1-322. Each TT-332 transmitter monitor cabinet houses six typing reperforators and six take-up reels which monitor and store the traffic transmitted by the two adjacent TT-333 transmitter groups. Each typing reperforator is wired in series with the DC loop of one of the tandem TD sets in an adjacent TT-333 cabinet.

1-323. AN/FGC-73 EQUIPMENT. A TT-329 high-speed tape punch and its associated C-4248 punch control unit, which are units of the AN/FGC-73 system, are installed directly above each TT-333 transmitter group cabinet. The TT-329 units deliver punched tapes of NTX messages intended for transmission by the TT-333 transmitters installed directly below.

1-324. NTX TORN TAPE RELAY, TYPICAL OPERATION. The operation of the NTX torn-tape relay facility is similar to the operation of the HICOM/ASC torn-tape relay previously described in this section. The functions of the AN/FGC-59 and AN/FGC-73 systems are the same. However, while the HICOM/ASC relay is installed in one container, RA1, providing an 18-line capability, the NTX relay is installed in the two containers just described and it provides a 48-line capability. The following is a brief description of torn-tape operation as it applies to the NTX relay installation in containers RJ1 and RJ2.

1-325. The NTX receive circuits are programmed at the RED MDF in container RB1 to appear on the NTX receive lines that terminate at the TT-331 typing reperforators in container RJ1. Incoming NTX messages are received on the typing reperforators which produce punched tapes of the messages. Each punched tape of the received NTX message is "torn-off" the reperforator and manually transferred to the AN/FGC-73 routing console which causes an identical tape to be produced by one or more of the TT-329 high-speed reperforators located in container RJ2. When an NTX receive circuit is to be monitored, a TT-176A monitor unit is patched into the NTX receive line at the monitor patch panel. The TT-329 unit installed in RJ1 is an overflow position.

1-326. In container RJ2, the tapes are "torn-off" the TT-329 units and manually inserted in the appropriate TT-333 transmitter distributor which transmits the message to a distant address or addressees. At the same time, a TT-332 monitor reperforator provides a tape copy of the transmitted message for the station file. The full reels of monitor tapes are removed from the TT-332 equipment and stored in the monitor reel storage cabinets in container RJ1.

1-327. SIGNAL DUCT AND CABLE INSTALLATION RJ2. All signal duct installed in container RJ2 is RED. It consists of RED audio signal duct that houses the NTX signal cables, and DC signal duct (control duct) that houses the control cables that are installed between the AN/FGC-73 routing console and the TT-329 high-speed reperforator units.

1-328. Audio Signal Duct, RJ2. A section of 4 x 4 audio signal duct that connects with the RED audio signal duct in container RJ1 is installed on the right rear wall of the container. This duct runs forward then down to the RED signal junction box. The NTX signal cables from the TT-333 equipment on the right side are run in the rack base duct then up a short 4 x 4 duct section to the RED signal junction box. The left side NTX signal cables are run in the left side rack-base duct toward the rear of the container, through the RED cross-container duct, then through right side base duct to the 4 x 4 vertical duct that connects with the signal junction box. The send NTX signal cables are extended to the RED MDF in container RB1.

1-329. DC Signal Duct, RJ2. The DC signal duct (control duct) housing the DC control cables from container RJ1 is a section of 4 x 4 duct installed on the left rear wall of RJ2. The control duct extends forward to the TT-329 unit installed in position RJ1. 5. Here the 4 x 4 duct connects with two sections of 3400 raceway. One section of 3400 raceway drops down and joins a 1700 raceway that is installed above the AN/FGC-59 equipment on the left side. The second section of 3400 raceway crosses to the right side of the container and drops down to a 1700 raceway installed above the AN/FGC-59 equipment on the right side. The 1700 raceway provides signal duct service to the C-4248 punch control units.

1-330. POWER DISTRIBUTION, RJ2. Two primary power cables from the power distribution container GR1 are brought into RJ2 through two stuffing tubes installed in the floor below the power distribution panels. The power panels contain circuit breakers for all RJ2 equipment, lighting, the air conditioning units, the air-conditioner control unit and AC utility outlets. A capacitive power line filter is mounted on the side of each power distribution panel.

1-331. Power wiring to the left side AN/FGC-59 equipment cabinets is run in the AC section of the rack base duct, and to the right side equipments through cross-container AC duct and the rack base duct on the right-side. The wall mounted TT-329 and C-4248 units are furnished AC power through horizontal 1700 raceway that is installed behind the TT-329 units on both walls. Vertical sections of 1700 raceway are installed on both walls at the front of the container to connect the horizontal AC raceway with the AC section of the rack base duct.

1-332. POWER DISTRIBUTION GROUP OA-4968/TSQ-56 (CONTAINER GR1). Container GR1 is the AC power distribution center of the Receiving Central primary electric power plant. Container GR1 houses a standard power bus, a No-Break power bus, and circuit breakers for the distribution of AC power to all containers and rotatable log-periodic antennas at the Receiving Central.

1-333. POWER CONTROL GROUP OA-4969/TSQ-56 (CONTAINER GR2). Container GR2 is the AC power control center of the Receiving Central primary electric power plant. GR2 houses twelve 1600-ampere, 3-phase circuit breakers and a power control console.

The circuit breakers in this container and in GR1 and the diesel engines and generators in the generator containers are controlled electrically from the power control console. One air conditioner unit is provided for this container.

1-334. DIESEL ENGINE GENERATOR SET PU-600/TSQ (CONTAINERS GR3 and GR6). Each PU-600/TSQ container houses three diesel-driven 335-kilowatt, 208-volt, 60-cycle, 3-phase generators that provide standard power for use in all areas of the Receiving Central.

1-335. DIESEL ENGINE GENERATOR SET PU-612/TSQ (CONTAINERS GR4 and GR5). Each PU-612/TSQ container houses a No-Break primary AC power system that is capable of furnishing 200-kilowatts of highly regulated 208-volt, 60-cycle, 3-phase power for critical communication areas. No-Break power is provided for containers RA3, RB1, RB2, RB3 and RC1. The remaining Receiving Central containers and the antennas are furnished standard power.

NOTE

A detailed description of the primary electric power plant and its components is contained in the following two instruction manuals that are furnished with the system:

Transportable Communication System SYM-2005 (AN/TSC-35) Primary Power System,
and
Operation and Maintenance Instructions for MODEL PFS 200 PNB "NO BREAK" ELECTRIC POWER SYSTEM.

SECTION II
INSTALLATION

2-1. INTRODUCTION.

This section contains installation information on the Receiving Central Antenna field, the ground system, and the primary power system.

2-2. RECEIVING CENTRAL AN/TSR-1 ANTENNAS.

The antennas installed at the Receiving Central include the following:

a. Six Rotatable Log-Periodic, 6.5 to 60 megacycles, type 237-1A.

b. Two Fixed Log-Periodic, 2.5 to 32 megacycles, type 726-1.

c. Eleven 3-wire Vertical Folded Doublet, 6 to 32 megacycles, type FDA-3-600R.

d. One Conical Monopole, 2 to 8 megacycles, type OCM-68.

e. One Conical Monopole, 4 to 16 megacycles, type OCM-28.

f. One Conical Monopole, 7 to 28 megacycles, type OCM-17.

g. Two Dual-Nested Rhombic.

h. Two Single Rhombic.

i. Two Low-Frequency Long-Wire, one 600-foot and one 700-foot, type RLW.

j. One VHF, 100 to 174 megacycles, type F-11.

k. One UHF, 225 to 400 megacycles, type AT-197.

l. One UHF, 225 to 400 megacycles, type AT-150.

2-3. The Receiving Central antenna locations are shown in figure 2-1. The antenna field is divided into four 90-degree sectors that are joined at approximately the center of the Receiving Central complex. The antennas, except for the two Fixed Log-Periodic and four Rhombics, are designated by a sector number, an abbreviation indicating the type of antenna, and the number of that type. For example, 1LP2 identifies Rotatable Log-Periodic antenna number 2 that is located in sector 1. The fixed Log-Periodic antennas are designated FLP1 and FLP2, the single Rhombics are RN1 and RN2, and the Dual-Nested Rhombics are RA1/2 and RS1/2.

2-4. COAXIAL CABLES.

All transmission lines from Receiving Central antennas are coaxial cables except the microwave transmission line which is rectangular waveguide. FJH5 7/8-inch foam heliax is used for the Rhombic and the VHF antennas, and FHJ4 1/2-inch foam heliax for the remaining receiving antennas. The coaxial cables from the special receivers Fixed Log Periodic antennas are terminated on the antenna patch panel in container RA3. The VHF and UHF coaxial cables are terminated at the VHF and UHF equipment in container RE2. Coaxial cables from the remaining receiving antennas are terminated at the antenna patch panel in container RE4.

2-5. The coaxial cables are run in trenches from the vicinity of the receivers containers to the location of the antennas. Where cables cross access roads, they are run in corrugated steel pipes which are buried below the road surfaces. Power and control wiring for the Rotable Log-Periodic antennas are run in the coaxial cable trenches.

2-6. RECEIVING CENTRAL GROUND SYSTEM.

The Receiving Central ground system includes a RED signal ground, a BLACK signal ground, and an AC power neutral ground which are completely separated ground systems until they are tied together at an earth ground grid. The ground wire of each signal circuit is an insulated and continuous ground connection from the equipment to the main distribution frame where the signal circuit terminates.

2-7. SIGNAL GROUND.

The signal grounds of all RED signal circuits are tied together at the RED MDF in container RB1 by tying all the drain wires of the signal pairs together at that point. The common connection of the drain wires are tied to an insulated ground bus in the RED MDF. From this ground bus, an insulated 4/0 wire is run to the earth ground where the wire is connected to the earth ground grid. The signal grounds of all BLACK signal circuits are tied together at the BLACK MDF in container RE1 in the same manner as the RED signal grounds. An insulated 4/0 wire is run from the BLACK MDF insulated ground connection to the earth ground grid.

2-8. In containers RB2 and RB3, the KW-26 order-wire signal circuits remain within the containers and the signal grounds of these circuits are connected to the RED MDF signal ground bus by an insulated ground wire. All the KW-26 order wire signal pairs are brought into an order-wire control panel, and the drain wires of the signal pairs are tied together and connected to an insulated ground bus in the control panel. The ground bus from each panel is connected to a number 12 wire (see figure 2-2) which in turn connects to a number 4 insulated ground wire in the

RED signal base duct. The number 4 wires from each side of the container are tied to an insulated terminal inside the RED signal junction box. The signal ground connection from the ground terminal in the signal junction box to the RED MDF is completed by a number 4 insulated wire.

2-9. RACK AND EQUIPMENT GROUNDING.

All equipment racks and the rack mounted equipment in each Receiving Central container are grounded to the AC power neutral connection in the container power distribution panel. The racks and the rack mounted equipment are tied to separate ground systems in the container, and both systems are connected to the AC power neutral.

2-10. Each rack mounted equipment is tied to a green wire of the 3-wire single phase power wiring system. The green wire of each power circuit is run to the power distribution panel and tied to the neutral bus bar.

2-11. The equipment racks are tied to a separate ground bus wire as shown in figure 2-3. An insulated number 4 bus wire is connected to the AC power neutral at the power distribution panel in each container. The number 4 wire is run in the AC base duct below all equipment racks. At each rack location, a length of number 12 wire connects the equipment rack to the ground bus, as illustrated in figure 2-4. The AC power neutral connections from all containers are commoned at the power distribution container GR1. A connection from the common neutral bus in GR1 is then made to the earth ground grid.

2-12. RECEIVING CENTRAL EARTH GROUND GRID.

Details of the Receiving Central earth ground grid are shown in figure 2-5. The ground grid consists of nine 10-foot copper-plated steel rods driven into the ground to a depth of 12 inches below the surface, and spaced 10 feet apart as shown in the figure. The rods are connected together by brazing 4/0 copper cable to the rods. The copper cable is extended to a terminal board above the ground. The RED and BLACK signal ground and the AC power neutral are connected to this terminal board. The terminal board is enclosed in a weatherproof box.

2-13. PRIMARY AC POWER SYSTEM, RECEIVING CENTRAL.

Primary AC power at the Receiving Central is furnished by the Electrical Power Plant AN/TSQ-56 which is located as shown in figure 1-1. Two PU-600/TSQ Diesel Engine Generator Sets (GR3 and GR6), each housing three diesel-driven 335-kilowatt, 208-volt, 3-phase generators, furnish standard power for the Receiving Central. Two PU-612/TSQ Diesel Engine Generator Sets (GR4 and GR5), each housing a 200-kilowatt, 208-volt, 3-phase No-Break Power System, furnish highly regulated primary power for critical communication areas of the Receiving Central.

2-14. PRIMARY POWER CABLING, GENERATORS TO GR1.

Figure 2-6 is a single-line power flow diagram showing distribution of 3-phase, 4-wire power from the generator containers and No-Break power systems to the power distribution container GR1. Each power run in the figure represents a 4-wire power circuit and each run consists of eight 500MCM cables, two for each phase and two for the neutral. All circuit breakers shown are type DB-50, 3-phase breakers which are adjustable from 1200 to 1600 amperes. Letter designations on the breakers in the figure are used only to assist in the discussion.

2-15. Power cables are run from the generators into cable ducts in the floor of the containers. Cable troughs that are supported by cable hangers under the container floors are used to carry the cables between the generator containers and control container GR2. The cable trough is extended under the walkway into container GR2, and the cables are run through feed-thru fittings in the floor into the circuit breakers cabinets. The power cables between GR2 and GR1 are run in the same way, through feed-thru fittings at the circuit breaker cabinets and supported on a cable trough between the containers.

2-16. STANDARD POWER.

Two generators in each standard power container, GR3 and GR6, are usually on the line furnishing power while the third is in standby status. Standard power is run from each generator to a DB-50 circuit breaker in the control container GR2. The circuit breakers are electrically operated from the power control console in GR2, and when closed, feed the power to a standard power bus in the distribution container GR1. The circuit breakers for the standby generators are kept open until the standby generators are ready to furnish power.

2-17. NO-BREAK POWER.

One No-Break power generator system is usually on the line while the other is in standby status. The No-Break power generator may be driven by an electric No-Break motor, or by a diesel engine. In normal operation, the No-Break generator is driven by the electric motor which in turn is driven by power furnished from the standard power bus. Three DB-50 circuit breakers associated with each No-Break power system are located in control container GR2.

2-18. In normal operation, when GR5 is in operation and GR4 is in standby, circuit breakers G, I, and M are closed, and circuit breakers H, J, K, L and N are open. Standard power is fed to the electric motor through circuit breaker G, and regulated AC power is fed to a No-Break Power bus in distribution container GR1 through breakers I and M. When GR4 is on the line, standard power is fed to the GR4 electric motor through breaker J, and regulated power is fed to the No-Break power bus through breakers L and N.

2-19. In the event of complete failure of the No-Break power system, standard power is switched to the No-

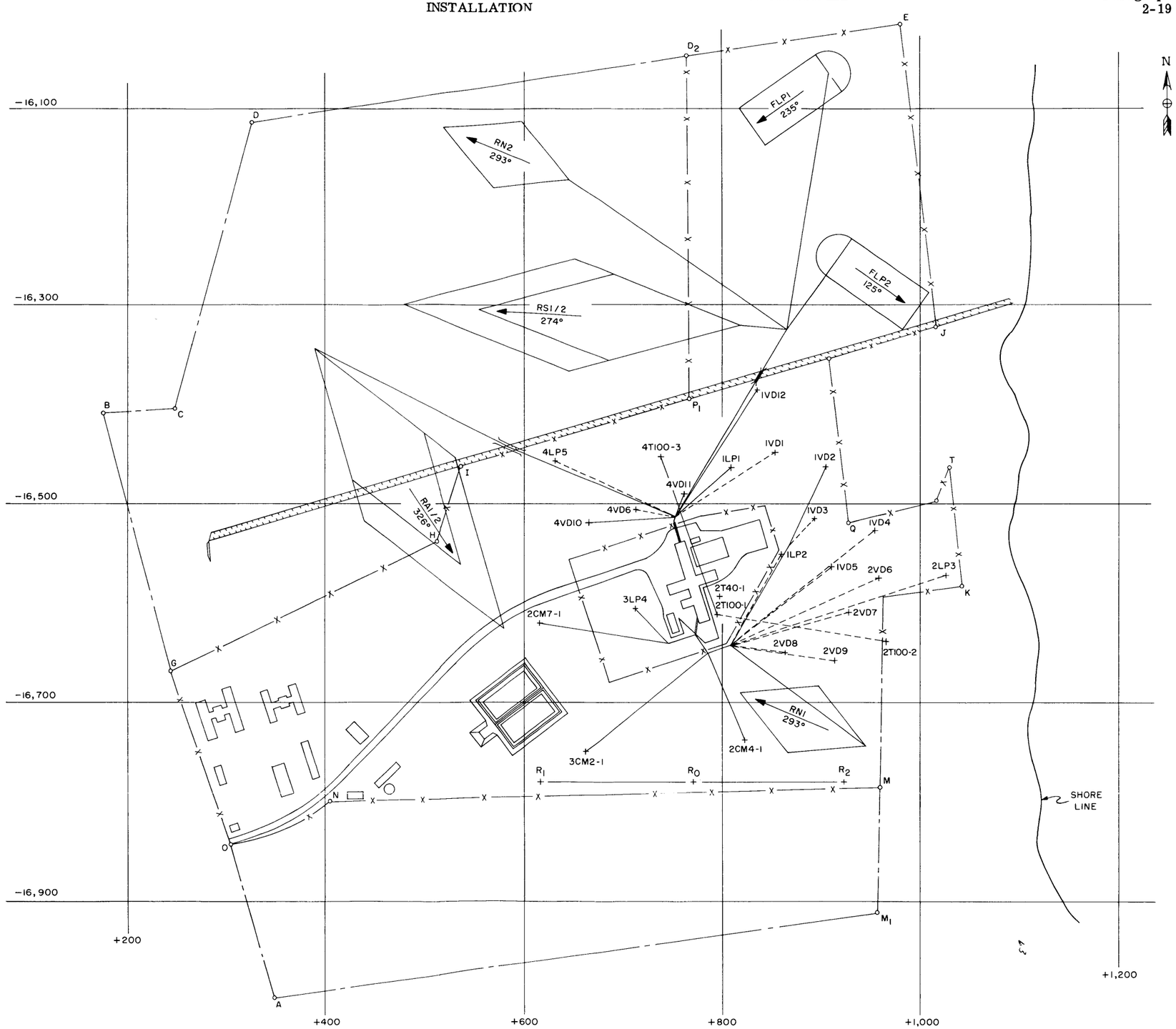


Figure 2-1. Antenna Field, Receiving Central AN/TSR-1

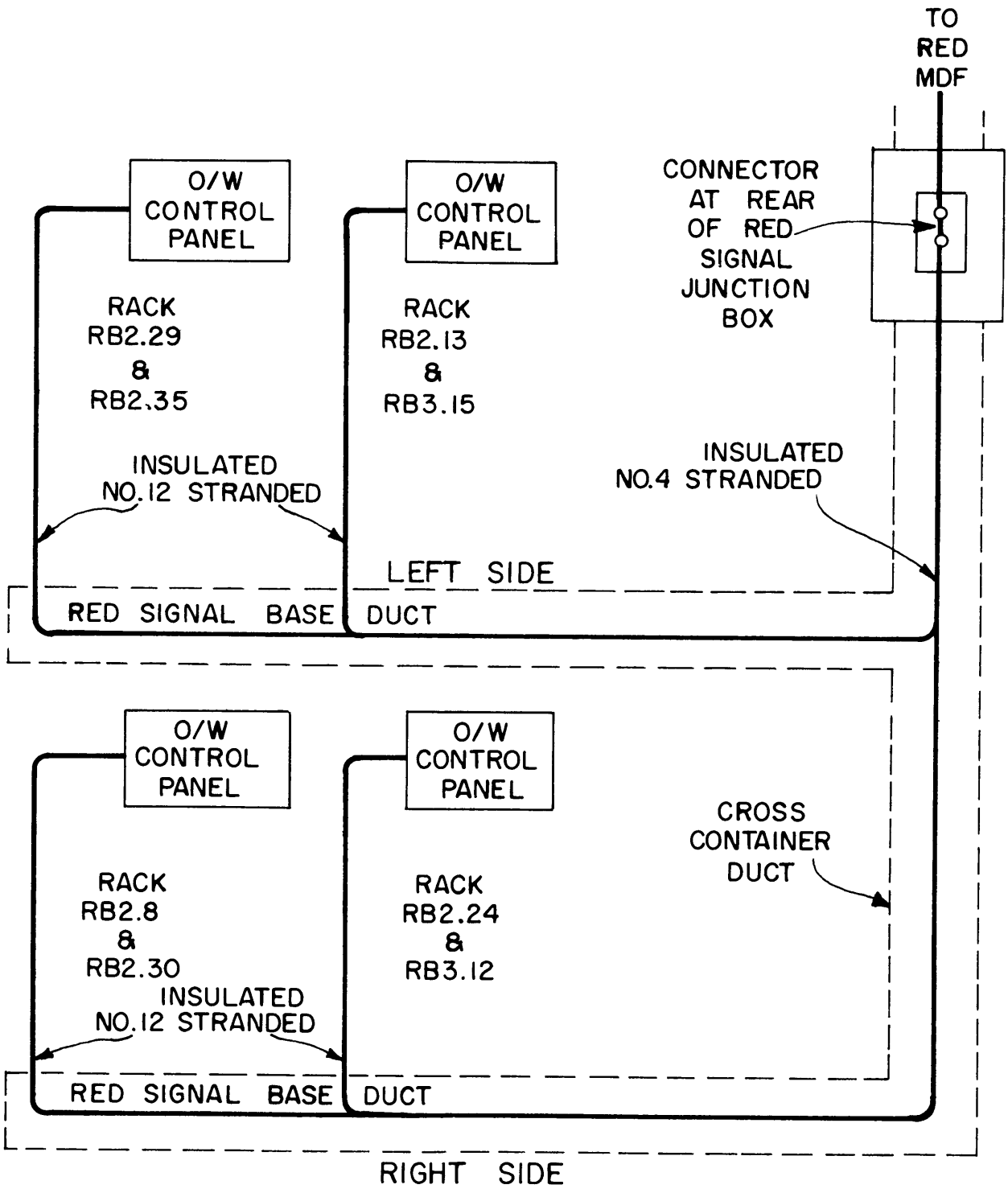


Figure 2-2. Signal Grounding, KW-26 Order-Wire Control Circuit, RB2 and RB3

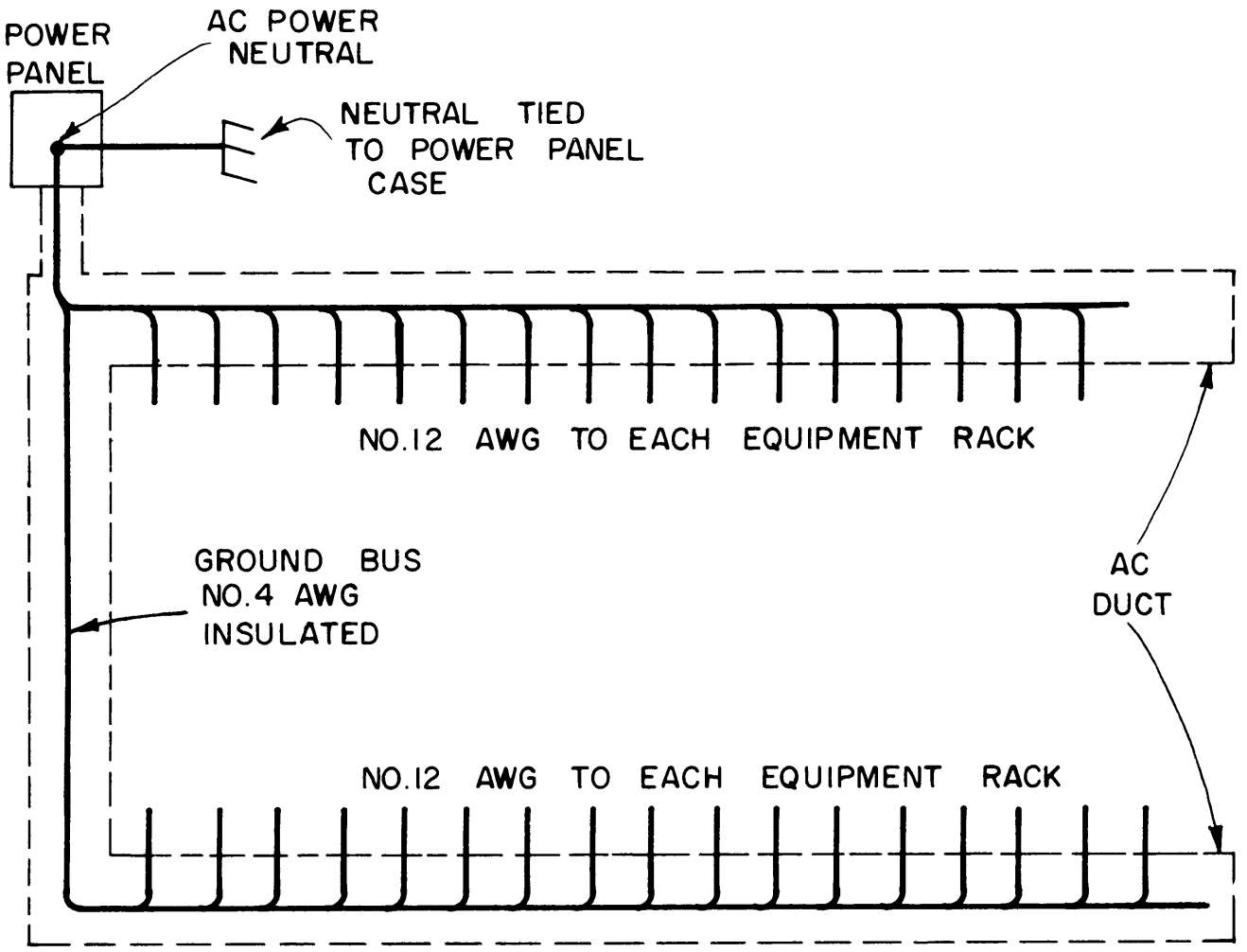


Figure 2-3. Equipment Rack Grounding Receiving Central AN/TSR-1

Break power bus through breakers H and M, or breakers K and N, and the remaining breakers associated with the No-Break System are open.

2-20. PRIMARY AC POWER DISTRIBUTION, GR1 TO EQUIPMENT CONTAINERS.

Power distribution from the standard and No-Break primary power busses in container GR1 to the equipment containers and antenna field is illustrated in figure 2-7. Regulated 3-phase, 4-wire AC power from the No-Break power bus is furnished for containers RC1, RB1, RB2, RB3 and RA3. Four-conductor 4/0 cables connect the power from 225-ampere circuit breakers in GR1 to 225-ampere circuit breakers in the containers. Two cable runs from separate circuit breakers are used for RB2 and RB3, and one for each of the others. Standard 208-volt, 3-phase power is fed to the remainder of the Receiving Central containers in the same manner, but from the standard power bus. Two power cable runs from the standard power bus are provided for containers RE3, RE4, and RJ2, and one run for the remaining containers.

2-21. Standard power which drives the No-Break power systems is fed back to GR2 from DB-50 1600-ampere circuit breakers through two runs of eight 500MCM cables each, as was described earlier. One cable is run to the diesel heating circuit, and one is provided for the mobile workshop trailer. The cable for the mobile workshop trailer is a 100-foot 4-conductor, 4/0 cable terminated at both ends with connectors so that the workshop trailer may be connected into the power system when it is at the Receiving Central.

2-22. Four single-phase, 2-wire circuits are provided for the RLPA antennas. Each RLPA feeder connects to a 70-ampere circuit breaker in GR1 and into a power junction box in the field. Power is then distributed to the individual RLPA antenna locations from the junction box.

2-23. Power cables from GR1 to the equipment containers are supported on cable stands that are approximately three feet high and spaced two feet apart. The cables are run in the stands from the side of GR1 to the right side of RB2 and are then run in cable hangers attached to the bottom of the containers. At each container, the cable passes through a feed-thru stuffing tube installed in the floor below the container circuit breaker, and is terminated on a power terminal board

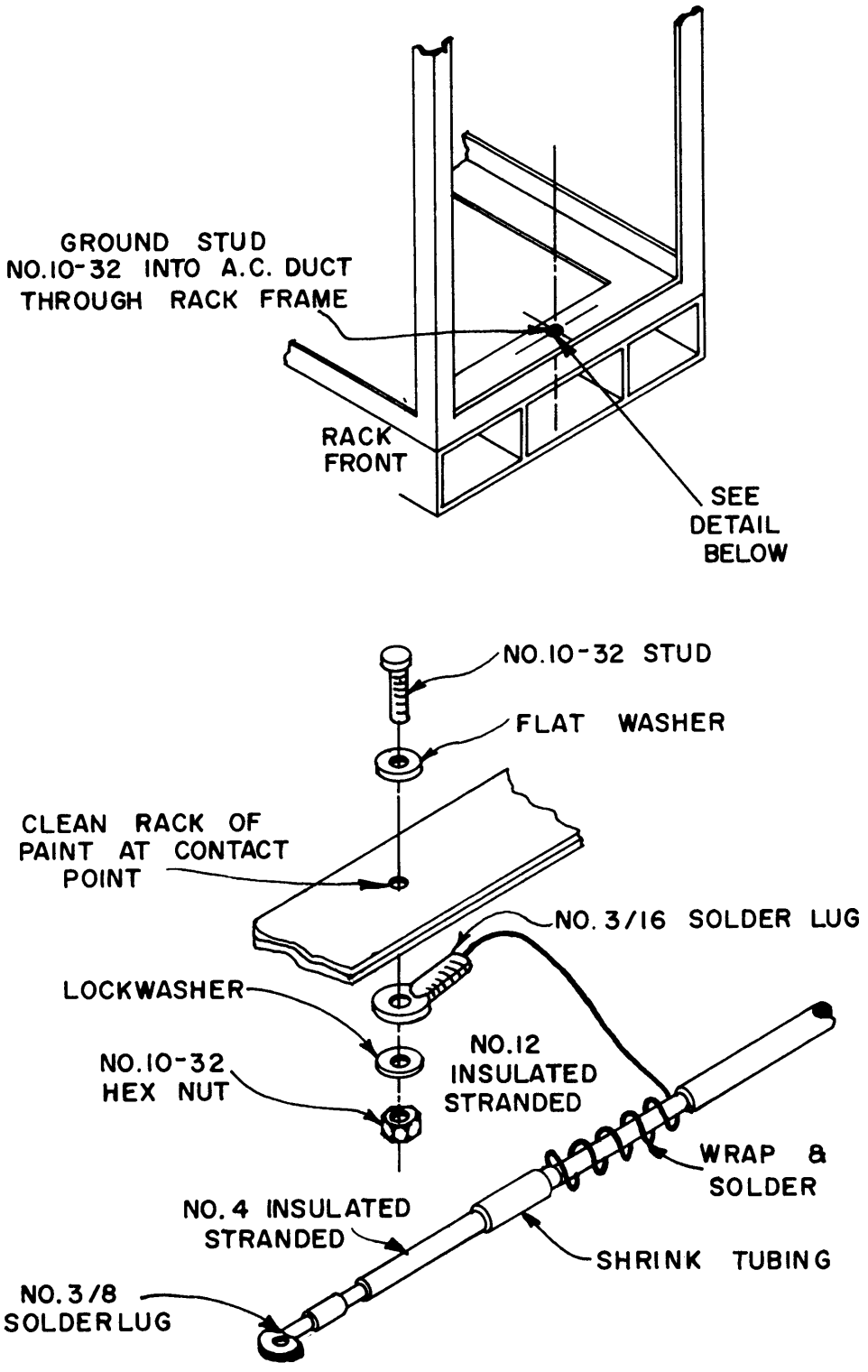


Figure 2-4. Rack Grounding Details, Receiving Central

2-24. POWER LINE INTERFERENCE FILTERS.

Power line interference filters are installed in all RED containers as shown in figure 2-8. Each filter unit consists of eight 6-microfarad capacitors that are mounted in a ferrous box. One filter capacitor is connected between each phase of the primary power and the GROUND (neutral) terminal, three capacitors are connected between the phases, and two capacitor are spares.

2-25. POWER DISTRIBUTION RECEIVING CENTRAL CONTAINERS.

Figures 2-9 and 2-10, which illustrate AC power distribution within container RB2, are typical for those containers having two power distribution panels. Figures 2-11 and 2-12 illustrate AC power distribution in container RF1 and are typical for containers having one power distribution panel. In all containers, single-phase 3-wire power is run to all equipment cabinets and operating equipment. Single-phase wiring is BLACK wire for the hot lead, WHITE for the neutral, and GREEN for protective ground, using number 12 wire. The air conditioner units are supplied 3-phase power using four number 4 wires. Five number 16 control wires are run from the control unit to the air conditioner unit. Power and control wiring for each air conditioner unit is terminated in a receptacle that is mounted under the container at the location of the unit. The wiring is then run to the air conditioner unit through a mating plug.

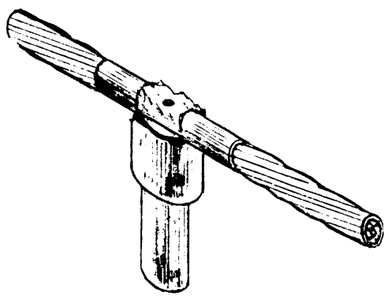
2-26. POWER DISTRIBUTION TABLES.

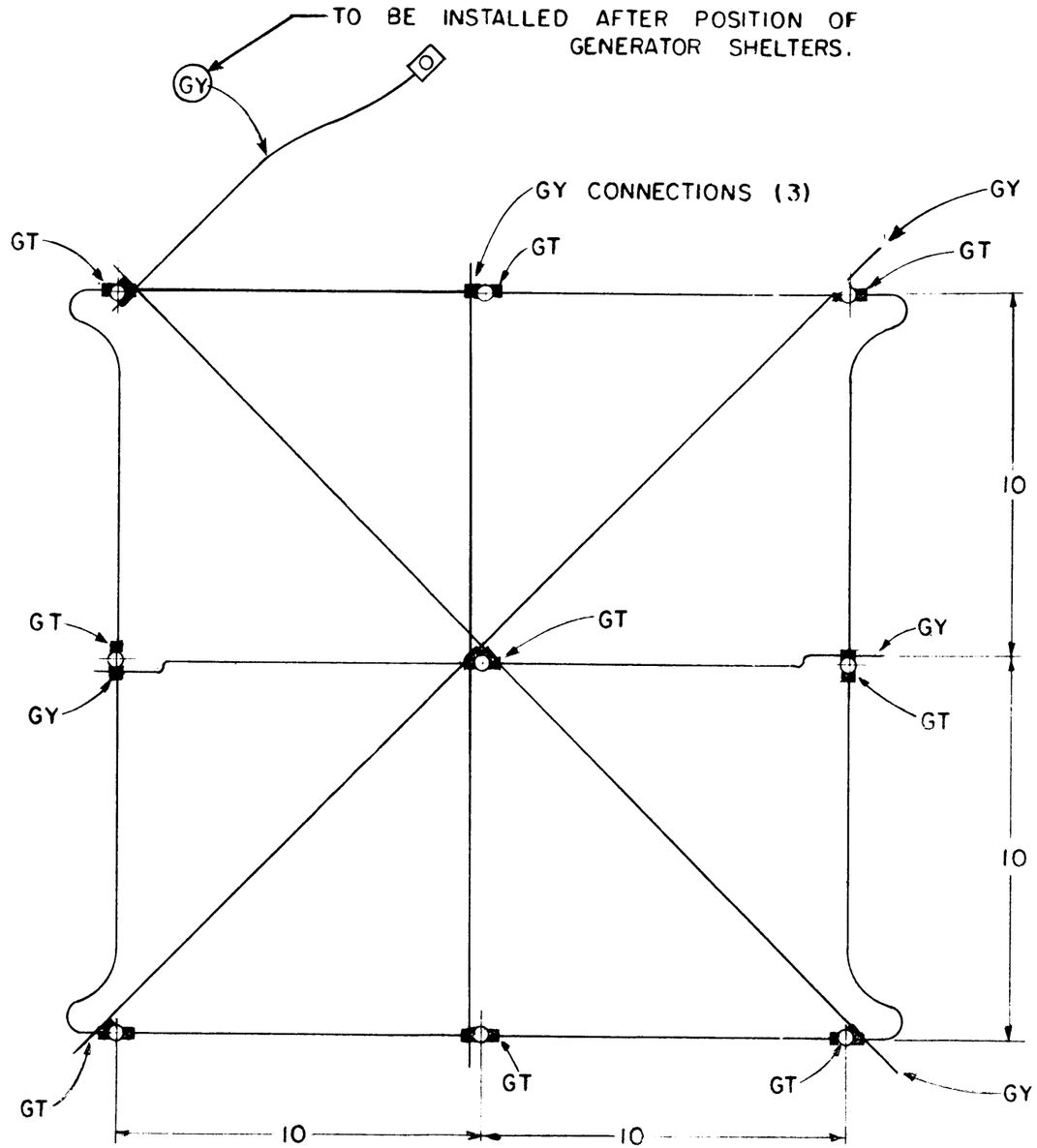
Tables 2-1 through 2-20 list the function, associated rack or equipment, power phase used, and current rating of each circuit breaker installed in the power distribution panels of the Receiving Central containers.

BILL OF MATERIALS

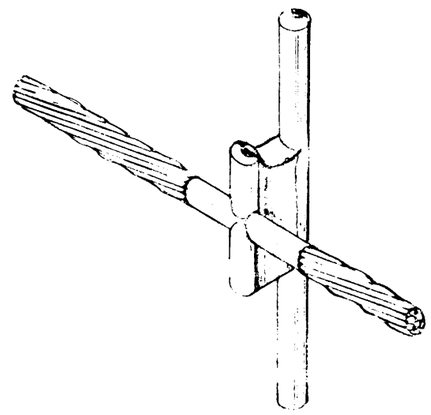
ITEM	QTY	DESCRIPTION
1	9	GROUND RODS, COPPER CLAD, 3/4"x10' LG.
2	200	COPPER CABLE, #, 4/0 BARE.
3	1	GY CONNECTION MOLD, ONLY. CADWELL GYE-182Q
4	1	DRIVING SLEEVE FOR 3/4 GROUND RODS. CADWELD #S-2927.
5	1	GT CONNECTION MOLD, ONLY, FOR 3/4" GROUND ROD TO 4/0 IN "T" CONNECTION. CADWELD GTC-182Q
6	1	E-Z CHANGE HANDLE CLAMP FOR GY & GT MOLDS. CLADWELD # L-160
7	12	CADWELD CARTRIDGE SIZE 150 FOR GY CONNECTION.
8	9	CADWELD CARTRIDGE SIZE 115 FOR GT CONNECTION.
9	1	LUG, 1/4"x1 1/4"@ 450 OFFSET, 1 HOLE TO PASS 1/2" STUD. CADWELD # 1-45-350
10	1	LA CONNECTION MOLD, 4/0 CABLE TO 1/4"x 1 1/4" LUG. CADWELD LAC-2QEF. (FROM TRANSMITTER SITE.)
11	1	CADWELD CARTRIDGE SIZE 115 FOR LA CONNECTION.

INSET GT CONNECTION



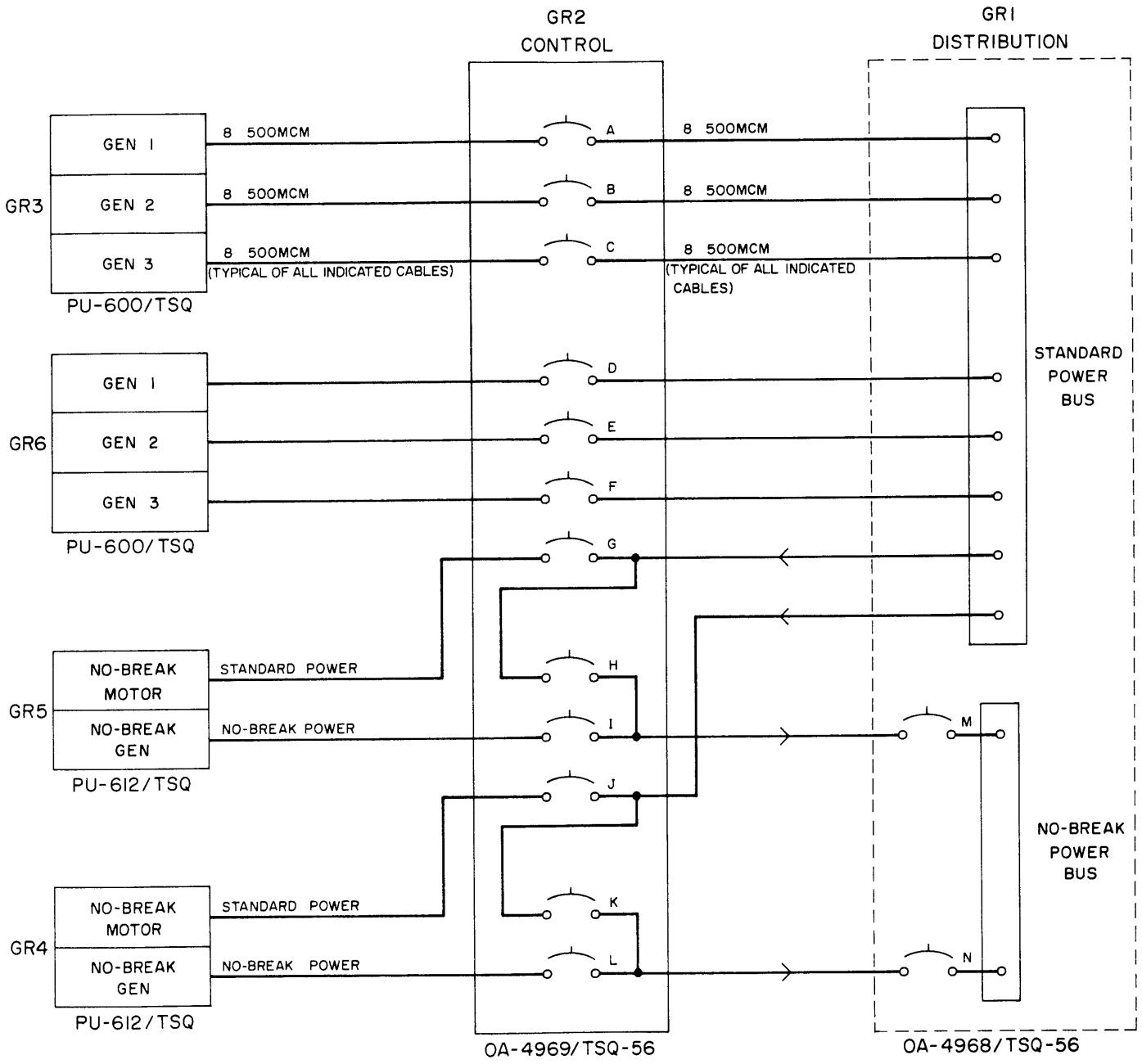


INSET GY CONNECTION



GROUND RODS TO BE DRIVEN INTO THE EARTH 12" BELOW THE SURFACE, THE CONNECTING CABLE GRID WILL BE AT LEAST THIS DEPTH.

Figure 2-5. Earth Ground Grid, Receiving Central AN/TSR-1



NOTES:

1. ALL CIRCUIT BREAKERS ARE 1600AMP, 3 PHASE, TYPE DB-50.

Figure 2-6. Power Distribution, From Generators to GR1, Receiving Central AN/TSR-1

NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL CIRCUIT BREAKERS ARE 225 AMP.
2. UNLESS OTHERWISE SPECIFIED, ALL CABLES ARE 4 CONDUCTOR, 4/0, TYPE RHW

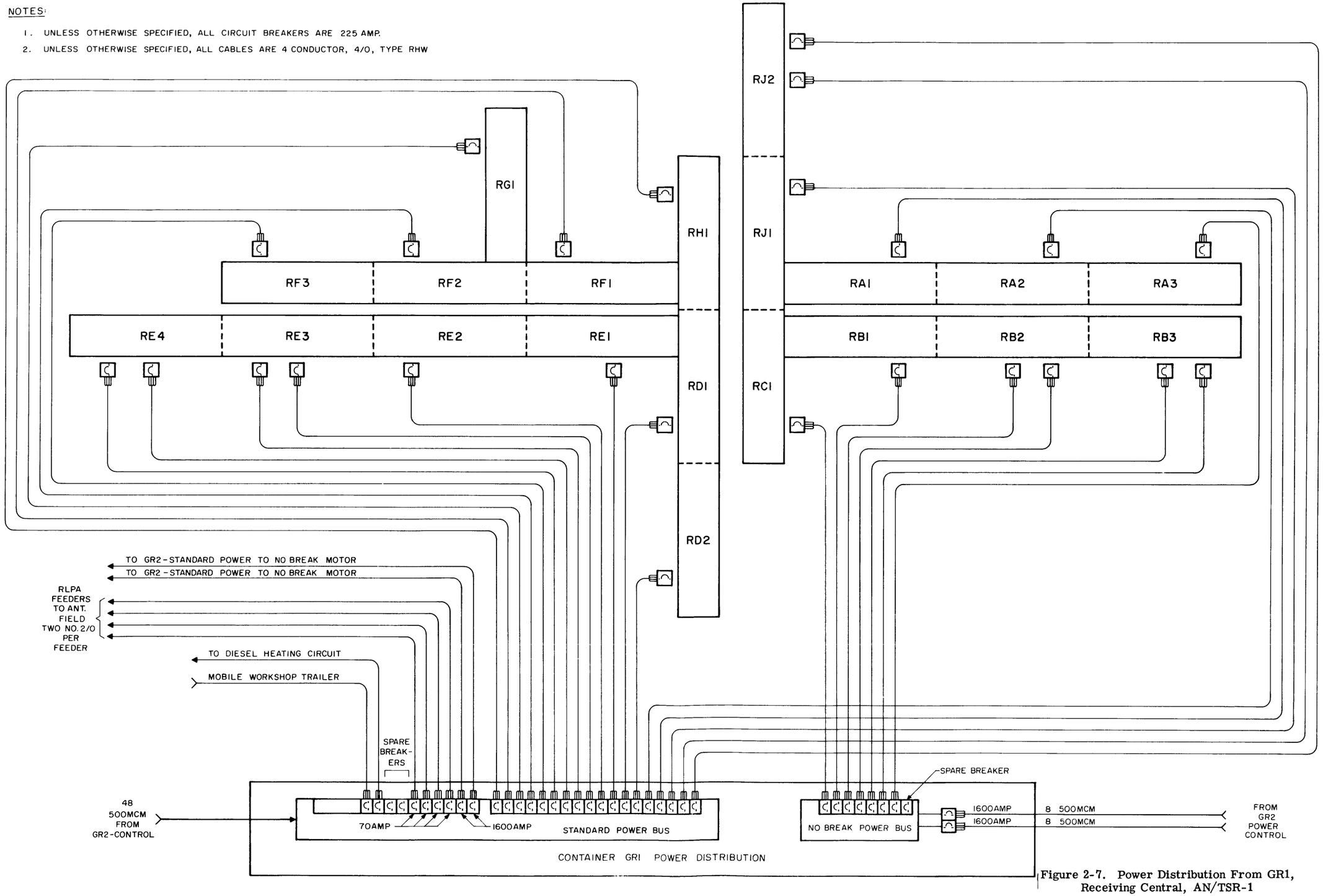
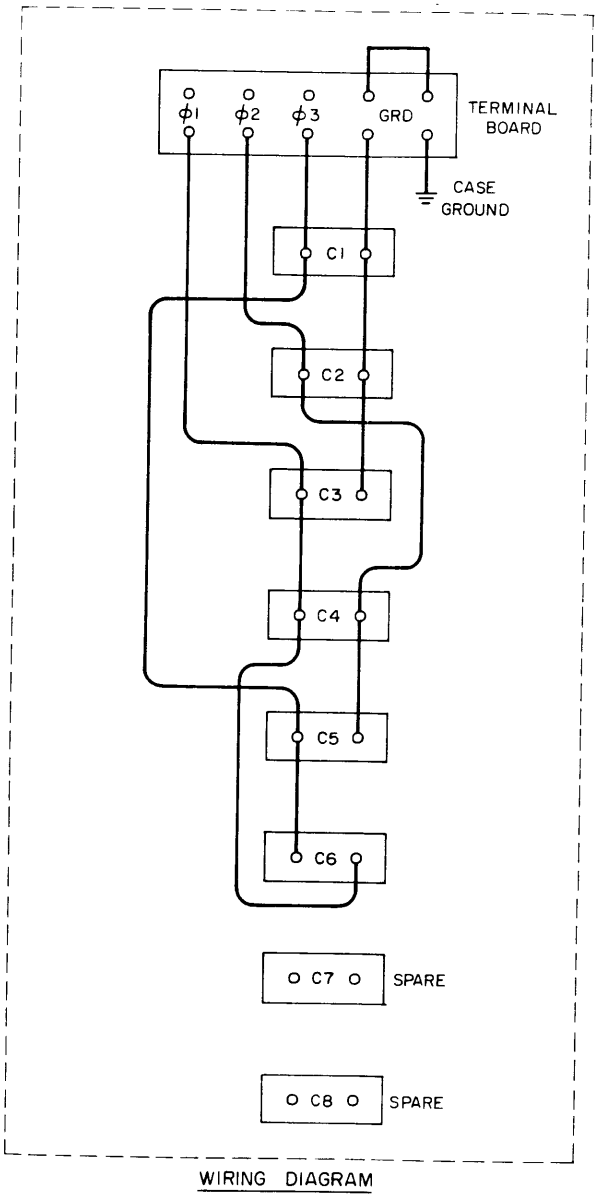
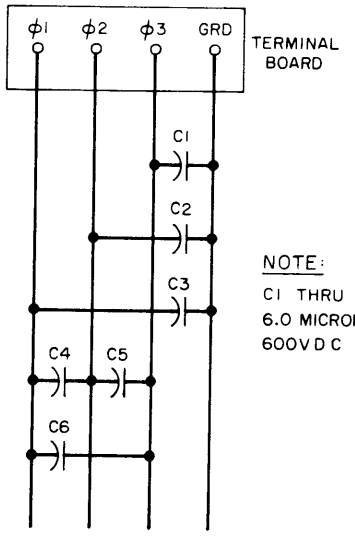


Figure 2-7. Power Distribution From GR1, Receiving Central, AN/TSR-1



WIRING DIAGRAM



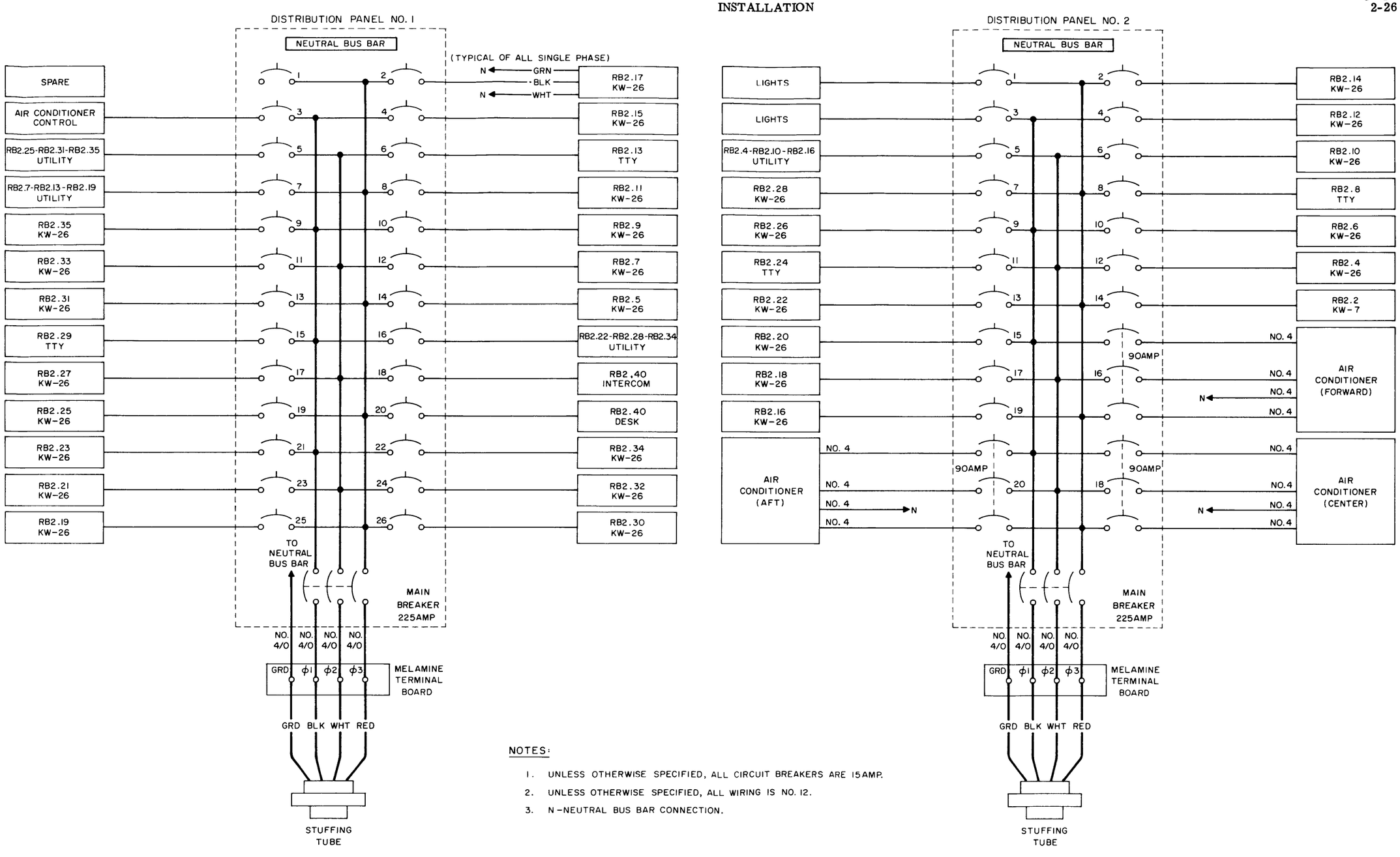
SCHEMATIC DIAGRAM

NOTE:
C1 THRU C8
6.0 MICROFARADS,
600V D C

FILTER ASSEMBLIES INSTALLED

CONTAINER	QUANTITY
RA1	1
RA2	1
RF1	1
RB1	1
RB2	2
RB3	2
RC1	1
RJ1	1
RJ2	2

Figure 2-8. Power Line Interference Filter Assembly, Receiving Central

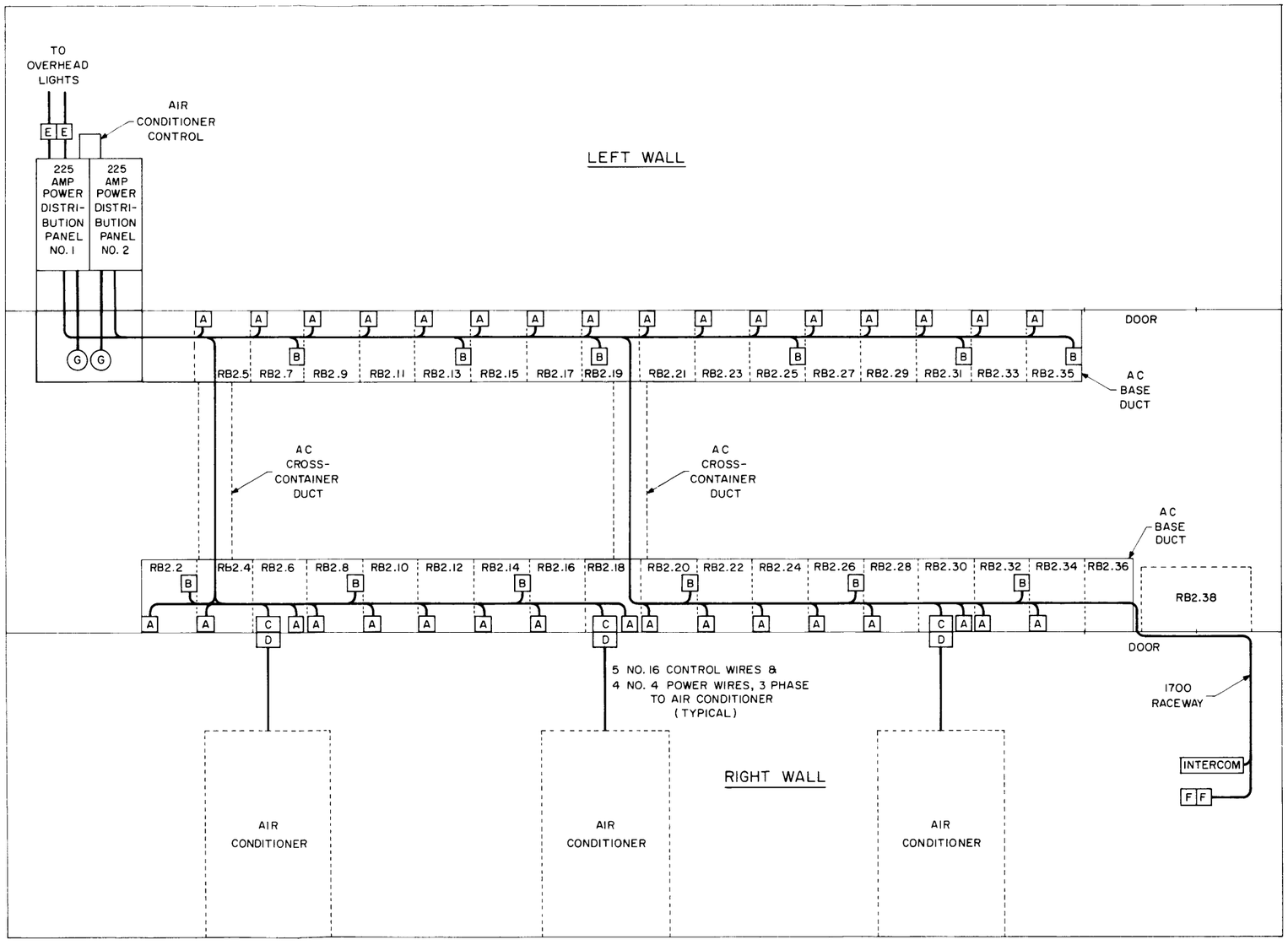


NOTES:

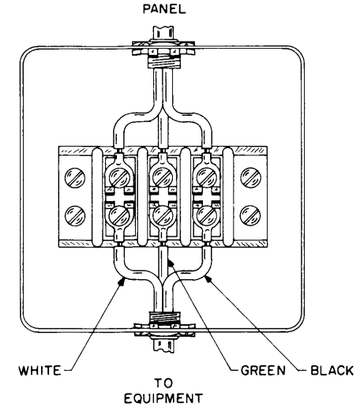
1. UNLESS OTHERWISE SPECIFIED, ALL CIRCUIT BREAKERS ARE 15AMP.
2. UNLESS OTHERWISE SPECIFIED, ALL WIRING IS NO. 12.
3. N-NEUTRAL BUS BAR CONNECTION.

MANUAL ART WORK

Figure 2-9. Power Distribution, Container RB2



TYPICAL AC
POWER JUNCTION BOX



NO. 12 WIRE COLOR CODE

BLACK – HOT
GREEN – PROTECTIVE GROUND
WHITE – NEUTRAL

LEGEND:

A — AC POWER JUNCTION BOX, CABINET EQUIPMENT.
B — AC POWER JUNCTION BOX, UTILITY.
C — CONNECTOR, AIR CONDITIONER.
D — PLUG, MATING, AIR CONDITIONER.
E — LIGHT SWITCH.
F — AC DUPLEX UTILITY OUTLET.
G — POWER INPUT FEED THRU.

GENERAL NOTES:

1. ALL WIRING, EXCEPT AS INDICATED, IS 3-WIRE, NO. 12, STRANDED.
2. UTILITY OUTLETS RB2.7, 2.13 & 2.19 ON COMMON 15 AMP BREAKER
   UTILITY OUTLETS RB2.25, 2.31 & 2.35 ON COMMON 15 AMP BREAKER
   UTILITY OUTLETS RB2.22, 2.28 & 2.34 ON COMMON 15 AMP BREAKER.
3. AC POWER LOCATED IN CENTER BASE DUCT.

Figure 2-10. Power Cabling, RB2

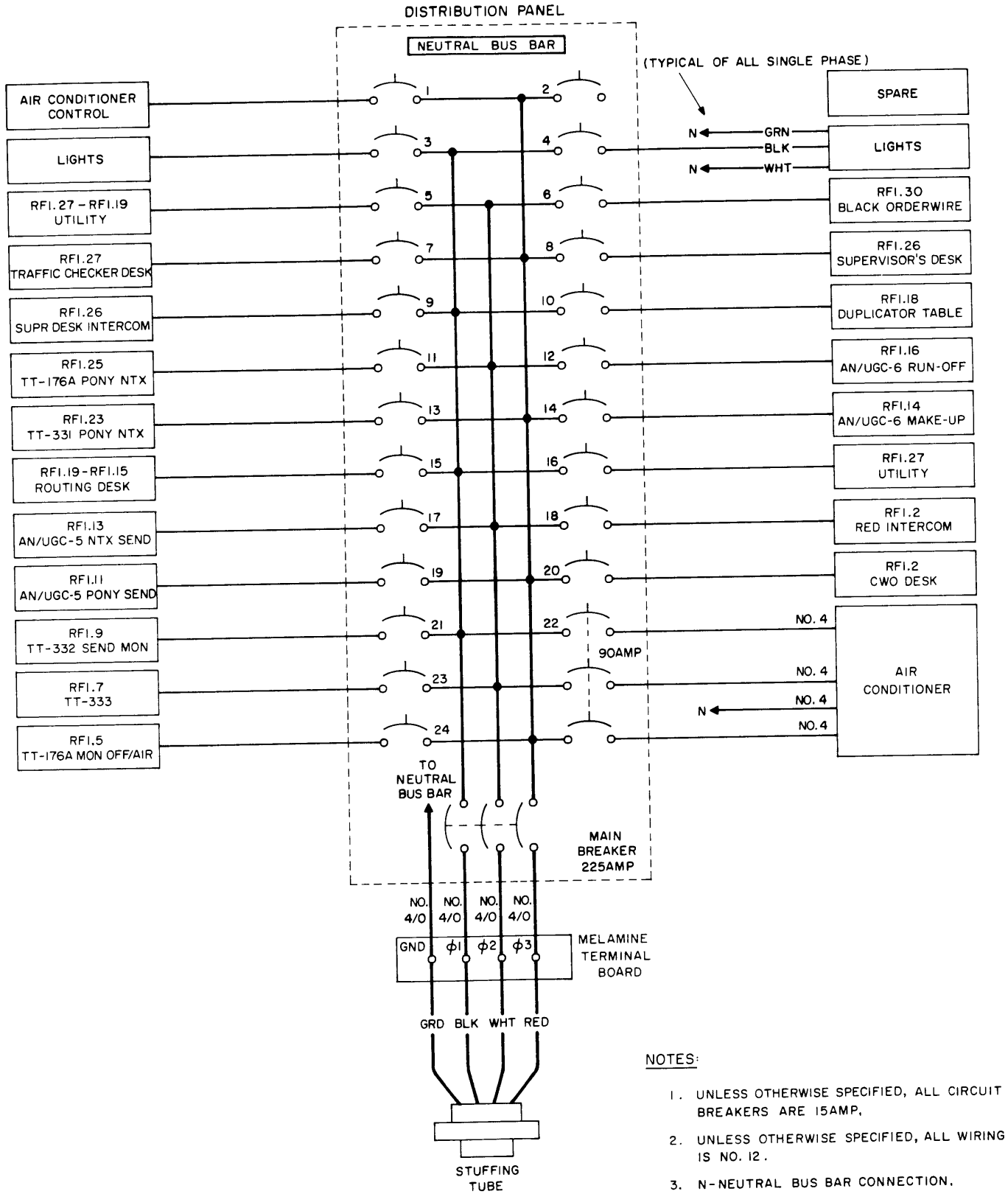
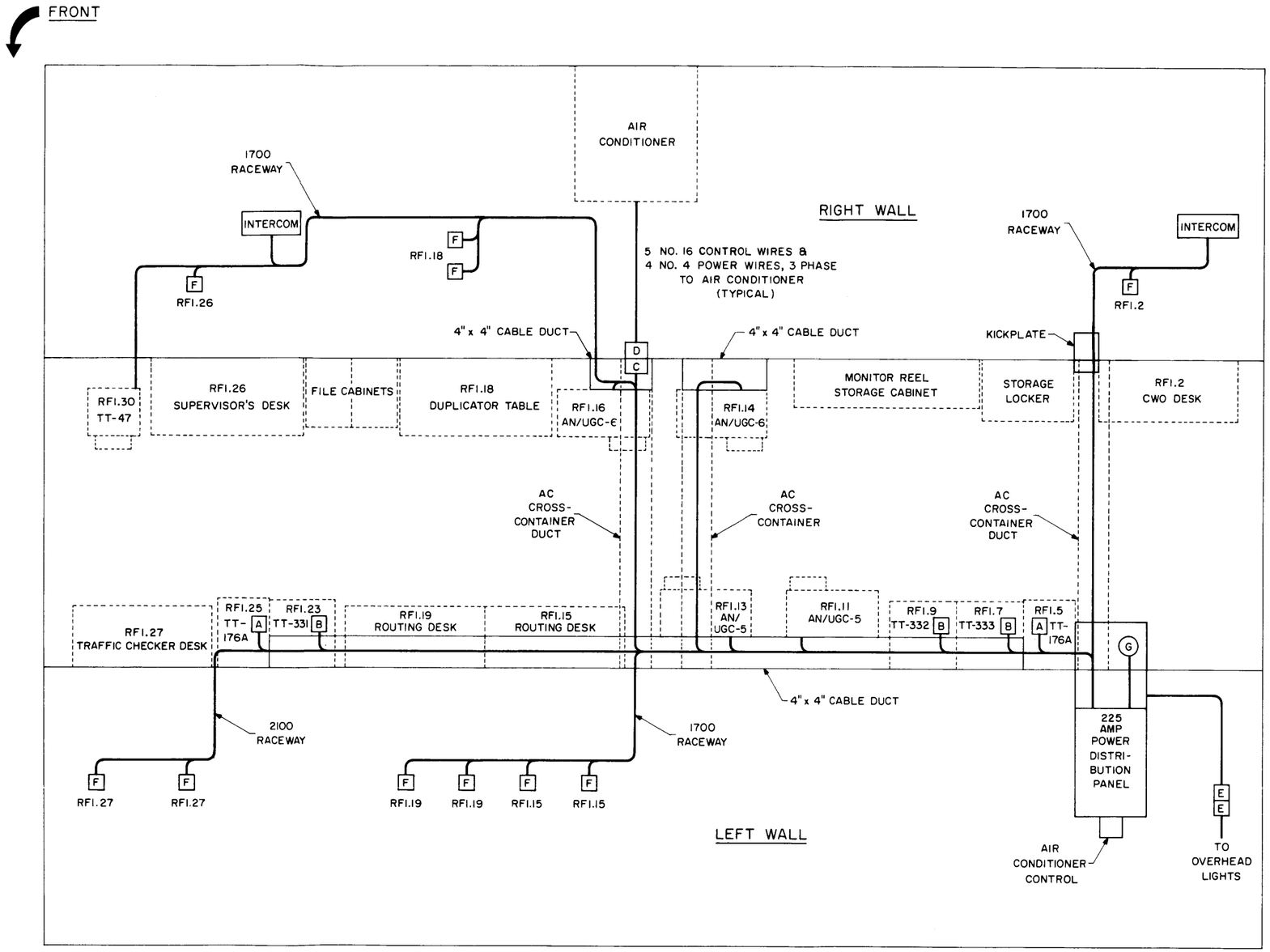
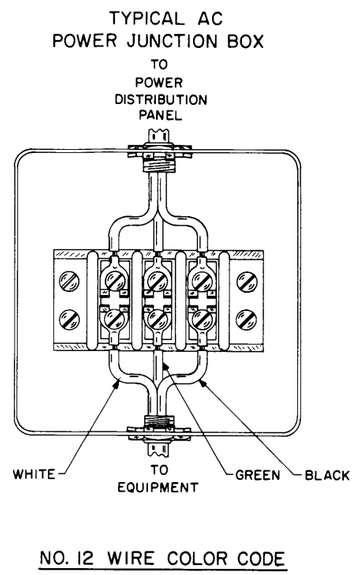


Figure 2-11. Power Distribution, Container RF1



TYPICAL AC
POWER JUNCTION BOX



NO. 12 WIRE COLOR CODE

BLACK – HOT
GREEN – PROTECTIVE GROUND
WHITE – NEUTRAL

LEGEND:

A — AC POWER JUNCTION BOX, CABINET EQUIPMENT.
B — AC TERMINAL BLOCK.
C — CONNECTOR, AIR CONDITIONER.
D — PLUG, MATING, AIR CONDITIONER.
E — LIGHT SWITCH.
F — AC DUPLEX UTILITY OUTLET.
G — POWER INPUT FEED THRU.

GENERAL NOTES:

1. ALL WIRING, EXCEPT AS INDICATED, IS 3-WIRE, NO. 12, STRANDED.

Figure 2-12. Power Cabling, RF1

TABLE 2-1. PRIMARY POWER DISTRIBUTION OA-3887/TSR-1 (CONTAINER RA1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	1	15		SPARE
1	2	1	15	RA1.28	TT-329
1	3	2	15		SPARE
1	4	2	15	RA1.26	TT-329
1	5	3	15		SPARE
1	6	3	15	RA1.22	TT-329
1	7	1	15	LIGHTS	GROUP A
1	8	1	15	RA1.20	TT-329
1	9	2	15	LIGHTS	GROUP B
1	10	2	15	RA1.16	TT-329
1	11	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	12	3	15	RA1.32	TT-333
1	13	1	15	RA1.13 RA1.23	UTILITY
1	14	1	15	RA1.30	TT-332
1	15	2	15	RA1.19	DITTO MACHINE
1	16	2	15	RA1.28	TT-333
1	17	3	15	RA1.17	TT-329
1	18	3	15	RA1.26	TT-333
1	19	1	15	RA1.17	AN/UGC-6
1	20	1	15	RA1.24	TT-332
1	21	2	15	RA1.15	TT-47
1	22	2	15	RA1.22	TT-333
1	23	3	15	RA1.13	RED INTERCOM
1	24	3	15	RA1.20	TT-333
1	25	1	15	RA1.13	DESK
1	26	1	15	RA1.18	TT-332
1	27	2	15	RA1.11	TT-329
1	28	2	15	RA1.16	TT-333
1	29	3	15	RA1.9	AN/UGC-6

TABLE 2-1. PRIMARY POWER DISTRIBUTION OA-3887/TSR-1 (CONTAINER RA1) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	30	3	15	RA1.14	TT-306
1	31	1	15	RA1.7	AN/FGC-73
1	32	1	15	RA1.12	TT-306
1	33	2	15	RA1.5	TT-331
1	34	2	15	RA1.10	TT-306
1	35	3	15	RA1.3	TT-331
1	36	3	15	RA1.8	TT-306
1	37	1	15	RA1.1	TT-331
1	38	ALL	90	AIR CONDITIONER	MAIN POWER
1	39	2	15	RA1.16 RA1.22 RA1.28	UTILITY
1	41	3	15	RA1.32	TT-329
1	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-2. PRIMARY POWER DISTRIBUTION OA-4936/TSR-1 (CONTAINER RA2)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	2	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	2	2	15	RA2.3	AN/UGC-6
1	3	3	15	RA2.6 RA2.31 RA2.33	BENCH & RED INTER-COM
1	4	3	15	RA2.1	TT-171A
1	5	1	15	RA2.25 RA2.27 RA2.29	BENCH NO. 3
1	6	1	20	RA2.8	AN/GGA-1
1	7	2	15	RA2.19 RA2.21 RA2.23	BENCH NO. 2
1	8	2	15	RA2.6	TSEC/HW-19
1	9	3	15	RA2.13 RA2.15 RA2.17	BENCH NO. 1

TABLE 2-2. PRIMARY POWER DISTRIBUTION OA-4936/TSR-1 (CONTAINER RA2) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	10	3	15	RA2.4	TT-171A
1	11	1	20	RA2.9	AN/GGA-1
1	12	1	15		SHOP LIGHTS
1	13	2	15	RA2.7	AN/UGC-6
1	14	2	15	LIGHTS	GROUP A
1	15	3	15	RA2.5	TT-171A
1	16	3	15	LIGHTS	GROUP B
1	17	ALL	90	AIR CONDITIONERS	MAIN POWER
1	18	ALL	90	AIR CONDITIONERS	MAIN POWER
1	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-3. PRIMARY POWER DISTRIBUTION OA-7041/TSR-1 (CONTAINER RA3)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
BLACK	1	2	15		SPARE
BLACK	2	2	15		SPARE
BLACK	3	3	15		SPARE
BLACK	4	3	15		SPARE
BLACK	5	1	15		SPARE
BLACK	6	1	15		SPARE
BLACK	7	2	15	RA3.19 RA3.23 RA3.27	UTILITY
BLACK	8	2	15	RA3.23	TEST EQUIPMENT
BLACK	9	3	15	RA3.27	RECEIVERS
BLACK	10	3	15	RA3.25	RECEIVERS
BLACK	11	1	15	RA3.31	UTILITY
BLACK	12	1	15	RA3.21	RECEIVERS
BLACK	13	2	15	RA3.19	MULTICOUPLERS
BLACK	14	2	15	RA3.15	BLACK CONTROL
BLACK	15	3	15	RA3.13	TT-47

TABLE 2-3. PRIMARY POWER DISTRIBUTION OA-7041/TSR-1 (CONTAINER RA3) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
BLACK	16	3	15	RA3.11 RA3.15	UTILITY
BLACK	17	1	15	LIGHTS	GROUP A
BLACK	18	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
BLACK	19	2	15	LIGHTS	GROUP B
BLACK	20	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
BLACK	21	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
BLACK	22	ALL	100	RA3.20	FEED TO RED DISTRIBUTION PANEL
BLACK	MAIN	ALL	225		RA3 MAIN POWER
RED	1	1	15		SPARE
RED	2	1	15		SPARE
RED	3	2	15		SPARE
RED	4	2	15		SPARE
RED	5	3	15		SPARE
RED	6	3	15	RA3.6 RA3.16 RA3.18	UTILITY
RED	7	1	15	RA3.8	TT-171
RED	8	1	15	RA3.12	TT-171
RED	9	2	15	RA3.10	AN/UGC-6
RED	10	2	15	RA3.14	AN/UGC-6
RED	11	3	15	RA3.16	RED CONTROL
RED	12	3	15	RA3.18	KW-26
RED	MAIN	ALL	100		RED POWER CONTROL

TABLE 2-4. PRIMARY POWER DISTRIBUTION AN/TGC-16 (CONTAINER RB1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	3	15	LIGHTS	GROUP A
1	2	3	15	LIGHTS	GROUP B

TABLE 2-4. PRIMARY POWER DISTRIBUTION AN/TGC-16 (CONTAINER RB1) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	3	1	15	RB1.40	KW-37
1	4	1	15	RB1.14 RB1.20	UTILITY
1	5	2	15	RB1.38	KW-37
1	6	2	15	RB1.20	TT-176A
1	7	3	15	RB1.36	KW-37
1	8	3	15	RB1.18	TT-176A
1	9	1	15	RB1.34	KW-37
1	10	1	15	RB1.16	RED INTERCOM
1	11	2	15	RB1.32	LOOP SUPPLY
1	12	2	15	RB1.16	TT-176A
1	13	3	15	RB1.26 RB1.30	UTILITY
1	14	3	15	RB1.14	AN/GGM-1
1	15	1	15	RB1.30	KG-14
1	16	1	15	RB1.12	FUTURE
1	17	2	15	RB1.28	FUTURE
1	18	2	15	RB1.10	METER
1	19	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	20	3	15	RB1.8	METER
1	21	1	15	RB1.26	TELETYPE AND BLACK INTERCOM
1	22	1	15	RB1.6	METER
1	23	2	15	RB1.24	TT-176A
1	24	2	15	RB1.4	METER
1	25	3	15	RB1.22	TT-176A
1	26	3	15	RB1.2	FUTURE
1	27	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
1	28	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
1	MAIN	ALL	225		MAIN POWER

TABLE 2-5. PRIMARY POWER DISTRIBUTION OA-4937/TSR-1 (CONTAINER RB2)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	3	15		SPARE
1	2	3	15	RB2.17	KW-26
1	3	1	15	AIR CONDITIONER CONTROL UNIT	
1	4	1	15	RB2.15	KW-26
1	5	2	15	RB2.25 RB2.31 RB2.35	UTILITY
1	6	2	15	RB2.13	TT-176 TELETYPE
1	7	3	15	RB2.7 RB2.13	UTILITY
1	8			RB2.19	
1	8	3	15	RB2.11	KW-26
1	9	1	15	RB2.35	KW-26
1	10	1	15	RB2.9	KW-26
1	11	2	15	RB2.33	KW-26
1	12	2	15	RB2.7	KW-26
1	13	3	15	RB2.31	KW-26
1	14	3	15	RB2.5	KW-26
1	15	1	15	RB2.29	TT-176A
1	16	1	15	RB2.22 RB2.28 RB2.34	UTILITY
1	17	2	15	RB2.27	KW-26
1	18	2	15	RB2.40	RED INTERCOM
1	19	3	15	RB2.25	KW-26
1	20	3	15	RB2.40	DESK
1	21	1	15	RB2.23	KW-26
1	22	1	15	RB2.36	KW-26
1	23	2	15	RB2.21	KW-26
1	24	2	15	RB2.34	KW-26
1	25	3	15	RB2.19	KW-26
1	26	3	15	RB2.32	KW-26

TABLE 2-5. PRIMARY POWER DISTRIBUTION OA-4937/TSR-1 (CONTAINER RB2) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	MAIN	ALL	225	ALL	MAIN POWER
2	1	3	15	LIGHTS	GROUP A
2	2	3	15	RB2.14	KW-26
2	3	1	15	LIGHTS	GROUP B
2	4	1	15	RB2.12	KW-26
2	5	2	15	RB2.4 RB2.10 RB2.16	UTILITY
2	6	2	15	RB2.10	KW-26
2	7	3	15	RB2.28	KW-26
2	8	3	15	RB2.8	TT-176A
2	9	1	15	RB2.26	KW-26
2	10	1	15	RB2.6	KW-26
2	11	2	15	RB2.24	TT-176A
2	12	2	15	RB2.4	KW-26
2	13	3	15	RB2.22	KW-26
2	14	3	15	RB2.2	KW-7
2	15	1	15	RB2.20	KW-26
2	16	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
2	17	2	15	RB2.18	KW-26
2	18	ALL	90	AIR CONDITIONER (CENTER)	MAIN POWER
2	19	3	15	RB2.16	KW-26
2	20	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
2	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-6. PRIMARY POWER DISTRIBUTION OA-4938/TSR-1 (CONTAINER RB3)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	1	15		SPARE
1	2	1	15	RB3.19	KW-26

TABLE 2-7. PRIMARY POWER DISTRIBUTION OA-4938/TSR-1 (CONTAINER RB3) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	3	2	15		SPARE
1	4	2	15	RB3.17	KW-26
1	5	3	15	RB3.27 RB3.33 RB3.39	UTILITY
1	6	3	15	RB3.15	TT-176A
1	7	1	15	RB3.5 RB3.11 RB3.15	UTILITY
1	8	1	15	RB3.13	KW-26
1	9	2	15	RB3.41	KW-26
1	10	2	15	RB3.11	KW-26
1	11	3	15	RB3.39	KW-26
1	12	3	15	RB3.9	KW-26
1	13	1	15	RB3.37	KW-26
1	14	1	15	RB3.7	KW-26
1	15	2	15	RB3.35	TT-176A
1	16	2	15	RB3.5	KW-26
1	17	3	15	RB3.33	KW-26
1	18	3	15	RB3.42	KW-26
1	19	1	15	RB3.31	KW-26
1	20	1	15	RE3.40	KW-26
1	21	2	15	RE3.29	TT-176A
1	22	2	15	RB3.38	KW-26
1	23	3	15	RB3.27	KW-26
1	24	3	15	RB3.36	KW-26
1	25	1	15	RB3.25	KW-26
1	26	1	15	RB3.34	KW-26
1	27	2	15	RB3.23	KW-26
1	28	2	15	RB3.32	KW-26
1	29	3	15	RB3.21	KW-26
1	30	3	15	RB3.30	TT-176A

TABLE 2-6. PRIMARY POWER DISTRIBUTION OA-4938/TSR-1 (CONTAINER RB3) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	MAIN	ALL	225	ALL	MAIN POWER
2	1	2	15	LIGHTS	GROUP A
2	2	2	15	RB3.18	KW-26
2	3	3	15	LIGHTS	GROUP B
2	4	3	15	RB3.16	KW-26
2	5	1	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
2	6	1	15	RB3.14	KW-26
2	7	2	15	RB3.28 RB3.34 RB3.40	UTILITY
2	8	2	15	RB3.12	TT-176A
2	9	3	15	RB3.21 RB3.22	UTILITY
2	10	3	15	RB3.10	KW-26
2	11	1	15	RB3.28	KW-26
2	12	1	15	RB3.8	KW-26
2	13	2	15	RB3.26	KW-26
2	14	2	15	RB3.6	KW-26
2	15	3	15	RB3.24	KW-26
2	16	3	15	RB3.4	KW-26
2	17	1	15	RB3.22	KW-26
2	18	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
2	19	2	15	RB3.4 RB3.10 RB3.16	UTILITY
2	20	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
2	21	3	15	RB3.20	KW-26
2	22	ALL	90	AIR CONDITIONER (CENTER)	MAIN POWER
2	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-7. PRIMARY POWER DISTRIBUTION OA-4939/TSR-1 (CONTAINER RC1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	1	15		SPARE
1	2	1	15		SPARE
1	3	2	15		SPARE
1	4	2	15	RC1.8	RED INTERCOM
1	5	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	6	3	15	RC1.8	AN/UGC-1A
1	7	1	15	LIGHTS	GROUP A
1	8	1	15	RC1.8 RC1.11 RC1.14	UTILITY
1	9	2	15	LIGHTS	GROUP B
1	10	2	15	RC1.7	KWR-22
1	11	3	15	RC1.15	KWT-22
1	12	3	15	RC1.6	KWT-22
1	13	1	15	RC1.14	AN/UGC-1A
1	14	1	15	RC1.5	AN/UGC-1A
1	15	2	15	RC1.13	KWR-22
1	16	2	15	RC1.4	KWR-22
1	17	3	15	RC1.12	KWT-22
1	18	3	15	RC1.2 RC1.5	UTILITY
1	19	1	15	RC1.11	AN/UGC-1A
1	20	1	15	RC1.3	KWT-22
1	21	2	15	RC1.10	KWR-22
1	22	2	15	RC1.2	AN/UGC-1A
1	23	3	15	RC1.9	KWT-22
1	24	3	15	RC1.1	KWR-22
1	25	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
1	26	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
1	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-8. PRIMARY POWER DISTRIBUTION OA-4941/TSR-1 (CONTAINER RD1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	2	15	RD1.7	GRINDER
1	2	2	15	RD1.1	3 OUTLETS
1	3	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	4	3	15	RD1.3	3 OUTLETS
1	5	1	15	LIGHTS	GROUP A
1	6	1	15	RD1.5	3 OUTLETS
1	7	2	15	LIGHTS	GROUP B
1	8	2	15	RD1.7	3 OUTLETS
1	9	3	15	RD1.4	CART "C"
1	10	3	15	RD1.1	BLACK INTERCOM
1	11	1	15	RD1.6	CART "B"
1	12	ALL	90	AIR CONDITIONER	MAIN POWER
1	13	2	15	RD1.8	CART "A"
1	14	3	15	RD1.12	DRILL PRESS
1	MAIN	ALL	225		

TABLE 2-9. PRIMARY POWER DISTRIBUTION OA-4942/TSR-1 (CONTAINER RD2)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	2	3	15		SPARE
1	3	1	15	LIGHTS	GROUP A
1	4	ALL	90	AIR CONDITIONER	
1	5	2	15	LIGHTS	GROUP B
1	6	3	15	RD2.2	DESK
1	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-10. PRIMARY POWER DISTRIBUTION AN/TGC-17 (CONTAINER RE1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	1	15	RE2.21 RE2.27	UTILITY
1	2	1	15	RE1.4 RE1.6	AN/FGC-60
1	3	2	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	4	2	15	RE1.8 RE1.10	AN/FGC-60
1	5	3	15	LIGHTS	GROUP A
1	6	3	15	RE1.12 RE1.14	AN/FGC-60
1	7	1	15	LIGHTS	GROUP B
1	8	1	15	RE1.16 RE1.18	AN/FGC-60
1	9	2	15	RE1.11	INTERCOM AND PATCH FIELD
1	10	2	15	RE1.20 RE1.22	AN/FGC-60
1	11	3	15	RE1.13	PATCH
1	12	3	15	RE1.24 RE1.26	AN/FGC-60
1	13	1	15	RE1.15	TEST
1	14	1	15	RE1.28	AN/FGC-60
1	15	2	15	RE1.17	PATCH
1	16	2	15	RE1.30	AN/FGC-60
1	17	3	15	RE1.19	FUTURE
1	18	3	15	RE1.32	AN/FGC-60
1	19	1	15	RE1.21	TELETYPE
1	20	1	15	RE1.34	AN/FGC-60
1	21	3	15	RE1.23	O/W AND BLACK INTER-COM
1	22	2	15	RE1.36 RE1.38	AN/FGC-60
1	23	3	15	RE1.25	TELETYPE
1	24	3	15	RE1.40 RE1.42	AN/FGC-60

TABLE 2-10. PRIMARY POWER DISTRIBUTION AN/TGC-17 (CONTAINER RE1) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	25	1	15	RE1.27	TELETYPE
1	26	1	15		SPARE
1	27	2	15	RE1.29	TELETYPE
1	28	2	15		SPARE
1	29	3	15	RE1.31	TELETYPE
1	30	3	15		SPARE
1	31	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
1	32	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
1	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-11. PRIMARY POWER DISTRIBUTION OA-4943/TSR-1 (CONTAINER RE2)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	1	15		AIR CONDITIONER CONTROL
1	2	1	15		LIGHTS
1	3	2	15	RE2.15	DEHYDRATOR
1	4	2	15	RE2.21	RECEIVER & INTERCOM
1	5	3	15	RE2.21, RE2.29	UTILITY
1	6	3	15	RE2.19	OUTLET
1	7	1	15	RE2.31	UHF
1	8	1	15	RE2.7	OUTLET
1	9	2	15	RE2.29	UHF
1	10	2	15	RE2.11	FRC-84A
1	11	3	15	RE2.27	VHF
1	12	3	15	RE2.7	FCC-17
1	13	1	15	RE2.25	TA-401
1	14	1	90		AIR CONDITIONER

TABLE 2-11. PRIMARY POWER DISTRIBUTION OA-4943/TSR-1 (CONTAINER RE2) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
		2	90		
		3	90		
1	15	2	15	RE2.23	OPR. POSITIONS
1	16	3	15		LIGHTS
1	17	1	15	RE2.11	FRC-84 CONTROL
1	18	3	15	RE2.13	FRC-84B
1	MAIN	ALL	225		

TABLE 2-12. PRIMARY POWER DISTRIBUTION OA-4944/TSR-1 (CONTAINER RE3)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	2	15	RE3.13 RE3.19	UTILITY
1	2	2	15	RE3.25 RE3.31 RE3.37	UTILITY
1	3	3	30	RE3.1	UTILITY
1	4	3	15	RE3.27	RECEIVERS
1	5	1	15	RE3.3	MULTICOUPLER
1	6	1	15	RE3.25	RECEIVERS
1	7	2	15	RE3.5	MULTICOUPLER
1	8	2	15	RE3.23	RECEIVERS
1	9	3	15	RE3.11	DEMULTIPLEXER
1	10	3	15	RE3.21	RECEIVERS
1	11	1	15	RE3.13	VLFC
1	12	1	15	RE3.19	RECEIVERS
1	13	2	15	RE3.15	RECEIVERS
1	14	2	15	RE3.6	BLACK INTERCOM
1	15	3	15	RE3.7	RECEIVERS
1	16	3	15	RE3.6	DESK

TABLE 2-12. PRIMARY POWER DISTRIBUTION OA-4944/TSR-1 (CONTAINER RE3) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	17	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
1	18	ALL	90	AIR CONDITIONER (REAR)	MAIN POWER
1	MAIN	ALL	225	ALL	MAIN POWER
2	1	1	15	LIGHTS	SECURITY GROUP
2	2	1	15	RE3.28	UTILITY
2	3	2	15	RE3.12	TELETYPE
2	4	2	30	RE3.30	AN/FRR-60
2	5	3	30	RE3.14	AN/FRR-60
2	6	3	15	RE3.32 RE3.35	UTILITY
2	7	1	15	RE3.16	UTILITY
2	8	1	15	RE3.29	RECEIVERS
2	9	2	30	RE3.18	AN/FRR-60
2	10	2	15	RE3.31	RECEIVERS
2	11	3	15	RE3.20	UTILITY
2	12	3	15	RE3.33	RECEIVERS
2	13	1	30	RE3.22	AN/FRR-60
2	14	1	15	RE3.35	RECEIVERS
2	15	2	15	RE3.24	UTILITY
2	16	2	15	RE3.37	RECEIVERS
2	17	3	30	RE3.26	AN/FRR-60
2	18	3	15	RE3.39	RECEIVERS
2	19	1	15	LIGHTS	GROUP A
2	20	1	15	LIGHTS	GROUP B
2	21	2	15	A/C CONTROL UNIT	A/C CONTROL
2	22	2	15	RE3.9	PATCH PANEL
2	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-13. PRIMARY POWER DISTRIBUTION AN/TSR-2 (CONTAINER RE4)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	2	15		FUTURE
1	2	2	15		FUTURE
1	3	3	15		FUTURE
1	4	3	15		FUTURE
1	5	1	15		FUTURE
1	6	1	15		FUTURE
1	7	2	15		FUTURE
1	8	2	30		FUTURE
1	9	3	15		FUTURE
1	10	3	15		FUTURE
1	11	1	30		FUTURE
1	12	1	30		FUTURE
1	13	2	15		FUTURE
1	14	2	15		FUTURE
1	15	3	30		FUTURE
1	16	3	30		FUTURE
1	17	1	15		FUTURE
1	18	1	15		FUTURE
1	19	2	15		FUTURE
1	20	2	15		FUTURE
1	21	1	30	RE4.14, RE4.16	AN/FRR-60(V)
1	22	1	30	RE4.10, RE4.12	AN/FRR-60(V)
1	23	2	30	RE4.6, RE4.8	AN/FRR-60(V)
1	24	2	15	RE4.8, RE4.12 RE4.16	UTILITY
1	25	3	15	RE4.4	AN/FRR-60(V)
1	26	3	15	LIGHTS	GROUP A
1	27	1	15	LIGHTS	GROUP B
1	28	1	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	29	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER

TABLE 2-13. PRIMARY POWER DISTRIBUTION AN/TSR-2 (CONTAINER RE4) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	30	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
1	MAIN	ALL	225		MAIN POWER
2	1	2	15		FUTURE
2	2	2	15		FUTURE
2	3	3	15		FUTURE
2	4	3	15		FUTURE
2	5	1	15		FUTURE
2	6	1	15		FUTURE
2	7	2	15		FUTURE
2	8	2	15		FUTURE
2	9	3	15		FUTURE
2	10	3	15		FUTURE
2	11	1	30		FUTURE
2	12	1	15		FUTURE
2	13	2	30		FUTURE
2	14	2	30		FUTURE
2	15	3	30		FUTURE
2	16	3	30		FUTURE
2	17	4	30		FUTURE
2	18	4	30		FUTURE
2	19	5	30		FUTURE
2	20	5	30		FUTURE
2	21	3	15	RE4.23, RE4.31	UTILITY
2	22	3	30		FUTURE
2	23	1	15	RE4.31, RE4.33	AN/UXH-2, TT-321
2	24	1	15	RE4.5, RE4.11, RE4.17	UTILITY
2	25	2	15	RE4.25	FUTURE
2	26	2	15	RE4.27	FAX EQUIPMENT
2	27	3	15	RE4.21	FUTURE

TABLE 2-13. PRIMARY POWER DISTRIBUTION AN/TSR-2 (CONTAINER RE4) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
2	28	3	15	RE4.23	FUTURE
2	29	1	15	RE4.17	CU-656
2	30	1	15	RE4.19	CU-656
2	31	2	15	RE4.13	CU-656
2	32	2	15	RE4.15	CU-656
2	33	3	15	RE4.9	CU-656
2	34	3	15	RE4.11	CU-656
2	MAIN	ALL	225		MAIN POWER

TABLE 2-14. PRIMARY POWER DISTRIBUTION OA-4945/TSR-1 (CONTAINER RF1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	2	3	15		SPARE
1	3	1	15	LIGHTS	GROUP A
1	4	1	15	LIGHTS	GROUP B
1	5	2	15	RF1.19 RF1.27	UTILITY
1	6	2	15	RF1.30	TT-47 O/W
1	7	3	15	RF1.27	TRAFFIC DESK
1	8	3	15	RF1.26	SUPERVISORS DESK
1	9	1	15	RF1.26	BLACK INTERCOM
1	10	1	15	RF1.18	DUPLICATOR TABLE
1	11	2	15	RF1.25	TT-176A PONY NTX
1	12	2	15	RF1.16	AN/UGC-6
1	13	3	15	RF1.23	TT-331
1	14	3	15	RF1.14	AN/UGC-6
1	15	1	15	RF1.15 RF1.19	ROUTING DESK

TABLE 2-14. PRIMARY POWER DISTRIBUTION OA-4945/TSR-1 (CONTAINER RF1) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	16	1	15	RF1.27	UTILITY
1	17	2	15	RF1.13	AN/UGC-5
1	18	2	15	RF1.2	RED INTERCOM
1	19	3	15	RF1.11	AN/UGC-5
1	20	3	15	RF1.2	CWO DESK
1	21	1	15	RF1.9	TT-332
1	22	ALL	90	AIR CONDITIONER	MAIN POWER
1	23	2	15	RF1.7	TT-333
1	24	3	15	RF1.5	TT-176A MON OFF/AIR
1	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-15. PRIMARY POWER DISTRIBUTION OA-4950/TSR-1 (CONTAINER RF2)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	2	3	15		LIGHTS
1	3	1	15	RF2.12	DESK
1	4	1	15		LIGHTS
1	5	2	15	RF2.12	BLACK INTERCOM
1	6	2	15		SPARE
1	7	3	15	RF2.10	TT-47
1	8	3	15	RF2.17	CW CONV. CAB.
1	9	1	15	RF2.8	UGC-8
1	10	1	15	RF2.15	CW ASR TTY
1	11	2	15	RF2.6	UGC-8
1	12	2	15	RF2.13	UGC-6

TABLE 2-15. PRIMARY POWER DISTRIBUTION OA-4950/TSR-1 (CONTAINER RF2) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	13	3	15	RF2.17, 2.19, 2.23	UTILITY
1	14	3	15	RF2.11	TT-47
1	15	1	15	RF2.23	OPERATORS POSITION
1	16	1	15	RF2.9	UGC-6
1	17	2	15	RF2.21	OPERATORS POSITION
1	18	2	15	RF2.7	UGC-8
1	19	3	15	RF2.19	OPERATORS POSITION
1	20	3	15	RF2.5	UGC-8
1	21	ALL	90		AIR CONDITIONER NO. 1
1	22	ALL	90		AIR CONDITIONER NO. 2
1	MAIN	ALL	225		

TABLE 2-16. PRIMARY POWER DISTRIBUTION OA-4951/TSR-1 (CONTAINER RF3)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	1	15	LIGHTS	STORAGE AREA
1	2	1	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	3	2	15	LIGHTS	GROUP A
1	4	2	15	LIGHTS	GROUP B
1	5	3	15	RF3.1 RF3.3 RF3.5	UTILITY
1	6	3	15		SPARE
1	7	1	15	RF3.5	OPERATORS POSITION
1	8	ALL	90	AIR CONDITIONER	MAIN POWER
1	9	2	15	OPERATORS POSITION RF3.3	OPERATORS POSITION
1	11	3	15	OPERATORS POSITION RF3.1	OPERATORS POSITION
1	MAIN	ALL	225		MAIN POWER

TABLE 2-17. PRIMARY POWER DISTRIBUTION OA-4966/TSR-1 (CONTAINER RG1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	1	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	2	1	15	RG1.11	BLACK INTERCOM
1	3	2	15	RG1.6	RED INTERCOM
1	4	2	15	RG1.12	DRAFTING TABLE
1	5	3	15	RG1.13	VAULT LIGHTS
1	6	3	15	RG1.6 RG1.14	DESKS
1	7	1	15		LIGHTS
1	8	ALL	90	AIR CONDITIONER	MAIN POWER
1	9	2	15	RG1.9 RG1.11	DESKS
1	10	3	15	RG1.1 RG1.7	TABLE & DESK
1	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-18. PRIMARY POWER DISTRIBUTION OA-4967/TSR-1 (CONTAINER RH1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	2	15	RH1.1	PRINTER TEST
1	2	2	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	3	3	15	RH1.9	AIR COMPRESSOR
1	4	3	15	LIGHTS	GROUP A
1	5	1	20	RH1.7	TEST BENCH
1	6	1	15	LIGHTS	GROUP B
1	7	2	15	RH1.3 RH1.7	DT-103
1	8	2	20	RH1.5	TD TEST
1	9	3	15	RH1.5	DT-603
1	10	3	15	RH1.3	REPERFORATOR TEST

TABLE 2-18. PRIMARY POWER DISTRIBUTION OA-4967/TSR-1 (CONTAINER RH1) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	11	1 & 2	15	RH1.15	SPRAY RINSE
1	12	1 & 2	20	RH1.1	WATER HEATER
1	13	1 & 3	30	RH1.13	SONIC CLEANER
1	14	3	15	RH1.4	BLACK INTERCOM
1	15	2 & 3	70	RH1.17	AIR DRYER
1	16	ALL	90	AIR CONDITIONER	MAIN POWER
1	MAIN	ALL	225	ALL	MAIN POWER

TABLE 2-19. PRIMARY POWER DISTRIBUTION AN/TGC-18 (CONTAINER RJ1)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	1	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	2	1	15		SPARE
1	3	2	15	LIGHTS	GROUP A
1	4	2	15	RJ1.26	TELETYPE
1	5	3	15	LIGHTS	GROUP B
1	6	3	15	RJ1.19	TTY
1	7	1	15	RJ1.24	TTY
1	8	1	15	RJ1.17	RED INTERCOM
1	9	2	15	RJ1.22	TTY
1	10	2	15	RJ1.17	DESK
1	11	3	15	RJ1.20	TTY
1	12	3	15	RJ1.17	UTILITY
1	13	1	15	RJ1.18	TTY
1	14	1	15	RJ1.15	TT-329
1	15	2	15	RJ1.16	TTY
1	16	2	15	RJ1.15	AN/FGC-73

TABLE 2-19. PRIMARY POWER DISTRIBUTION AN/TGC-18 (CONTAINER RJ1) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	17	3	15	RJ1.14	TT-331
1	18	3	15	RJ1.13	TT-331
1	19	1	15	RJ1.12	TT-331
1	20	1	15	RJ1.11	TT-331
1	21	2	15	RJ1.10	TT-331
1	22	2	15	RJ1.9	TT-331
1	23	3	15	RJ1.8	TT-331
1	24	3	15	RJ1.7	TT-331
1	25	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
1	26	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
1	MAIN	ALL	225		MAIN POWER

TABLE 2-20. PRIMARY POWER DISTRIBUTION AN/TGC-19 (CONTAINER RJ2)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	1	2	15		SPARE
1	2	2	15	RJ2.17	TT-329
1	3	3	15	AIR CONDITIONER CONTROL UNIT	A/C CONTROL
1	4	3	15	RJ2.15	TT-333
1	5	1	15	LIGHTS	GROUP A
1	6	1	15	RJ2.15	TT-329
1	7	2	15	LIGHTS	GROUP B
1	8	2	15	RJ2.13	TT-332
1	9	3	15	RJ2.9 RJ2.15 RJ2.21	UTILITY
1	10	3	15	RJ2.11	TT-333
1	11	1	15	RJ2.27	TT-333

TABLE 2-20. PRIMARY POWER DISTRIBUTION AN/TGC-19 (CONTAINER RJ2) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
1	12	1	15	RJ2.11	TT-329
1	13	2	15	RJ2.27	TT-329
1	14	2	15	RJ2.9	TT-333
1	15	3	15	RJ2.25	TT-332
1	16	3	15	RJ2.9	TT-329
1	17	1	15	RJ2.23	TT-333
1	18	1	15	RJ2.7	TT-332
1	19	2	15	RJ2.23	TT-329
1	20	2	15	RJ2.5	TT-333
1	21	3	15	RJ2.21	TT-333
1	22	3	15	RJ2.5	TT-329
1	23	1	15	RJ2.21	TT-329
1	24	1	15	RJ2.10 RJ2.16 RJ2.22	UTILITY
1	25	2	15	RJ2.19	TT-332
1	26	2	15	RJ2.2	AN/UGC-6
1	27	3	15	RJ2.17	TT-333
1	28	3	15	RJ2.1	AN/UGC-6
1	MAIN	ALL	225		
2	1	3	15	RJ2.28	TT-333
2	2	3	15	RJ2.16	TT-333
2	3	1	15	RJ2.28	TT-329
2	4	1	15	RJ2.16	TT-329
2	5	2	15	RJ2.26	TT-332
2	6	2	15	RJ2.14	TT-332
2	7	3	15	RJ2.24	TT-333
2	8	3	15	RJ2.12	TT-333
2	9	2	15	RJ2.24	TT-329
2	10	2	15	RJ2.12	TT-329

TABLE 2-20. PRIMARY POWER DISTRIBUTION AN/TGC-19 (CONTAINER RJ2) (CONT)

PANEL NUMBER	BREAKER NUMBER	PHASE	CURRENT RATING	ASSOCIATED RACK OR EQUIPMENT	FUNCTION
2	11	3	15	RJ2.22	TT-333
2	12	3	15	RJ2.10	TT-333
2	13	1	15	RJ2.22	TT-329
2	14	1	15	RJ2.10	TT-329
2	15	2	15	RJ2.20	TT-332
2	16	2	15	RJ2.8	TT-332
2	17	3	15	RJ2.18	TT-333
2	18	3	15	RJ2.6	TT-333
2	19	1	15	RJ2.18	TT-329
2	20	1	15	RJ2.6	TT-329
2	21	ALL	90	AIR CONDITIONER (FORWARD)	MAIN POWER
2	22	ALL	90	AIR CONDITIONER (AFT)	MAIN POWER
2	MAIN	ALL	225	ALL	MAIN POWER

SECTION III
SYSTEM OPERATION

3-1. INTRODUCTION.

This section contains information relative to the overall operation of Communication System AN/TSC-35. It is directed toward operating personnel with emphasis on signal flow, circuit programming and typical AN/TSC-35 signal circuits. For a complete understanding of the material covered in this section, the operator should be familiar with the descriptive information contained in this volume, and in Volume I and III of this manual.

3-2. Operating instructions for all equipment installed at the Communication Station are contained in technical manuals or instruction books which are furnished for each type of equipment. Reference should be made to these publications for correct operating procedures pertaining to individual equipment.

3-3. The following paragraphs introduce a relatively new concept in signal distribution within a Communication Station, contain a discussions of typical AN/TSC-35 signal circuits, and describe the operation of voice and CW operating positions, the station Internal Order-Wire System, and special operating equipment designed for this installation.

3-4. OPERATIONAL CONCEPT.

An important operational concept is introduced at the Receiving Central of Communication System AN/TSC-35. It is a tone-conversion system that eliminates the need for DC patching, complex battery cabling, and separate trip-control wiring normally required for transmission of binary signals from one area of a communication station to another.

3-5. TONE CONVERSION SYSTEM.

Teletype, CW, and push-to-talk signals are converted to phase-shift audio-tone signals at the send equipment or operating positions. The phase-shift audio-tone signals are then transmitted at low levels over signal pairs to another area of the Receiving Central where they are reconverted to the original binary form and applied to cryptographic, teletype, or terminal equipment.

3-6. Similarly, a teletype trip-control (clutch-control) MARK or SPACE signal is converted to a frequency-shift audio-tone signal at a cryptographic unit and transmitted at low level to an associated send teletype unit where it is reconverted to the original MARK or SPACE form, and then applied to the trip-control circuit of the teletype unit. The frequency-shifted trip-control signal is transmitted over the same pair of signal wires that carries the phase-shift teletype signal to the cryptographic equipment.

3-7. When loop current from an external source is required for the operation of a tone converter it is furnished by an individual loop supply module at each tone converter.

3-8. The phase-shift tone converter system consists of model 6002-1 modulators (keyers) and model 6002-2 demodulators (converters). The frequency-shift tone converter units are model 6004-1 trip-control modulators (keyers) and model 6004-2 trip-control demodulators (converters). Loop current is furnished by model 6006 Loop Supplies.

3-9. All tone converters and loop supplies are transistorized, single-channel plug-in modules that are mounted in tone converter drawers or on tone converter panels which in turn are installed in or as near as practicable to the associated send and receive equipment or operating positions.

3-10. TONE CONVERTERS AND LOOP SUPPLIES.

The tone converter modulators, demodulators, and loop supply units used in the tone conversion system are described in the following paragraphs to enable the operator to better understand the operation of the system.

3-11. MODEL 6002-1 MODULATOR.

The 6002-1 modulator converts MARK-SPACE or contact closure signals to 10-kc phase-shift signals. When connected to a source of AC power, the 6002-1 modulator produces a 10-kc audio-tone output signal at all times. Each time the input keying signal changes from a SPACE to a MARK, or from an open to a closed contact condition, the 10-kc output of the modulator shifts phase approximately 130 degrees. When the input keying signal returns to a space or to an open contact condition, the 10-kc output of the modulator shifts back to its original phase. The 6002-1 modulator operates on a 6-volt input signal and may be keyed by one of the three following methods:

1. Current keying at 20-ma or 60-ma DC (using external shunt resistor).

2. Dry-contact keying (hand-key, relay contacts or push-to-talk switch).

3. Voltage keying at 6-volts positive for MARK and zero volts for SPACE. All three modes of operation are employed at Receiving Central AN/TSR-1. When connected for dry-contact keying, the internal DC power supply of the modulator furnishes a positive 6-volt keying potential to the input keying line. When connected for current keying, the modulator input circuit must be shunted with a 100-ohm resistor for

60-ma operation or with a 300-ohm resistor for 20-ma operation.

3-12. MODEL 6002-2 DEMODULATOR.

The 6002-2 demodulator converts the 10-kc phase-shift signal received from a 6002-1 modulator to a MARK or a SPACE output signal, depending upon the phase characteristics of the received 10-kc signal. The demodulator output circuit may be connected into a current or voltage loop circuit. Loop battery is supplied by a 6006 loop supply unit or by the associated equipment. The demodulator output circuit is a transistor switch which is turned on and off by the action of the input signal. Current in the output circuit is permitted to flow during a MARK input signal and is reduced to zero during a SPACE input signal. The demodulator input is a high impedance circuit and up to 20 demodulator units may be operated in parallel across the output of one modulator unit.

3-13. The 6002-2 demodulator is equipped with a mark-hold feature that returns the demodulator output to a MARK condition in the absence of input keying signals for a period of time approximating one teletype character. The mark-hold feature is not used on AN/TSC-35 signal circuits because a series of spacing signals may carry intelligence. Mark-hold is used on the station internal order-wire circuit where the tone outputs of modulators are disconnected from the internal order-wire circuit except when a message is being transmitted.

3-14. MODEL 6004-1 TRIP-CONTROL MODULATOR.

The 6004-1 trip-control modulator is a frequency-shift device that converts an input MARK or closed-contact signal to a 2167.5-cps output signal, and an input SPACE or open-contact signal to a 2082.5-cps output signal. The 6004-1 modulator unit may be current keyed, dry-contact keyed or voltage keyed in exactly the same manner as the 6002-1 modulator unit. Current and dry-contact keying modes of operation are used at the Receiving Central.

3-15. MODEL 6004-2 TRIP-CONTROL DEMODULATOR.

The 6004-2 Trip-Control Demodulator converts a 2167.5-cps signal received from a 6004-1 modulator to a MARK output signal, and a 2082.5-cps signal to a SPACE output signal. The demodulator output circuit may key a current or voltage loop circuit and is turned on and off by the action of the input signal in the same manner as the 6002-2 demodulator unit. The high impedance input circuit allows up to 20 demodulator units to be operated in parallel across the output circuit of one 6004-1 modulator unit. The 6004-2 demodulator is also equipped with a mark-hold feature but this feature is not used in this system.

3-16. MODEL 6006 LOOP SUPPLY.

The 6006 loop supply is a solid state power supply module that furnishes direct current for the operation of one loop circuit. The power supply is strapped internally for either 20-ma 48-volt or 60-ma 120-volt DC output. A CURRENT ADJUSTMENT control and a CURRENT MONITORING JACK are provided for fine adjustment of output current.

3-17. TONE CONVERTER OPERATION.

The basic phase-shift tone converters used for TTY, CW keying, and transmitter control circuits, and frequency shift tone converters used for TD trip-control circuits described in the following paragraphs are typical for all such circuits at this communication system.

3-18. PHASE-SHIFT TONE CONVERTERS.

Figure 3-1 is a simplified block diagram illustrating a basic phase-shift tone converter circuit used throughout the Receiving Central. At the send end of the circuit, send equipment is connected in series with the DC input of a 6002-1 modulator. In another area of the Receiving Central, a receive equipment is connected in series with the DC output of a 6002-2 demodulator and a 6006 loop supply unit. The send equipment may be a teletype keyboard, a TD, a TTY converter, a cryptographic equipment, an AN/FGC-60 tone telegraph channel, a CW handkey or a push-to-talk microphone switch. The receive equipment may be a receive teletype unit, a cryptographic equipment or a channel of a tone telegraph terminal. The modulator produces a 10-kc tone which is phase-shifted in accordance with the input keying signal from the send equipment. The 10-kc tone output of the modulator is connected to the input of the demodulator through a pair of signal wires. The demodulator detects the intelligence present on the incoming 10-kc phase-shifted tone and keys the associated receive equipment.

3-19. As noted previously the 6002-1 modulator may be dry-contact keyed, current keyed, or voltage keyed. When dry-contact keying is employed, the 6002-1 modulator furnishes a 6-volt keying potential to the input keying line. When current keying is used, loop current may be supplied internally by the send equipment or externally by a 6006 loop supply unit and a resistor that will produce a 6-volt keying signal must be shunted across the modulator input terminals. When external loop battery is required, a 6006 loop supply unit is connected in series with the modulator input, the shunt resistor, and the send equipment. When a 6002-2 demodulator is used in a "wet-key" or current loop circuit, loop battery that is adjusted for a maximum of 60-ma may be furnished internally by the receive equipment or externally by a 6006 loop supply module.

3-20. DEMODULATOR PHASE DETECTION CHARACTERISTICS.

The use of phase-shift tone converter modulators and demodulators requires the operator to become familiar with certain characteristics of the units in order to avoid possible difficulty when phase-shift tone circuits are patched or first energized.

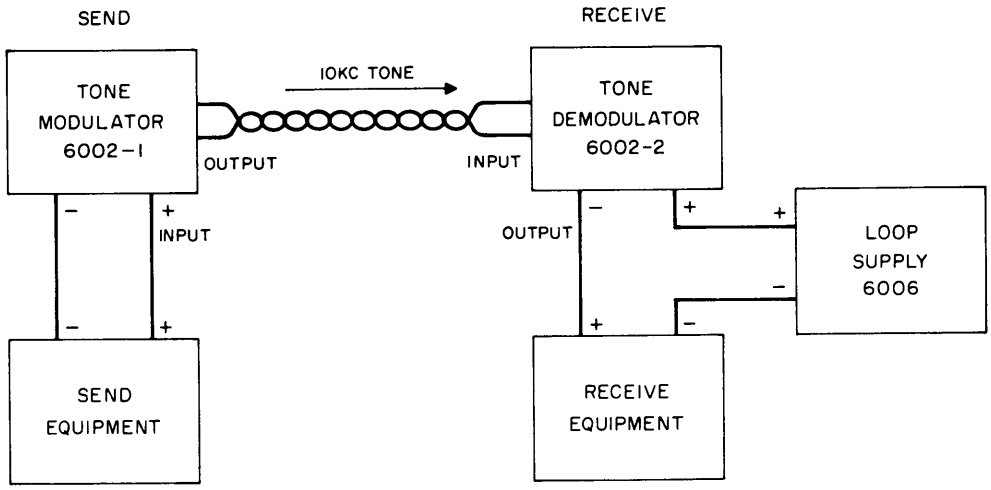


Figure 3-1. Basic Tone Converter Circuit

3-21. The output of a 6002-1 modulator is always a 10-kc tone which is shifted in phase by the input keying signal. The associated 6002-2 demodulator detects the phase shift and produces a MARK or SPACE in the receive loop, depending on the phase characteristics of the input tone signal. However, when the 6002-2 demodulator is initially energized or patched into a steady-state circuit it can produce either a MARK or a SPACE at its output and it will be necessary to synchronize the demodulator with the associated modulator.

3-22. For example, a receive teletype unit is patched into a circuit that is in a steady state MARK condition. The TTY runs open, indicating that the demodulator unit at the receive TTY is not in phase with the circuit and must be synchronized with the circuit modulator. This may be accomplished by having a test character sent from the send teletype equipment or keying device. The test character will produce a phase shift in the incoming 10-kc tone, the demodulator will detect the phase shift and become synchronized with the associated modulator. If it is not possible to send a test character, the first incoming character on the circuit will synchronize the demodulator with the remainder of the circuit, but the receive TTY will probably print the first character incorrectly.

3-23. Another example is a CW keying or a transmitter control circuit. The contacts of the hand key or the transmitter control switch are open but the transmitter is radiating. This indicates that the tone converter circuit is probably out of synchronization. This type of circuit is easily synchronized by momentarily closing the handkey or control switch.

3-24. FREQUENCY SHIFT TONE CONVERTERS.

Figure 3-2 is a simplified block diagram illustrating a basic trip-control circuit used at Receiving Central AN/TSR-1. The circuit includes a phase-shift TTY signal circuit from a transmitter distributor (TD) to a send cryptographic equipment, and a frequency-shift trip-control circuit from the cryptographic equipment back to the TD. The TTY circuit is the same as previously described for a phase-shift tone converter circuit.

3-25. The trip-control circuit of the send cryptographic unit is connected in series with the DC input of a 6004-1 trip-control modulator, and the tone output of the modulator is wired in parallel with the tone signal line from the TD. At the TD end of the circuit, the tone input to a 6004-2 trip-control demodulator is connected in parallel with the tone output signal line from the TD, and the demodulator DC output is connected in series with the TD trip control circuit with the TD equipment furnishing loop battery. Note that both tone signals are connected to the same pair of signal wires.

3-26. The 6004-1 trip-control modulator converts a MARK or contact closure signal to a 2167.5-cps signal, and a SPACE or open contact condition to a 2082.5-cps signal. The 6004-2 trip-control demodulator reconverts the MARK or SPACE signals back to their original form. A MARK trip control signal allows the TD to operate or transmit and a SPACE signal causes the TD clutch to lock, preventing transmission. Band pass filters at the inputs of both the 6002-2 and 6004-2 demodulators accept only a narrow band of frequencies near their operating frequencies preventing interaction between the 10-kc phase shift tones and the frequency shift tones.

3-27. The 6004-1 modulator may be current keyed or dry-contact keyed in exactly the same way as a 6002-1 modulator. The 6004-2 always keys a current loop circuit, loop battery being furnished either internally by the associated equipment or by a 6006 loop supply unit.

3-28. TYPICAL CIRCUITS.

Navy Transportable Communication System AN/TSC-35 offers an extremely wide range of complex receiving and transmitting circuits. Since circuit routing and interconnections may be as varied as the number of circuits available, this section does not attempt

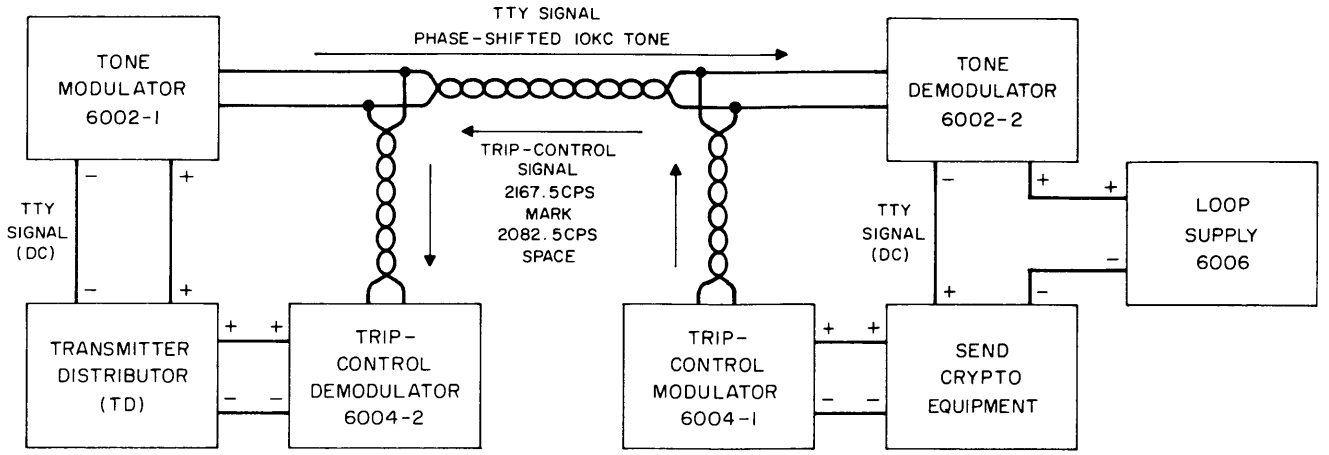


Figure 3-2. Typical Trip Control Circuit

describe each possible circuit in detail but illustrates by means of several typical operating circuits the many circuit configurations used in the system. Simplified signal flow block diagrams are used to illustrates typical circuits.

3-29. Signal input and output circuits of all operating equipment at Communication System AN/TSC-35 are terminated at signal distribution frames as described in Volume I, Section II of this manual. Each distribution frame is comprised of a program board on which the signal circuits terminate, and a patch panel (patchfield) which is normally used for monitoring, troubleshooting or temporarily by-passing defective equipment. The signal circuits are completed by means of program patches made on the program boards according to the operational requirements of the Communication System.

3-30. Program patches are in the same category as permanent cross-connects on the porcupine type distribution frames and are not to be removed or rearranged except by circuit control personnel with the responsibility for circuit programming. Program patches are rearranged only when equipment interconnections are to be permanently changed or rerouted. Operating personnel may use the jack circuits on the patch panels to temporarily route traffic to spare equipment while repairs or maintenance is performed on programmed operating equipment.

3-31. All signal circuits appearing at the Main Distribution Frames at the Receiving Central are audio signals and they may be 10-kc tone-converted TTY, CW or control signals, terminal equipment aggregate tones, or voice signals. At the Transmitting Central, and in container RA3, both audio and DC signal circuits are terminated on distribution frames.

3-32. PROGRAM PATCHING, AUDIO SIGNAL.

Program patches for a typical receive signal circuit at an audio distribution frame are illustrated in figure 3-3. The signal output of the first equipment on the left is program patched to a LINE jack of a normal through LINE-EQUIPMENT jack circuit on the associated patch panel, and the EQUIPMENT jack is programmed to the input of the next equipment. The output of the second equipment is programmed to another LINE jack, and the associated EQUIPMENT jack to the following equipment in the circuit. A send circuit is programmed in the same way except that the first equipment is program patched to an EQUIPMENT jack, and the LINE jack is programmed to the next equipment in the circuit. This procedure is carried out until all equipment associated with the circuit is interconnected. A MONITOR jack is connected directly in parallel with each LINE jack, providing monitoring capability at each point in the signal circuit. However, since the MONITOR jacks are directly parallel with the LINE jacks, only monitor or test equipment having a high impedance or bridging input may be patched into the MONITOR jack without disturbing the circuit.

3-33. PROGRAM PATCHING, DC SIGNAL.

Program patches for a typical signal circuit at a DC distribution frame are illustrated in figure 3-4. Since the DC circuits involve the use of loop battery supplies, the figure shows typical program patches for equipment having internal loop battery supplies, and typical program patches for equipment requiring external loop battery. The series loop circuit consisting of LOOP, LOOP, SET 1 and SET 2 jacks shown on the DC patch panel is typical for all AN/TSC-35 DC loop circuits. The SET 1 and SET 2 jacks and the LOOP circuit are terminated on the program board. A MISCELLANEOUS jack is provided below each DC loop circuit and it is also terminated on the program board.

3-34. The first equipment on the left provides battery internally and is therefore program patched to a LOOP circuit on the associated DC patch panel. The SET 1 jack of the loop circuit is programmed to the input of the second equipment in the circuit. Since the SET 2

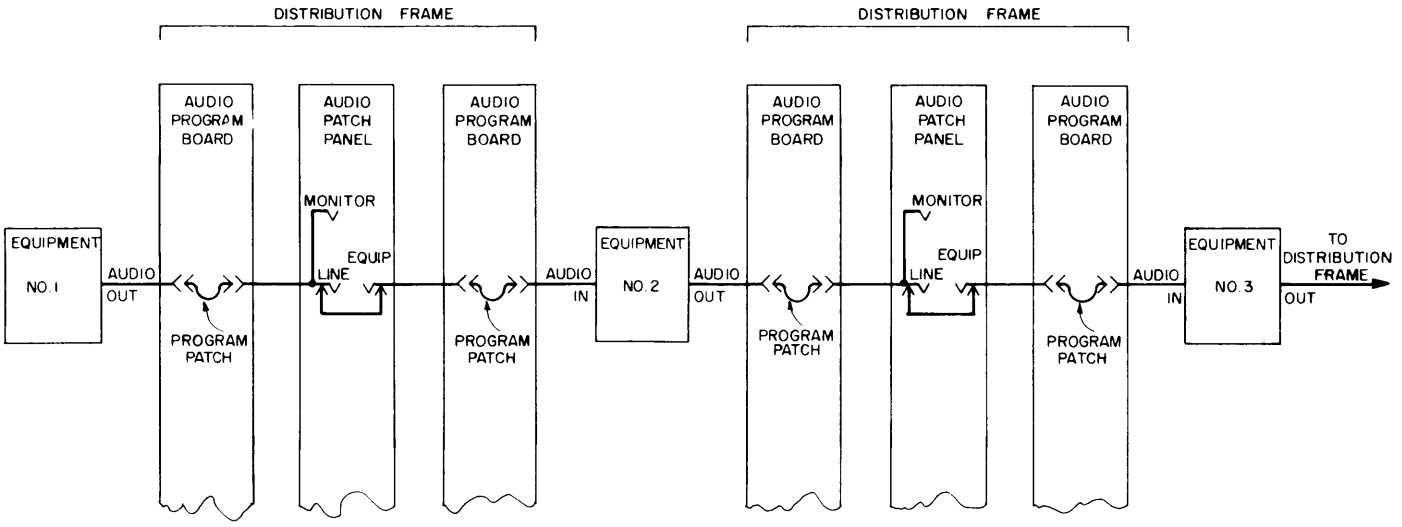


Figure 3-3. Typical Audio Circuit Program Patches

jack is not used in this instance, a shorting coaxicon connector is plugged in to the SET 2 jack appearance on the program board in order to close the loop circuit. The second equipment, which requires external loop battery, is program patched to a SET 2 jack of another loop circuit. The external loop battery is program patched to the LOOP jack of the same circuit, and the SET 1 jack is programmed to the input of the next equipment in the signal circuit. DC monitor or metering equipment may be patched into any LOOP jack without disturbing the circuit.

3-35. Spare operating equipment may be programmed to the MISCELLANEOUS jacks in order to provide the operator with readily available spare units in the event of normal equipment failure.

3-36. TYPICAL POINT-TO-POINT RECEIVE CIRCUIT.

Figure 3-5 is a block diagram of a point-to-point receive circuit showing typical interconnections to complete one voice and one TTY receive channel.

3-37. A dual-diversity synthesized AN/FRR-60 radio receiver connected for space diversity is used for the reception of the point-to-point radio signal. The receiver is located in the Primary Receivers area, in

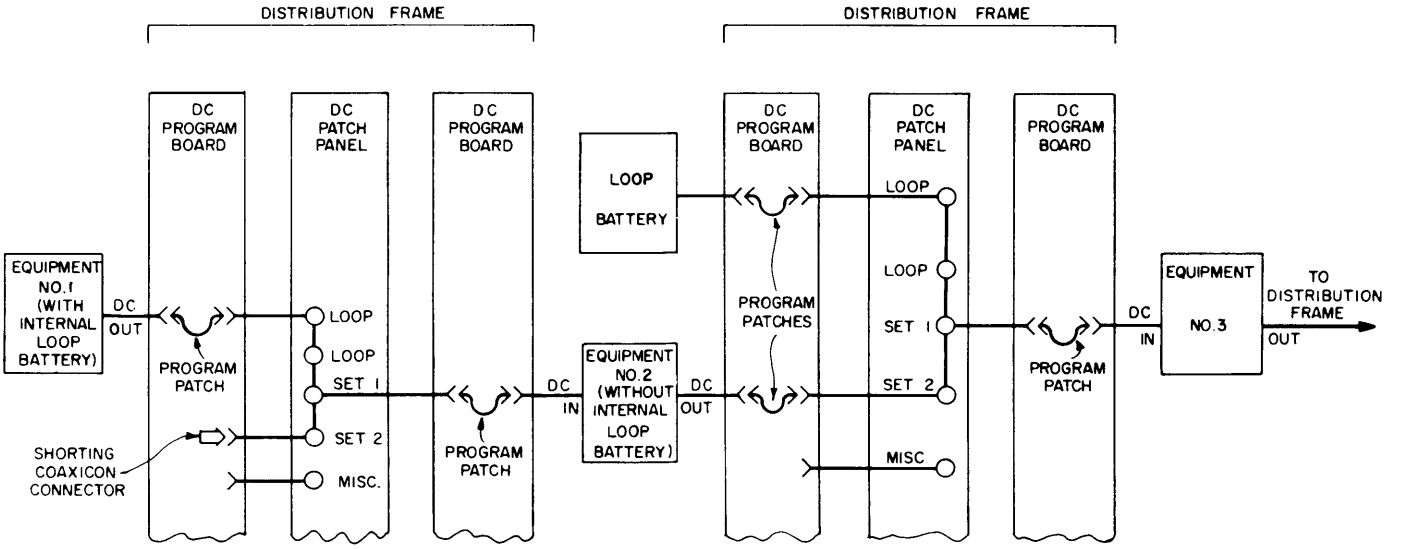


Figure 3-4. Typical DC Circuit Program Patches

either container RE3 or RE4. The receiving antennas are programmed to the receiver RF inputs at the antenna patching facility which is located in container RE4. The upper sideband (USB) and lower sideband (LSB) outputs of both the normal and the diversity sections of the receiver are terminated on the 2013 system Receivers Intermediate Distribution Frame (IDF).

3-38. Each sideband is a composite 6-kc bandwidth signal that contains two 3-kc voice frequency (VF) bandwidth intelligence channels. The upper sideband, ALPHA channel, is normally used for teletype aggregate tone signals, and the lower sideband, BRAVO channel, is normally used for voice channels. One of the 3-kc VF channels may carry a facsimile signal.

3-39. At the IDF program board, each 6-kc sideband signal is programmed to a LINE jack of a normal-through MONITOR-LINE-EQUIPMENT jack circuit on the IDF monitor patch panel. The patch panel provides monitoring facilities for all signal circuits in the Primary Receivers area. The 6-kc signal is then programmed from the EQUIPMENT jack to a 2030 system TD-411/UGC channel which demultiplexes the 6-kc composite signal into two 3-kc VF signals. The 3-kc outputs of the demultiplexer are terminated on the IDF program board where they are also programmed through the IDF monitor patch panel and then to audio trunk lines that carry the signals to the Unclassified Facility Control container RE1. The trunk lines terminate on the Audio program board of the BLACK Main Distribution Frame (MDF). At the MDF audio program board, the TTY aggregate tones and the voice channels are programmed through different paths. The TTY signals path will be described first followed by a description of the voice signal path.

3-40. TTY SIGNAL PATH. The normal and the diversity TTY aggregate tone signals are first programmed to the BLACK MDF audio patch panel and then to diversity AN/FGC-60/24 tone telegraph terminal equipment which is also located in container RE1. The AN/FGC-60/24 separates the 3-kc aggregate tone signals into 16 normal and 16 diversity TTY frequency-shift tone signals. The normal and diversity tones for each channel are fed to an AN/FGC-60 combiner which continuously selects the best of the normal or the diversity tone signals and provides at its output one resultant DC TTY keying signal.

3-41. The DC TTY keying signal is then applied to a 6002-1 modulator unit that converts the DC keying into a corresponding 10-kc phase-shifted TTY tone signal. The 10-kc modulator outputs are terminated on the MDF TTY program board where they are programmed to the TTY monitor patch panel. The TTY monitor patch panel provides monitoring facilities for all BLACK 10-kc phase-shifted TTY tone signals at the Receiving Central. The 10-kc tones pass through the normal-through jacks and again appear on the MDF TTY program board where they are programmed to intercontainer cables which carry the signals to the single channel on-line CRYPTO area which is located in containers RB2 and RB3.

3-42. In the on-line CRYPTO area, the 10-kc TTY tone is applied to a 6002-2 demodulator unit at the input of a KWR-26 equipment. The 6002-2 converts the 10-kc TTY tone signal to a corresponding DC keying signal that is applied to the input of the KWR-26. The KWR-26 deciphers the incoming TTY signal and the clear text DC output of the KWR-26 is applied to the input of a 6002-1 modulator unit which converts the signal to a corresponding 10-kc phase-shifted tone signal. Since the TTY signal is now in clear text form, it is connected through RED inter-container cables to the 2016 system RED Main Distribution Frame which is located in container RB1. The clear text 10-kc TTY signal is programmed to a normal-through LINE-EQUIPMENT jack circuit on the RED MDF patch panel which provides monitoring facilities for all RED circuits at the Receiving Central.

3-43. At the RED MDF, the 10-kc clear test TTY signal is programmed to one of the torn-tape relay areas, container RA1 or RJ1. NTX traffic channels are programmed to RJ1 and HICOM traffic to RA1. In the torn-tape relay areas, the 10-kc signal is converted to a DC keying signal by a 6002-2 demodulator and then applied to a reperforator unit of a TT-331 Receive Group teletype equipment. In both containers, RA1 and RJ1, the TTY receive signal lines are parallel connected to jacks on a monitor patch panel. The received TTY signal can be monitored on a TT-176A page copy monitor unit. All page copy monitors are equipped with 6002-2 demodulator units which are terminated on jacks on the patch panel.

3-44. The KWR-26 REMOTE and LOCAL indicator lamp circuits are extended to the RED MDF to provide control personnel with an indication of the current status of the KWR-26 equipment. The indicating lamp circuits are programmed to green (REMOTE) and red (ALARM) indicating lamps which are located directly above the LINE-EQUIPMENT jack circuit used for the clear text 10-kc TTY signal from the KWR-26 equipment. When lighted, the green lamp indicates that the KWR-26 is in the LOCAL operating mode. A lighted red lamp indicates that there are no transitions on the line at the KWR-26. When the KWR-26 is operating normally in the REMOTE mode, neither lamp at the MDF is lighted.

3-45. VOICE SIGNAL PATH. Incoming voice order-wire circuits are programmed at the MDF in container RE1 to trunk lines terminated at the 2014 system Special Distribution Frame (SDF) located in container RE2. At the SDF program board, the circuit is programmed to a TA-401B 2-wire/4-wire telephone terminal set, and the output of the TA-401B is programmed to a speaker amplifier unit that provides control of the voice signal volume. The output of the speaker amplifier is fed to a receiver control panel at the voice operating position where the operator may select either speaker or headphones for monitoring. The point-to-point voice operating position is described in paragraph 3-120.

3-46. TYPICAL POINT-TO-POINT SEND CIRCUIT.

Figure 3-6 is a block diagram of a typical point-to-point send circuit illustrating interconnections required to complete one voice and one TTY send channel. The send TTY signal path to the Transmitting Central is desc4ibed first, followed by a description of the send voice signal patch.

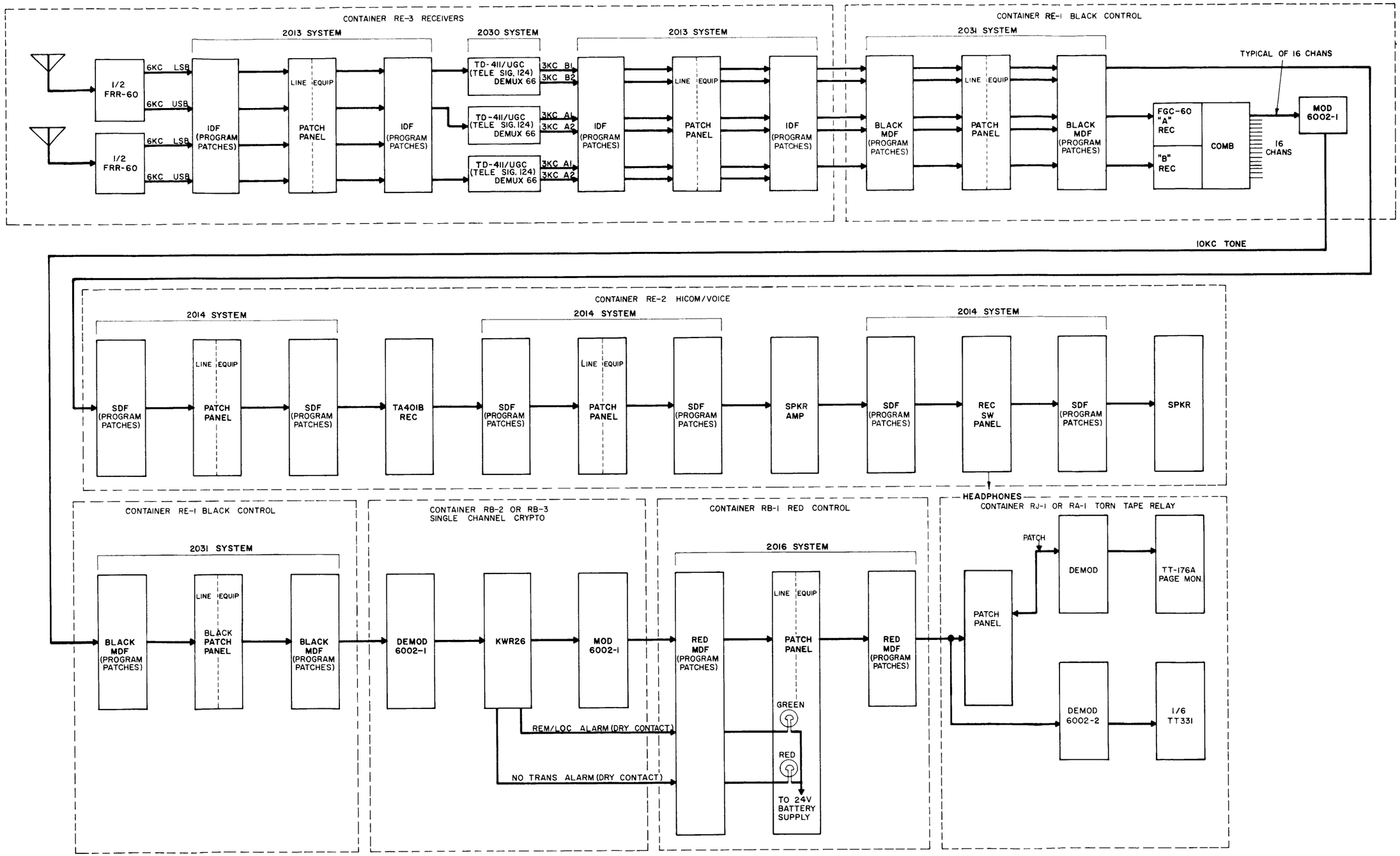


Figure 3-5. Typical Point-To-Point Receive Circuit

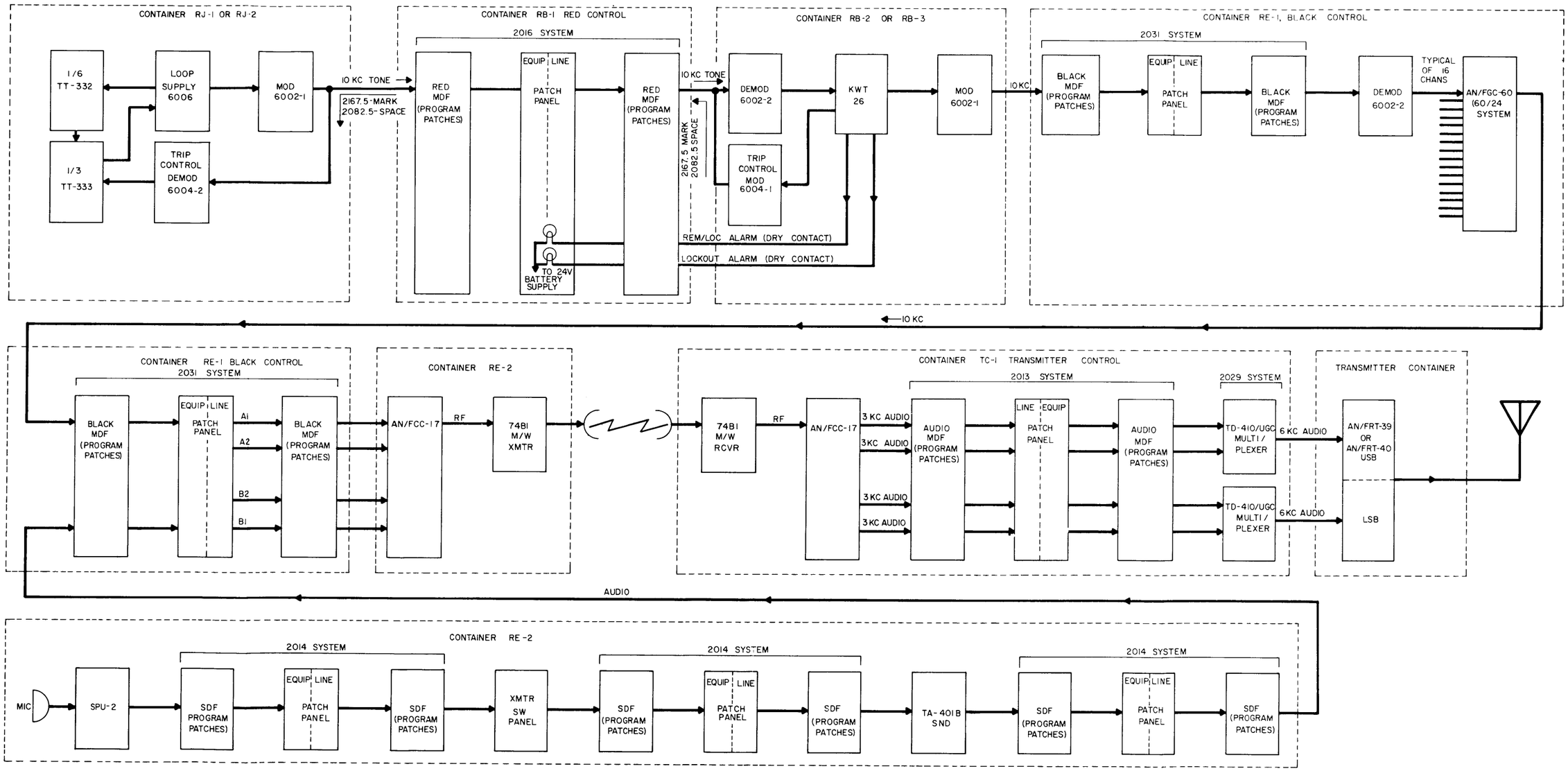


Figure 3-6. Typical Point-To-Point Send Circuit

3-47. In containers RA1 or RJ2, intelligence in the form of punched tape is fed to TT-333 tandem-operated transmitter-distributors. Each TT-333 contains six TD's which are operated in pairs to provide three active send channels. The DC output from a TT-333 channel is in series with a TT-332 monitor reperforator unit, a 6006 loop supply unit, and a 6002-1 modulator unit. The TT-332 furnishes a tape copy of the transmitted message for the station file.

3-48. The 6002-1 modulator produces a 10-kc phase-shifted TTY signal which is connected through a RED inter-container cable to the 2016 system RED Main Distribution Frame (MDF) located in container RB1. The clear text 10-kc signal is programmed to an EQUIPMENT jack on a normal-through LINE-EQUIPMENT jack circuit on the RED MDF patch panel. The signal is then programmed from the LINE jack to the on-line CRYPTO area located in containers RB2 or RB3 where it is reconverted to a DC signal by a 6002-2 demodulator at the input to a KWT-26 cryptographic equipment. The encrypted DC output of the KWT-26 is converted to a 10-kc phase-shifted signal by a 6002-1 modulator, and then fed over an inter-container cable to the 2031 system BLACK TTY MDF program board that is located in container RE1.

3-49. The KWT-26 unit provides a trip control signal for its associated TT-333 transmitter-distributor unit, and two indicating lamp signals that operate lamps on the RED MDF monitor patch panel. When the KWT-26 unit is in the REMOTE mode of operation and operating normally, it provides a DC MARK signal to an associated 6004-1 trip-control modulator and both indicating lamps on the RED MDF patch panel are extinguished. The 6004-1 modulator converts the DC MARK to a 2167.5-cps MARK tone and transmits this tone over the TTY signal pair to an associated 6004-2 trip control demodulator that is located at the TT-333 transmitter distributor. The demodulator reconverts the MARK tone to a DC MARK signal that is applied to the TT-333 TD clutch circuit allowing the TD to operate and transmit.

3-50. When the KWT-26 is in a LOCAL mode of operation, or in the event of KWT-26 malfunction, it provides a DC SPACE signal to the 6004-1 trip-control modulator which then furnishes a 2082.5-cps SPACE tone to the 6004-2 demodulator. The demodulator reconverts the space tone to a DC SPACE signal that causes the TD clutch to lock, preventing transmission. At the RED MDF patch panel, a lighted green lamp indicates that the KWT-26 is in the LOCAL mode of operation and a lighted red lamp indicates that the KWT-26 is inoperative. This condition will exist until the 6004-2 trip-control demodulator receives a mark tone from the 6004-1 modulator, indicating normal operation of the KWT-26 equipment in the REMOTE mode.

3-51. In container RE1, the encrypted TTY 10-kc signal is programmed to an EQUIPMENT jack of a normal through LINE-EQUIPMENT jack circuit. The signal is then programmed from the LINE jack to the input of one channel of an AN/FGC-60 tone telegraph terminal. Each input channel of the AN/FGC-60 is equipped with a 6002-2 demodulator which converts the incoming 10-kc TTY tone to a DC keying signal. The AN/FGC-60 furnishes a DC voltage internally for this circuit. The DC keying signal is applied to a channel of the AN/FGC-60 telegraph terminal where other similar signals are combined into a composite (aggregate tone) signal of approximately 3-kc bandwidth. The aggregate tone signal from the AN/FGC-60 is terminated on the audio program board of the BLACK MDF where it is programmed to a VF channel of an AN/FCC-17 microwave terminal installed in container RE2.

3-52. Speech input to the send point-to-point voice circuit is through a microphone at an operators position in container RE2. The microphone output is fed to a speech processing unit (SPU-2) which regulates the volume of the voice signal that is applied to the transmitter. The output of the SPU-2 is terminated on the program board of the 2014 system special distribution frame (SDF) in RE2. The voice signal is programmed through the SDF monitor patchfield to a transmitter-control switch panel where the operator may select the appropriate send voice line. The output of the switch panel appears on the SDF and the voice signal is programmed to a TA-401B 2-wire/4-wire telephone terminal unit. Speech input to the TA-401B may also be from a telephone line. The output of the TA-401B is terminated on the SDF where the voice signal is programmed into a trunk line to the 2031 System BLACK audio MDF in container RE1. At the MDF, the send voice signal is programmed to a VF channel of the AN/FCC-17 microwave terminal that is located in container RE2.

3-53. The TTY composite signals from the AN/FGC-60/24 tone telegraph equipment and the send voice signals from the point-to-point operating positions are multiplexed at the AN/FCC-17 terminal in RE2 and then fed to a 74B1 microwave transmitter for transmission to the transmitter control container TC1 at the Transmitting Central.

3-54. In container TC1, the microwave signal is received on a 74B1 microwave receiver and fed to an AN/FCC-17 terminal which demultiplexes the signal into the original 3-kc VF audio channels that were applied to the AN/FCC-17 terminal in RE2. The VF channels are terminated on the transmitters audio MDF in container TC1. The TTY aggregate tone signal is programmed to a TD-410/UGC multiplexer which multiplexes two 3-kc VF audio signals into one 6-kc composite signal. The 6-kc output of the TD-410/UGC carrying telegraph terminal aggregate tones is programmed to the upper side-band (ALPHA channel) of an SSB transmitting equipment. Similarly, the send voice signal is programmed to another TD-410/UGC multiplexer, where it may be multiplexed with another voice channel or perhaps a facsimile signal, and the 6-kc multiplexed signal carrying the voice signal is programmed to the lower side-band (BRAVO channel) of the same SSB transmitting equipment.

3-55. Generally, the transmitter used on point-to-point SSB circuits is an AN/FRT-39D 10-kilowatt or an AN/FRT-40B 40-kilowatt general purpose transmitter. The RF outputs of the SSB transmitters are

terminated on an RF coaxial patch panel in either container TD1 or container TG1 where the RF output of the transmitter used is programmed to the appropriate send antenna.

3-56. TYPICAL 4-CHANNEL MULTIPLEX SEND CIRCUIT.

A typical 4-channel multiplex send circuit using an AN/UGC-1A time-division multiplex (MUX) and a KW-22 cryptographic equipment is illustrated in figure 3-7. This circuit is generally used for multi-channel ship-to-shore TTY communications. The AN/UGC-1A multiplexes four telegraph channels into one composite send channel which is encrypted by the KW-22 and returned to the AN/UGC-1A for transmission.

3-57. Channel A of the AN/UGC-1A is used for the circuit order-wire as shown in the figure, but may be used for traffic in the event an additional channel is required. The remaining three channels, B, C, and D, are used for NTX traffic and are programmed as circuit requirements dictate. Super-encryption of a traffic channel is illustrated by the circuit that is programmed to channel C. This does not imply that channel C is always used for super-encryption, but is shown as an example of the program patches required to provide this service. When channel D is not assigned a specific circuit function, it may be used for an NTX overflow or backup channel as the need arises.

3-58. The circuit order-wire may be operated from the classified control center RB1 or from the Multi-Channel CRYPTO area RC1. A TT-176A order-wire TTY is located in RB1 and the TTY signal is programmed through the RED MDF to the input of channel A of the MUX. Another TT-176A order-wire TTY is located in RC1 adjacent to the MUX. When the TT-176A TTY in RB1 is used, the TTY send signal is converted to a 10-kc phase-shift tone signal and then reconverted to a DC keying signal at the input to channel A. When the order-wire TTY unit in RC1 is used, the TTY signal is fed directly to channel A without tone conversion.

3-59. A typical NTX channel that is programmed to channel B of the MUX is shown in figure 3-7. A TD of a TT-333 equipment in the NTX torn-tape relay located in container RJ2 is used as the send equipment. This portion of the circuit is the same as the send point-to-point NTX circuit previously described. The TD send loop circuit is in series with a TT-332 monitor reperforator, a 6006 loop supply and a 6002-1 modulator. The TTY signal is converted to a 10-kc phase shifted tone at the TT-333 equipment and fed through an inter-container cable to the RED MDF in container RB1. The TT-332 provides a tape copy of the transmitted message for the station file. At the MDF, the NTX 10-kc tone signal is programmed through a normal-through LINE-EQUIPMENT jack circuit on the MDF monitor patch panel and then to the input of channel B of the MUX. At the MUX equipment in RC1, the NTX tone signal is demodulated by a 6002-2 tone converter and the DC signal is applied to the input of channel B. Program patches to complete the circuit for channel D of the AN/UGC-1A are identical to those required for channel B.

3-60. A trip-control signal for each input channel of the AN/UGC-1A and one LOCK-UP indicating circuit are provided by the associated KW-22 equipment. The trip control signal is applied to a 6004-1 trip-control modulator which converts the MARK or SPACE input to a frequency-shift tone signal. The frequency-shift trip-control signal is carried back to the send TD over the send-signal pair of wires. At the TT-333 equipment, the trip-control tone signal is reconverted to a DC keying signal and applied to the trip-control circuit of the TD. The trip-control function is not used on the order wire channel. The KW-22 trip-control circuit uses dry-contact keying. The LOCK-UP indicating circuit from the KW-22 equipment is programmed to a red indicating ALARM lamp on the RED MDF program board providing the circuit control operator with an indication of the current status of the KW-22 equipment.

3-61. Super-encryption of a traffic channel consists of double-encrypting the message by two cryptographic devices. Such a circuit is shown programmed to channel C of the AN/UGC-1A. A TT-333 TD in the HICOM/ASC container RA1 is used to transmit the message. The portion of the circuit shown in RA1 is identical to the NTX circuit located in RJ2 and described previously. The tone converted TTY signal is fed through an inter-container cable to the RED MDF in container RB1. At the MDF, the 10-kc tone signal is programmed through the monitor patch panel and then to a super-encrypt KW-26 position in container RB3. This position is equipped with a modified KW-26 tone converter drawer having a SUPER-ENCRYPT/NORMAL switch that transfers the encrypted output of the KWT-26 to the RED MDF where it can be programmed to the input of the second encryption device. The KW-26 units that are equipped with modified tone converter drawers are located in RB3 positions 7, 11, 19, 23, 27 and 31. The modified KW-26 tone converter drawer is described in section 4 of this manual.

3-62. In container RB3, the 10-kc tone signal is applied to a 6002-2 demodulator and the resultant DC signal is fed to a KWT-26 unit. The KWT-26 furnishes internal battery for this circuit. The encrypted output of the KWT-26 is fed to a modified tone converter where it is converted to a phase-shift 10-kc tone and then applied to a SUPER-ENCRYPT/NORMAL switch. In the SUPER-ENCRYPT position of the switch, the encrypted 10-kc signal is applied to a RED inter-container cable that terminates on the RED MDF in RB1. In the NORMAL position of the switch, the encrypted output of the KWT-26 is fed through a BLACK inter-container cable to the BLACK MDF in container RE1, providing normal operation of the KW-26 equipment. At the RED MDF, the encrypted 10-kc TTY signal is programmed through the monitor patch panel and then to the input of channel C of the AN/UGC-1A. The encrypted channel C input is then fed to the KW-22 for further encryption.

3-63. The KWT-26 provides the trip-control and indicating lamp functions for this circuit. The KW-22 trip control circuit is not used to control the TD. The KWT-26 trip-control signal is applied to a 6004-1 trip-control modulator and the tone output of the modulator is fed back to the sending TD in RA1 over the

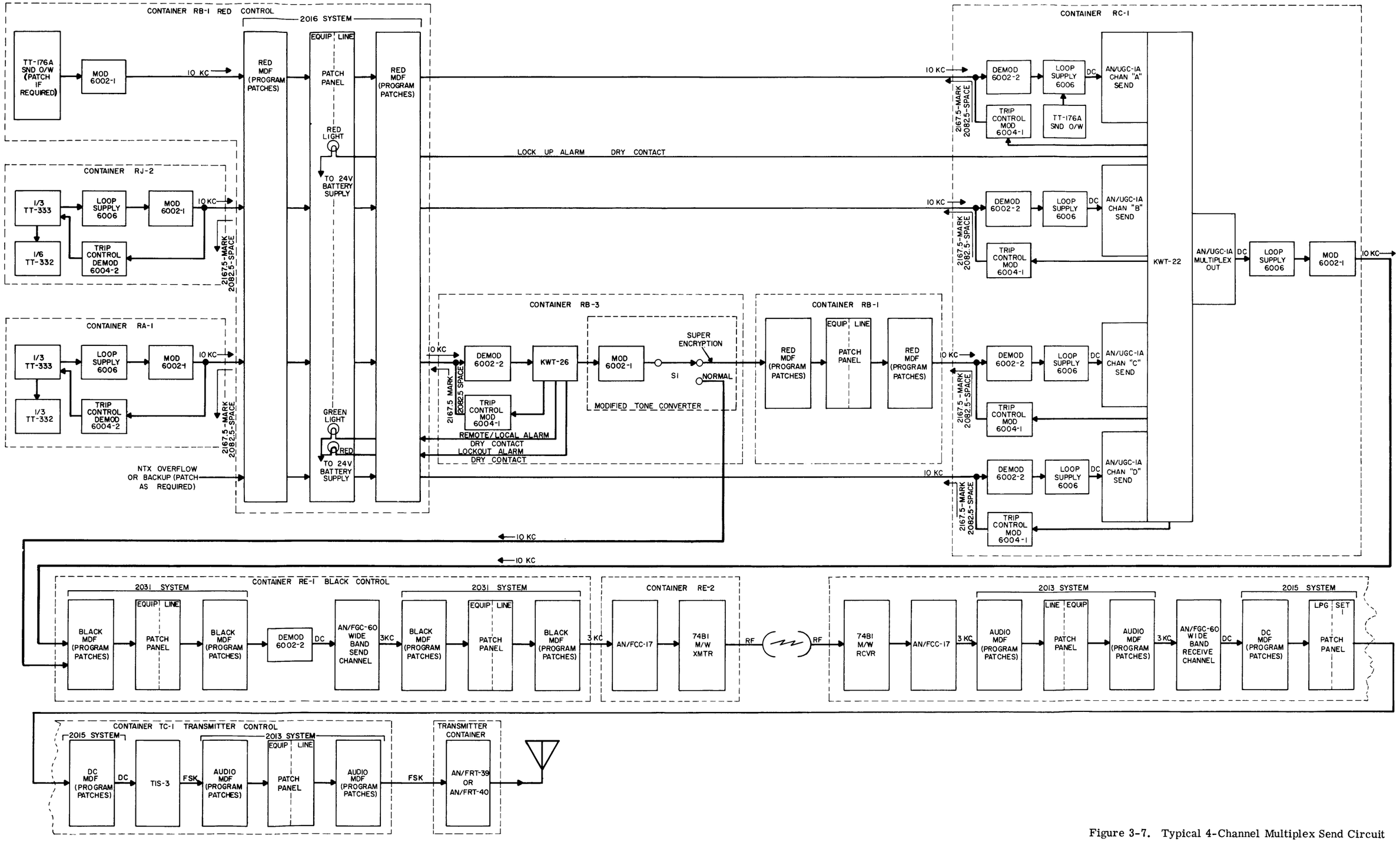


Figure 3-7. Typical 4-Channel Multiplex Send Circuit

send signal pair. The indicating lamp circuits are programmed to appear above the LINE-EQUIPMENT jack circuit on the RED MDF associated with the super-encrypted send channel. The function of the indicating lamp circuits is the same as described for the point-to-point send circuit in paragraph 3-49.

3-64. The encrypted, multiplexed output of the AN/UGC-1A is fed to a 6002-1 modulator and converted to a 10-kc phase-shift tone. Loop battery for the AN/UGC-1A output circuit is furnished by a 6006 loop supply unit. The multiplexed 10-kc signal is then carried over an inter-container cable to the TTY program board of the BLACK MDF in container RE1. The multiplexed 10-kc signal is programmed through the monitor patch panel to the input of a wide-band send channel of an AN/FGC-60 CCL tone telegraph terminal. The DC inputs to the AN/FGC-60 channels are equipped with 6002-2 demodulators. A demodulator converts the multiplexed tone signal to DC, and battery for the DC loop circuit is furnished internally by the AN/FGC-60 terminal. The multiplexed DC signal is converted to a frequency shift tone signal in the AN/FGC-60 and then combined with other similar signals to provide one aggregate tone signal of approximately 3-kc bandwidth. The aggregate tone output of the AN/FGC-60 is terminated on the audio program board of the BLACK MDF.

3-65. The aggregate tone output of the AN/FGC-60 is programmed through a LINE-EQUIPMENT jack circuit of the monitor patch panel to a VF channel of the AN/FCC-17 microwave terminal which is located in container RE2. The AN/FCC-17 multiplexes the aggregate tone signal with other similar signals and voice channels, and then the multiplexed VF signals are applied to a 74B1 microwave transmitter for transmission to the transmitter control container TC1 at the Transmitting Central.

3-66. In TC1, the microwave signal is received on a 74B1 microwave receiver and fed to an AN/FCC-17 terminal which demultiplexes the signal into the original 3-kc VF channels. The VF channels are terminated on the 2013 system transmitters audio MDF. The aggregate tone signal carrying the AN/UGC-1A multiplexed signal is programmed to a receive CCL AN/FGC-60 tone telegraph terminal equipment where the multiplexed signal is separated from the other signals and converted to DC. The DC output channels of the AN/FGC-60 equipment are terminated on the 2015 system DC MDF program board. The AN/FGC-60 furnishes loop battery for its output channels. The multiplexed signal is programmed to a LOOP circuit on the DC MDF monitor patch panel and the SET 1 jack of the circuit is then programmed to the input of a TIS-3, which is a TH-39A/UGT Tone Intelligence Unit.

3-67. The TIS-3 converts the multiplexed TTY DC signal to a frequency shift audio signal which is terminated on the transmitters audio MDF program board. The frequency shift signal is then programmed through a LINE-EQUIPMENT jack circuit of the MDF audio patch panel to the input of an AN/FRT-39D or AN/FRT-40B transmitter. The transmitter RF output is programmed to the appropriate send antenna at an RF patch panel which may be located in either container TD1 or container TG1.

3-68. TYPICAL 4-CHANNEL MULTIPLEX RECEIVE CIRCUIT.

A typical 4-channel multiplex receive circuit is illustrated in figure 3-8. This circuit is a counterpart of the previously described 4-channel multiplex send circuit. It utilizes the receive portion of an AN/UGC-1A 4-channel time-division multiplex and a KWR-22 cryptographic (receive) equipment.

3-69. Space diversity reception of the RF signal, using two R390A/URR receivers, is employed in order to enhance the reliability of the circuit. The receiving antennas are programmed to the receiver RF inputs at the receivers RF distribution facility in container RE4. The R390A/URR receivers are located in container RE3. Additional equipment that is part of this circuit and is located in container RE3 includes D3 frequency-shift demodulators, a 2013 system Intermediate Distribution Frame (receivers IDF), and 6002-1 tone converter modulator units. The R390A/URR receivers, D3 demodulators and 6002-1 modulators for one frequency-shift diversity receive circuit are installed in the same equipment rack.

3-70. Either one of two methods of feeding the outputs of the R390A/URR receivers to the D3 demodulators may be used. The IF output of the receivers may be patched directly to the IF input of the D3 demodulator units, or the audio outputs of the receivers may be programmed through the receivers IDF to the audio signal inputs of the demodulators. When either method is used, the alternate signal input must be disconnected from the D3 demodulators.

3-71. The D3 demodulators are inter-connected so that they may compare and select the best of the two frequency-shift signals provided by the R390A/URR receivers, and then the demodulators furnish identical DC output signals, one from each D3 unit. The DC output signals of both demodulators are fed directly to the inputs of 6002-1 tone converter modulators using dry-contact keying. The 6002-1 modulators convert the DC binary signals to 10-kc phase-shift tones which are terminated on the receivers IDF program board. Since both signals are identical, only one is programmed through the IDF monitor patch panel and then over inter-container cables to the program board of the BLACK main distribution frame (2031 system) in container RE1. The second signal may be used as a standby in the event of failure of the D3 demodulator output circuit or 6002-1 unit in use.

3-72. At the MDF program board, the 10-kc phase-shift multiplexed signal is program patched through the monitor patch panel and then carried over inter-container cables to the input of the receive AN/UGC-1A unit in the Multi-channel CRYPTO area RC1. The input circuit of the receive AN/UGC-1A is equipped with a 6002-2 demodulator which converts the 10-kc phase shift signal to a DC keying signal, and with a 6006 loop supply unit which furnishes battery for the input circuit. The signal is demultiplexed by the AN/UGC-1A and deciphered by the KWR-22. The four DC output channels are applied to 6002-1 modulators. External loop battery is supplied for each MUX output channel by a 6006 loop supply unit.

3-73. For the purpose of this discussion, it will be assumed that the channel assignments of the receive multiplex circuit are the same as those of the associated send circuit which was previously discussed. The tone-converted 10-kc outputs of the 6002-1 modulators are terminated on the 2016 system RED MDF program board in container RB1.

3-74. Channel A, which is the circuit order-wire channel, is equipped with a local TT-176A equipment, and a remote TT-176A that is located in RB1. The local TTY unit is connected directly to the DC output loop of channel A of the AN/UGC-1A. The signal for the remote TTY order-wire equipment is tone-converted and programmed through the RED MDF monitor patch panel to the remote TTY equipment. At the remote TTY equipment, the 10-kc tone is converted to a DC keying signal and applied to the input of the TT-176A. A 6006 loop supply unit furnishes battery for the circuit.

3-75. The signal from channel B of the AN/UGC-1A is programmed through the RED MDF monitor patch panel and then to the input of a typing reperforator of a TT-331 teletype receive unit that is located in the NTX torn-tape receive area, container RJ1. At the TT-331, the signal is reconverted to DC keying by a 6002-2 demodulator and fed to the typing reperforator, with a 6006 loop supply module furnishing current for the circuit. Note that the 10-kc phase-shift TTY signal is connected in parallel to a jack on the RJ1 monitor patch panel. This is true of all NTX receive lines coming into RJ1. RJ1 is equipped with 19 TT-176A page copy monitors which are also terminated on jacks on the monitor patch panel. The TT-176A units are equipped with 6002-2 demodulators and 6006 loop supply units. In order to monitor any RJ1 NTX receive circuit, a patch must be made on the monitor patch panel from the NTX receive line to a monitor page printer equipment.

3-76. The signal from channel C of the AN/UGC-1A is shown programmed for decoding a super-encrypted signal. Here again, the circuit is shown as an example of a typical receive super-encrypted circuit and is not intended to imply that channel C output is always programmed in this manner. The tone converted 10-kc output of channel C, which is still enciphered, is programmed through the RED MDF monitor patch panel to an RB3 KWR-26 unit that is equipped with a modified KW-26 tone converter drawer. The SUPER-ENCRYPT/NORMAL switch of the drawer is in the SUPER-ENCRYPT position to accept the signal from the RED MDF. The signal is converted to DC keying by a 6002-2 demodulator and fed to the KWR-26 for decoding. The KWR-26 furnishes internal battery for this DC circuit. In the NORMAL position of the switch, the modified tone converter drawer accepts a signal from the BLACK MDF, providing normal operation of the KWR-26 equipment.

3-77. The deciphered, clear-text, DC output of the KWR-26 is tone-converted and carried over an inter-container cable back to the RED MDF in container RB1. The signal is then programmed through the RED MDF monitor patch panel to the HICOM/ASC area, container RA1. In RA1, the signal is converted to DC keying by a 6002-2 demodulator and applied to a channel to a TT-331 teletype receive unit.

3-78. Container RA1 is equipped with a monitor patching facility, similar to the one installed in container RJ1. Twelve TT-176A page-copy monitors are terminated on separate jacks on the patch panel, and all incoming receive circuit lines are parallel connected to jacks on the patch panel. In order to monitor any RA1 incoming receive circuit, a patch from the receive line to the input of a TT-176A page-copy monitor equipment is required.

3-79. Channel D of the AN/UGC-1A may be used as an NTX overflow or back-up channel, or it may be assigned a specific circuit function. When used for NTX traffic, program patches are identical to those for channel B.

3-80. TYPICAL CW SEND/RECEIVE CIRCUIT.

A typical AN/TSC-35 CW send and receive circuit is illustrated in figure 3-9. Three CW operating positions are located in the CW Ship/Shore operating area in container RF2. The operating positions are described in paragraph 1-240 and paragraph 3-131 of this volume. All CW operating functions can be performed at any one of the three positions and the equipment at all three positions may be controlled from any one of the positions.

3-81. A CW hand-key is connected directly to the DC input of a 6002-1 modulator unit which produces a 10-kc phase-shift tone corresponding to the input keying signal. Dry-contact keying is employed and the 6002-1 furnishes a 6-volt keying potential for the input DC keying circuit. The phase-shift 10-kc CW keying signal is connected to a transmitter switch panel where the operator selects the appropriate keying line from one of nine transmit keying lines available in the CW Ship/Shore operating area. The keying lines are terminated on the TTY section of the 2031 system BLACK MDF in container RE1.

3-82. The 10-kc CW keying signal is programmed through the MDF TTY monitor patch panel to an input channel of an AN/FGC-60 CCL tone telegraph terminal. At the input to the AN/FGC-60 channel, the 10-kc CW keying signal is converted to DC by a 6002-2 demodulator, and the resultant DC signal keys the telegraph channel. Internal loop battery is supplied by the AN/FGC-60 channel.

3-83. The AN/FGC-60 converts the CW DC signal to a frequency-shift tone signal and combines the tone signal with other similarly converted signals into a 3-kc aggregate tone signal. The aggregate tone output of the AN/FGC-60 is terminated on the audio section of the 2031 system BLACK MDF.

3-84. The aggregate tone signal, containing the CW keying signal, is programmed through the MDF audio monitor patch panel to a VF channel of an AN/FCC-17 microwave terminal located in container RE2. The aggregate tone signal is multiplexed with other tone and voice signals from the Receiving Central and fed

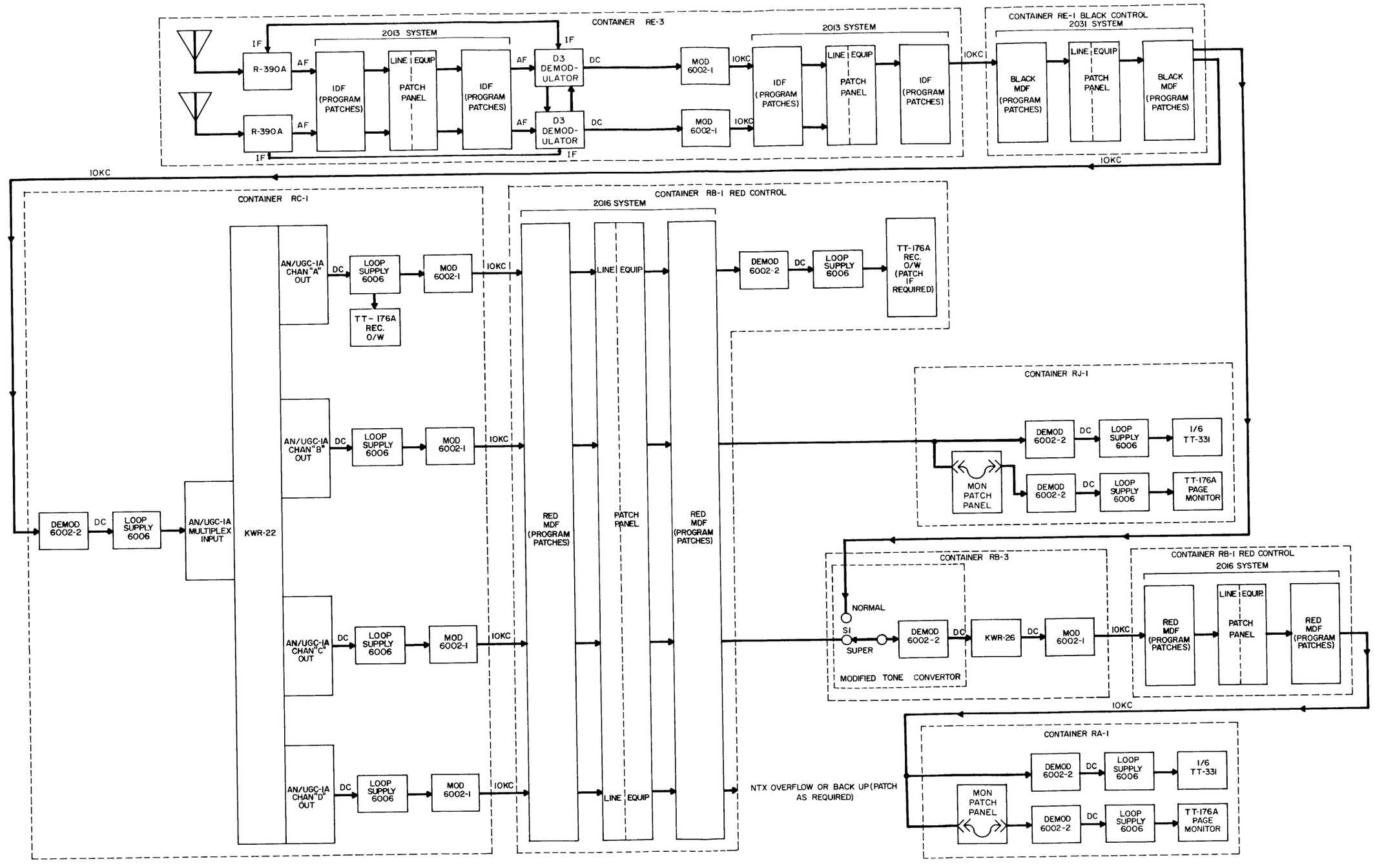


Figure 3-8. Typical 4-Channel Multiplex Receive Circuit

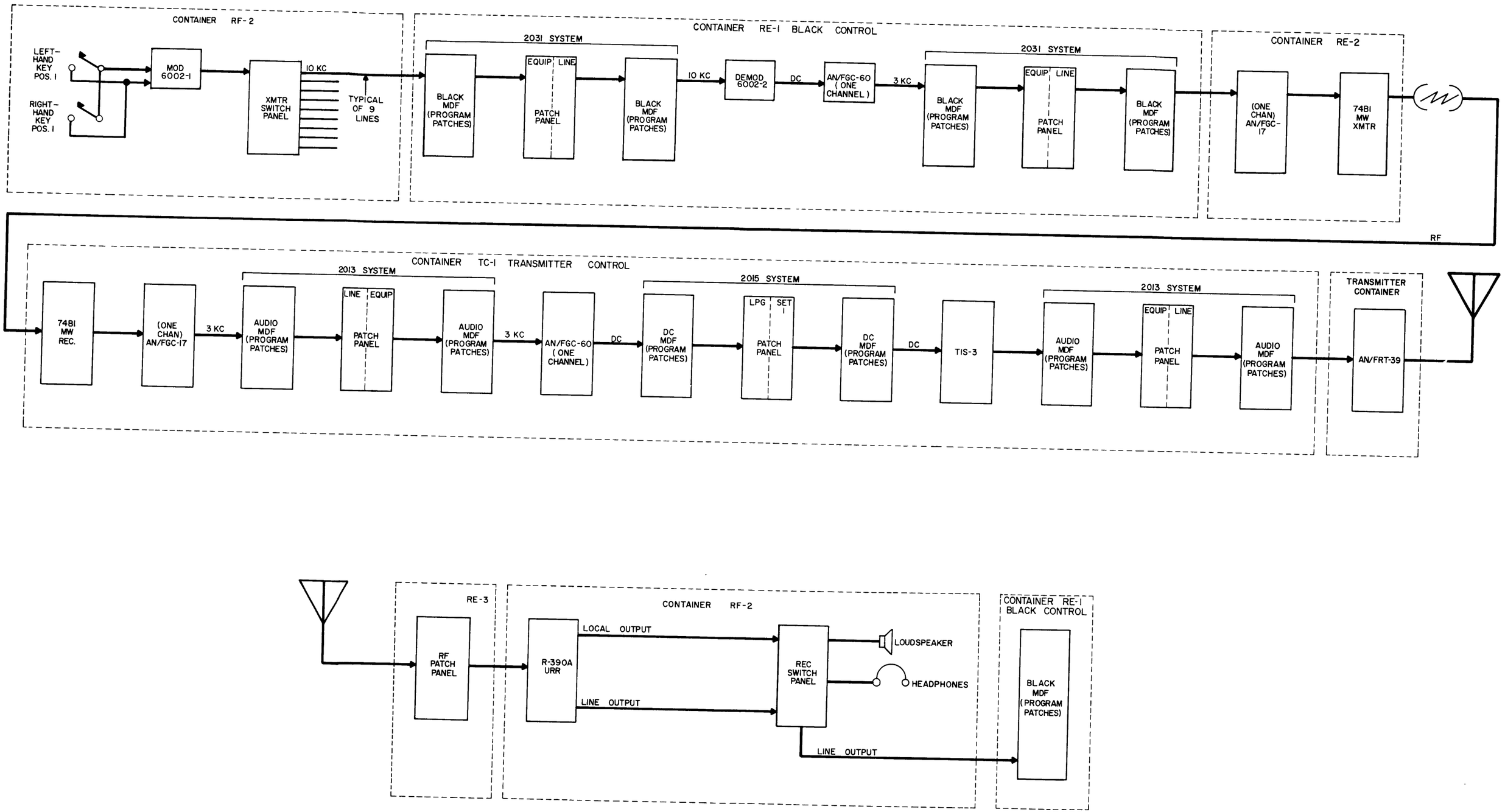


Figure 3-9. Typical CW Send/Receive Circuit

to a 74B1 microwave transmitter which transmits the multiplexed signal to the Transmitter Control contrainer TC1.

3-85. In the Transmitter Control container TC1, the microwave signals is received on a 74B1 microwave receiver and demultiplexed into 3-kc VF channels by an AN/FCC-17 microwave receive terminal. The AN/FCC-17 VF channels are terminated on the 2013 system transmitters audio MDF. The aggregate tones carrying the CW keying signal are programmed through the audio monitor patch panel to the tone input of a receive CCL AN/FGC-60 telegraph terminal equipment.

3-86. The AN/FGC-60 separates the aggregate tone signal into its respective individual frequency-shift keying signals and converts the F/S signal to DC keying signals. The DC output channels of the AN/FGC-60 terminal are terminated on the program board of the 2015 system Transmitters DC MDF. The AN/FGC-60 furnishes internal battery for its output channel loop circuits.

3-87. Since loop battery is supplied by the AN/FGC-60 terminal, the CW keying signal is program patched to a LOOP circuit on the DC MDF monitor patch panel. The SET 1 jack of the circuit is programmed to the input of a TIS-3 Tone Intelligence Unit. The SET 2 jack of this circuit is not used and is terminated on the program board with a shorting coaxicon connector to close the loop circuit.

3-88. The TIS-3 provides an ON-OFF 1-kc tone output signal corresponding of the ON-OFF CW keying input signal. The tone output circuit of the TIS-3 is terminated on the Transmitters audio MDF. The 1-kc CW keying signal is programmed through the audio monitor patch panel of the transmitters MDF to the input of a transmitter. A typical transmitter for high-frequency CW operations may be an AN/FRT-39D 10-kilowatt general purpose transmitter. However, any general purpose transmitter may be used depending upon the output power requirements. For low frequency CW operations, a typical transmitter may be a model TAB-7 or an AN/FRT-19.

3-89. The receive CW typical circuit is illustrated at the bottom of figure 3-9. The receiving antenna is programmed to the receiver at the receivers antenna patching facility in container RE4. The RF signal is carried over a coaxial cable to the input of an R-390A/URR receiver at the CW operating position in container RF2. The LOCAL and LINE audio outputs of the R-390 receiver are connected to the receiver control panel at the operators position. The operator may select either loudspeaker or headphone monitoring of the received CW signal from the local audio output of the receiver.

3-90. The LINE audio output of the R-390 receiver can be switched by the operator to appear on the BLACK MDF in container RE1 where the CW receive signal may be programmed to any area of the Receiving Central for monitoring. When the LINE audio output of the receiver is switched to the MDF, the LOCAL audio output is disconnected from the local operating position.

3-91. TYPICAL SEARCH AND RESCUE SEND/RECEIVE CIRCUIT.

A typical search and rescue send and receive circuit is illustrated in figure 3-10. Search and rescue operations and other air to ground communications are conducted from the Air-Ground operations area in container RF3. The Air-Ground operations area contains three operating positions that are equipped for both voice and CW communications. This description is of a typical voice search and rescue circuit. A CW search and rescue circuit is identical, except for the location of the operating position, as the typical CW circuit described in paragraph 3-80. A physical description of the Air-Ground operating positions is contained in paragraph 1-260, and a functional description of these positions is contained in paragraph 3-139.

3-92. At an operating position in RF3, the operator may select either a desk microphone or a boom microphone. The desk microphone is equipped with a hand-operated push-to-talk switch, and the bottom microphone with a foot-operated push-to-talk switch. Push-to-talk operation is described since air to ground transmitting and receiving circuits usually operate on the same frequency.

3-93. The microphone audio output and push-to-talk circuits are connected to an SPU-2 Speech Processing Unit. The SPU-2 is constant-level audio amplifier that is suipped for push-to-talk operation and receiver muting. The push-to-talk circuit from the SPU-2 is connected directly to the DC input of a 6002-1 modulator which produces a 10-kc phase shift tone corresponding to the push-to-talk input keying signal. The modulator DC input circuit uses the dry-contact keying mode of operation. The tone converted push-to-talk signal, the regulated voice output signal, and the receiver mute circuits of the SPU-2 are connected to the transmitter control panel at the operating position. The operator selects the appropriate set of audio, push-to-talk and receiver muting circuit lines by means of a toggle switch at the transmitter control panel. The switch controls all three circuits simultaneously, connecting the muting circuit to the receiver and the audio and push-to-talk circuits to trunk lines that terminate on the 2031 system BLACK MDF in container RE1. The audio circuit terminates on the MDF audio program board, and the push-to-talk circuit on the MDF TTY program board.

3-94. In container RE1, the audio circuit is programmed through the audio monitor patch panel to the input of an AN/FCC-17 VF channel. The AN/FCC-17 is located in container RE2. The push-to-talk 10-kc tone is programmed through the TTY monitor patch panel to the input channel of an AN/FGC-60 CCL tone telegraph terminal. The 10-kc tone is converted to a corresponding DC keying signal by a 6002-2 demodulator at the input to the AN/FGC-60 channel, and the DC signal keys the telegraph channel. Keying voltage for this circuit is supplied internally by the AN/FGC-

60. The AN/FGC-60 converts the DC push-to-talk signal to a frequency-shift tone signal and combines the F/S tone with other similarly converted signals. The aggregate tone output of the AN/FGC-60 is programmed through the CCL section of the BLACK MDF to the input of AN/FCC-17 VF channel. The AN/FCC-17 multiplexes the audio and aggregate tone signals with other tone and voice signals and the multiplexed signals are applied to the input of a 74B1 microwave transmitter for transmission to the Transmitter Control container TC1.

3-95. At the Transmitter Control container TC1, the microwave signal is received on a 74B1 microwave receiver. The receiver output is fed to an AN/FCC-17 microwave receive terminal which demultiplexes the signal into its respective 3-kc VF channels. The VF channels are terminated on the 2013 system transmitters audio MDF. The voice audio signal is programmed through the MDF monitor patch panel to the input of a selected SSB transmitter.

3-96. The aggregate tone signal carrying the push-to-talk signal is programmed through the patch panel to the tone input of an AN/FGC-60 CCL terminal. The AN/FGC-60 separates the individual frequency-shift tone signals from the aggregate tones and converts each signal to a DC keying signal. The DC outputs of the AN/FGC-60 channels, with internal battery supplied by the AN/FGC-60 terminal, are terminated on the 2015 system Transmitters DC MDF.

3-97. Since loop battery is furnished by the AN/FGC-60 terminal, the DC push-to-talk circuit is programmed to a LOOP circuit on the DC MDF monitor patch panel, and the SET 1 jack of this circuit is program patched to the Key-Line input of the transmitter in use on this circuit. A typical example of the transmitter that may be used is an AN/FRT-39D which is a 10-kilowatt general purpose transmitter. If less power will suffice, an AN/URT-19 1-kilowatt transmitter may be used. If more power is required, a 40-kilowatt AN/FRT-40B transmitter can be used. These transmitters have all been modified for push-to-talk operation. Modifications to these transmitters are discussed in Volume III of the AN/TSC-35 manual.

3-98. The RF output of the transmitter is terminated on an RF distribution panel in either container TD1 or TG1, depending on which transmitter is used. At the RF distribution panel, the transmitter RF output is program-patched to the selected transmitting antenna.

3-99. The receive portion of the typical search and rescue circuit is shown at the bottom of figure 3-10. The receiving antenna is program patched to the receiver RF input at the receivers RF distribution facility located in container RE4. An R-390A/URR receiver installed at an RF3 operating position is used on this circuit. The IF output of the R390 receiver is connected to the input of a CV-591A single-sideband converter. The CV-591A demodulates the IF input signal and provides a low-impedance local output and a 600-ohm line output which connect directly to the receiver control panel at the operators position.

3-100. At the receiver control panel, the operator may select either speaker or headphone monitoring of the receive signal, or he may switch the line audio output of the CV-591A to the BLACK MDF in container RE1. Whenever the operator selects any one of the three functions described above, the remaining two functions are disconnected by the action of the toggle switch on the control panel.

3-101. TYPICAL FACSIMILE SEND/RECEIVE CIRCUIT.

A typical facsimile send and receive circuit is illustrated in figure 3-11. The facsimile equipment is installed in container RE4 and includes a TT-321/UX Transceiver, an MD-168/UX Modulator, an AN/UXH-2 Continuous Page Recorder and a CV-1066/UX Converter. AN R-390/URR receiver is provided in RE4 for use in conjunction with facsimile operations. The R-390 may be used for off-air monitoring the facsimile send signal, or to receive the facsimile signal from a distant point.

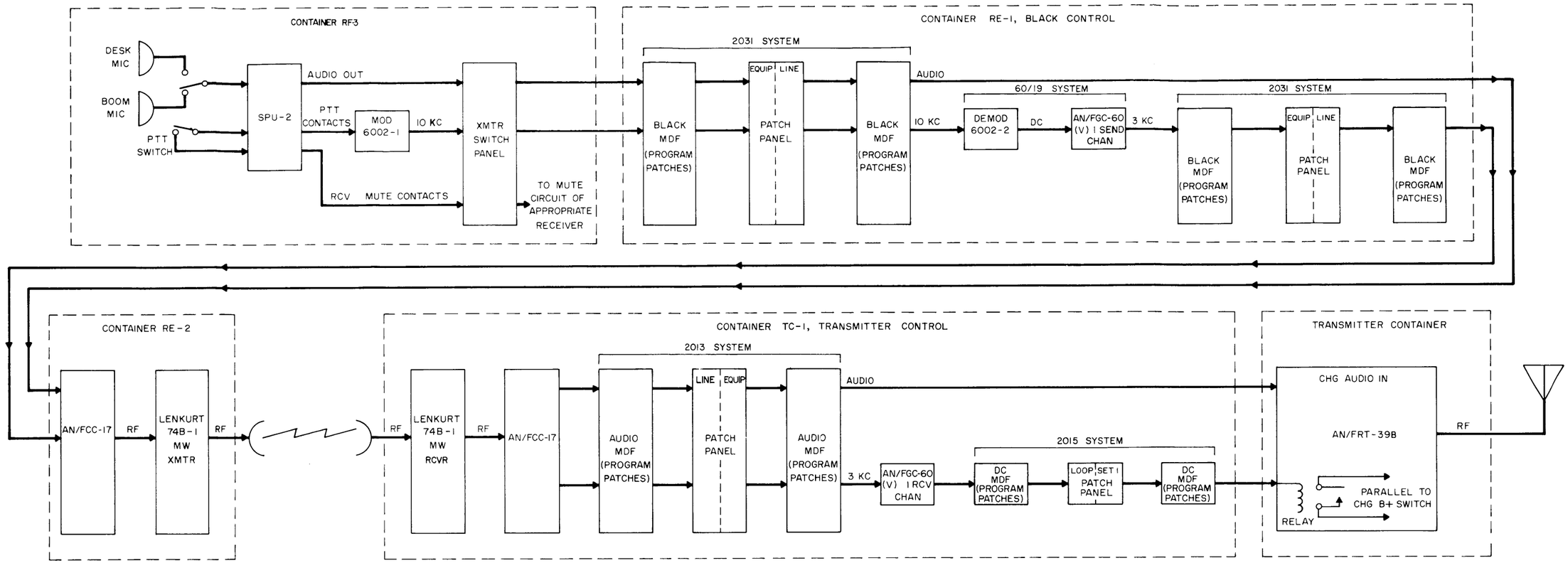
3-102. The output of the transceiver is an amplitude modulated 1800-cps carrier which is patched to a jack provided at the facsimile operating position. The facsimile jack is terminated on the 2013 system Receivers IDF program board in container RE3. The 1800-cps signal is program patched through the IDF monitor patch panel to the input of the MD-168/UX modulator. The modulator converts the 1800-cps AM signal to a frequency-shift signal that shifts between 1500-cps to 2300-cps. The output of the modulator is terminated on the 2013 system program board where it is program-patched through the IDF patch panel and then to a trunk line that terminates on the BLACK MDF in container RE1.

3-103. In container RE1, the frequency-shift facsimile signal is programmed through the MDF audio patch panel and then to the input of a VF channel of the AN/FCC-17 microwave terminal. The signal is multiplexed with other audio signals from the Receiving Central and fed to a 74B1 microwave transmitter for transmission to the Transmitter Control container TC1.

3-104. In container TC1, circuit programming of the F/S facsimile signal to a transmitter is identical to the programming required for a 3-kc audio signal as described in paragraph 3-54 and illustrated in figure 3-6.

3-105. The receive facsimile circuit may use the local R-390A/URR receiver provided in container RE4, or it may be part of a point-to-point SSB receive circuit using an AN/FRR-60 SSB receiver. Local receiver operation is illustrated in figure 3-11. Programming of a facsimile signal which is received on a point-to-point circuit is illustrated in the container RE3 portion of the circuit in figure 3-5 which is described in paragraphs 3-37 through 3-39.

3-106. The receiving antenna is programmed to the R-390 local receiver at the Receivers RF distribution facility in RE4. The output of the receiver is a 1500



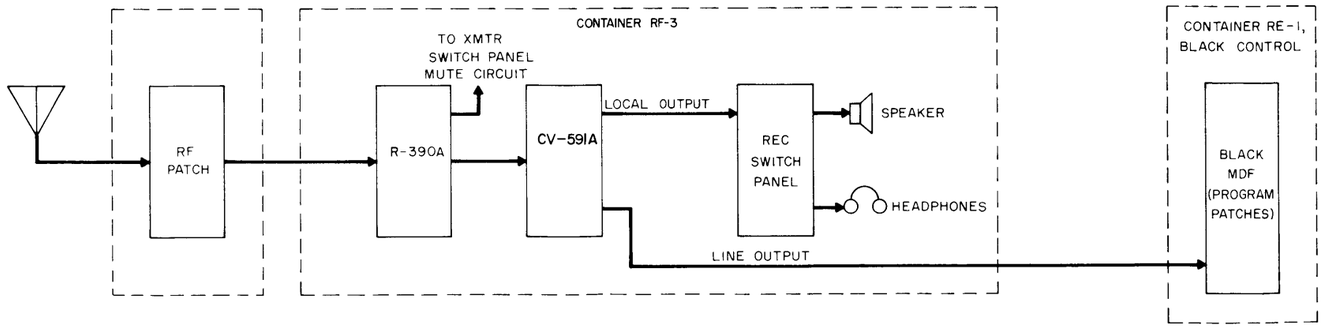
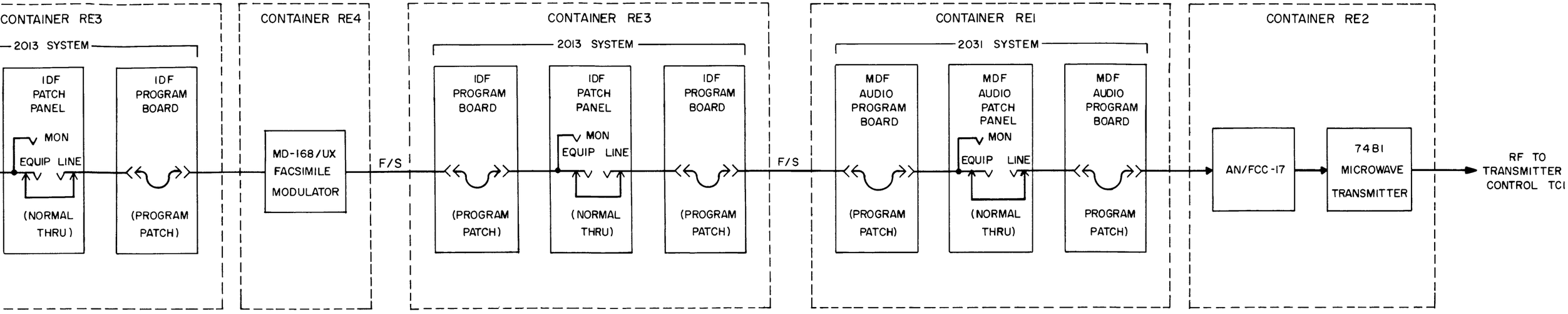


Figure 3-10. Typical Search and Rescue Send/Receive Circuit



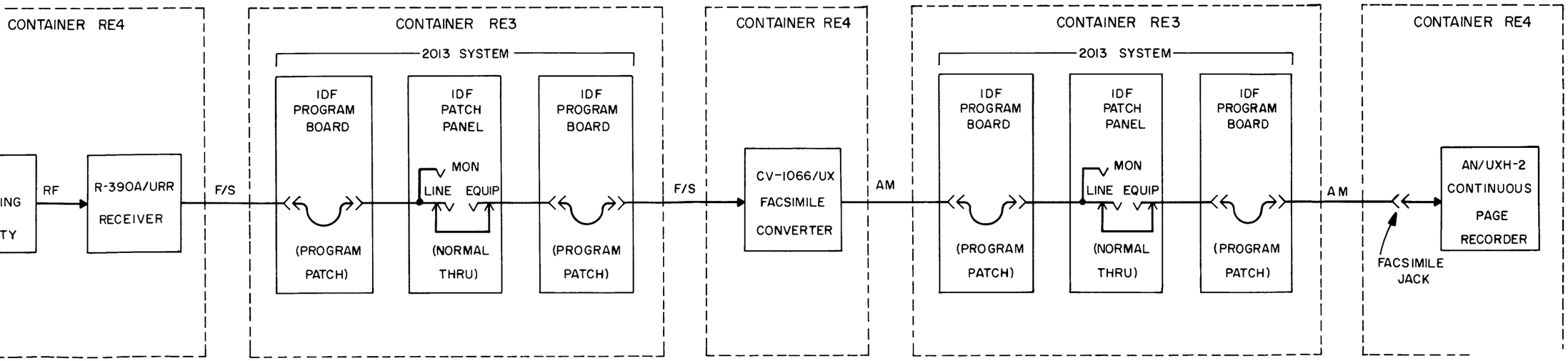


Figure 3-11. Typical Facsimile Send/Receive Circuit

to 2300-cps frequency-shift facsimile signal which is terminated on the 2013 system Receivers IDF program board. The facsimile signal is programmed through the IDF patch panel to the input of the CV-1066/UX converter which converts the F/S signal to an amplitude-modulated facsimile signal. The output of the CV-1066/UX is terminated on the IDF program board where it is programmed through the patch panel to a receive facsimile jack provided at the facsimile operating position. The signal connects to the AN/UXH-2 continuous page recorder by means of a patch-cord.

3-107. TYPICAL CIRCUIT PROGRAMMING, CONTAINER RA3.

Container RA3 is equipped with separate audio and DC programming facilities for both RED and BLACK circuits. Teletype equipment and the clear text input and output circuits of KW-26 equipment in container RA3 are terminated on the RED DC SDF program board. The RED SDF is equipped with tone converter and loop supply units. The cipher input and output circuits of the KW-26 are terminated on the program board of the BLACK DC SDF which is also equipped with tone converter and loop supply units. The tone converter audio circuits are terminated on their respective audio SDF program boards, and the DC circuits on the respective DC SDF program boards.

3-108. Teletype circuits in RA3 may operate with the local KW-26 equipment installed in RA3, or with remote KW-26 equipment in the single-channel on-line CRYPTO area. When a remote KW-26 is used, the remote KW-26 clear-text circuits are program patched to RA3 at the RED MDF program board in container RB1.

3-109. TYPICAL LOCAL KW-26 CIRCUIT PROGRAMMING RA3. Figure 3-12 illustrates typical circuit programming using a local KW-26 equipment that is installed in RA3. The KW-26 clear text and cipher input and output circuits may use external loop battery supplied by 6006 loop supply units, or the KW-26 may furnish loop battery internally for these circuits. Figure 3-12 illustrates programming when external loop battery is supplied by 6006 units. The 6006 loop supply units used on the signal circuits are strapped for 20-ma operation, and the loop supply units used on the trip-control (TD Clutch control) circuits are strapped for 60-ma operation.

3-110. Three signal pairs are run from the AN/UGC-6 to the program board of the RED DC SDF; one each for the send, trip-control, and reperforator circuits. The transmitter distributor (TD), keyboard, and page printer are series-connected providing page copy of received messages for the RA3 traffic file. One signal pair from the TT-171A, which provides page copy of receive messages, is terminated on the RED DC SDF.

3-111. The AN/UGC-6 send line is program patched to a SET 2 jack of a KW-26 send jack circuit on the RED DC SDF patch panel, the REMOTE TTY (RED DC INPUT) circuit of the KWT-26 is program patched to the SET 1 jack, and a 20-ma 6006 loop supply unit is program patched to the LOOP of the circuit. The AN/UGC-6 trip-control line is programmed to a SET 2 jack of a second loop circuit, the KWT-26 trip-control output line to the SET 1 jack, and a 60-ma loop supply unit to the LOOP.

3-112. The cipher output of the KWT-26 is programmed to a SET 2 jack of a loop circuit on the BLACK DC SDF patch panel, a 20-ma 6006 loop supply unit to the LOOP, and the DC input of a 6002-1 modulator to the SET 1 jack. The modulator converts the DC cipher signal to a 10-kc phase shift signal which is terminated on the audio section of the BLACK SDF. The 10-kc cipher signal is then programmed through a normal through LINE-EQUIPMENT jack circuit on the BLACK audio patch panel and then into a trunk line to the BLACK MDF in container RE1 for further programming to the transmitter site.

3-113. The receive 10-kc cipher signal is brought into container RA3 through a trunk line from the BLACK MDF in container RE1. The receive signal is programmed through a LINE-EQUIPMENT jack circuit on the BLACK audio patch panel and then to the audio input of a 6002-2 demodulator. The DC output of the demodulator, which appears on the BLACK DC SDF, is program patched to a SET 1 jack of the KWR-26 input loop circuit, the SET 2 jack is programmed to the KWR-26 signal input, and the LOOP is programmed to a 6006 loop supply unit wired for 20-ma operation. The REMOTE TTY (RED DC OUTPUT) of the KWR-26 is terminated on the RED DC SDF and is programmed to a SET 1 jack of the KWR-26 loop circuit. The SET 2 jack is programmed to the input of the TT-171A page printer. Since the reperforator and loop battery supply still remain to be programmed, a second loop circuit is placed in series by programming the loop of the first circuit into a SET 1 of the second. A 6006 loop supply unit strapped for 20-ma operation is programmed to the LOOP, and the reperforator of the AN/UGC-6 to the SET 2 jack of the second loop circuit.

3-114. When loop battery for the signal circuits is supplied by the KW-26 equipment, the DC program patches are made in the following manner. The RED input of the KWT-26 to the LOOP, the AN/UGC-6 send line to the SET 2 jack, and the SET 1 jack terminated with a shorting coaxicon connector on the program board. The KWT-26 BLACK output to the LOOP circuit on the BLACK SDF, the SET 1 jack to the modulator DC input, and the SET 2 jack terminated with a shorting coaxicon connector. The trip control circuit programming is not changed. The KWR-26 input to the LOOP of the BLACK input loop circuit, the demodulator DC output to the SET 1 jack, and the SET 2 jack terminated with a shorting coaxicon connector. The KWR-26 RED output to the LOOP, the TT-171A to the SET 1 jack, and the AN/UGC-6 reperforator to the SET 2 jack of the KWR-26 RED loop circuit. The second loop circuit is not required, and the audio program patches remain the same as shown.

3-115. TYPICAL REMOTE KW-26 CIRCUIT PROGRAMMING RA3. Figure 3-13 illustrates typical RA3 cryptographic circuit programming using a remote

KW-26 equipment. The AN/UGC-6, as noted previously, has the TD, keyboard and page printer wired in series, and the reperforator is used to furnish tape copy of received messages.

3-116. The AN/UGC-6 send circuit is program patched to a SET 2 jack on the RED DC patch panel of the RED DC SDF. External battery for the send circuit is furnished by a 6006 loop supply unit which is programmed to the LOOP of the jack circuit. The SET 1 jack is program patched to the DC input of a 6002-1 modulator. The modulator 10-kc output is terminated on the RED audio SDF since the signal is still in clear text form. The 10-kc TTY signal is programmed through the RED audio patch panel to a multiple coaxicon connector on the LINE side of the program board. The signal is program patched from the multiple coaxicon connector to a trunk line that terminates on the RED MDF in container RB1.

3-117. The trip-control signals from the remote KWT-26 equipment, which uses the signal line from the remote KWT-26, is program patched from the multiple coaxicon block to the input of a 6004-2 trip-control demodulator. The DC output of the trip-control demodulator is terminated on the RED DC SDF program board where it is programmed to a SET 1 jack of a loop circuit. The AN/UGC-6 trip-control circuit requires external loop battery which is supplied by a 6006 loop supply unit that is programmed to the LOOP of the trip control jack circuit. The SET 2 jack of the circuit is programmed to the trip-control circuit of the AN/UGC-6.

3-118. The receive clear-text 10-kc message, which is carried over a trunk line from the RED MDF in container RB1, is terminated on the RED audio SDF in RA3. The receive signal is programmed through the audio patch panel to the input of a 6002-2 demodulator. The DC output of the demodulator, which terminates on the RED DC SDF program board, is program patched to a SET 1 jack of a loop circuit on the patch panel. The SET 2 jack of this circuit is programmed to the input of the TT-171A page copy monitor. Since this circuit requires external loop battery and the AN/UGC-6 reperforator is still to be series connected into this circuit, a second loop circuit is programmed in series with this one. A 6006 loop supply unit is programmed to the LOOP of the second loop circuit, and the SET 2 jack is programmed to the LOOP of the first loop circuit putting both loop circuits in series and connecting the DC output of the demodulator, the TT-171A, the reperforator and the 6006 loop supply into one series loop circuit.

3-119. VOICE AND CW OPERATING POSITIONS.

Operating positions are installed in containers RE2, RF2, and RF3. Container RE2 is equipped with one voice operating position that is used primarily for point-to-point voice communications. Container RF2 houses three CW operating positions, and container RF3 houses three operating positions which are equipped for both voice and CW communications.

3-120. POINT-TO-POINT VOICE OPERATING POSITIONS, RE2.

The voice operating position installed in container RE2 is shown in figure 3-14. The left side of the dual rack, which is mounted on the operating desk, contains a CV-501A single-sideband converter, a 9-position receiver control panel and an R390A/URR radio receiver. The right side of the dual rack contains a BSP-2 dual speaker-amplifier unit, a CV-591A SSB converter, a 9-position transmitter control panel and an R390A/URR receiver. Additional equipment associated with the operating position is installed in the two equipment racks adjoining the operating position. Two SPU-2 Speech Processing Units and a BSP-2 dual speaker-amplifier are located near the top of the rack on the left side, and the rack on the right side of the operating position contains five TA-401B 2-wire/4-wire Telephone Terminal Units, a BSP-2 dual speaker-amplifier, and the Special Distribution Frame used for programming the voice equipment installed in RE2.

3-121. The operating position is equipped with a desk type microphone having a hand-operated push-to-talk switch, and a boom microphone equipped with a foot-operated push-to-talk switch. The boom microphone assembly has a headphone jack which connects in parallel with a headphone jack mounted on the left leg of the desk through a microphone control unit which is mounted on the right leg of the desk. Both microphones plug into receptacles on the control unit. Either the boom or desk microphone may be selected for use by the operator by means of a rotary microphone-selector switch on the microphone control unit. The desk is equipped with a drawer on each side of the typewriter well, and message-blank storage shelves on the left side.

3-122. RECEIVER CONTROL AND PROGRAMMING, RE2. Each of the nine positions of the receiver control panel is equipped with a 3-position lever switch, an indicator lamp, and a headphone-circuit volume control. The first six positions on the left of the control panel, positions 1 through 6, are active while positions 7, 8 and 9 are spares. Figure 3-15 is a block diagram showing the functions of the receiver control panel and typical program patches at the SDF to complete the receive point-to-point voice circuits. The receiver control panel is shown with the lever switches in the CENTER position which connects the receiver audio outputs to the speakers. When a lever switch is placed in the DOWN position, the speaker associated with the switch is disconnected, the receiver audio output is connected to the operators headphone circuit and the associated indicator lamp is lighted. The UP position of the switches on this receiver control panel are not used, however, should a switch be placed in the UP position, both the speaker and the headphone circuit would be disconnected from the receiver audio output circuit.

3-123. The two R-390 receivers which are installed in the dual rack are normally used in conjunction with positions 1 and 2 of the receiver control panel. Antenna inputs to these receivers are programmed through the receivers RF patching facility located in container RE4. The IF output of each receiver is connected directly to the input of a CV-591A single-sideband converter unit (see figure 3-15) and the audio output of the SSB converters are terminated on the SDF program board. The R-390 receiver MUTE circuits are also

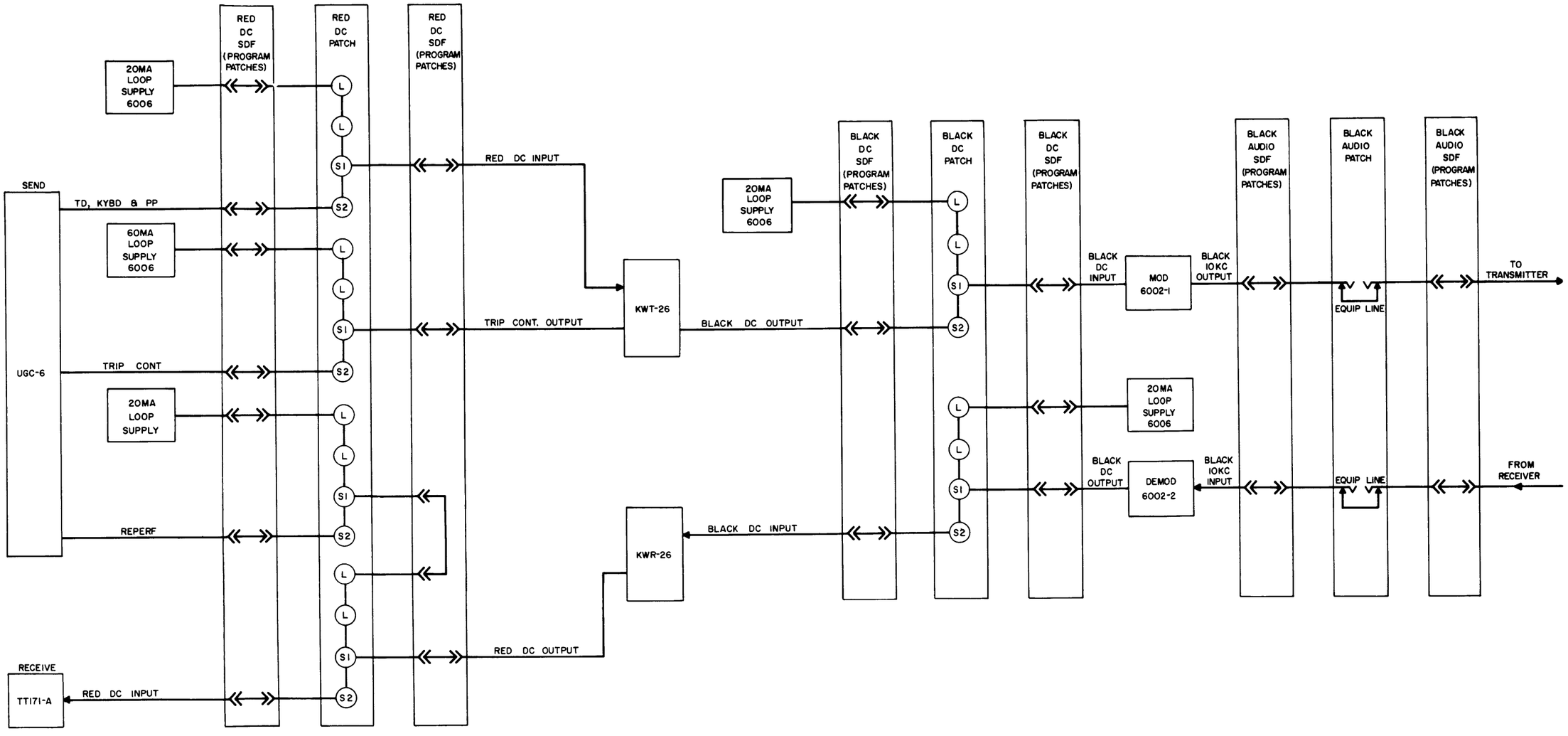


Figure 3-12. Local KW-26 RA3, Typical Programming

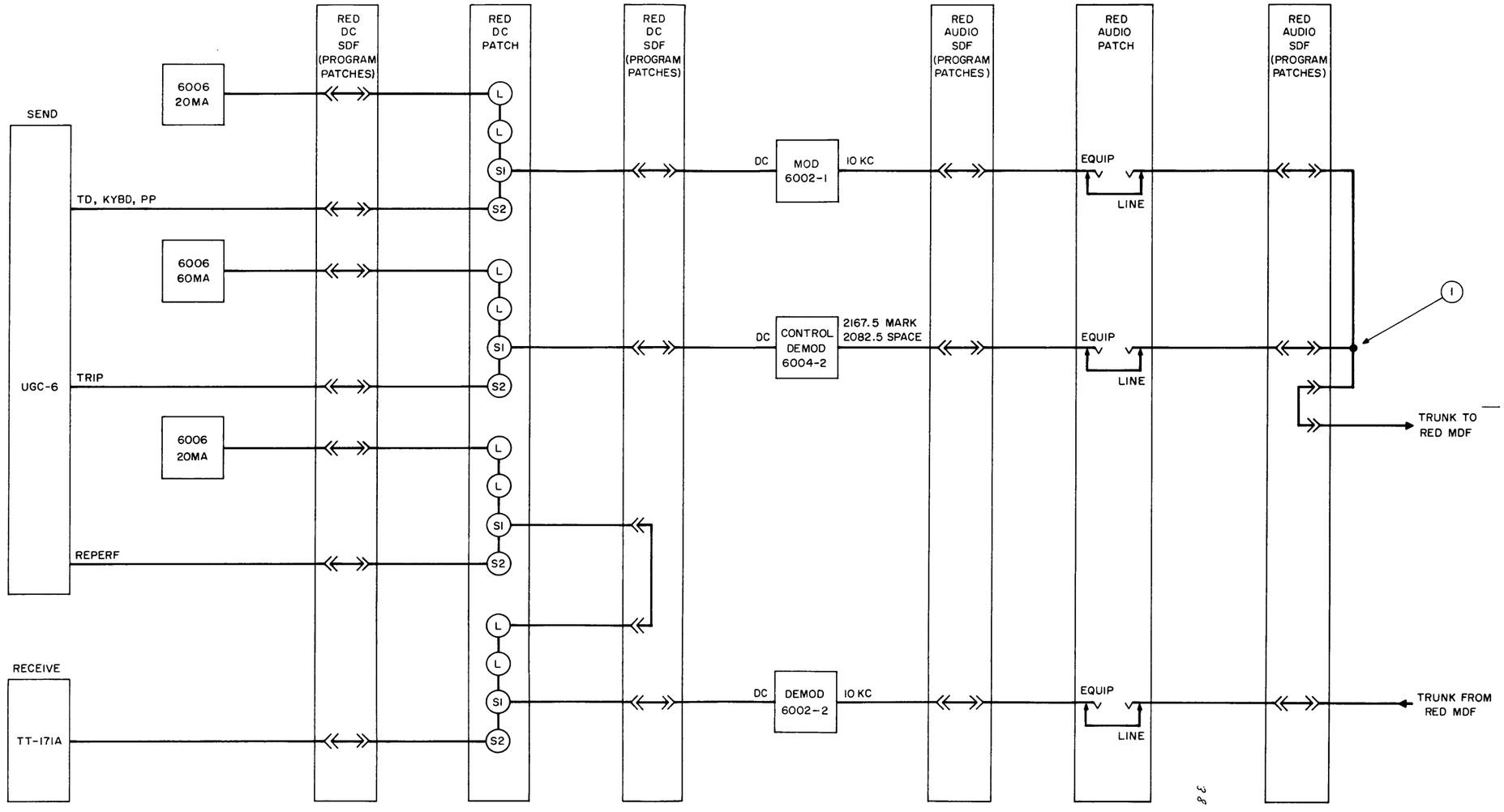


Figure 3-13. Remote KW-26 RA3, Typical Programming

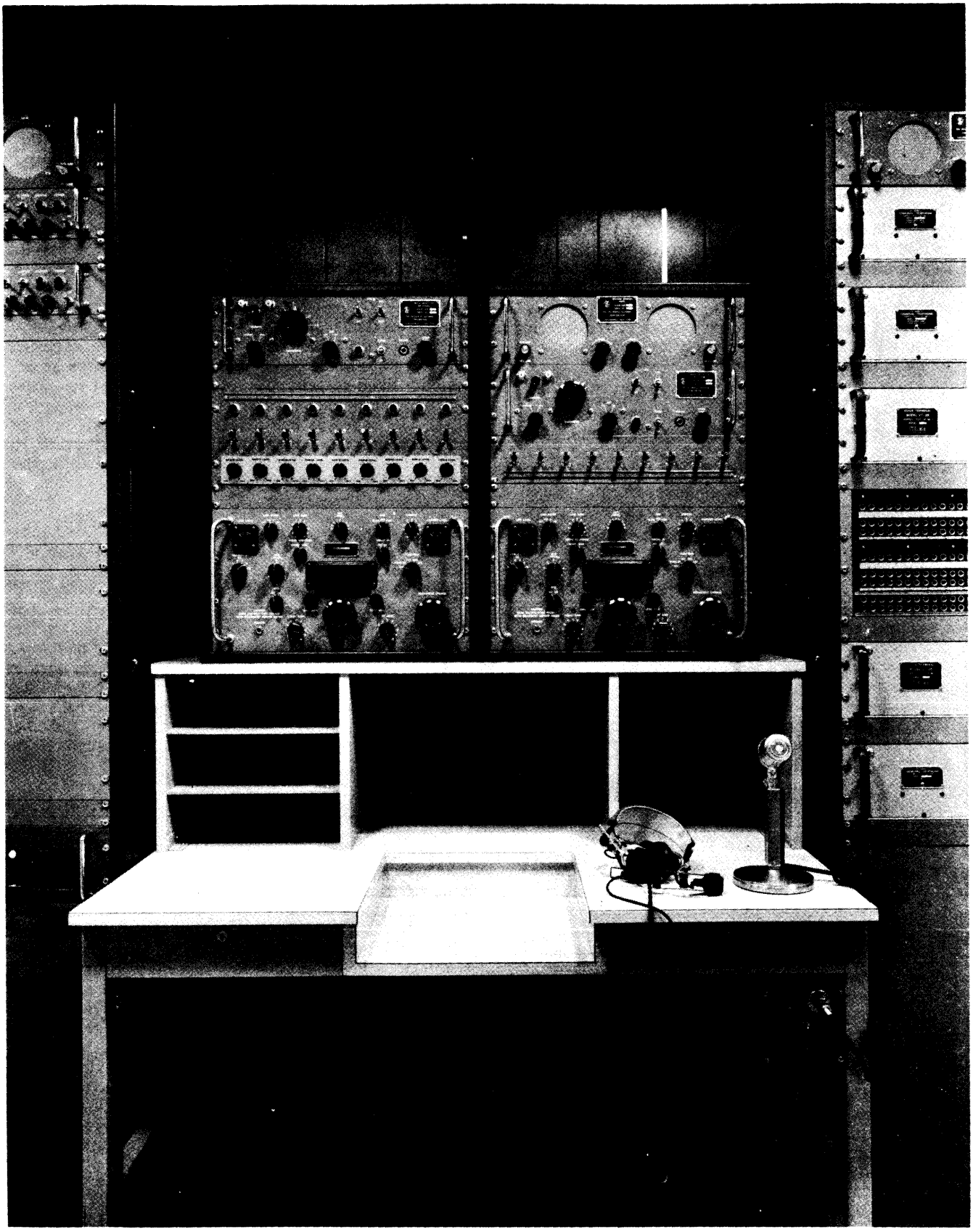


Figure 3-14. Voice Operating Position RE2, Front View

terminated on the SDF program board where they are programmed to MUTE circuits from SPU-2 Speech Processing Units.

3-124. The audio outputs of the CV-591A SSB converters are programmed through LINE-EQUIPMENT jack circuits of the SDF monitor patch panel to the receive inputs of TA-401B 2-wire/4-wire telephone terminal units. The receive outputs of the TA-401B units, which appear on the SDF program board, are programmed through the SDF patch panel to the inputs of the amplifier units of the BSP-2 that is installed at the operating position. The outputs of the two BSP-2 amplifiers are connected directly to the position 1 and 2 switch inputs of the receiver control panel, and the speakers of these units are connected directly to the output contacts of the switches. As noted previously, the control panel switches are shown in the center position which connects the amplifier outputs to the associated speakers.

3-125. Receiver control positions 3 through 6 of the RE2 receiver control panel are shown programmed to trunk lines from the BLACK MDF in container RE1. This arrangement is used when the voice circuit is part of a point-to-point SSB receive circuit. Since there are five TA-401B units in RE2, the circuit for position 6 is shown programmed without a TA-401B unit. The speaker-amplifiers shown in positions 4 through 6 are located in the two adjoining racks and have their amplifier outputs and speaker inputs terminated on the SDF program board. Program patches are required to connect these amplifiers and speakers to the receiver control panel. The volume controls for the headphone circuits (not shown in the figure) are connected between the outputs of the receiver control switches and the parallel connections to the headphones, providing separate control of the headphone volume from each receive circuit.

3-126. TRANSMITTER CONTROL AND PROGRAMMING, RE2.

The function of the transmitter control panel and typical program patches at the RE2 SDF to complete send voice circuits are illustrated in figure 3-16.

3-127. The microphone illustrated in figure 3-16 may be either the desk or the boom microphone. The microphone connects to either one of two SPU-2 units through a toggle switch on the microphone control unit. One SPU-2 unit is a standby which can be quickly programmed into the circuit should the SPU-2 in use malfunction. The microphone audio output and push-to-talk circuits are fed to the input of the selected SPU-2. The audio output of the SPU-2 is an amplitude-regulated voice signal, and the push-to-talk and receiver muting outputs are relay contacts which close when the microphone push-to-talk switch is closed. The push-to-talk circuit is tone-converted by a 6002-1 modulator to a corresponding 10-kc phase-shift tone signal. The audio output, 10-kc push-to-talk signal, and the receiver muting outputs of the SPU-2 terminate on the RE2 SDF where they are program patched to the transmitter control panel.

3-128. Each of the nine positions of the transmitter control panel is equipped with a 3-position lever switch which simultaneously connects the audio, push-to-talk, and receiver muting circuits to outputs lines when the front panel lever switch is plaved in the DOWN position. The CENTER position of the switch disconnects the three circuits (as shown in the figure), and the UP position is not used. The inputs of similar sections of all nine switches are connected in parallel, allowing the operator to switch the outputs of the SPU-2 to any one of the available output lines.

3-129. The audio, push-to-talk and receiver muting outputs of each transmitter control position are terminated on the SDF. When the send voice circuit is part of a typical point-to-point SSB circuit as shown in figures 3-5 and 3-6, the push-to-talk and receiver muting outputs of the SPU-2 are not used. Push-to-talk operation is not required on most point-to-point SSB circuits since the transmitter is radiating at all times. Push-to-talk operation may be used when the transmitter is used exclusively for the voice circuit in RE2. The receiver muting circuit may be used only in conjunction with a local R-390 receiver located in RE2. The muting circuit is then programmed to the MUTE input of the local R-390 receiver.

3-130. The voice signal from the output of the transmitter control panel is program patched through the SDF monitor patch panel to the input of a TA-401B 2-wire/4-wire telephone terminal unit. The output of the TA-401B terminal is then programmed through the patch panel to a trunk line that terminates on the BLACK MDF in container RE1. The 10-kc push-to-talk signal, when required for operation, is program patched in the same way to another RE1 trunk line. The remainder of the circuit from container RE1 to a transmitter is described in paragraph 3-46, and the push-to-talk circuit programming is described in paragraph 3-91.

3-131. CW OPERATING POSITIONS CONTAINER RF2.

Three CW operating positions are provided in container RF2. Figure 3-17 is a front view of CW operating position 2 which is the center position. Position 1 is on the left and position 3 on the right. The equipment installed in the left side of the dual rack above the desk includes an LSP-6 speaker-amplifier unit, a receiver control panel, and a R-390A/URR radio receiver. The right side of the dual rack contains an LSP-6 speaker-amplifier unit, a transmitter control panel, and an R-390A/URR radio receiver. A telegraph key is mounted on the right side of the desk, and a headphone jack on the left leg of the desk. CW operating positions 1 and 3 are identical except that each contains one LSP-6, and position 3 contains a low-frequency R-389/URR receiver which is installed in the right side of the dual rack.

3-132. RECEIVER CONTROL PANEL RF2. Each receiver control panel in RF2 contains nine 3-position multi-contact lever switches, nine headphone volume controls, and nine headphone indicator lamps. Fig-

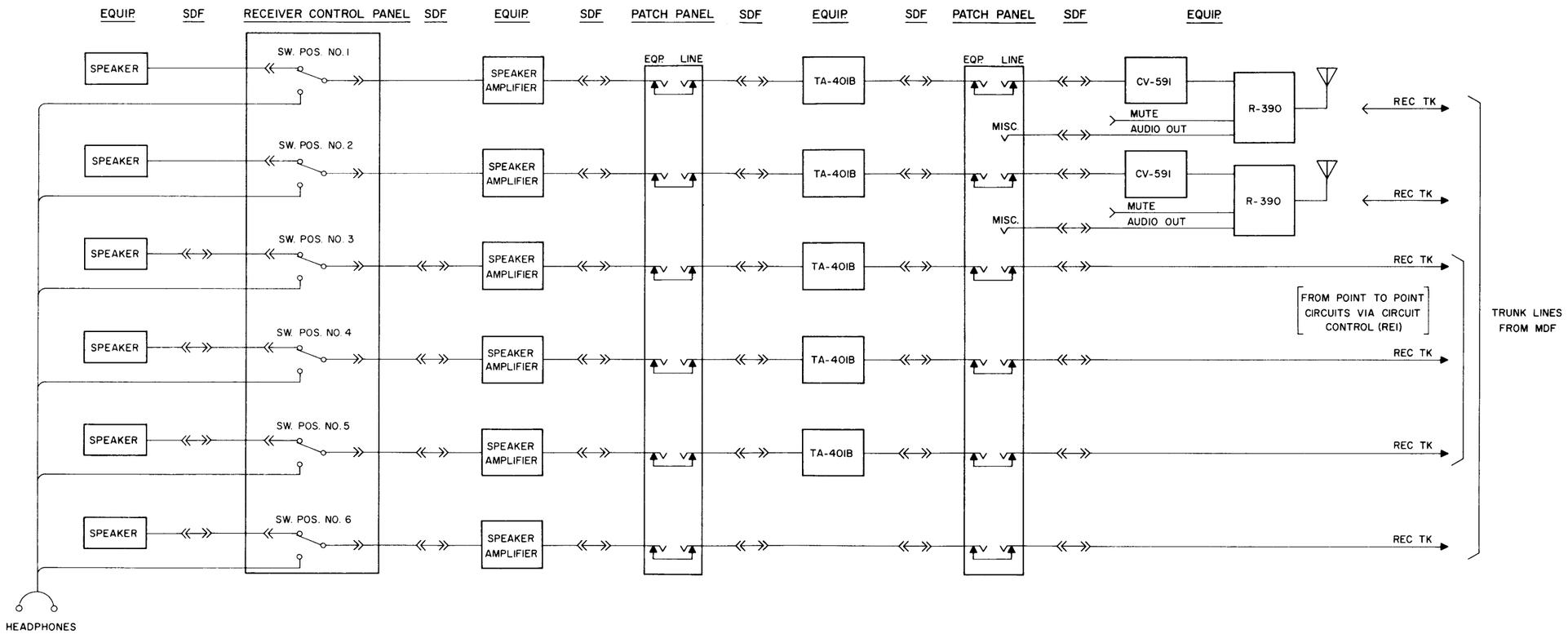


Figure 3-15. Voice Operating Position RE2, Receive Block Diagram

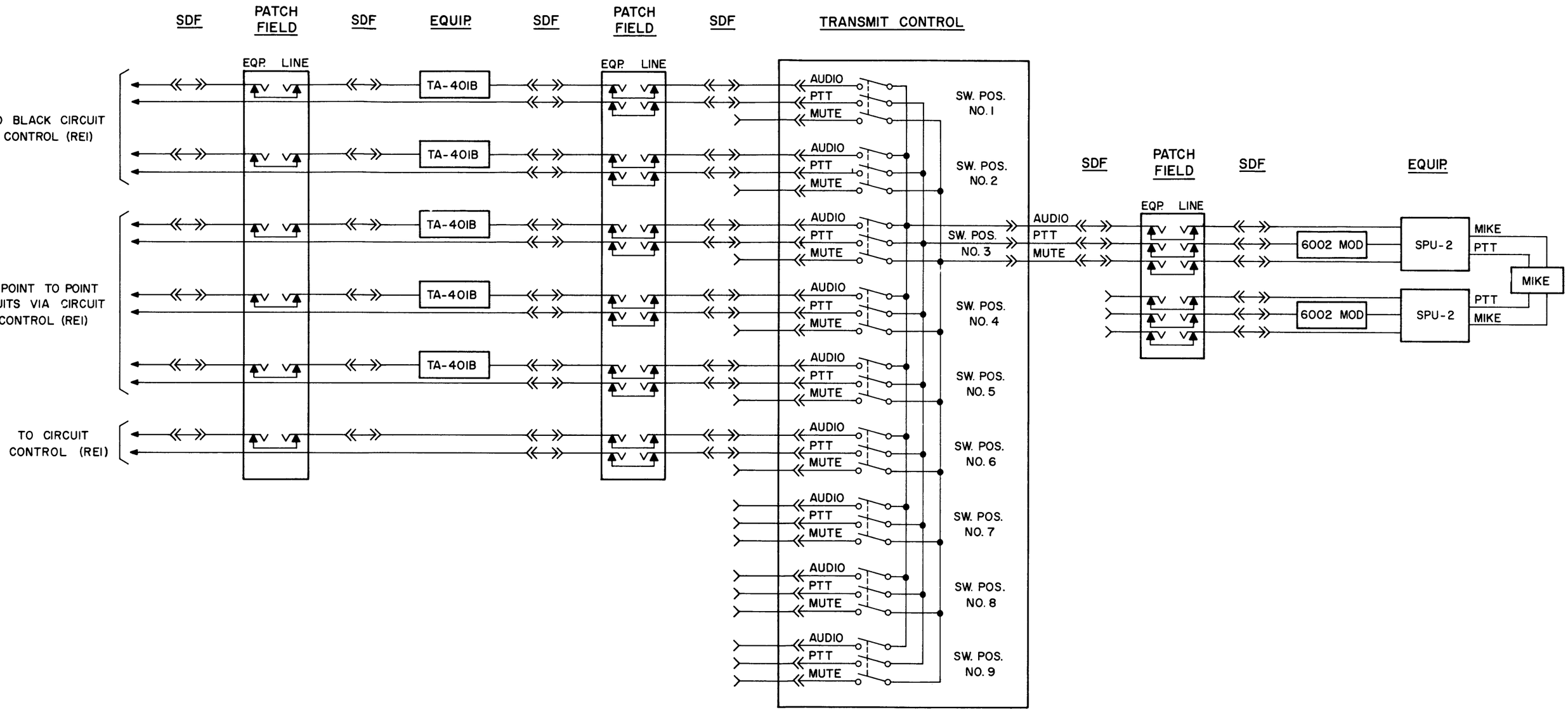


Figure 3-16. Voice Operating Position RE2, Send Block Diagram

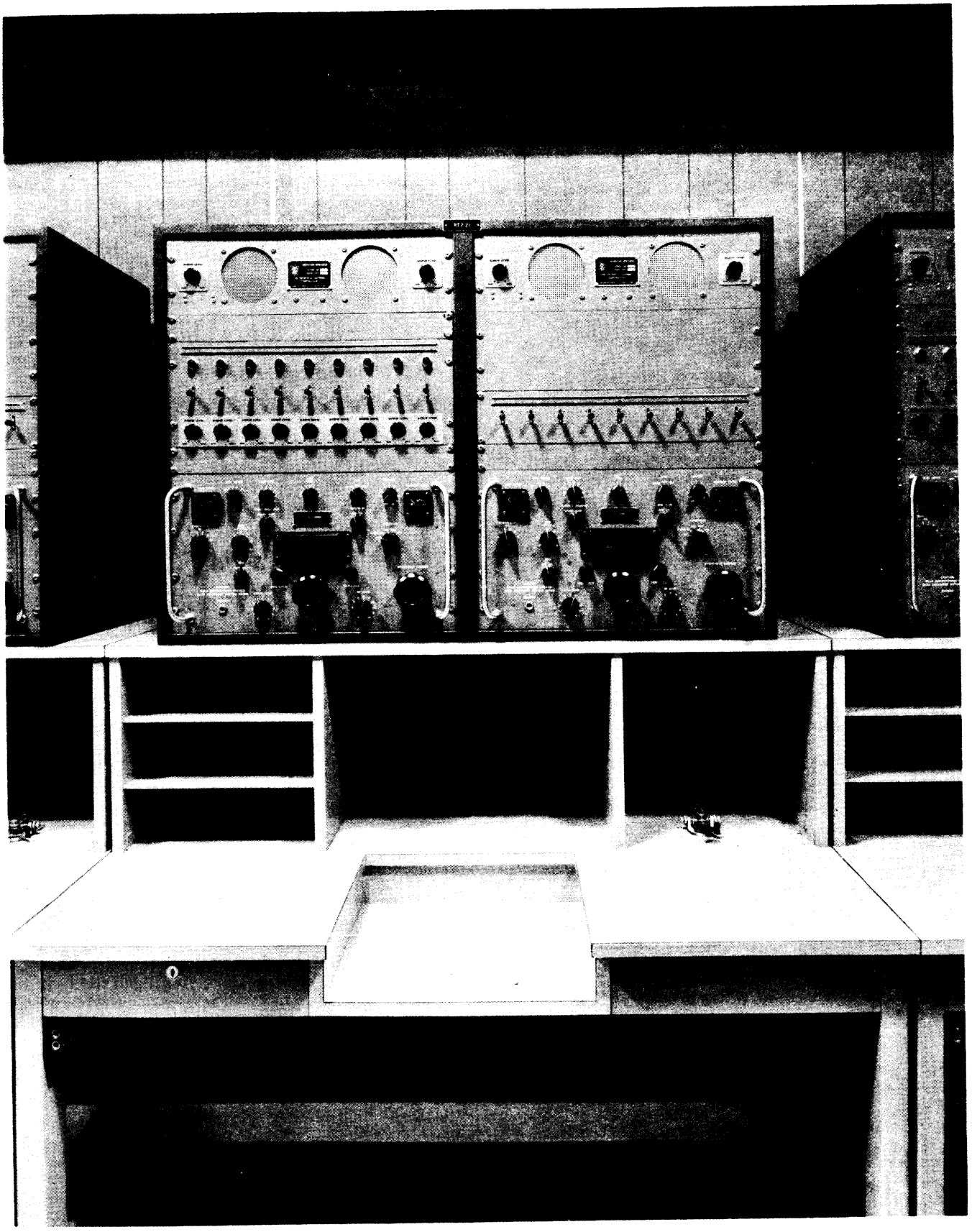


Figure 3-17. CW Operating Position RF2, Front View

ure 3-18 is a simplified block diagram that illustrates the audio functions of the receiver control panels in operating position 1 of container RF2 and RF3. The top portion of the figure applies to both RF2 and RF3, except that RF2 has no CV-591A SSB converters or remote receive lines. The bottom portion of figure 3-18 applies to the operating positions in container RF3 only.

3-133. In RF2, the audio outputs of the R-390 receivers are connected directly to the inputs of the amplifiers of LSP-6 units. At CW operating position 1, the amplifier outputs are connected to switch positions 1 and 2 of the receiver control panel. At CW operating position 2, the amplifier outputs are connected to switch positions 3 and 4. At CW operating position 3, the amplifier outputs are connected to switch positions 5 and 6, and the R-389 receiver output connects directly to switch position 9. Switch positions 7 and 8 at all three operating positions are not used.

3-134. The receiver control panel switches are shown in the CENTER positions which connects the amplifier outputs to the LSP-6 speaker inputs. The DOWN position of the switches connect the amplifier outputs to the headphones through headphone volume controls which are not shown. The UP positions of the switches are not used. An indicator lamp circuit (not shown) for each switch position connects to another set of contacts of the switch which closes the circuit to the indicator lamp when the switch is placed in the DOWN or headphone position.

3-135. The receiver control panels at CW operating positions 1, 2, and 3 are interconnected in such a manner that an operator at any one of the three positions may monitor any one of the seven CW receiver outputs in container RF2 on the headphone circuit at his position. Whenever one of the seven active switches is placed in the DOWN position at any of the three CW operating positions, it connects the associated receiver output signal to the headphone jack at that position, and at the same time lights the indicator lamps associated with that switch position at all three CW operating opsitions.

3-136. TRANSMITTER CONTROL PANEL RF2. The transmitter control panels at all three CW operating positions in RF2 are identical. Each has nine 3-position lever switches. A simplified block diagram of the transmitter control panel function is contained in the bottom section of figure 3-19. The top portion of the figure applied to RF3 only.

3-137. The telegraph handkey at each operating position is connected to the DC input of a 6002-1 modulator unit. Dry contact keying is used in this circuit. The modulator converts the ON-OFF keying signal to a corresponding 10-kc phase shift signal. The 10-kc output of the modulator is connected in parallel to the inputs of all nine lever switches. The output of each lever switch is connected to a transmitter keying line which is terminated on the BLACK MDF in container RE1. A switch is placed in the UP position to connect the 10-kc CW keying signal to a keying line. The CENTER position of a switch disconnects the keying signal from the keying line, as indicated in the figure.

3-138. All three transmitter control panels in RF2 are inter-connected so that an operator at any one of the three CW positions may key any one of nine RF2 transmitter keying lines. To provide this service, each transmitter keying line is parallel connected to the output contacts of the same numbered switch at all three transmitter control panels.

3-139. AIR/GROUND OPERATING POSITIONS, RF3.

Three identical operating positions (see figure 3-20) that are equipped for both voice and CW communications are installed in container RF3. The initial installation of equipment in the dual rack at each position included a BSP-1 single-speaker-amplifier, a BSP-2 dual speaker-amplifier, an SPU-2 Speech Processing Unit, a 9-position receiver control panel, and a 9-position transmitter control panel, as shown in the figure. Subsequently, two R-390A/URR radio receivers and one CV-591A SSB converter were added to each position. Each position is also equipped with a boom microphone, a desk microphone, a telegraph hand-key, a 600-ohm headphone set, a foot-operated push-to-talk switch, a microphone control unit, and headphone jack circuit.

3-140. RECEIVER CONTROL PANEL RF3. Each position of the 9-position receiver control panel in RF3 has a 3-position multi-contact lever switch, a headphone indicator lamp and a headphone-circuit volume control. Figure 3-18 illustrates the receive function of the control panel at operating position number 1. The IF output of R-390 receiver number 1 (in the left side of the dual rack) is connected directly to the input of the CV-591A SSB converter. The audio output of the CV-591A is connected to the input of one amplifier in the BSP-2, and the audio output of the amplifier connects to the input of switch position 1. The LOCAL audio output of R-390 receiver number 2 (in the right side of the dual rack) connects directly to the input of the other amplifier in the BSP-2, and the amplifier output to the input of switch position 2. A remote receive line input is connected to the input of switch position 7. The LINE audio outputs of the R-390 receivers are connected to other sets of contacts on switch positions 1 and 2, as illustrated in the bottom portion of figure 3-18.

3-141. All three positions of the switches on the receiver control panels in RF3 are used. In the CENTER position, switches 1 and 2 connect the amplifier outputs to their associated speakers, and switch 7 connects the remote receive line input to the BSP-1 speaker amplifier unit. The DOWN position of each switch connects the audio input to the headphone circuit through a volume control (not shown), and lights an associated headphone indicator lamp at each operating position. The UP position of switches 1 and 2 remote the LINE audio outputs of the R-390 receivers to the BLACK MDF in container RE1.

3-142. The receiver control panel of operating position 2 and 3 container RF3 is connected in the same manner as position 1, except that at operating position 2 switches 3 and 4 are used with the R-390 receivers and switch 8 with the remote line input, and at operating position 3 switches 5 and 6 are used with the R-390 receivers and switch 9 with the remote line input.

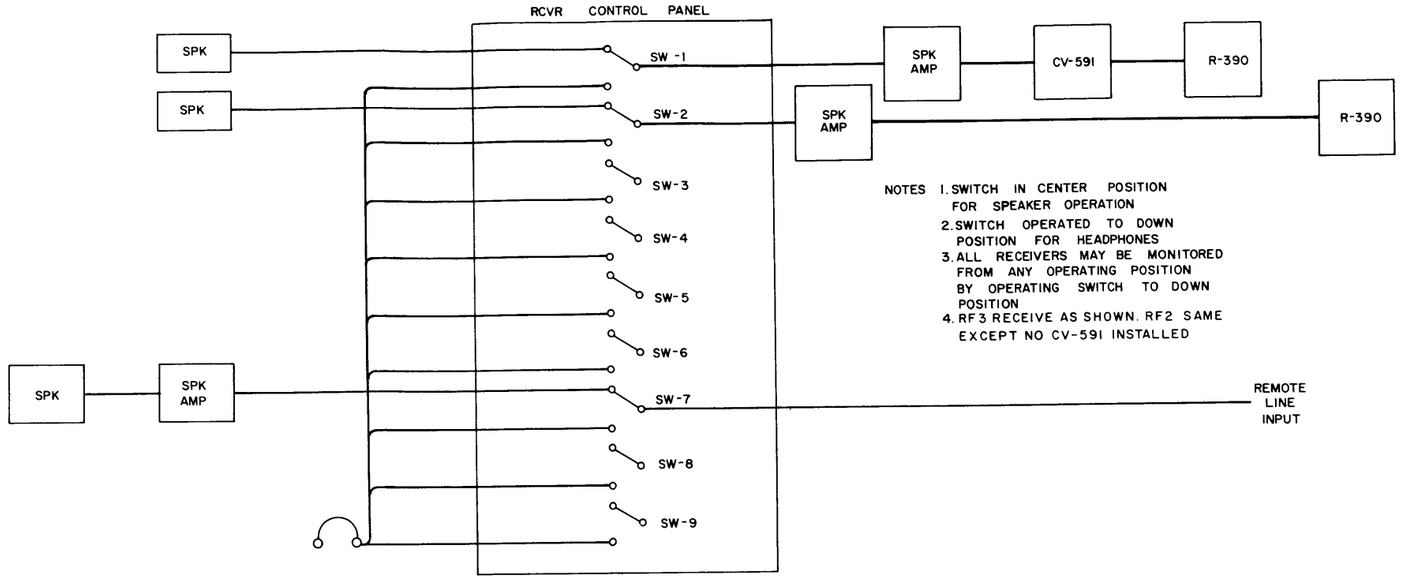


Figure 3-18. Receiver Control Panel RF2 and RF3, Functional Block Diagram

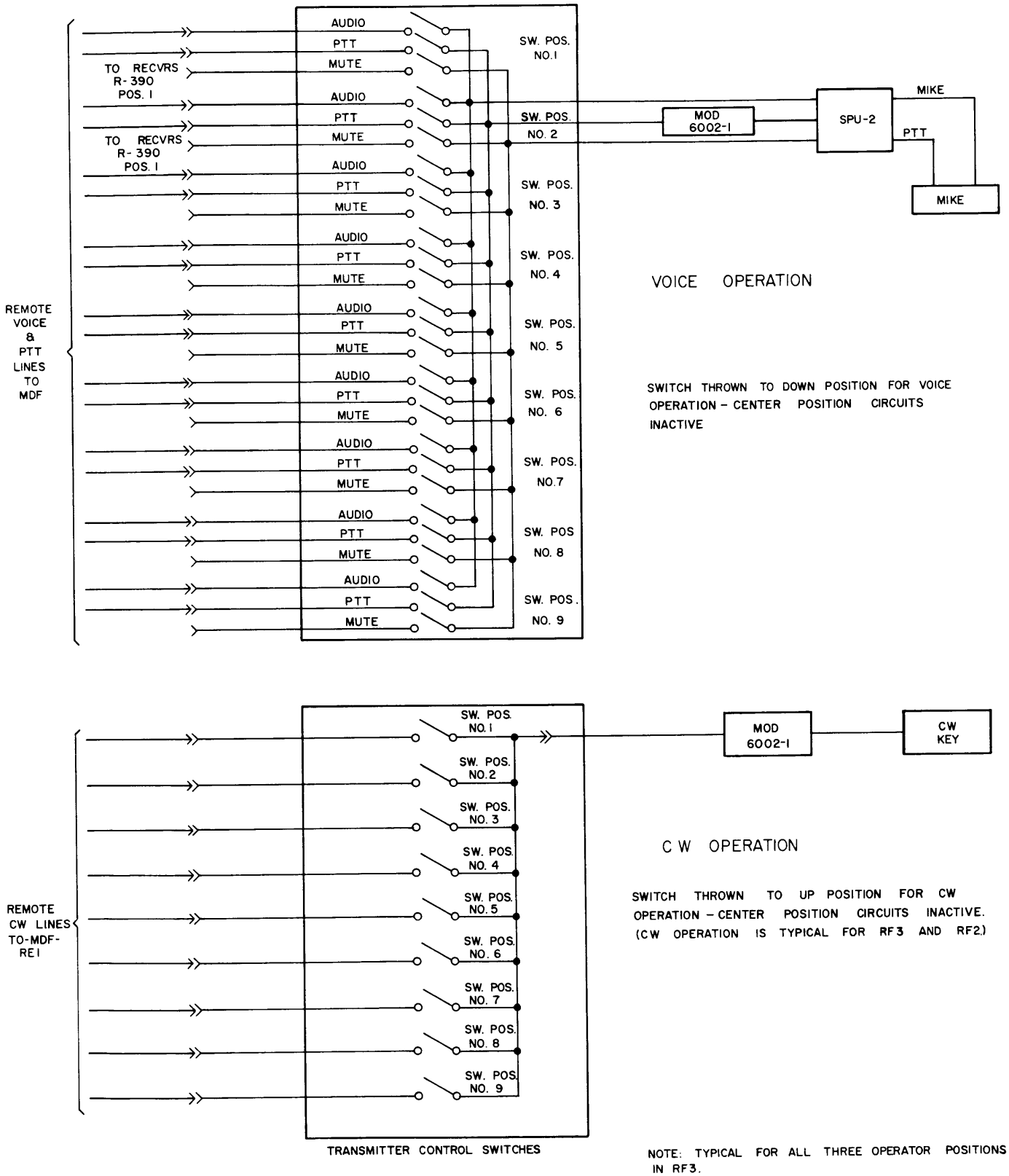


Figure 3-19. Transmitter Control Panel, RF2 and RF3, Functional Block Diagram

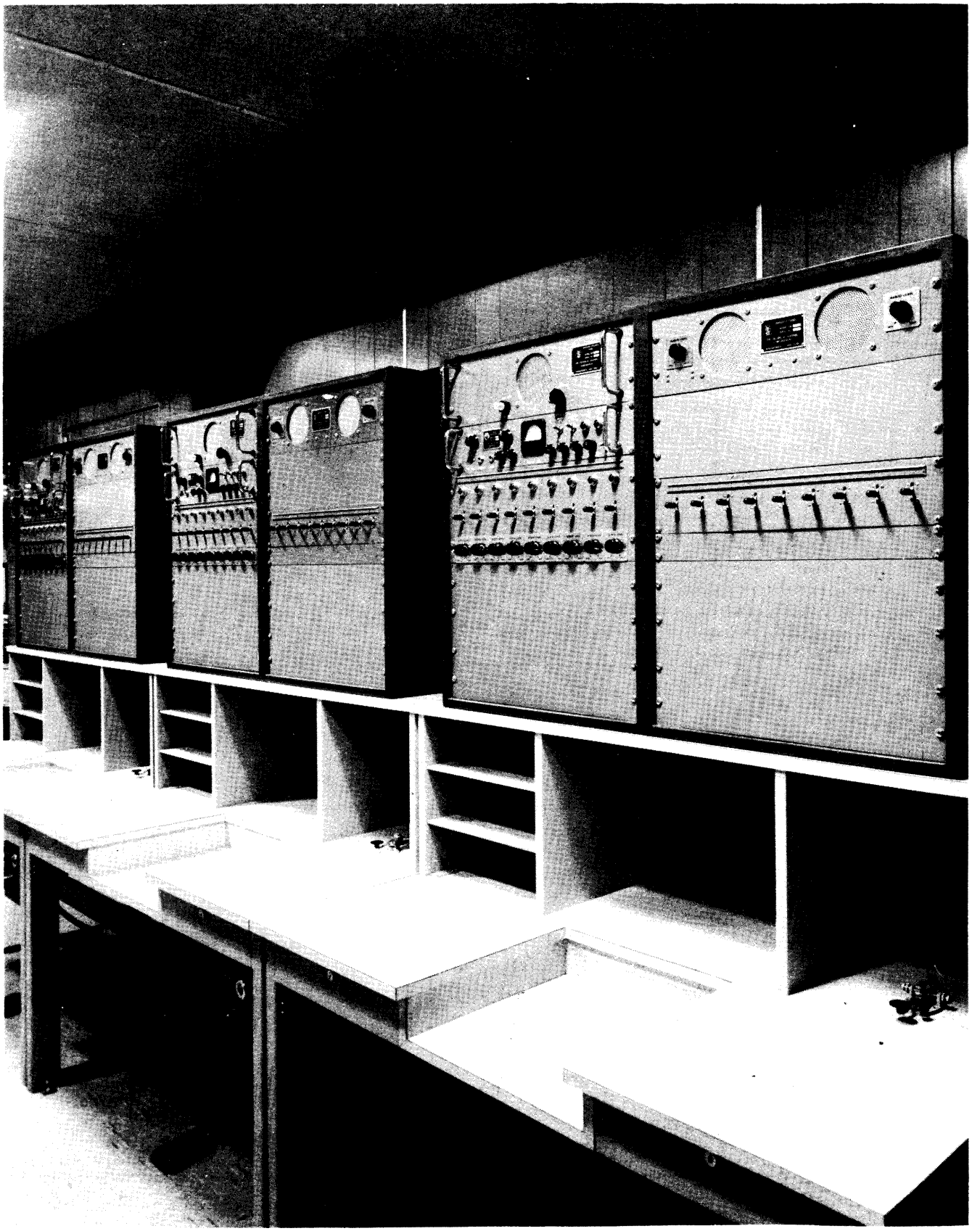


Figure 3-20. Voice and CW Operation Positions RF3, Front View

3-143. TRANSMITTER CONTROL PANELS RF3. The transmitter control panel at each Air/Ground operating position in RF3 contains nine 3-position lever switches that provide control of both voice and CW circuits to the transmitters. Figure 3-19 is a simplified block diagram illustrating the functions of the transmitter control panels. All switches are shown in the CENTER position. Voice operation is shown in the top portion of the figure, and CW operation in the bottom portion. The input contacts of similar sections of all nine switches are connected in parallel. The CENTER position of the switches disconnect the input from the output circuits of the switches, as illustrated in the figure. The DOWN position of the switches are used for voice operation and the UP position for CW operation.

3-144. The voice and push-to-talk circuit from either the boom or desk microphone connects to the SPU-2 through the microphone control unit. The push-to-talk signal from the SPU-2 output is tone-converted by a 6002-1 modulator. The amplitude-regulated voice output, the tone-converted 10-kc push-to-talk signal, and the receiver muting circuit of the SPU-2 are connected to the inputs of all nine switches on the transmitter control panel. The CW signal from the telegraph key is converted to a 10-kc phase-shift tone by a 6002-1 modulator and then fed to the parallel connected inputs of the CW sections of all nine switches. Both 6002-1 modulators use dry-contact keying.

3-145. The audio, push-to-talk, and remote CW lines from each switch output are terminated on the BLACK MDF in container RE1. The receiver muting circuits from switch positions 1 through 6 connect to the MUTE inputs of the six R-390 receivers at the operating positions in RF3.

3-146. The transmitter control panels at all three operating positions in RF3 are interconnected in the same manner as those in RF2. An operator at any of the three positions may control any one of the nine voice and CW lines to the transmitters. When a switch is placed in the DOWN position, the voice, push-to-talk, and MUTE circuits are connected to the selected audio, PTT and MUTE output lines. When a switch is placed in the UP position, the 10-kc CW signal is connected to the selected CW line.

3-147. STATION TTY INTERNAL ORDER-WIRE SYSTEM.

The AN/TSC-35 internal order-wire system consists of nine stations; eight are distributed in key areas of the Receiving Central and one is located in the Transmitter Control container TC1 at the Transmitting Central. Teletype equipment used in the order-wire system include four TT-176A's and four TT-47 units at the receiving Central and one TT-176A unit at the Transmitting Central. All teletype units are wired for full duplex operation.

3-148. INTERNAL ORDER-WIRE CIRCUIT.

The overall internal order-wire circuit is illustrated in figure 3-21, and typical programming of the internal order-wire circuit in container RA3 is shown in figure 3-22. The internal order-wire circuit at the Receiving Central uses tone conversion to transmit the TTY signals from one area to another, and the same signal pair is used for both the send and receive signals. Since phase-shift tone conversion is not used at the Transmitting Central, the internal order-wire circuit from the Transmitter Control container TC1 to the Unclassified Control container RE1 requires separate signal lines for the send, receive and order-wire control circuits. In container RE1, the transmitters order-wire signals are converted to 10-kc phase shift tone signals and are then compatible with the remainder of the internal order-wire circuit at the Receiving Central.

3-149. The TT-47 and TT-176A teletype units employed in the internal order-wire system are equipped with tone converter panels (except the TT-47 unit in RA3 and the TT-176A in TC1) and foot-operated control switches. The teletype units and tone converters are connected as illustrated in figure 3-21C. The printer selector magnet circuit of the TTY is series connected with the DC output of a 6002-2 demodulator and a 6006 loop supply. The demodulator audio input circuit is connected to a signal pair that terminates on the BLACK MDF program board. The TTY keyboard is connected to the DC input of a 6002-1 modulator that is strapped for dry-contact keying. The 10-kc output of the modulator connects to movable contacts of the foot switch, and the stationary contacts of the foot switch are connected in parallel with the signal pair to the MDF. When the foot switch is closed, the modulator 10-kc output is connected to the demodulator audio input, providing page-copy of the transmitted message. The MARK-HOLD feature of the 6002-2 demodulator units is used in the internal order-wire system.

3-150. INTERNAL ORDER-WIRE CIRCUIT, RA3. The TT-47 internal order-wire TTY unit in RA3 (see figure 3-22) is not equipped with a tone converter panel, but the keyboard and selector magnet circuits are terminated on the BLACK DC SDF program board in RA3. The keyboard line is program patched to SET 2 jack of a loop circuit on the SDF DC patch panel, and the SET 1 jack is programmed to the DC input of a 6002-1 modulator unit. External loop battery is furnished for this circuit by a 6006 loop supply unit which is programmed to the LOOP connection of the circuit. The 10-kc output of the modulator is program patched through the audio SDF patch panel, and then to the moveable contact of the order-wire foot switch. The stationary contact of the switch is program patched to a multiple coaxicon connector block.

3-151. The selector magnet of the RA3 internal order-wire TTY unit is program-patched to the SET 2 jack of another loop circuit, a demodulator DC output circuit to the SET 1 jack, and a 6006 loop supply unit to the LOOP connection. The audio input circuit of the demodulator is program patched through the audio patch panel and then to the multiple coaxicon connector block. The order-wire signal line to the MDF in RE1 is programmed through the audio patch panel to a third connector on the multiple block. The operation of this order-wire station is the same as the other stations at the Receiving Central. When the foot switch is closed, the send circuit is connected to the signal line and a message may be transmitted to all stations of the sys-

tem.

3-152. INTERNAL ORDER-WIRE PROGRAMMING. At the MDF program board, all signal lines from the internal order-wire stations are programmed through the monitor patch panel and then to a multiple coaxicon connector block which connects all the order-wire signal lines in parallel. When an operator at any internal order-wire station wishes to send a message on the order-wire circuit, he depresses the foot switch which connects his keyboard circuit to the order-wire signal line, and then sends the message on the keyboard. When the message is completed, he releases the foot switch, disconnecting the keyboard circuit from the line.

3-153. Note that when no message is being transmitted, the contacts of all foot switches are open and there is no 10-kc signal on the order-wire signal lines. During this condition, the printers of all internal order-wire TTY units are kept on a steady mark by the MARK-HOLD circuit of the demodulators. Whenever a foot switch is closed and a keyboard is operated, the TTY signal is transmitted to all stations simultaneously, and the message is also printed on the TTY unit at the sending station.

3-154. TRANSMITTING CENTRAL INTERNAL ORDER-WIRE CIRCUIT. The internal order-wire TT-176A in container TC1 is wired as shown in figure 3-21A. The keyboard and selector magnet circuits of the TT-176A are connected through a small TTY patch panel in the order-wire equipment rack to the Transmitters DC MDF program board. A foot-operated control switch is provided at the TT-176A location, and is wired through a KEY LINE to the DC MDF. The foot switch provides a control signal which is used to connect the Transmitters order-wire send circuit to the order-wire signal line at the Receiving Central.

3-155. The TTY order-wire send circuit and KEY LINE in container TC1 are programmed through the DC MDF patch panel to the inputs of two telegraph channels of an AN/FGC-60 CCL send terminal. The AN/FGC-60 furnishes internal battery for these circuits. The aggregate tone output signal from the AN/FGC-60 send terminal is program patched through the audio MDF program board to the input of a VF channel of an AN/FCC-17 microwave terminal. The aggregate tone signal is multiplexed with other audio signals and fed to the 74B1 microwave transmitter for transmission to the Receiving Central.

3-156. At the Receiving Central, the microwave signal is received on the 74B1 microwave receiver in container RE2 then fed to an AN/FCC-17 receive terminal which demultiplexes the signal into its original VF channels which are terminated on the BLACK MDF in container RE1. The aggregate tone signal carrying the Transmitters order-wire send and control signals is program patched through the MDF audio patch panel in RE1 to the input of an AN/FCC-60 CCL receive terminal. The send and control signals are separated from the aggregate tones and converted to DC by the AN/FGC-60 and then tone converted by 6002-1 modulators. The 10-kc outputs of the modulators are fed to the REC LINE and KEY LINE inputs of the transmitters order wire tone converter unit (see figure 3-21B) which is mounted in equipment rack RE1.13 in container RE1.

3-157. The Transmitters order wire tone converter contains a 6002-2 demodulator, a 6006 loop supply unit and a relay. The REC LINE input to the tone converter is the send circuit of the transmitters order-wire circuit, and is connected to movable contacts of the relay. The stationary contacts of the relay are parallel-connected to SEND LINE circuit which is the transmitters order-wire receive circuit that is terminated on the MDF in RE1. The KEY LINE circuit connects to the audio input of the 6002-2 demodulator, and the DC output of the demodulator is connected in series with the relay coil and the 6006 loop supply. When the foot switch at the Transmitters order-wire equipment is closed, the relay contacts close, connecting the send signal from the transmitters order-wire to the order-wire signal line at the Receiving Central.

3-158. The transmitters order-wire receive circuit connects from the MDF in RE1 to the SEND LINE of the transmitters order-wire tone converter as mentioned previously. The SEND LINE connects to a demodulator at the input of an AN/FGC-60 CCL send terminal. The aggregate tone output of the CCL terminal is programmed through the MDF patch panel to the input an the AN/FCC-17 microwave terminal, and the AN/FCC-17 multiplexed output is fed to the 74B1 microwave transmitter.

3-159. At container TC1, the microwave signal is received on the 74B1 receiver and then demultiplexed by the AN/FCC-17 receive terminal whose VF outputs are terminated on the audio MDF program board. The CCL aggregate tone signal is programmed to the input of an AN/FGC-60 receive terminal which separates the individual telegraph channels and converts them to DC. The DC outputs of the receive CCL terminal are terminated on the DC MDF where the order-wire receive circuit is programmed through a DC loop circuit on the DC patch panel. The receive circuit is then programmed to the selector magnet input of the TT-176A internal order-wire teletype unit.

3-160. CODE FORMAT CONVERTER SYSTEMS.

Two code format converter systems, which are used to convert MARK-SPACE teletype code into equivalent Morse code, are provided in container RF2. Each system is independent and both may be operated simultaneously. The code format converter system provides direct electronic conversion of standard teletype five-level (Baudot) code from the output of a TD or TTY keyboard to international Morse code, eliminating the need for an intermediate operation involving tape conversion.

3-161. The systems may be used for fleet broadcast (FOX) or weather broadcast (WX) operations where messages are broadcast in the form of CW to units of the fleet. In this type of operation, teletype tapes of messages are stored until the schedules time of the CW broadcast, at which time the tapes are manually

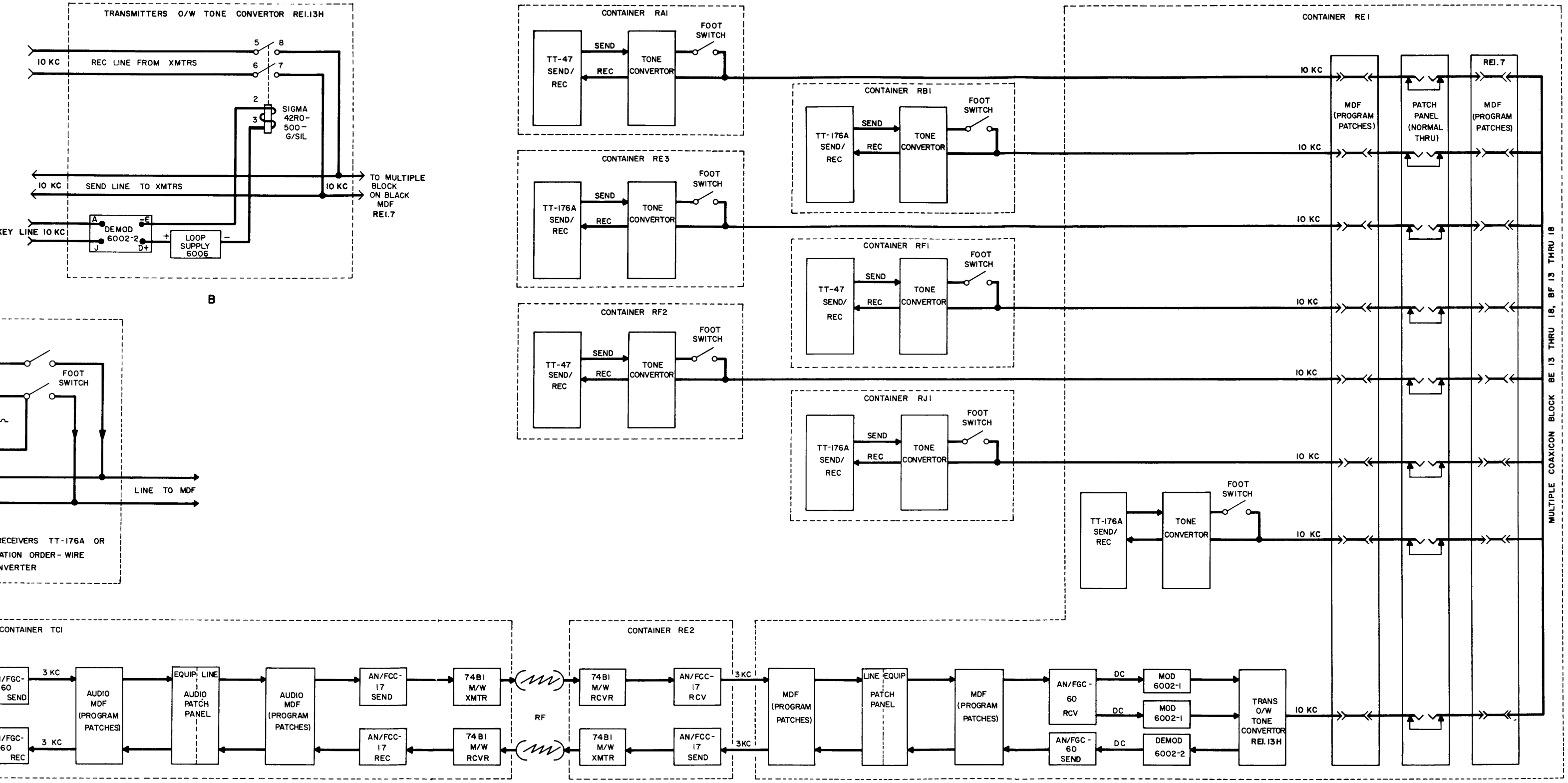
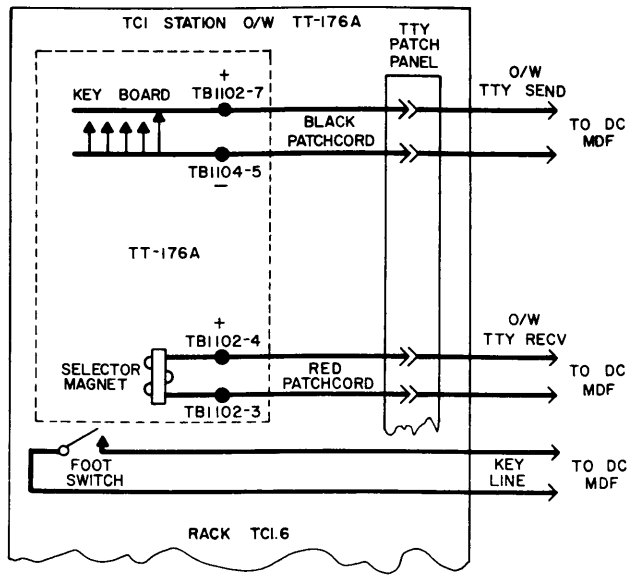
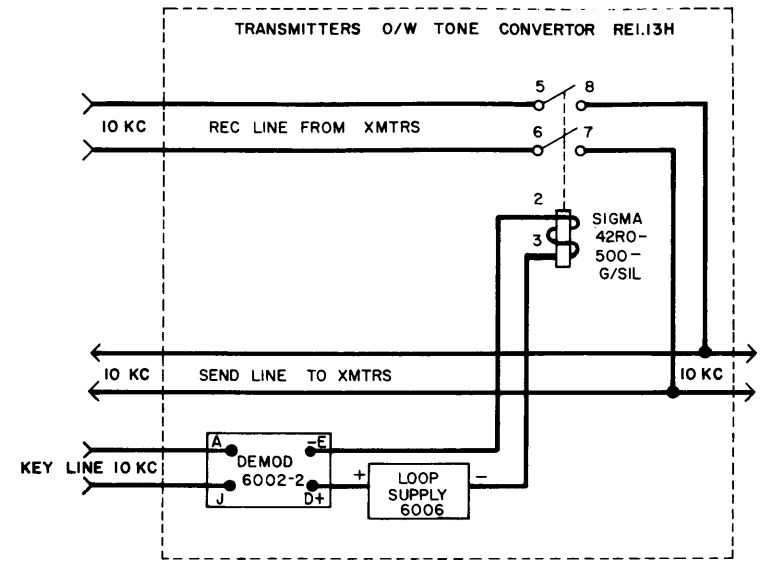


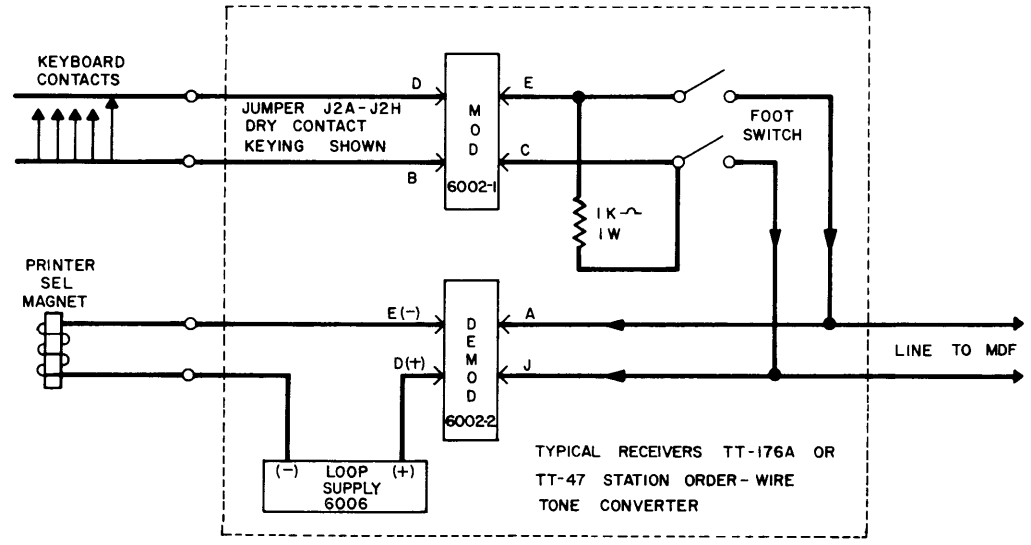
Figure 3-21. Station Internal Order-Wire System, Block Diagram


TCI STATION O/W TT-176A
TTY PATCH PANEL
KEY BOARD
+
TB1102-7
BLACK PATCHCORD
TB1104-5
−
O/W TTY SEND
TO DC MDF
TT-176A
+
TB1102-4
SELECTOR MAGNET
RED PATCHCORD
TB1102-3
O/W TTY RECV
TO DC MDF
FOOT SWITCH
KEY LINE
TO DC MDF
RACK TCI.6

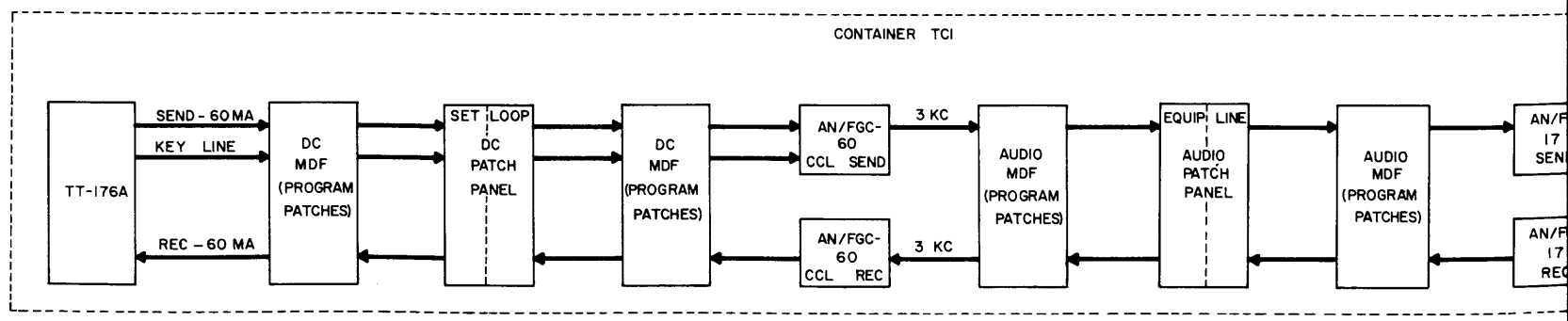
A

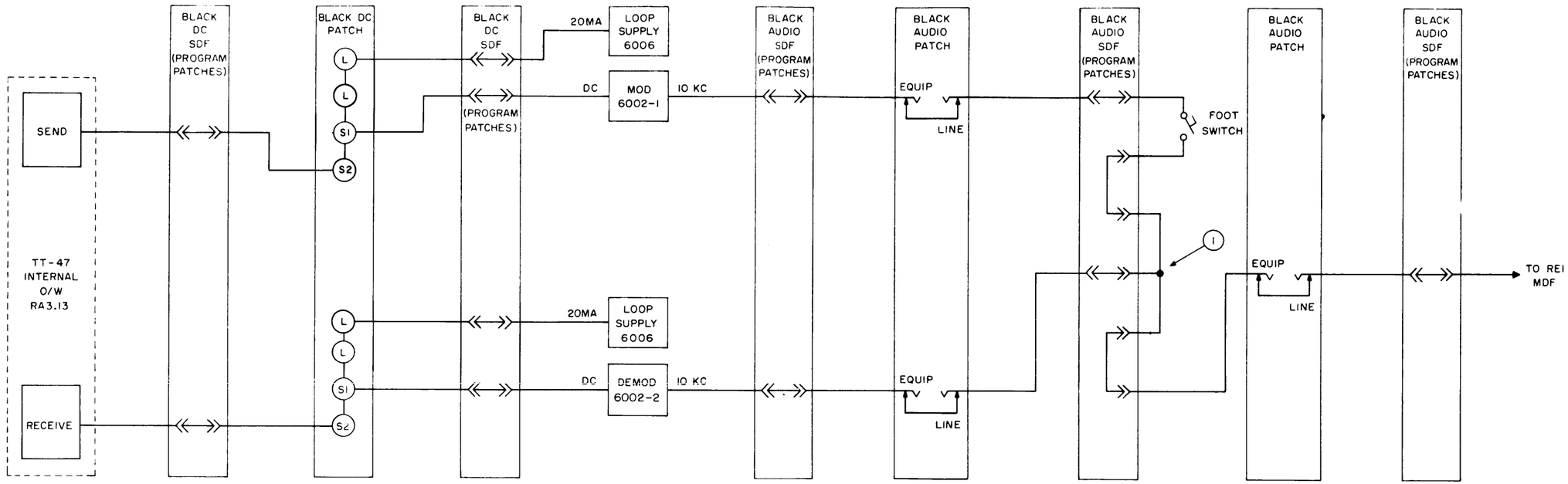

TRANSMITTERS O/W TONE CONVERTOR REI.13H
10 KC
REC LINE FROM XMTRS
5
8
6
7
2
3
SIGMA 42RO-500-G/SIL
10 KC
SEND LINE TO XMTRS
10 KC
KEY LINE 10 KC
A
J
DEMOD 6002-2
−E
D+
+
LOOP SUPPLY 6006
−

B


KEYBOARD CONTACTS
JUMPER J2A-J2H
DRY CONTACT
KEYING SHOWN
D
B
MOD 6002-1
E
C
FOOT SWITCH
1K
1W
PRINTER SEL MAGNET
E(−)
D(+)
DEMOD 6002-2
A
J
LINE TO MDF
(−) LOOP SUPPLY 6006 (+)
TYPICAL RECEIVERS TT-176A OR
TT-47 STATION ORDER-WIRE
TONE CONVERTER

C


CONTAINER TCI
TT-176A
SEND - 60 MA
KEY LINE
REC - 60 MA
DC MDF (PROGRAM PATCHES)
SET LOOP
DC PATCH PANEL
DC MDF (PROGRAM PATCHES)
AN/FGC-60 CCL SEND
AN/FGC-60 CCL REC
3 KC
3 KC
AUDIO MDF (PROGRAM PATCHES)
EQUIP LINE
AUDIO PATCH PANEL
AUDIO MDF (PROGRAM PATCHES)



NOTE 1: MULTIPLE COAXICON BLOCK.

Figure 3-22. Station Internal Order-Wire RA3, Typical Programming

fed to the send teletype unit, a transmitter distributor. The TD transmits the message which is automatically converted into Morse code at the desired speed, and the Morse code signal is tone-converted and fed to a transmitter through the BLACK MDF in container RE1. The systems may also be used to send RATT signals. In this type of operation, the Morse code converter is bypassed and the standard teletype signal is tone-converted and fed to a transmitter through the BLACK MDF.

3-162. CODE FORMAT CONVERTER EQUIPMENT.

The equipment comprising the two code format converter systems include two AN/UGC-6 teletype units, two model 660A teleprinter to Morse code converter units, a dual 660A tone converter drawer, and a BSP-2 dual speaker-amplifier unit.

3-163. AN/UGC-6 TELETYPE EQUIPMENT. One AN/UGC-6 unit is used in each system to transmit teletype messages, either from the TD or the keyboard. Each AN/UGC-6 is modified by the addition of a 6006 loop supply which furnishes 60-ma loop current for the send circuit.

3-164. 660A TELEPRINTER TO MORSE CODE CONVERTER. The 660A performs electronic conversion of five-level teletype code to international Morse code, and one is used in each system. The 660A produces a Morse code output and a STEP output which are on-off keying signals, and a 1-kc sidetone output. The STEP output is a TD clutch-control signal used to step the sending TD at a preset speed. The 1-kc sidetone output provides audible monitoring of the Morse code signal. A front-panel OUTPUT RATE control sets the speed of the Morse code output signal which is continuously variable from 5 to 50 words per minute.

3-165. 660A TONE CONVERTER DRAWER. The 660A tone converter drawer contains two 6002-1 modulators, four 6006 loop supply units, two circuit FUNCTION switches, and two MONITOR switches. One-half of the equipment is used in each code converter system. The 6002-1 modulators convert DC Morse code or RATT output signals to 10-kc phase shift signals. Two 6006 loop supply units furnish loop current for the clutch control circuits of the AN/UGC-6 units. The remaining two 6006 loop supplies furnish loop current to the DC input circuits of the 6002-1 modulators when the systems are used to send Morse code. The FUNCTION switch is a 3-position rotary switch that is used to select CW (Morse Code) or RATT operation, or to disconnect the input signal from the output circuits in the OFF position. The MONITOR switch is used to connect the side-tone output signal to a speaker-amplifier unit in the BSP-2 when audible monitoring is desired.

3-166. BSP-2 SPEAKER-AMPLIFIER. The BSP-2 is used for monitoring the Morse code output of the code converter systems. The BSP-2 contains two speaker-amplifiers, one for each system, and is equipped with a front panel volume controls for each amplifier.

3-167. CODE FORMAT CONVERTER OPERATION.

The code format converter systems are illustrated in block diagram form in figure 3-23 which also shows the signal inter-connections between the system components and the functions of the front panel control switches. The FUNCTION switch on the front panel of the 660A tone converter drawer provides either CW or RATT operation.

3-168. CW OPERATION. When the FUNCTION switch (S2 or S3) is set to the CW position (position 1, as shown in figure 3-23) the following signal inter-connections are made:

a. The AN/UGC-6 send circuit is connected to the INPUT terminals of the 660A teleprinter to Morse code converter.

b. The Morse code OUTPUT terminals of the 660A are connected in series with a 6006 loop supply unit and a 6002-1 modulator.

c. The STEP output of the 660A is connected in series with a 6006 loop supply unit and the clutch control circuit of the AN/UGC-6.

When a teletype tape is inserted into the TD of the AN/UGC-6, the TD transmits the message to the 660A at a speed determined by the setting of the OUTPUT RATE control on the front panel of the 660A. As each character is converted from TTY to Morse code, the 660A produces a step signal which releases the TD clutch, allowing the TD to transmit another character. The 660A converts the teletype input signal into an equivalent Morse code signal. The Morse code output signal keys the input loop circuit of the 6002-1 modulator which converts the DC Morse code signal into a 10-kc phase-shift Morse code signal. The 10-kc Morse code signal is applied to a signal cable that is terminated on the BLACK MDF in container RE1 where it is programmed to the transmitter site. The Morse code signal may be monitored on a BSP-2 speaker by placing the associated MONITOR switch (S1 or S4) on the 660A tone converter drawer to the ON position.

3-169. When the AN/UGC-6 keyboard is used to send a message, the operator must regulate his keying speed to a speed that is not greater than the Morse code converter speed in order not to lose characters of the message. The keyboard is not stepped, or controlled, as is the transmitter-distributor. Continuous keyboard operation is not generally used, but it can be used very effectively for corrections, numbering, etc.

3-170. RATT OPERATION. When the FUNCTION switch is set to the RATT position (position 2) the system is connected as follows:

a. The AN/UGC-6 send circuit is connected directly to the DC input of the 6002-1 modulator, bypassing the 660A Morse code converter. Loop battery is supplied by the 6006 in the AN/UGC-6.

b. The clutch control circuit of the AN/UGC-6 is continuously energized through section A of the FUNC-

TION switch (S2 or S3), allowing the TD unit of the AN/UGC-6 to operate at normal speed.

The TD or keyboard of the AN/UGC-6 transmits the TTY message directly to the input of the 6002-1 modulator which converts the DC TTY signal to a 10-kc phase-shift TTY signal. The 10-kc TTY signal is fed to the BLACK MDF for programming to a transmitter. There is no sidetone signal on RATT operation since the 660A is not in the circuit.

3-171. KW-26 ORDER-WIRE CONTROL PANELS.

The KW-26 order-wire control panels are used in the single-channel on-line CRYPTO area, containers RB2 and RB3, to connect TT-176A teletype equipment to KW-26 cryptographic equipment for order-wire operation. Four KW-26 order-wire equipment racks, each housing an order-wire control panel and two associated TT-176A teletype units, are provided in each of the containers. Two of the control panels, interconnected to form an order-wire control circuit, allow as many as eighteen KW-26 equipments to be operated on a shared basis from four TT-176A order-wire TTY units.

3-172. The front panel operating controls of a KW-26 order-wire control panel (see figure 3-24) include two 18-position push-button selector switches and two 2-position LOCK-UP lever switches. The LOCK-UP switches are at the top and bottom of the panel. The upper LOCK-UP and selector switches are associated with the upper TT-176A unit mounted in the same rack, and the lower selector and LOCK-UP switches are associated with the lower TT-176A. The push-buttons of each selector switch are mechanically inter-locked so that only one push-button of the eighteen will remain depressed at any one time. However, there is no mechanical inter-lock between the upper and lower selector switches on the panel.

3-173. Figure 3-25 is a simplified signal-flow block diagram of a KW-26 order-wire control circuit. The circuit includes two inter-connected order-wire control panels and four TT-176A teletype units, and it can accommodate as many as 18 KW-26 send and receive units. The two control panels are on opposite sides of the container and are interconnected by means of cross-container cables.

3-174. Switches S2 and S4 on each panel in figure 3-25 are the 18-position push-button selector switches. Each push-button is shown as a small square in the figure. The 18 push-buttons of each selector switch have one set of contacts connected in parallel and the paralleled contacts are connected to the send and the receive loops of one TT-176A TTY unit. The second set of contacts of each push-button are connected to LOCAL TTY send and receive circuits of a KW-26 equipment and to similar contacts of the push-buttons on the other three selector switches.

3-175. The KW-26 units on the left side of the container are connected to the odd-numbered switch positions, and those on the right side of the container to the even numbered switch positions. Whenever a push-button is depressed, it connects the associated TT-176A to the KW-26 unit that is connected to the switch position. As many as four KW-26 equipments may be operated on the same time through one control circuit by using different push-button positions on the four associated selector switches. In order to operate the KW-26 equipment from the order-wire control panels, the KW-26 must be in the LOCAL mode of operation.

3-176. Since there is no mechanical inter-lcok between the selector switches, the operator must exercise care not to depress the same position on two or more selector switches at any one time as this would parallel two TT-176A equipments to the send and receive loops of one KW-26 unit. Should this occur accidently, the unwanted push-button may be released by depressing any other push-button of the same selector switch.

3-177. The LOCK-UP lever switches have a NORMAL and a LOCK-UP position. In the NORMAL position, the associated TT-176A is connected "full-duplex" to the selected KW-26 equipment; the keyboard to the KW-26 LOCAL send loop, and the page-printer selector magnet to the KW-26 LOCAL receive loop. At the same time, a relay in the control panel keys the receive loop whenever the keyboard is used, provindg page copy of the transmitted message. The LOCK-UP position of the lever switch is used when the receive side of the circuit is out. When the switch is in the LOCK-UP position, the keyboard and page-printer selector magnet of the associated TT-176A are placed in series in order to provide page copy of what is sent on the keyboard.

3-178. POINT-TO-POINT ORDER-WIRE CONTROL CIRCUIT.

Several point-to-point order-wire TT-176A teletype units are provided in the classified facility control RB1 and in the unclassified facility control RE1 for use on point-to-point circuits. The send and receive circuits of the TT-176A units are tone converted and may be patched to the point-to-point order-wire circuits on the respective MDF monitor patch panel as required.

3-179. Figure 3-26 illustrates a typical point-to-point order wire circuit. The circuit consists of a TT-176A unit, a point-to-point order-wire tone converter panel and a LOCK-UP switch. The LOCK-UP switch is mounted at the front of the equipment rack and the tone converter panel is mounted at the rear of the rack behind the TT-176A unit.

3-180. The TT-176A is connected for full-duplex operation. The keyboard circuit is wired in series with the DC input loop of a 6002-1 modulator consisting of a 6006 loop supply unit, a 300-ohm resistor, the coil of relay K1, and contacts of the LOCK-UP switch. The LOCK-UP switch is shown in the NORMAL position. The modulator DC input keying signal is developed across the 300-ohm resistor. The printer selector magnet is wired in series with the DC output loop of a 6002-2 demodulator that includes the demodulator, a 6006 loop supply, contacts of the LOCK-UP switch, and the contacts of relay K1.

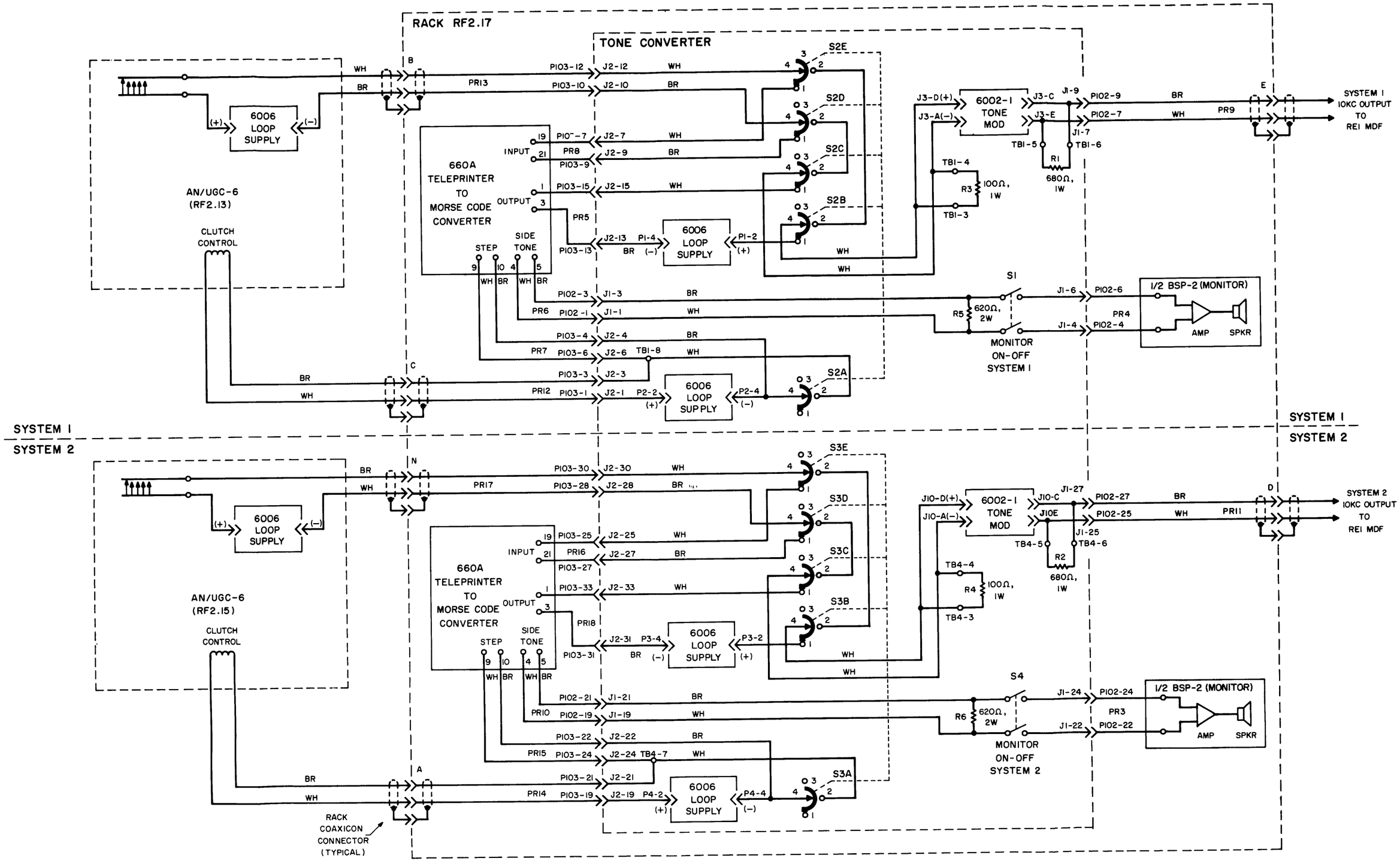


Figure 3-23. Code Format Converter Systems RF2, Block Diagram

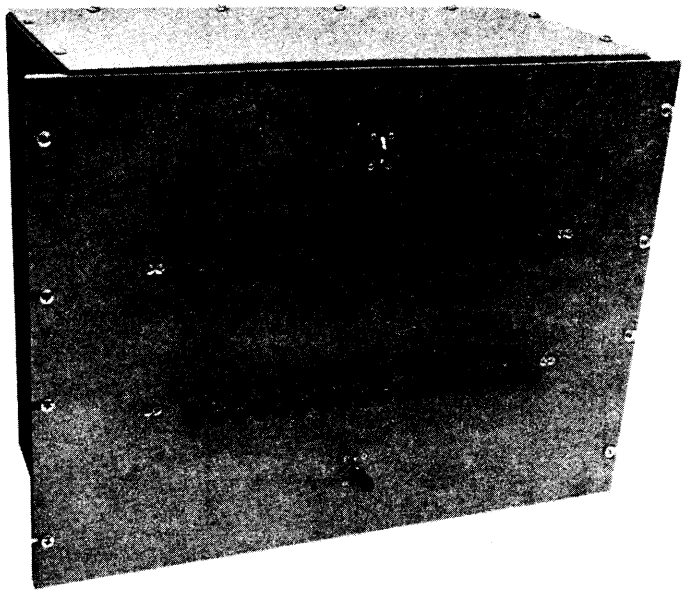


Figure 3-24. KW-26 Order-Wire Control Panel, Front View

3-181. In the NORMAL position of the control switch, messages transmitted on the keyboard are sent to the distant station and a copy of the message is made on the page printer through the contacts of relay K1 which keys the receive loop. When the switch is placed in the LOCK-UP position the selector magnet is placed in series with the send loop through contacts E and B of the switch. The LOCK-UP position is used to retain a copy of the transmitted traffic when the receive side of the circuit is out.

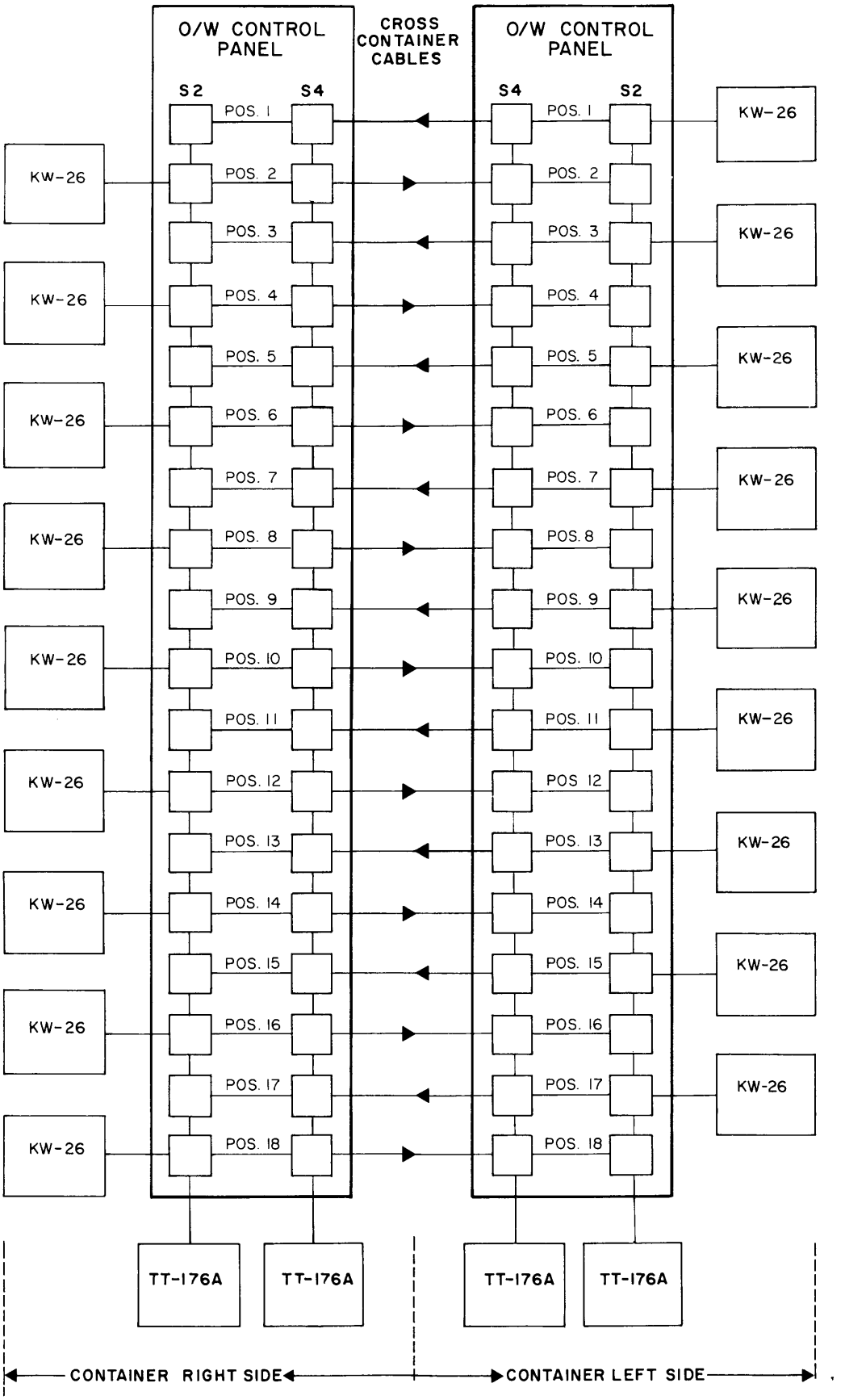


Figure 3-25. KW-26 Order-Wire Control Circuit, Block Diagram

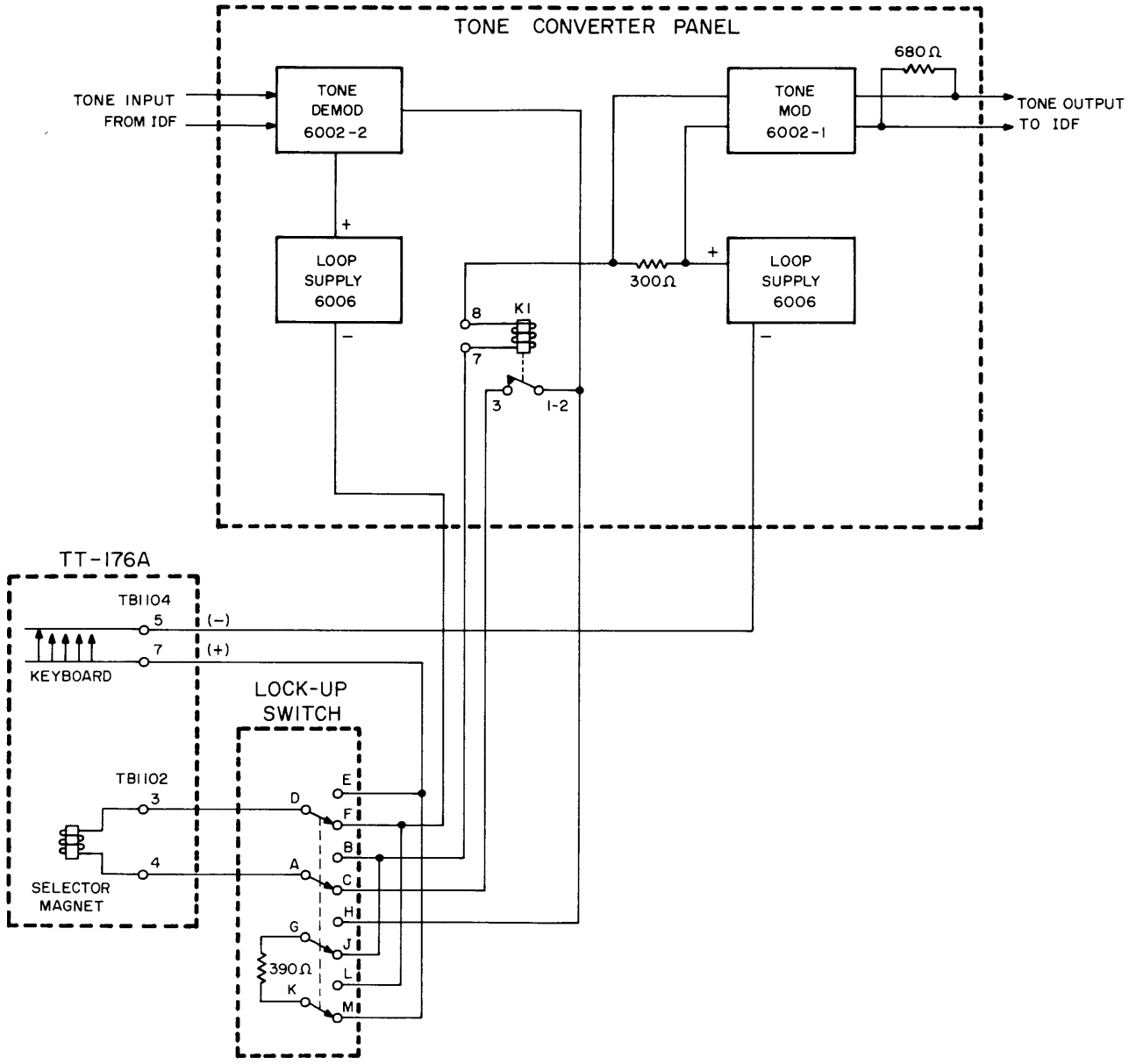


Figure 3-26. Point-To-Point Order Wire Control Circuit, Block Diagram

SECTION IV
TECHNICAL DESCRIPTION OF SPECIAL CIRCUITS

4-1. INTRODUCTION.

This section contains a technical description of special components designed specifically for this installation. The special components consist largely of tone converter drawers and panels. In addition, wiring diagrams of equipment racks and operating positions installed at the Receiving Central are contained in this section.

4-2. AN/FGC-59 TONE CONVERTERS.

The AN/FGC-59 system tone converters consist of modulators, demodulators, loop supplies and relays that are mounted on panels and installed in the respective TT-331 and TT-333 cabinets which they serve. The AN/FGC-59 tone converters are used in containers RA1, RF1 and RJ2.

4-3. TT-331 TONE CONVERTER PANEL.

The TT-331 tone converter panel (see figure 4-1) contains six 6002-2 demodulator units and six associated 6006 loop supply units. The panel is mounted in the lower compartment of the TT-331 cabinet, and is the interface assembly between the KWR-26 equipment and the TT-331 torn-tape receive units. Each panel provides tone conversion for the six input lines to one TT-331 assembly.

4-4. Figure 4-2 is a wiring diagram of a TT-331 tone converter panel. Incoming signal line number 1 to the unit terminates on TB1 terminals 1 and 2. Terminals 1 and 2 are connected to the tone input of demodulator number 1 at pins A and J of J2. The demodulator DC output is on pins D and E of J2. Pin E of J2 is wired back to terminal 3 of TB1. Pin D connects to terminal 2 of P1 which is the 6006 loop supply number 1 connector. Terminal 4 of P1 is wired back to terminal 4 of TB1 placing the 6006 in series with the demodulator output loop. Terminals 3 and 4 of TB1 connect to terminals 102 and 101 of the T terminal block of the TT-331 completing the demodulator output loop circuit to the reperforator unit. The remaining five demodulator circuits are wired in a similar manner.

4-5. The drain wires (signal ground) of the shielded signal lines are terminated on terminal boards TB4 and TB5 and then carried through to pin H of the respective demodulator signal connectors. The signal ground for each TT-331 circuit originates at this point and is carried back to the RED MDF through the shield of the signal line. AC power to the tone converter panel is supplied from the N terminal block of the TT-331 to TB3 of the panel where it is distributed to the demodulator and loop supply units.

4-6. TT-333 TONE CONVERTER AND LOOP SUPPLY-RELAY PANELS.

The TT-333 tone converter panel (figure 4-3) contains one 6002-1 modulator unit and one 6004-2 trip-control demodulator unit. Three of the panels are mounted in the numbering unit shelf of a TT-333 cabinet. The TT-333 loop supply-relay panel (figure 4-4) contains three 6006 loop supply units and three DC relays. It is mounted on the rear wall of the TT-333 cabinet. The tone converter and the loop supply-relay panels comprise the interface assembly between the KWT-26 units and the TT-333 and TT-332 torn-tape transmit units.

4-7. Figure 4-5 is a wiring diagram of a TT-333 loop supply-relay panel. Three tone converter panels and one loop supply-relay panel service each TT-333 cabinet and one monitor shelf of a TT-332 cabinet, due to the utilization of upper and lower TD units connected for tandem operation and the use of one monitor reperforator for each of the three send circuits. The 6002-1 and 6004-2 units on the tone converter panels are wired to the loop supply-relay panels; the DC input circuits to the 6002-1 modulators are connected to terminal board TS2, the DC output circuits of the 6004-2 demodulators are connected to terminal board TS1, and the tone inputs and outputs of the demodulators and modulators are connected to TS4. Figure 4-6 shows the AN/FGC-59 wired for tandem operation and the monitor reperforator interconnections.

4-8. Signal circuit number 1 is inter-connected to the loop supply-relay panel at TS1-14 and TS2-7 from TB9-2 of the TT-333 unit and T-62 of the TT-332 unit with TB1-21 and T-61 of the two units inter-connected to series the monitor reperforator into the circuit. Loop supply B1 is connected in series with the circuit between TB9-2 and P2-d of the 6002-1 modulator. The series loop circuit is completed with the connection between P2-A of the modulator and TS2-7. Resistor R4 is a voltage dropping resistor in series with the loop circuit. When the TD contacts key the loop circuit, the TT-332 reperforator operates, and corresponding voltage changes occur across resistor R4 (zero to 6 volts) at the input to the 6002-1 modulator, keying the modulator. The tone-converted TTY output of the modulator, terminals P2C and P2E, connects to signal line number 1 at TS4, terminals 2 and 3.

4-9. Trip-control demodulator number 1 input, terminals P2A and P2J, are parallel-connected to signal line 1 on terminals 2 and 3 of TS4. The demodulator DC output, P2E and P2D, connect to the loop supply-relay panel on TS1 terminals 2 and 3, keying the coil of relay KA1 (pins 3 and 2) through resistor R1. R1 is a current limiting resistor. The relay coil circuit derives 48-volts DC from the TT-333 unit at TB2-140

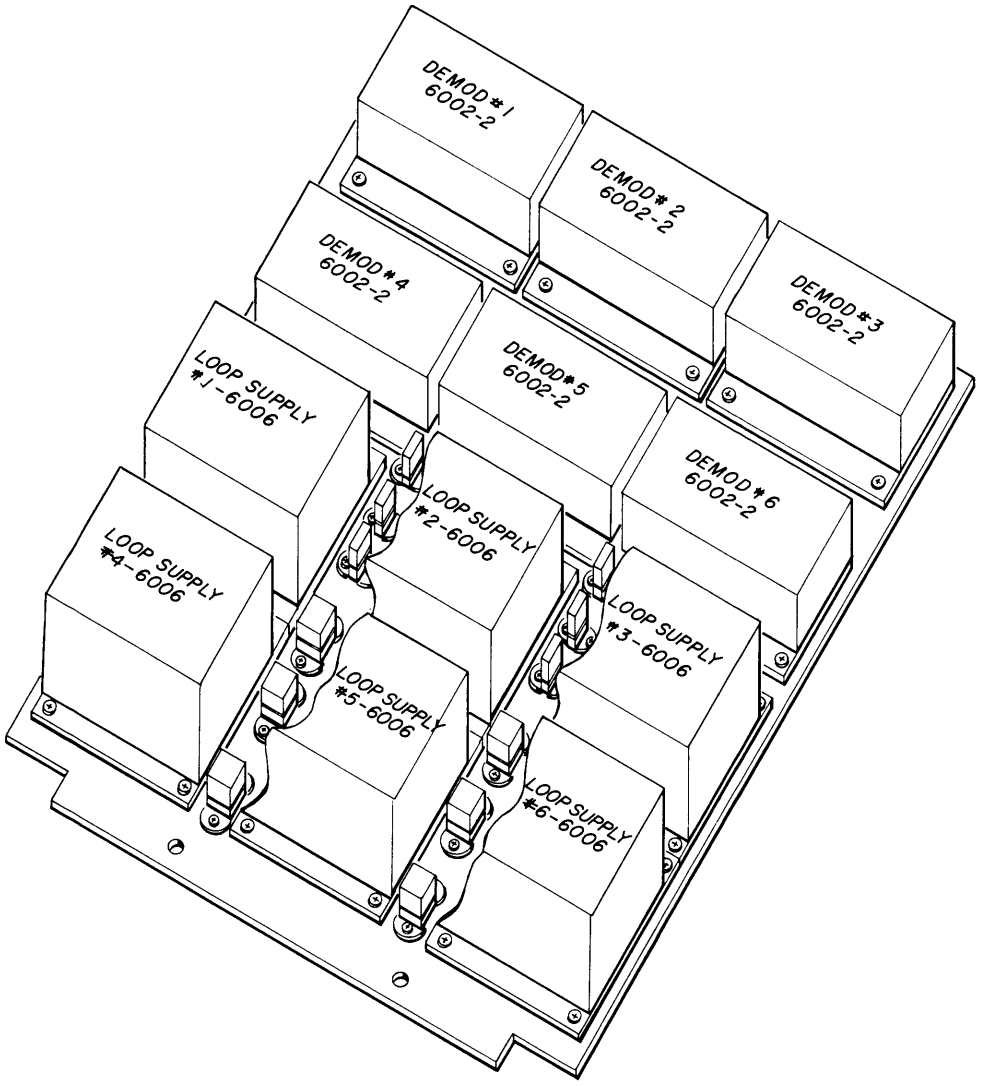


Figure 4-1. TT-331 Tone Converter Panel, Isometric View

and TB2-1. Tongue 5 and contact 8 of relay KA1 are series-connected in the upper TD control circuit at TB9-9 and resistor R23, while contact 7 and tongue 6 of KA1 are series-connected in the lower TD control circuit at TB8-7 and R17. This circuitry enables external TD step or lock-up control to be exerted on the TD's by the 6004-2 demodulator sensing the input signal, converting the signal to the proper condition at its output, and opening or closing the relay contacts in series with the control circuit of the individual TD by energizing or de-energizing the relay coil.

4-10. AC power for the tone converter panels and the loop supply panel is furnished from TB3 of the TT-333 unit to TS3, terminals 14, 15 and 16. From TS3, the power wiring connects to the AC input connectors on the loop supply panel and to terminals 11 through 16 of TS2 where the AC power is distributed to the 6002-1 modulators and the 6004-2 demodulators.

4-11. KW-26 TONE CONVERTER DRAWERS.

The KW-26 tone converter drawers are used in the single-channel on-line CRYPTO area, RB2 and RB3, as an interface assembly between the KW-26 equipment and both the RED and the BLACK signal circuits. Each drawer contains two 6002-1 modulators, two 6002-2 demodulators, and a 6004-1 trip-control modulator. Right-hand and left-hand KW-26 tone converter drawers are provided to conform with the right and left side RED wiring in the KW-26 racks as described in paragraph 1-86, and six modified left hand drawers are provided for super-encryption service. One KW-26 tone converter drawer is installed in each KW-26 equipment rack.

4-12. RIGHT-HAND TONE CONVERTER DRAWER.

The right-hand KW-26 tone converter drawer is illustrated in figure 4-7. The demodulator, modulator

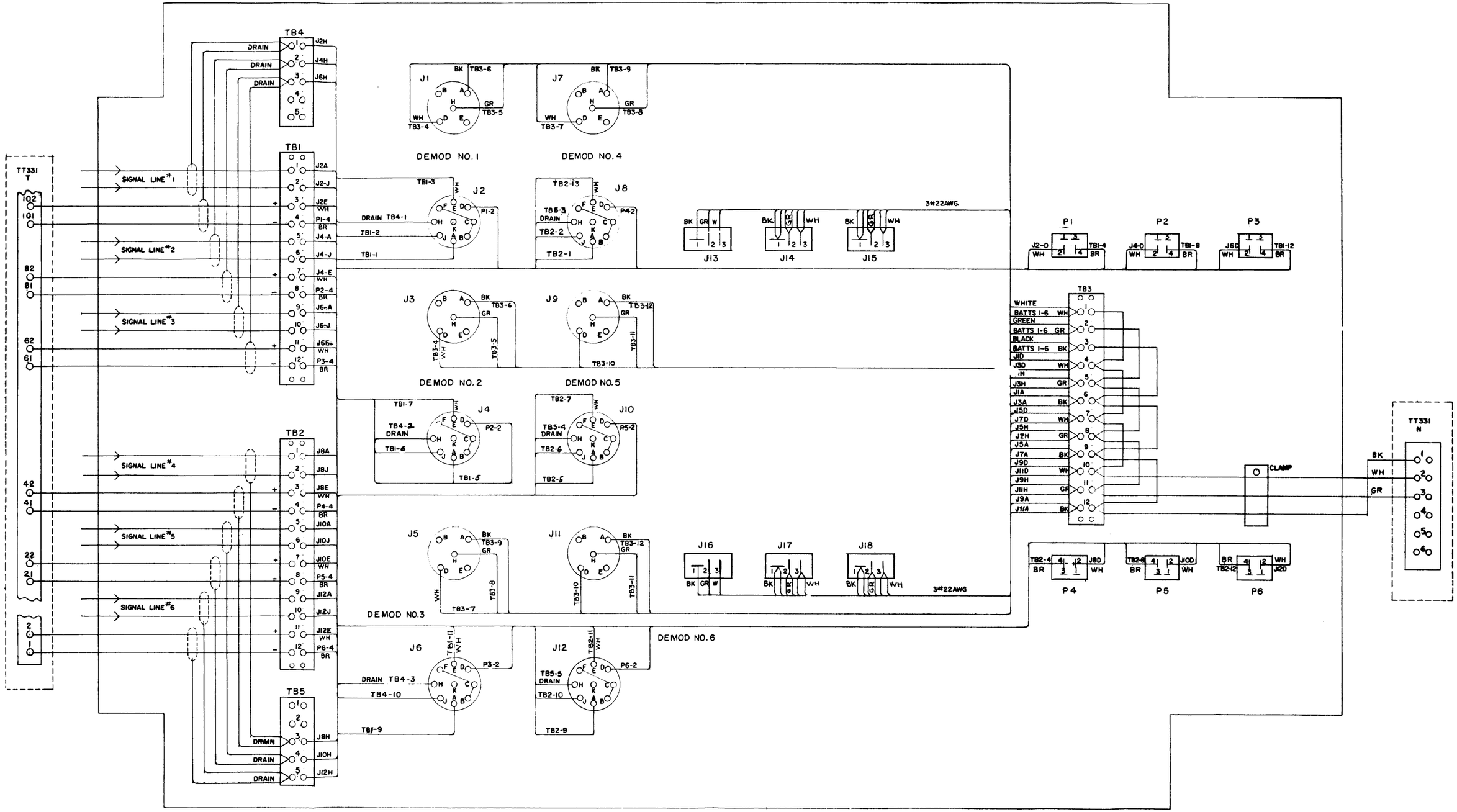


Figure 4-2. TT-331 Tone Converter Panel, Wiring Diagram

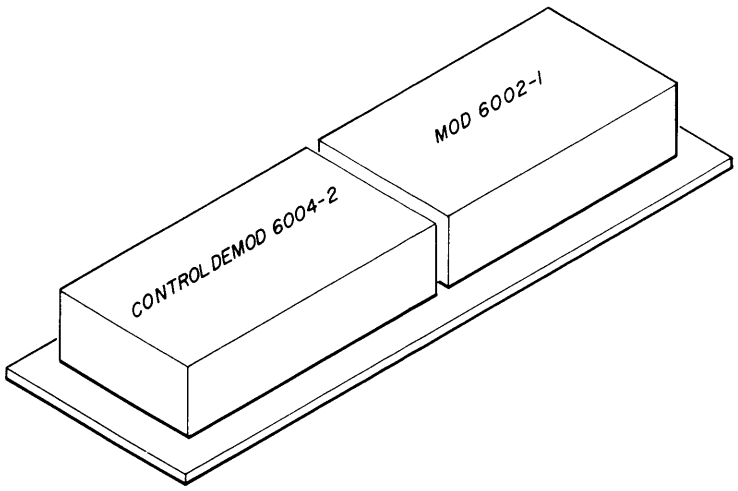


Figure 4-3. TT-333 Tone Converter Panel, Isometric View

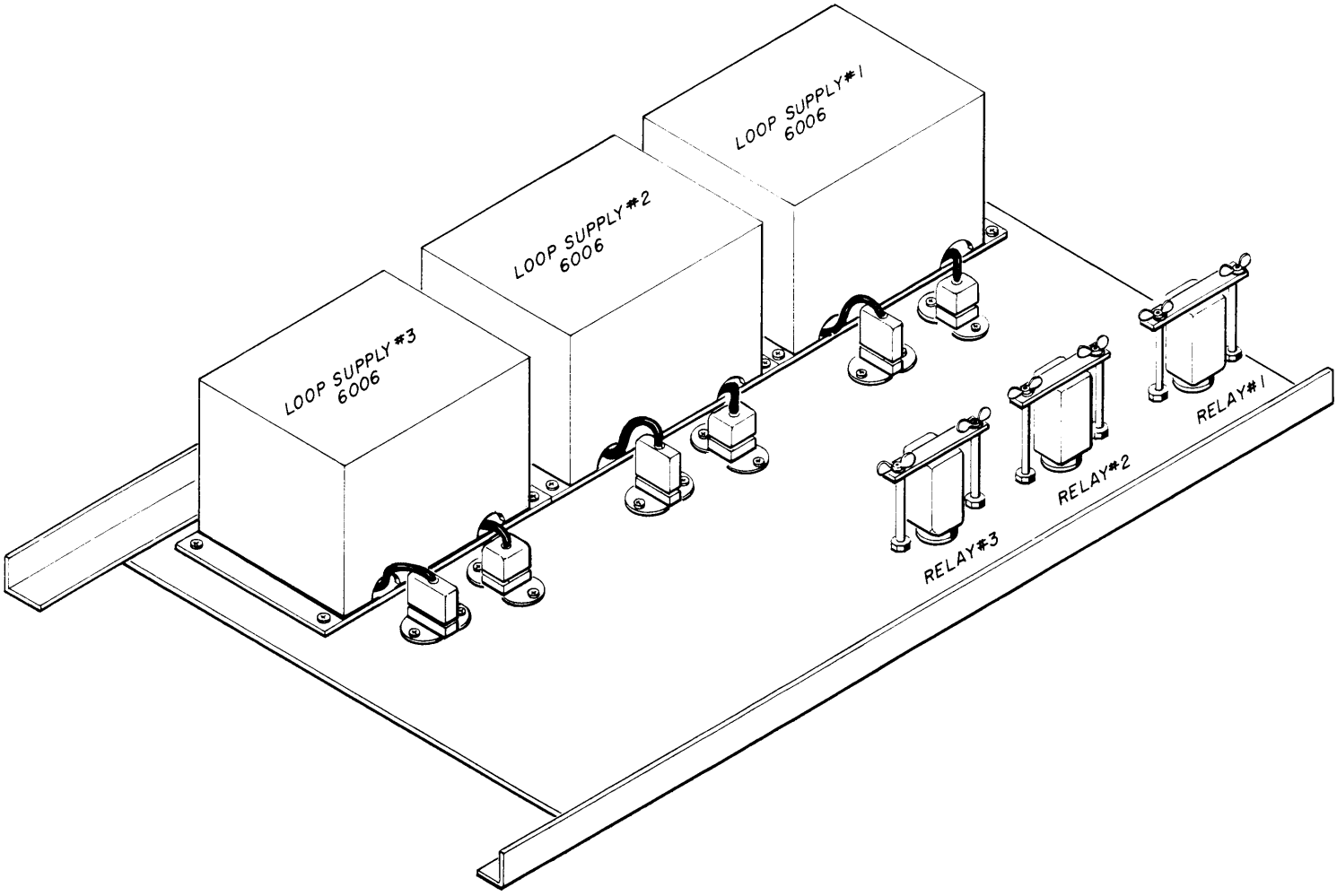


Figure 4-4. TT-333 Loop Supply and Relay Panel, Isometric View

and trip-control modulator on the right side are used for the KW-26 RED circuits, and the demodulator and modulator on the left side for the KW-26 BLACK circuits.

4-13. Figure 4-8 is a wiring diagram of a right-hand KW-26 tone converter drawer and figure 4-9 is a typical KW-26 circuit cabling diagram. The BLACK receive 10-kc signal terminates on TB3 terminals 4 and 6 and is applied to demodulator 2 input on terminals J and A of P8. The demodulator DC output terminals D and E connect to TB3 terminals 1 and 3 and to the KWR-26 input terminals A1 and A2. The signal ground of the demodulator input and output circuits is carried through the drawer on terminals 2 and 5 which are strapped and also connected to the signal ground terminal H of the demodulator.

4-14. The signal is deciphered and the KWR-26 DC output, which is now RED, terminates in the right-hand compartment on terminals 7 and 9 of TB2 and is applied to the modulator number 1 input terminals D and A on P3. Resistor R3, which is connected in parallel with the modulator DC input terminals, develops the keying voltage at the modulator input. The tone-converted modulator output signal from terminals E and C connects to terminals 10 and 12 of TB2 and is applied to a signal pair that is terminated on the RED MDF in container RB1. Resistor R2 is parallel-connected across the modulator output terminals to provide the correct impedance match for the modulator output circuit.

4-15. The RED send TTY tone signal from a TD terminates on 1 and 3 of TB2 and is applied to demodulator number 1 input terminals A and J on P1. The demodulator DC output terminals D and E connect to terminals 4 and 6 of TB2 and then to the KWT-26 input terminals.

4-16. The trip-control DC signal from the KWT-26 terminates on 13 and 15 of TB2. The signal is developed across 470-ohm resistor R1 and the resultant keying voltage is applied to the 6004-1 modulator input terminals D and A on P5. The frequency-shift output signal of the modulator, from terminals E and C of P5, connects to the RED signal line on terminals 1 and 3 of TB2 and the trip control signal is carried back to the sending TD over this line.

4-17. The encrypted DC output of the KWT-26 connects to terminals 10 and 12 of TB 3 on the BLACK side of the drawer, and is then applied across voltage dropping resistor R4 to modulator number 2 input at terminals D and A of P10. The modulator tone output from E and C of P10 connects to terminals 7 and 9 of TB3, and then to a signal line that terminates on the BLACK MDF in container RE1.

4-18. The AC power input to the KW-26 tone drawer terminates on TB1 and is distributed to the AC input connectors of the modulators and demodulators through a separate 3-wire circuit for each unit. The AC compartment is separated from the RED and BLACK signal compartments by a ferrous shield. A metal cover plate is installed on the bottom of the drawer to shield the signal circuits from surrounding signal sources.

4-19. LEFT-HAND TONE CONVERTER DRAWER.

The left-hand KW-26 tone converter drawer is illustrated in figure 4-10 and the wiring in figure 4-11. The wiring of the left-hand drawer, except for the placement of the RED and BLACK components, is identical to the right-hand drawer wiring using identical component and terminal symbol designations for the same functions.

4-20. Figure 4-12 is a typical KW-26 rack wiring diagram showing the inter-connecting wiring between terminal boards 2 and 3 of the tone converter drawer and the KWR-26 and KWT-26 cryptographic units.

4-21. MODIFIED KW-26 TONE CONVERTER DRAWER.

The modified KW-26 tone converter drawer figure 4-13 is a standard left-hand drawer that has been modified by the addition of a switch and terminal board to provide a SUPER-ENCRYPT capability to the communication system.

4-22. Figure 4-14 is a wiring diagram of the modified tone converter drawer. Switch S1 is a 4-pole double-throw toggle switch with a NORMAL and a SUPER-ENCRYPT position. In the NORMAL position of S1, the BLACK receive 10-kc signal from terminals 4 and 6 of TB3 is applied through two S1 contacts to demodulator 2 input terminals J and A of P8, and modulator 2 BLACK tone output from E and C of P10 is applied through two S1 contacts to terminals 7 and 9 of TB3. These connections are the same as those of an unmodified tone drawer, and the drawer may be used for normal encryption service when S1 is in the NORMAL position.

4-23. In the SUPER-ENCRYPT position of switch S1, the tone input to demodulator 2 and tone output of modulator 2 are applied to TB4 in the RED compartment through the contacts of S1. The signal lines are run in ferrous conduit through the AC compartment. The RED receive signal from the first CRYPTO device is connected to terminals 4 and 5 of TB4 and applied through S1 to demodulator number 2 input terminals A and J on P8. The DC output of the demodulator from terminals D and E of P8 connects to terminals 1 and 3 of TB3 where it is applied to the input of the KWR-26, for decryption in the usual manner. The encrypted DC send signal from the KWT-26, terminals 10 and 12 on TB3, is applied to modulator number 2 input at D and A of P10 in the usual manner. The tone output of the modulator from C and E of P10 is applied through S1 to terminals 1 and 2 of TB4 in the RED compartment where a RED signal pair is connected to carry the KWT-26 tone converted signal to the second encryption equipment. Super-encryption of TTY signals is illustrated in figures 3-7 and 3-8.

4-24. KW-26 ORDER-WIRE CONTROL PANEL.

The KW-26 order-wire control panels are used in the single-channel on-line CRYPTO area, RB2 and RB3, to connect TT-176A teletype equipment to KW-26 cryptographic equipment for order-wire operations. The control panels permit up to eighteen KW-

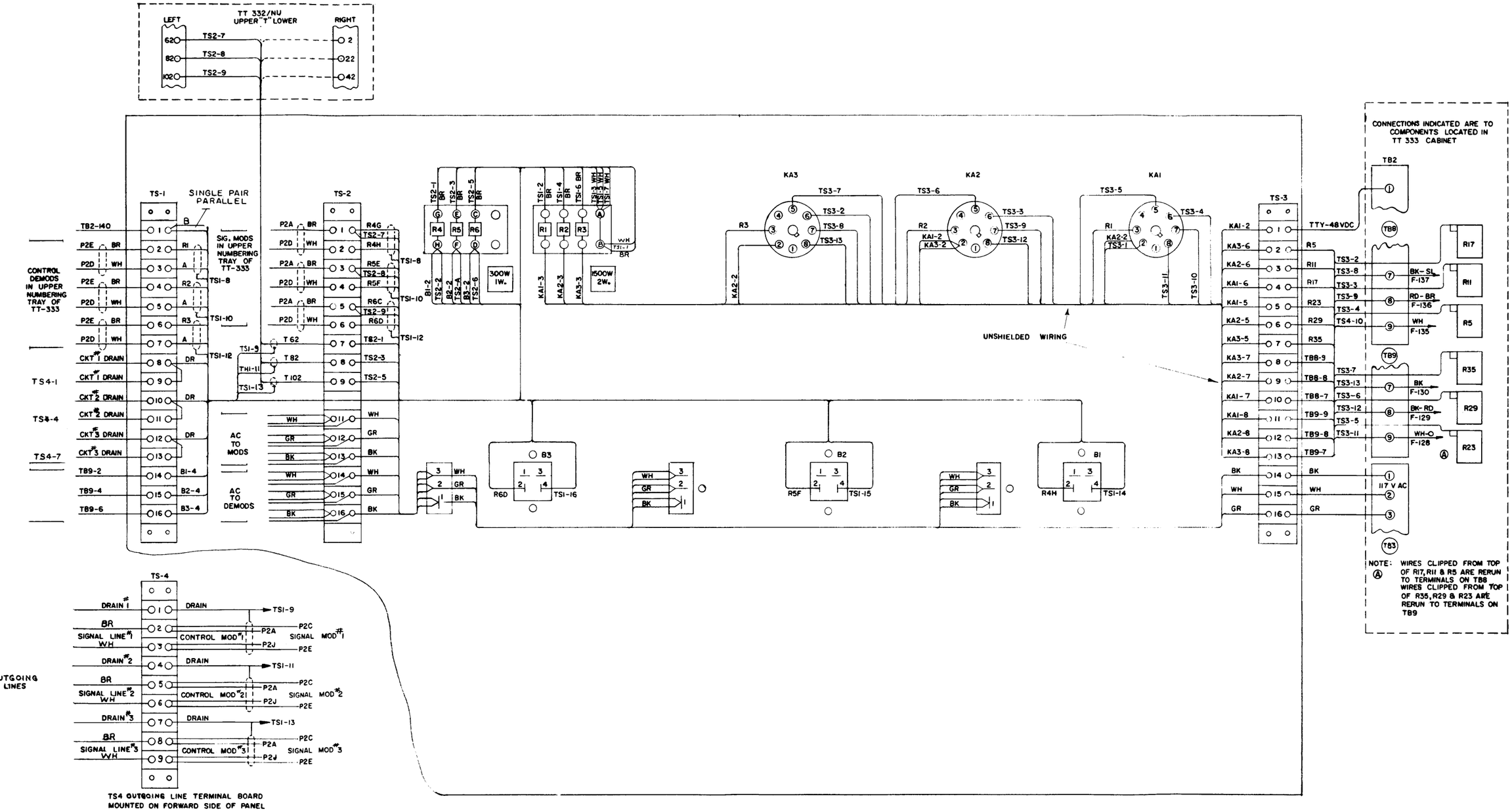


Figure 4-5. TT-333 Loop Supply-Relay Panel, Wiring Diagram

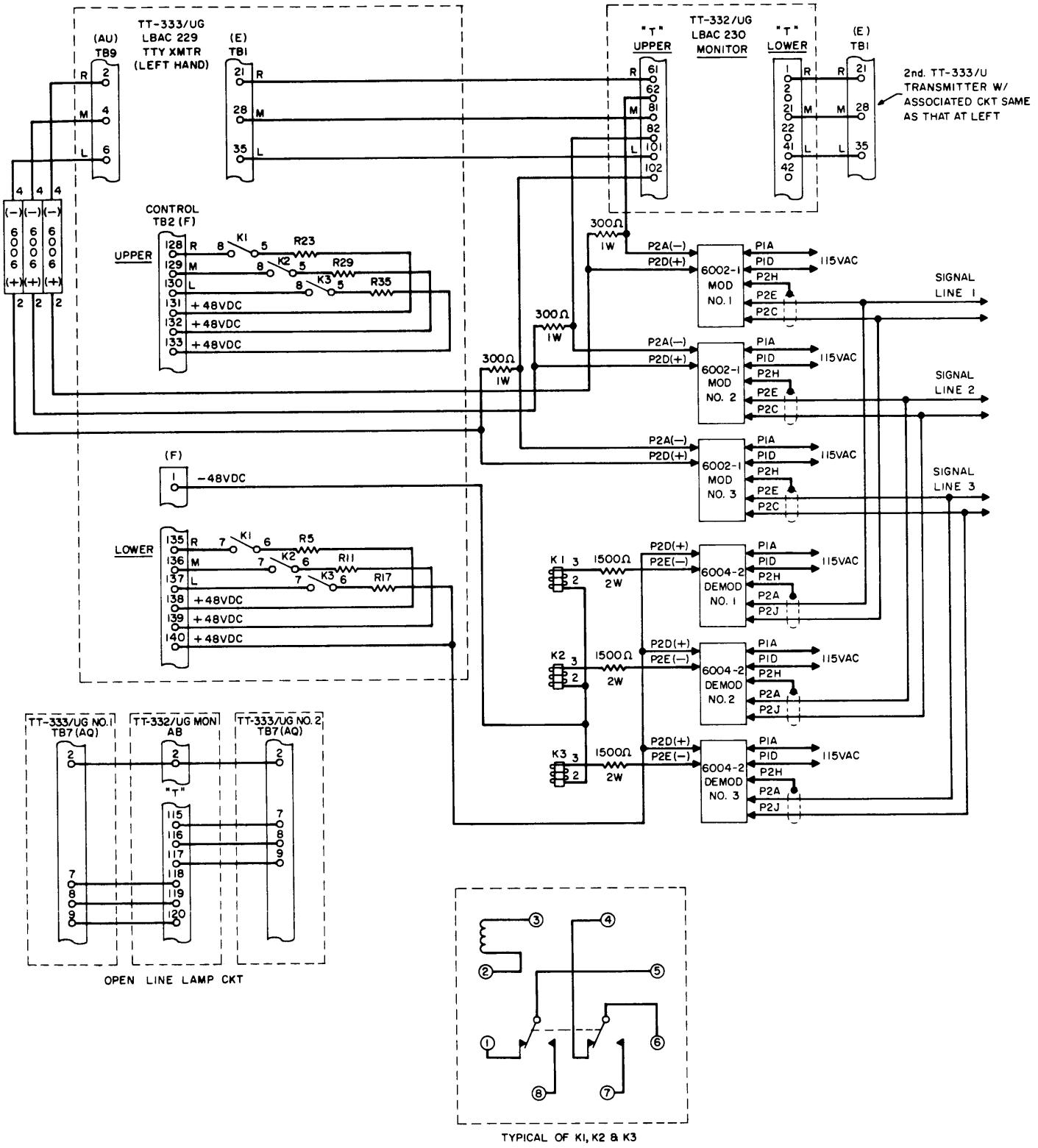


Figure 4-6. AN/FGC-59 TD-Monitor Tandem Operation, Block Diagram

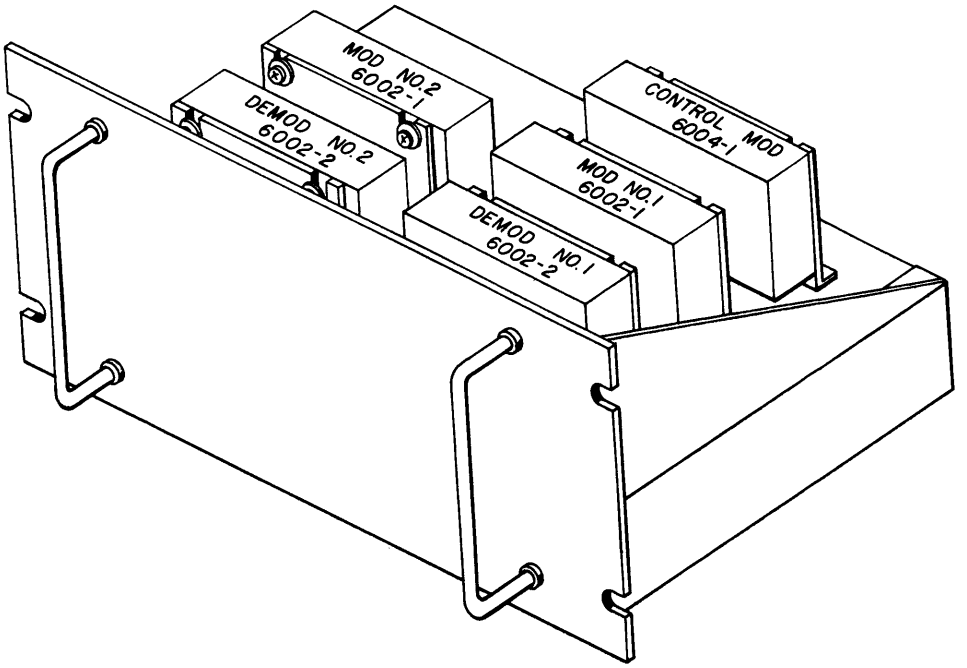


Figure 4-7. KW-26 Tone Converter Drawer, Right Hand, Isometric View

26 send-receive units to be operated on a shared basis from four TT-176A teletype units.

4-25. Figure 4-15 is a wiring diagram of a KW-26 order-wire control panel, and figure 4-16 is a simplified schematic diagram of the control panel. The control panel mounts two 18-position push-button selector switches SW2 and SW4, two 2-position lock-up lever switches SW1 and SW3, and two relays K1 and K2. Each panel is connected to two TT-176A TTY units, and two panels are interconnected to form an order-wire control circuit that services half of the KW-26 equipments in one container. Each 18-position selector switch is associated with one TT-176A teletype unit. Each position of the selector switch is actuated by a push-button the front panel. The eighteen push-buttons of a selector switch are mechanically inter-locked allowing only one button to remain depressed at any one time.

4-26. Terminals C and D of each selector switch SW2 position (see figure 4-16) are parallel-connected to form a receive bus which is connected to the top TT-176A printer selector magnet through the contacts of K1 and SW1. Terminals E and F of each position of SW2 are connected in parallel to form a send bus which is connected to the keyboard contacts of the TT-176A through the coil of relay K1 and contacts of SW1. Selector switch SW4 is connected in a similar manner to the bottom TT-176A unit. Terminals A, B, G and H of SW2 position 1 are parallel connected to A, B, G and H of SW4 position 1 and to position 1 of the two switches on the opposite side of the container. Each of the remaining 17 positions of the four associated selector switches are parallel connected in an identical manner. Terminals A and B of each selector switch position are connected to the LOCAL TTY OUTPUT of a KWR-26, and terminals G and H to the LOCAL TTY INPUT of a KWT-26.

4-27. When a push-button is depressed, contacts C, D, E and F close onto contacts A, B, G and H respectively, connecting the send bus to the associated KWT-26 input and the receive bus to the associated KWR-26 output. In RB2, fourteen KW-26 units are connected to each order-wire control circuit, and in RB3, eighteen KW-26 units are connected to one control circuit and seventeen to the other.

4-28. Lock-up switches SW1 and SW3 are used to connect the keyboard contacts and selector magnet of the associated TT-176A in series in order to provide page copy of transmitted messages when the receive side of the circuit is out. Switch SW1 is shown in the NORMAL position. One side of the keyboard of the upper TT-176A is connected to one side of the send bus. The other side of the keyboard connects through TB1 terminal 4 to R1 through H and G of SW1, from R1 through K and L of SW1 to the coil of K1 at 7, and from 8 to the other side of the send bus. The contacts of K1 are in series with the selector magnet and receive bus, providing page copy of transmitted messages during NORMAL operation of SW1.

4-29. Lock-up switch SW3 is shown in the LOCK-UP position. The series circuit is through the keyboard contacts, through C and A of SW3 to one side of the selector magnet, and the other side of the selector magnet connects through D and F of SW3, through the coil of K2 to the other side of the send bus. Resistor R2 is connected across the receive bus through K and M and G and J of SW3 terminating the KWR-26 output circuit. The TT-176A printer again provides page copy of transmitted messages.

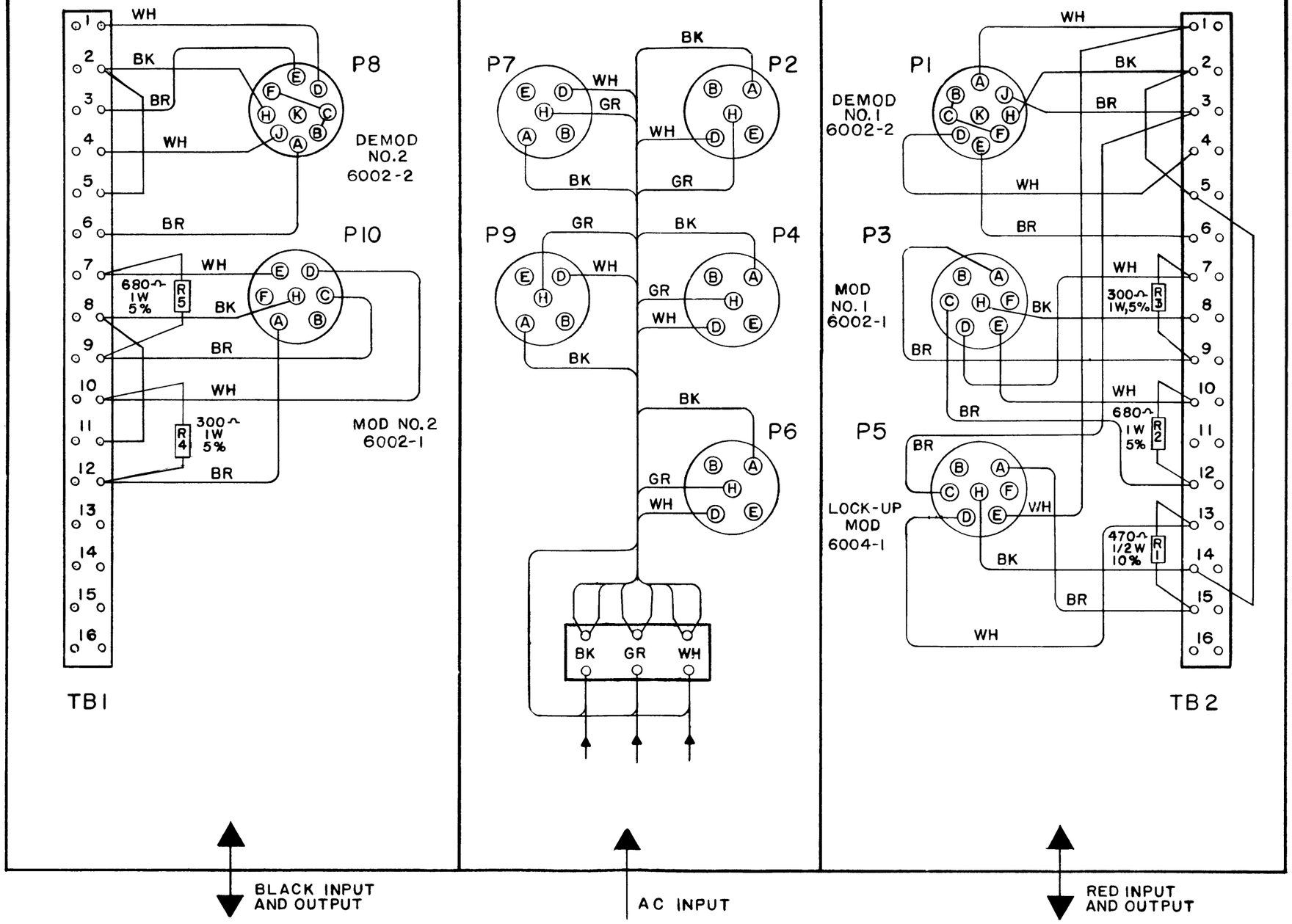
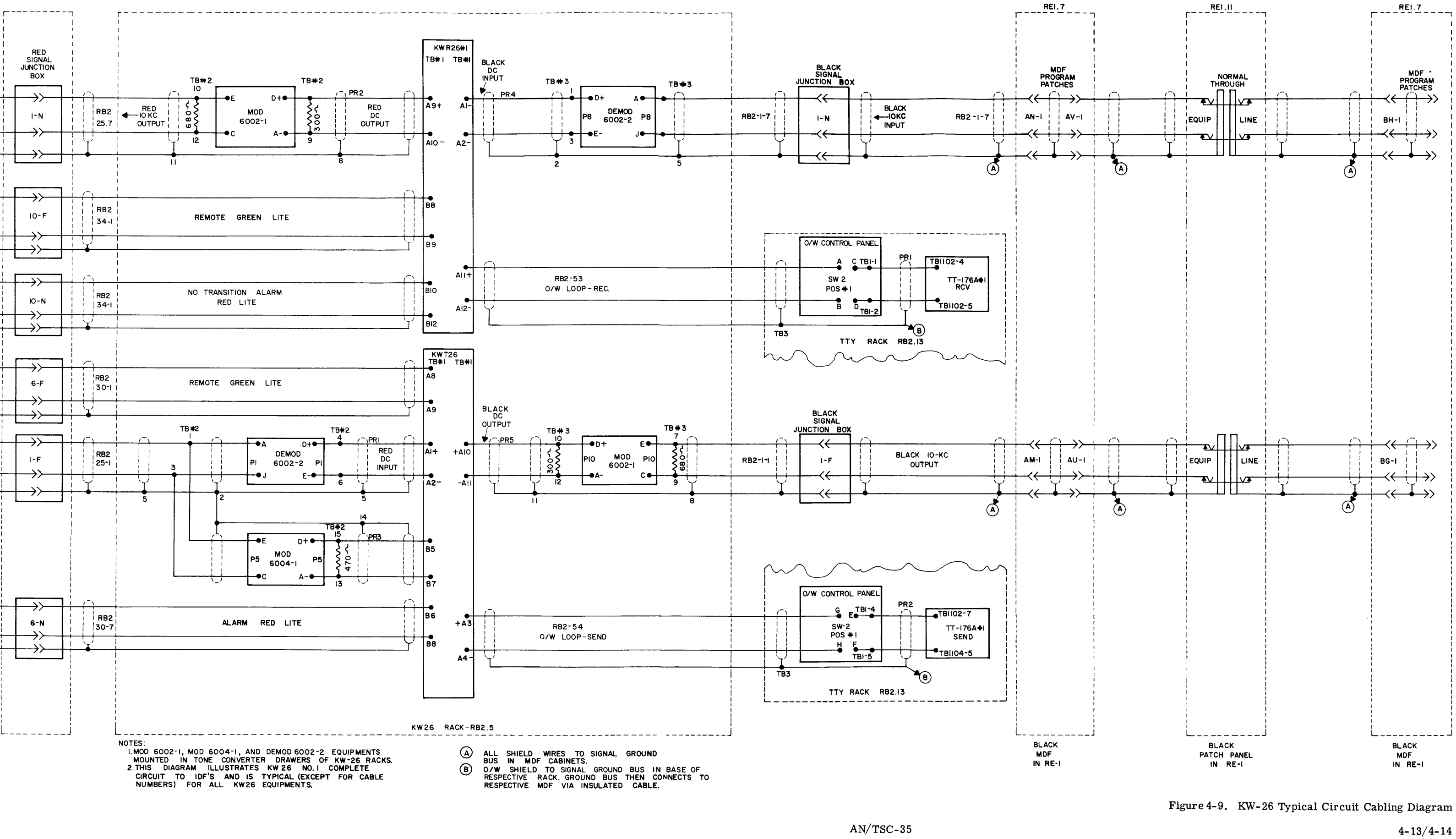


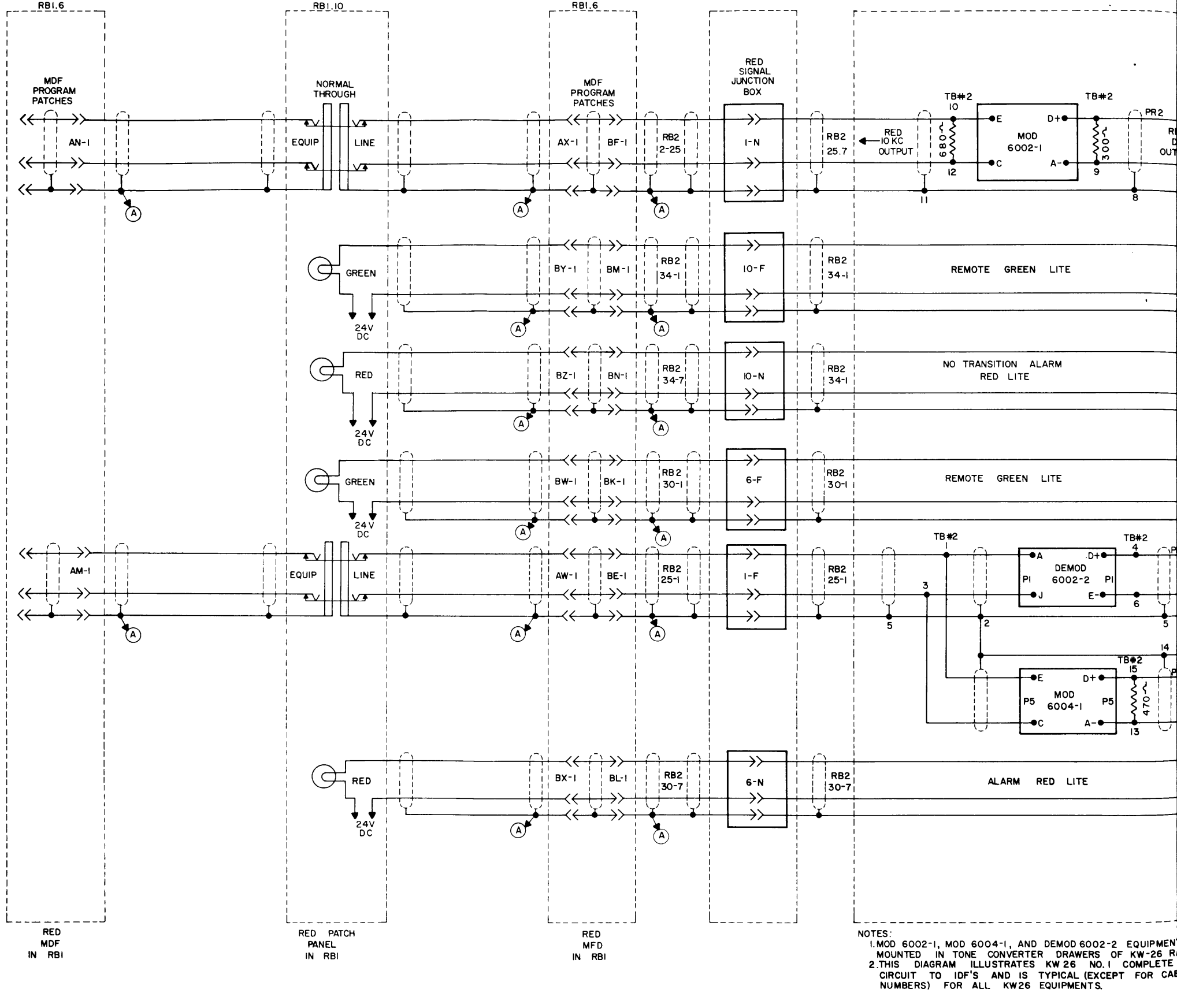
Figure 4-8. KW-26 Tone Converter Drawer, Right Hand, Wiring Diagram



NOTES:
1. MOD 6002-1, MOD 6004-1, AND DEMOD 6002-2 EQUIPMENTS MOUNTED IN TONE CONVERTER DRAWERS OF KW-26 RACKS.
2. THIS DIAGRAM ILLUSTRATES KW 26 NO. 1 COMPLETE CIRCUIT TO IDF'S AND IS TYPICAL (EXCEPT FOR CABLE NUMBERS) FOR ALL KW26 EQUIPMENTS.

(A) ALL SHIELD WIRES TO SIGNAL GROUND BUS IN MDF CABINETS.
(B) O/W SHIELD TO SIGNAL GROUND BUS IN BASE OF RESPECTIVE RACK. GROUND BUS THEN CONNECTS TO RESPECTIVE MDF VIA INSULATED CABLE.

Figure 4-9. KW-26 Typical Circuit Cabling Diagram



NOTES:
1. MOD 6002-1, MOD 6004-1, AND DEMOD 6002-2 EQUIPMENT MOUNTED IN TONE CONVERTER DRAWERS OF KW-26 R
2. THIS DIAGRAM ILLUSTRATES KW 26 NO. 1 COMPLETE CIRCUIT TO IDF'S AND IS TYPICAL (EXCEPT FOR CAB NUMBERS) FOR ALL KW26 EQUIPMENTS.

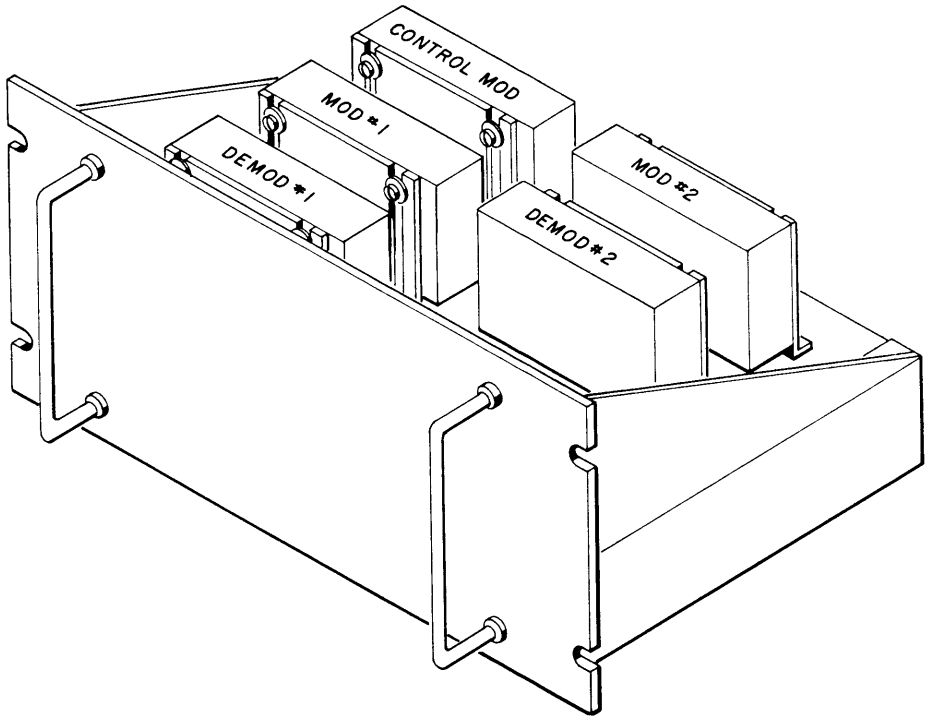


Figure 4-10. KW-26 Tone Converter Drawer, Left Hand, Isometric View

4-30. Figure 4-17 illustrates the 18-position selector switch and the lock-up switch, and shows the switch pile-up and a schematic of each switch. Figure 4-18 is a wiring diagram of a typical order-wire control rack showing the inter-connections between the order-wire control panel and the TT-176A units, and the AC power distribution within the rack.

4-31. AN/FGC-60(V) TELEGRAPH TERMINAL TONE CONVERTERS.

A 6002-2 demodulator unit is used to convert the 10-kc phase-shift tone signal from a TTY unit, a telegraph key, or a push-to-talk circuit to a DC keying signal at the input of an AN/FGC-60 send channel. The DC output of an AN/FGC-60 receive channel is converted to a 10-kc phase-shift tone by a 6002-1 modulator unit. Loop voltage for the AN/FGC-60 input and output telegraph channels is furnished internally by the AN/FGC-60 receive terminal. The tone converter units are mounted in drawers which are slide mounted in the associated AN/FGC-60 equipment racks.

4-32. Signal wiring to and from the tone converter drawers is through the cabinet harness and two miniature 36-pin connectors, one for the DC circuits and the other for the 10-kc tone circuits. The tone circuits from and to the BLACK MDF are wired through the AN/FGC-60 front panel KEYER IN and CONVERTER OUT jacks. The 6002-2 demodulator DC outputs connect to the 101A keyer inputs and the 6002-1 modulator DC inputs connect to the 102A converter outputs of the associated AN/FGC-60 telegraph terminal.

4-33. AN/FGC-60/19 DEMODULATOR TONE CONVERTER DRAWER.

The AN/FGC-60/19 demodulator tone converter drawer (figure 4-19) provides tone conversion for the twelve send channels of the 60/19 CCL tone telegraph terminal. The drawer contains twelve 6002-2 demodulator units.

4-34. Figure 4-20 is a wiring diagram of the 60/19 system demodulator drawer. Twelve CCL send circuits from the BLACK MDF connect to pins 1 through 24 of J1 at the rear of the drawer. From J1, each send circuit connects to pins A and J of a demodulator connector, channels 1 through 12 to connectors P1 through P12.

4-35. The tone-converted DC outputs from pins D and E of the twelve demodulator connectors are wired to pins 1 through 24 of the DC connector J2, and through a mating connector and the rack harness, to the 101A keyer inputs of the 60/19 send telegraph channels. The 101A keyers furnish voltage for the demodulator DC output circuits. Pins B, C and F of each demodulator connector are strapped to de-activate the mark-hold feature of the demodulator units.

4-36. Single-phase, 3-wire AC input to the demodulator units is connected to terminal boards 1, 2, and 3 and then distributed to the demodulator AC input connectors from the terminal boards. A ferrous shield separates the AC wiring compartment from the signal wiring compartments and a steel cover plate covers the entire chassis bottom.

4-37. AN/FGC-60/19 MODULATOR TONE CONVERTER DRAWER.

The AN/FGC-60/19 modulator tone converter drawer (figure 4-21) provides tone conversion for the twelve receive channels of the 60/19 CCL tone telegraph terminal. The drawer mounts twelve 6002-1 modulator units.

4-38. Figure 4-22 is a wiring diagram of the 60/19 modulator drawer. The DC outputs of the twelve receive 60/19 channels connect to pins 1 through 24 of J2 at the rear of the drawer. The positive leads connect to the odd numbered pins and the negative leads to the even numbered pins. From connector J2, the positive lead connects to pin D and the negative to pin A of the associated modulator signal connector, channels 1 through 12 to connectors P1 through P12.

4-39. The 10-kc tone outputs of the modulators, pins E and C of the signal connectors, are wired to impedance matching resistors R1 through R12 on terminal boards 1 through 4. The resistors are connected in parallel with the modulator output circuits. From the terminal boards, the tone signals connect to pins 1 through 24 of the drawer connector J1 and then the twelve output channels are fed through the CONVERTER OUT jacks on the 60/19 jackfield to the BLACK MDF.

4-40. Single-phase, 3-wire AC power input to the modulators is connected to terminal boards 5, 6 and 7 and then distributed to each modulator AC connector. Black wire is used for the hot, white wire for the neutral, and green wire for the AC protective ground. The AC wiring is in the middle compartment of the chassis and is separated from the signal wiring by a ferrous shield. The bottom of the chassis is equipped with a steel cover plate.

4-41. AN/FGC-60/22 DEMODULATOR TONE CONVERTER DRAWER.

The AN/FGC-60/22 demodulator tone converter drawer (figure 4-23) contains sixteen 6002-2 demodulator units that provide tone conversion for the sixteen send channels of one 60/22 tone telegraph terminal.

4-42. Figure 4-24 is a wiring diagram of a 60/22 system demodulator drawer. Sixteen input lines from the BLACK MDF connect to J1 at the rear of the drawer, channels 1 through 8 to terminals 1 through 16 and channels 9 through 16 to terminals 17 through 32. Inside the drawer, input channels 1 through 8 are connected to demodulator connectors J3 through J10 and channels 9 through 16 to J27 through J34. Terminals A and J on the demodulator signal connectors are the tone input terminals. Terminals B, C and F of each demodulator signal connector are strapped to deactivate the mark-hold feature of the units. The tone signal is converted by the demodulators and the resultant DC signal appears on terminals D and E of the signal connectors.

4-43. The DC outputs of demodulators 1 through 8 (J3 through J10) are applied to terminals 1 through 16 of J2 and the outputs of demodulators 9 through 16 (J27 through J34) to terminals 17 through 34 of J2. From J2, the sixteen DC signals connect to 101A keyer inputs of the 60/22 send telegraph channels.

4-44. The AC power input to the demodulator units is connected to TB1 through TB4 and distributed to the demodulator AC connectors J11 through J26, the hot leads to terminals A, neutral wiring to D, and protective ground to H.

4-45. AN/FGC-60/22 MODULATOR TONE CONVERTER DRAWER.

The AN/FGC-60/22 modulator tone converter drawer (figure 4-25) contains sixteen 6002-1 modulator units that provide tone conversion for the sixteen receive channels of one 60/22 tone telegraph terminal.

4-46. Figure 4-26 is a wiring diagram of a 60/22 system modulator drawer. The DC output signals of the sixteen receive telegraph channels connect to J2 at the rear of the drawer, channels 1 through 8 to terminals 1 through 16, and channels 9 through 16 to terminals 17 through 32. From J2, the DC keying signals connect to terminals D and A of the modulator connectors, channels 1 through 8 to J3 through J10, and channels 9 through 16 to J27 through J34.

4-47. The 10-kc tone outputs of the modulators are wired to the impedance matching resistors (R1 through R16) that are mounted on TB1 through TB8, then to the audio connector J1 in the same order as the DC inputs to the drawer. The sixteen tone converted 60/22 receive channel outputs are wired from J1 to the front panel CONVERTER OUT jacks then to the BLACK MDF.

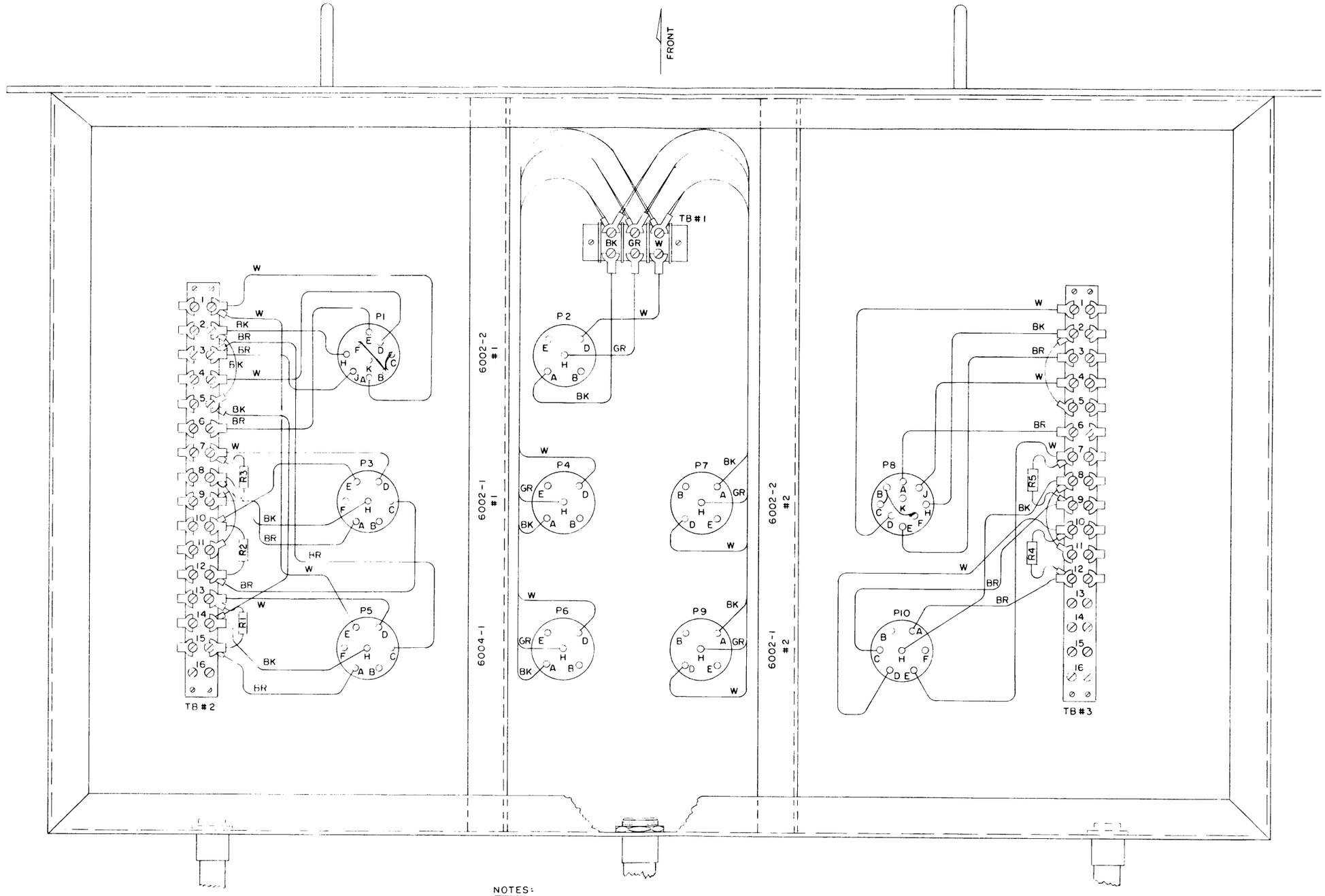
4-48. The AC power input for the modulator units terminates on TB9 through TB12 and is then distributed to the modulator AC connectors J11 through J26 using the standard 3-wire single-phase wiring colors, namely black, white and green.

4-49. AN/FGC-60/23A DEMODULATOR TONE CONVERTER DRAWER.

The AN/FGC-60/23A demodulator tone converter drawer mounts twelve 6002-2 demodulator units that provide tone conversion for twelve channels of the 60/23A CCL send telegraph terminal. Two demodulator drawers are used for the twenty-four send channels of the 60/23A system. The drawer is similar in appearance to the 60/19 system demodulator drawer illustrated in figure 4-19. Both drawers are installed in the 60/23A equipment cabinet.

4-50. Figure 4-27 is a wiring diagram of a 60/23A demodulator drawer. Twelve CCL send tone circuits from the BLACK MDF connect to J1 of each demodulator drawer, group 1 signals to the top drawer and group 2 to the bottom drawer. The tone inputs connect to A and J of the demodulator signal connectors, the first six channels of the group to J3 through J8 and the second six channels of the group to J21 through J26.

4-51. The tone-converted DC outputs of the demodulators, from terminals D and E of the signal connectors,



NOTES:

1. INTER-CONTAINER & INTRA-CONTAINER CABLES - REFER TO RB-2 OR RB-3 CABLE RECORD CARDS FOR SPECIFIC CABLE NUMBER.
2. R-3 & R-4 - 300 OHM, 1W, 5%.
3. R2, R5 - 680 OHM, 1W, 5%.
4. INTRA-RACK SIGNAL PAIRS - REFER TO DWG NO. P-0164 (KW-26 INTRA-RACK WIRING DIAGRAM).

Figure 4-11. KW-26 Tone Converter Drawer, Left Hand, Wiring Diagram

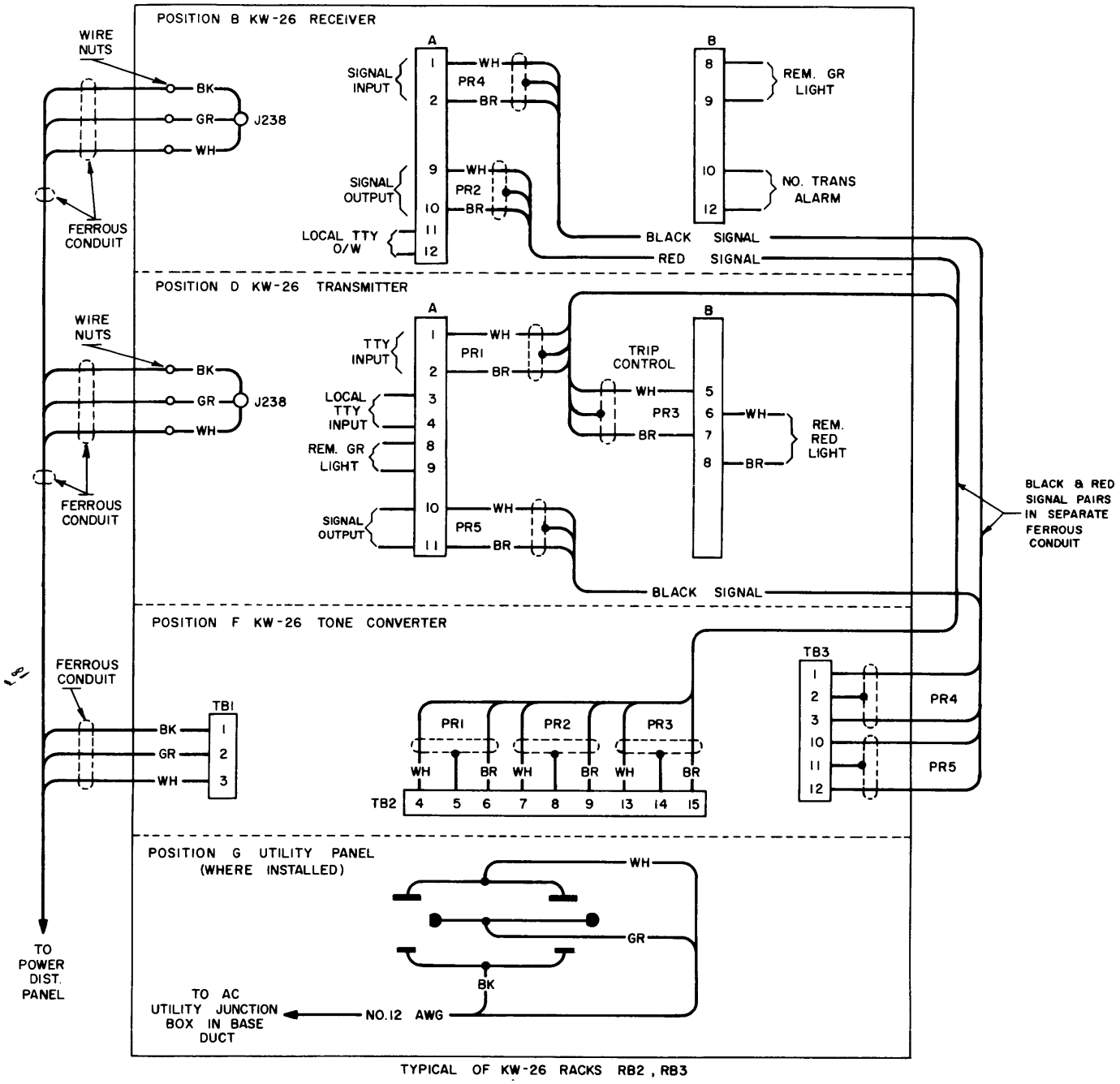


Figure 4-12. KW-26 Equipment Racks RB2 and RB3, Wiring Diagram

are terminated on J2 where they connect to the 101A keyer inputs of the 60/23A telegraph send channels. Since the mark-hold feature of the demodulators is not used, terminals B, C and F of each signal connector are strapped.

4-52. The AC power for the demodulator units connects to TB3, TB2 and TB1 and is then distributed to the AC connectors J9 through J20, using standard 3-wire, single-phase wiring.

4-53. AN/FGC-60/24 TONE CONVERTER DRAWER.

The AN/FGC-60/24 tone converter drawer (figure 4-28) contains eight 6002-1 modulator units and eight 6002-2 demodulator units. One tone converter drawer is installed in each bay of the 16-channel 60/24 tone telegraph terminal. Each drawer provides tone conversion for the eight send and eight receive telegraph channels in one bay.

4-54. Figure 4-29 is a wiring diagram of a 60/24 tone converter drawer. Eight modulator units are

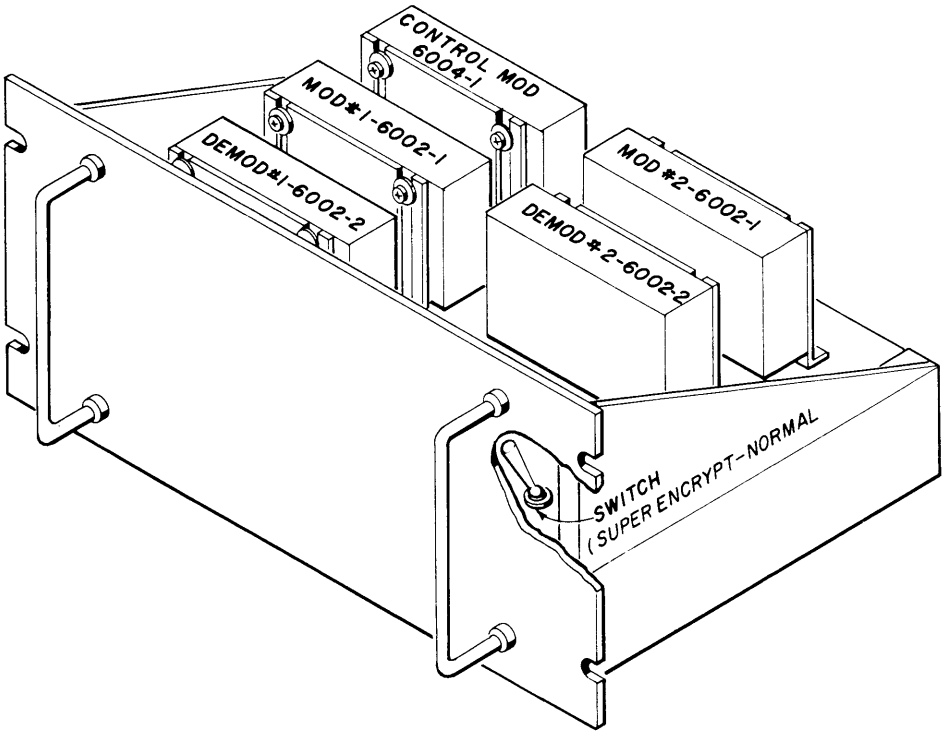


Figure 4-13. Modified KW-26 Tone Converter, Isometric View

mounted on one side of the drawer and eight demodulator units on the other, and the AC input connectors of all units are in the center section of the drawer. All 10-kc tone circuits terminate on J1 and all DC circuits connect to J2.

4-55. Eight point-to-point 10-kc send circuits from the BLACK MDF connect through J1, terminals 1 through 16, to the demodulator signal connectors P9 through P16 terminating on pins A and J of the connectors. The send signals are converted to DC and appear on D and E of the demodulator signal connectors. The D and E pins of the demodulator connectors are wired to terminals 1 through 16 of J2 where they connect through the cabinet wiring to the 101A keyers of the 60/24 telegraph channels.

4-56. The DC outputs of the 102A converters of the eight 60/24 receive channels in the bay connect to J2, terminals 17 through 32, at the rear of the tone converter drawer. From J2, the DC signals connect to pins D and A of modulator signal connectors P1 through P8. The 10-kc tone output of the modulators from pins C and E of the signal connectors are wired to impedance matching resistors R1 through R8 on terminal boards TB1 through TB4, then to the tone signal connector J1, terminals 17 through 32. The eight receive tone-converted 60/24 signals from J1 are wired through the RECEIVE CHANNEL OUT jacks on the 60/24 bay jackfield to the BLACK MDF.

4-57. The AC power wiring terminates on TB5 through TB8 in the drawer and is distributed to all modulator and demodulator units from the terminal boards. Standard 3-wire single-phase wiring is run to pins D, A and H of each of the sixteen AC power connectors.

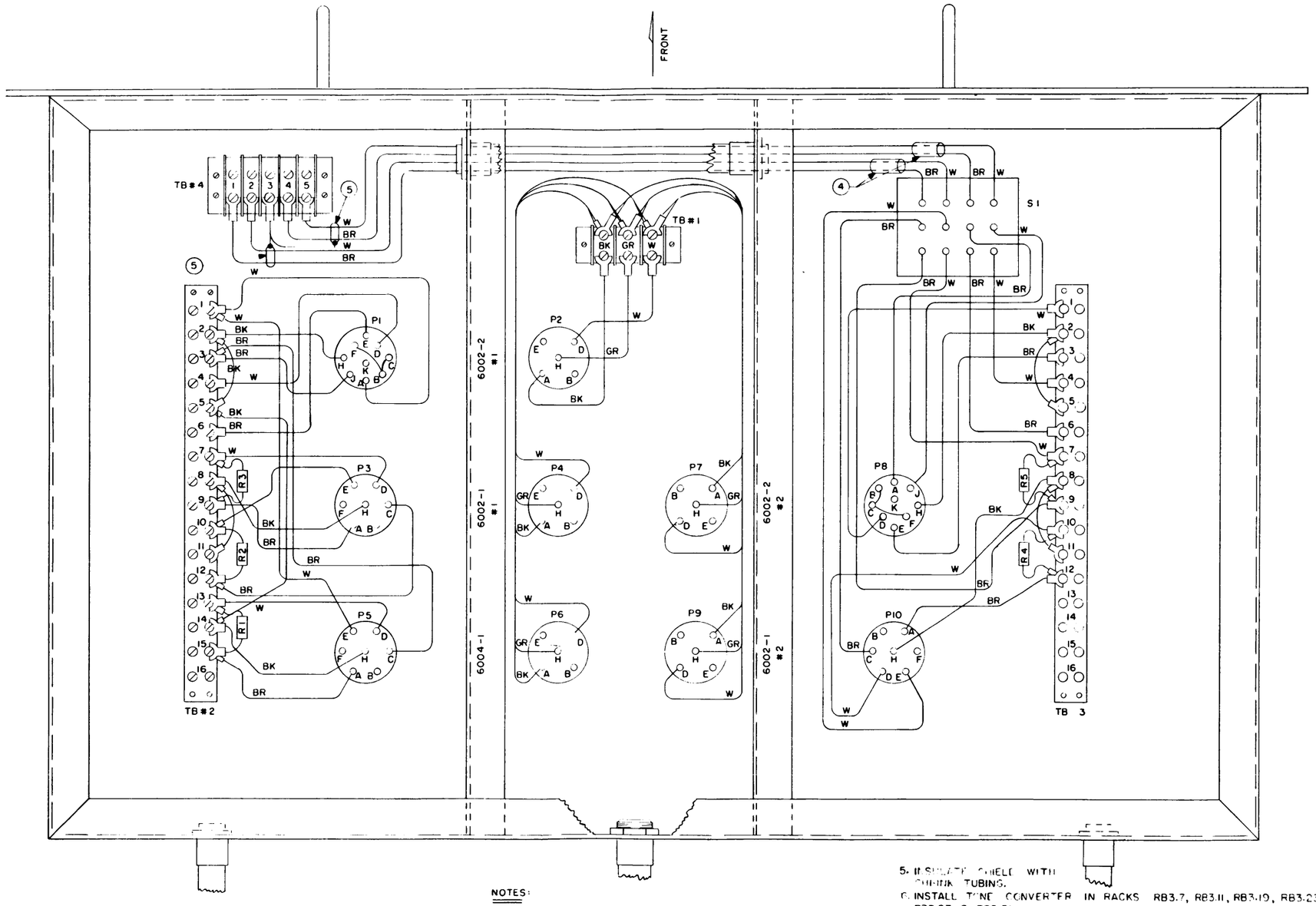
4-58. AN/UGC-1A TONE CONVERTERS.

The AN/UGC-1A 4-channel multiplex equipment operates in conjunction with a KW-22 4-channel cryptographic unit to provide encryption and decryption of four traffic channels. Separate RED and BLACK tone converter drawers are provided for use with the AN/UGC-1A equipment. The AN/UGC-1A requires external battery for all input and output loop circuits. Loop battery for the BLACK circuits is supplied by two 6006 units mounted on the BLACK tone converter drawer, and battery for the RED circuits is furnished by a separate loop supply drawer which contains eight 6006 units.

4-59. AN/UGC-1A BLACK TONE CONVERTER DRAWER.

The AN/UGC-1A black tone converter drawer (figure 4-30) provides tone conversion for the multiplexed input and output of an AN/UGC-1A equipment. The drawer mounts a 6002-1 modulator, a 6002-2 demodulator and two 6006 loop supply units.

4-60. Figure 4-31 is a wiring diagram of an AN/UGC-1A black tone converter drawer. The incoming multiplexed 10-kc signal from the receive circuit is programmed through the BLACK MDF and terminates on TB1, terminals 1 and 2, in the tone converter drawer. Terminals 1 and 2 connect to pins A and J of P2, the demodulator input signal connector. The DC output of the demodulator appears on pins D and E of P2. Pin D is wired to terminal 2 of P1, the 6006 plug, and terminal 4 of P1 is wired back to TB1-3 placing the 6006 in



NOTES:

1. FOR INTER-CONTAINER & INTRA-CONTAINER CABLES - REFER TO RB-3 CABLE RECORD CARDS FOR SPECIFIC CABLE NUMBER.
2. R-3 & R-4 - 300 OHM, 1W, 5%.
3. R2, R5 - 680 OHM, 1W, 5%.
4. ROLL SHEILD RACK 1/4", CUT DRAIN WIRE AT END OF SHIELD AND INSULATE EXPOSED SHIELD WITH SHRINK TUBING.
5. INSULATE SHIELD WITH SHRINK TUBING.
6. INSTALL TONE CONVERTER IN RACKS RB3.7, RB3.11, RB3.19, RB3.23, RB3.27, & RB3.31.

Figure 4-14. Modified KW-26 Tone Converter, Wiring Diagram

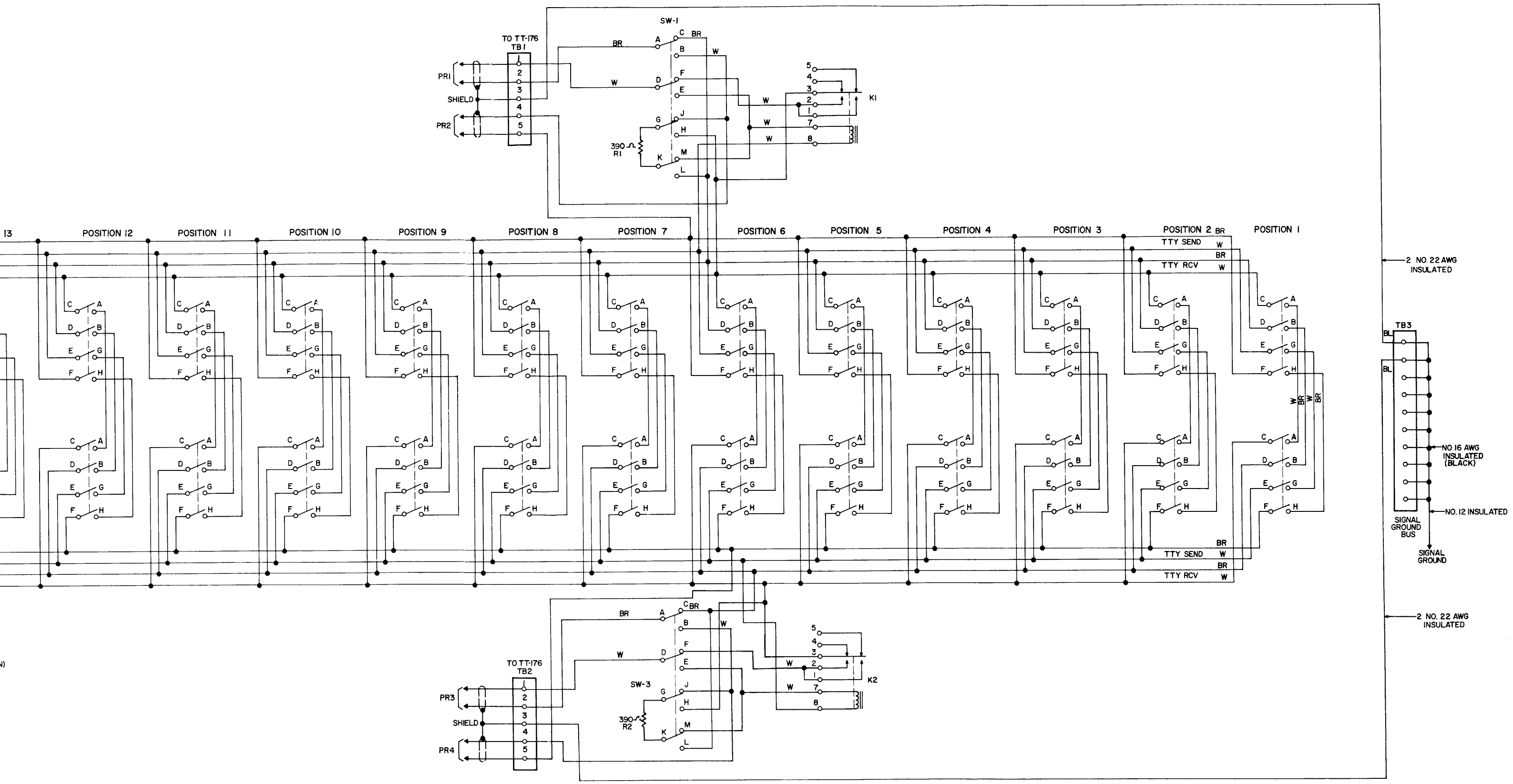
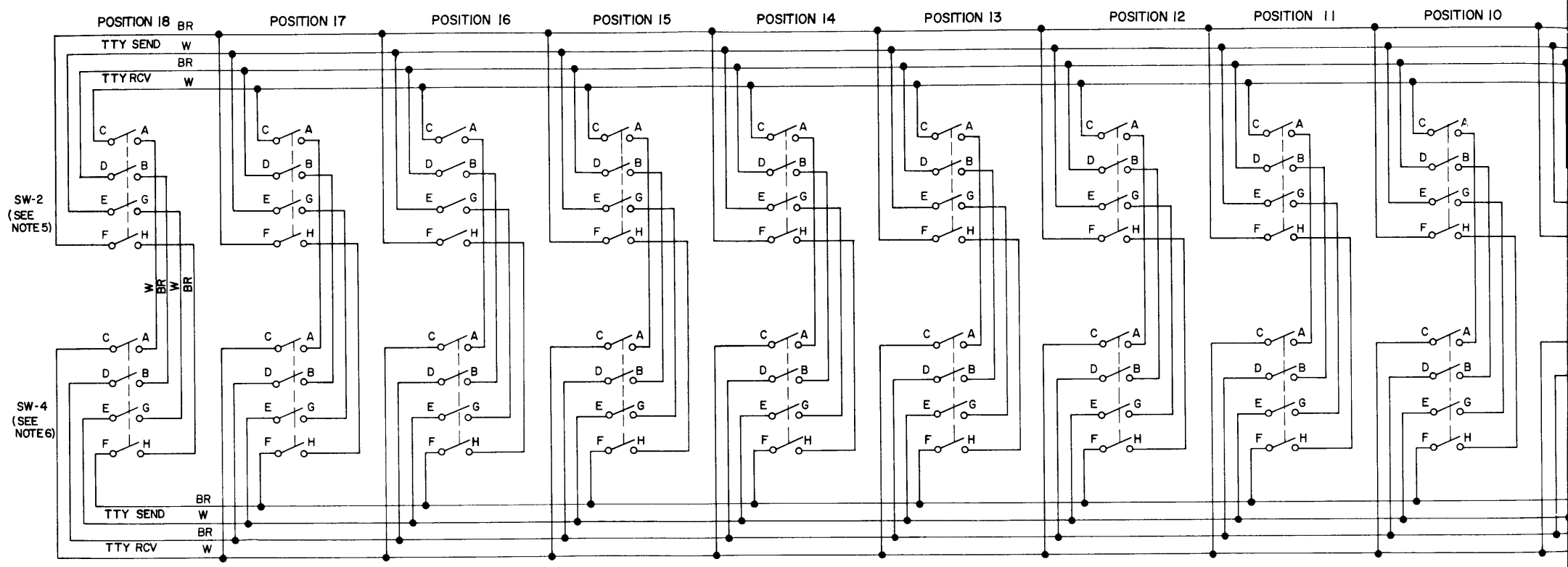


Figure 4-15. KW-26 Order-Wire Control Panel, Wiring Diagram



NOTES:

1. K1, K2 WECO 276A
2. SW1, SW3 - SWITCHCRAFT 60012L
3. SW2, SW4 - SWITCHCRAFT 71800 (18 POSITION)
4. R1, R2 - 390 Ω, 1W
5. SW2 EXTERNAL CONNECTIONS - TERMINALS A&B TO KWR O/W LOOP, TERMINALS G&H TO KWT O/W LOOP.
6. SW4 EXTERNAL CONNECTIONS - TERMINALS A&B & G&H CONNECT TO ASSOCIATED CROSS CONTAINER O/W CONTROL PANEL VIA CROSS CONTAINER CABLES.

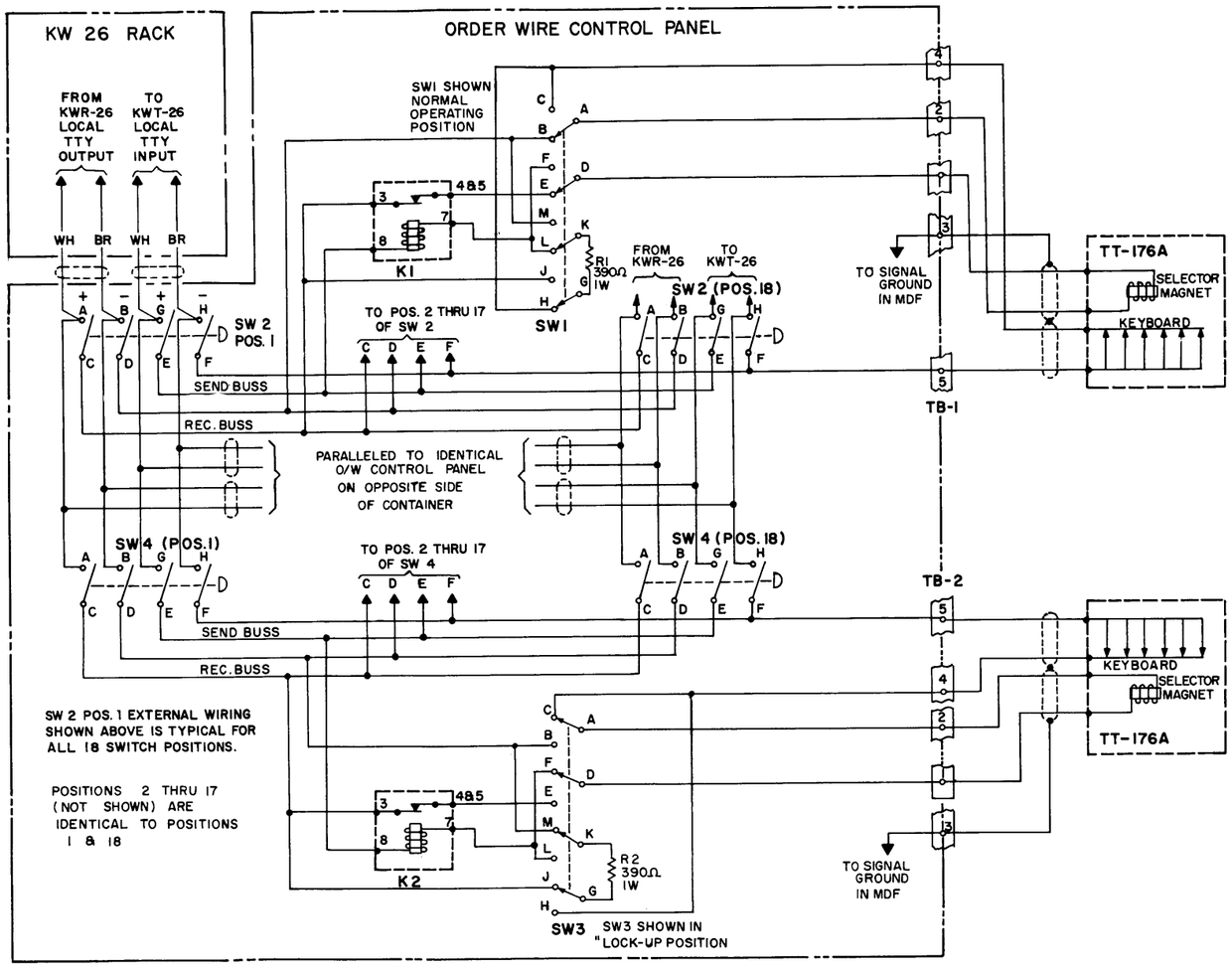


Figure 4-16. KW-26 Order-Wire Control Panel, Simplified Schematic Diagram

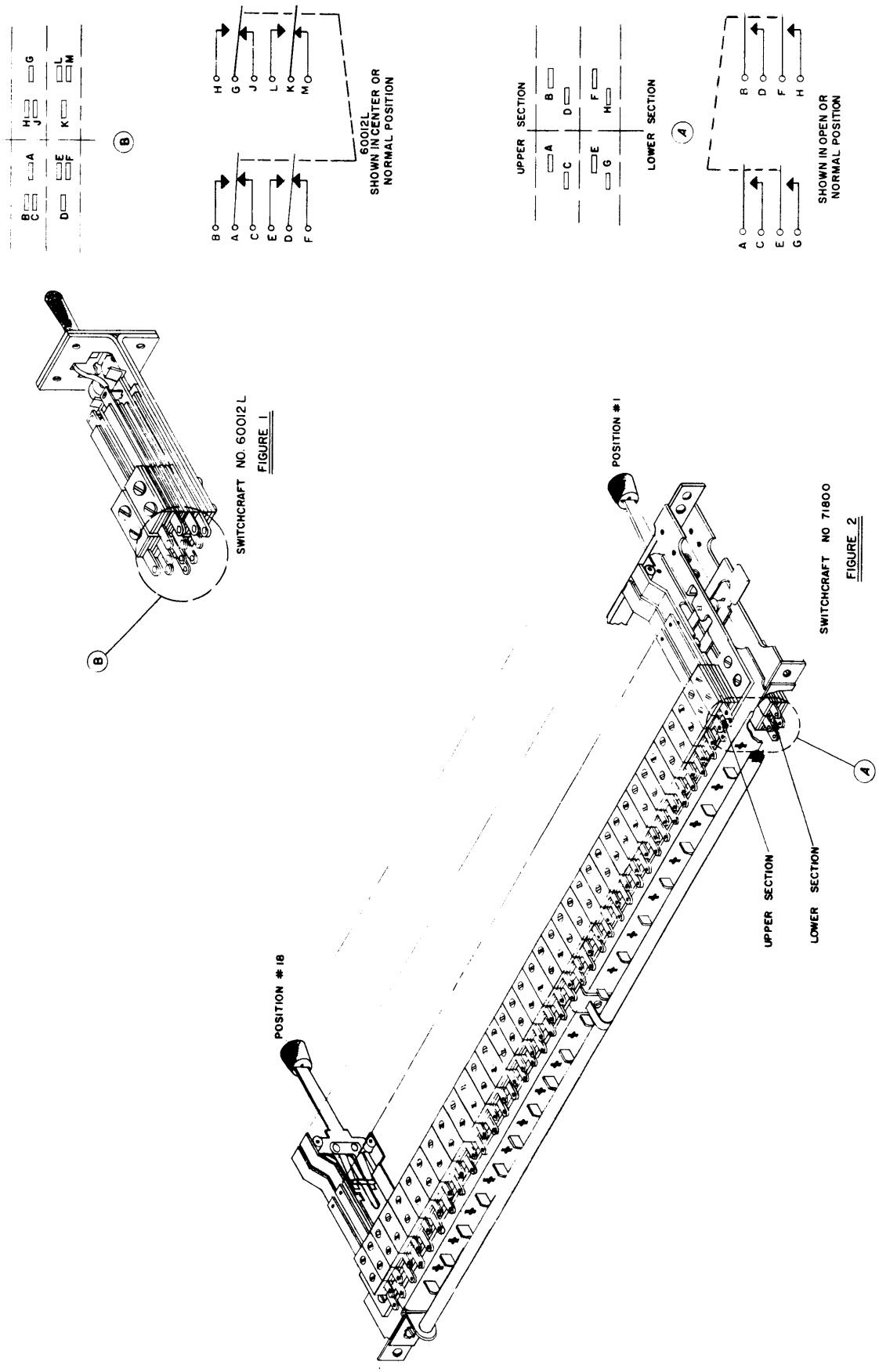


Figure 4-17. KW-26 Order-Wire Control Panel Switches

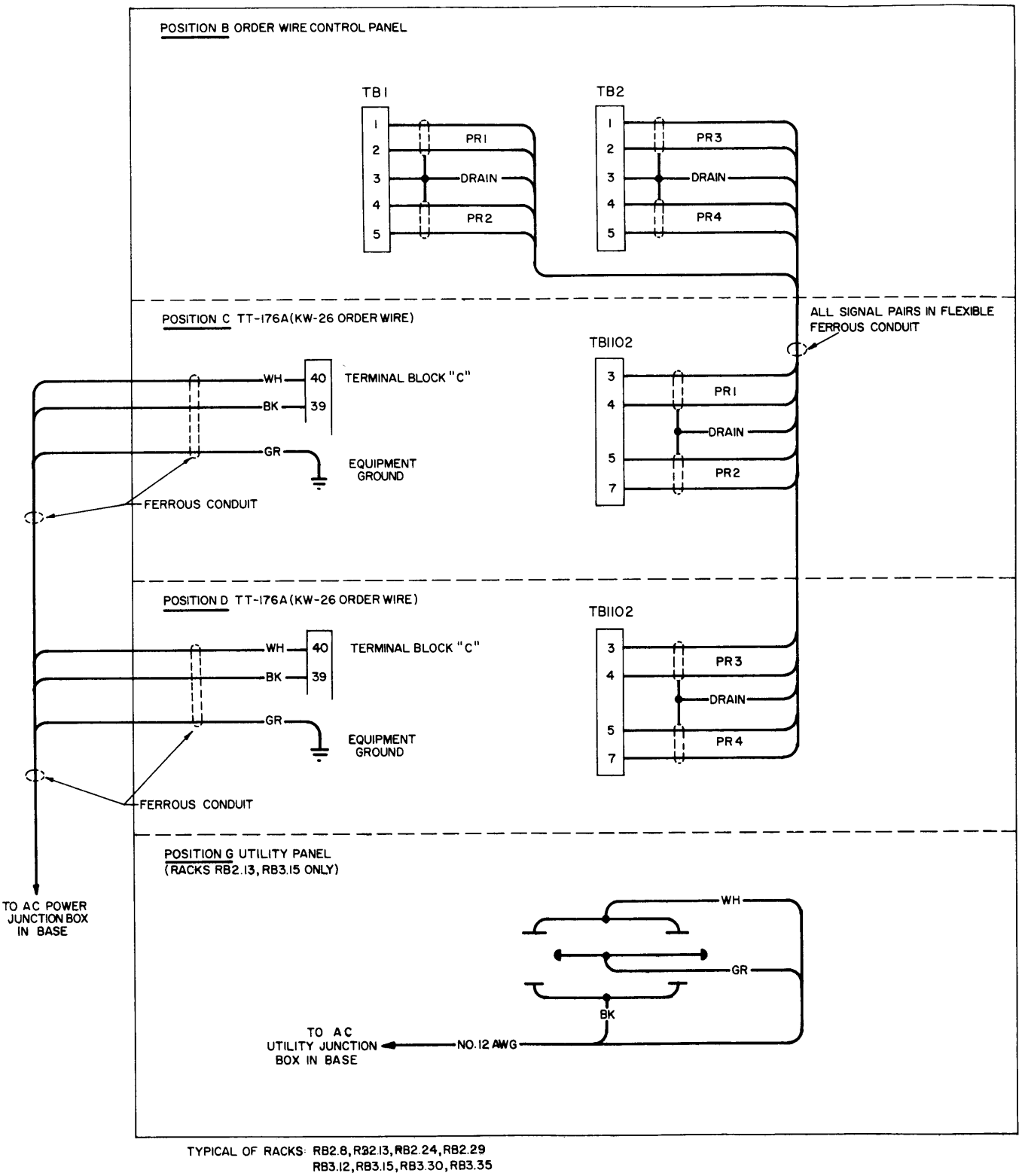


Figure 4-18. KW-26 Order-Wire Control Racks, Typical Wiring Diagram

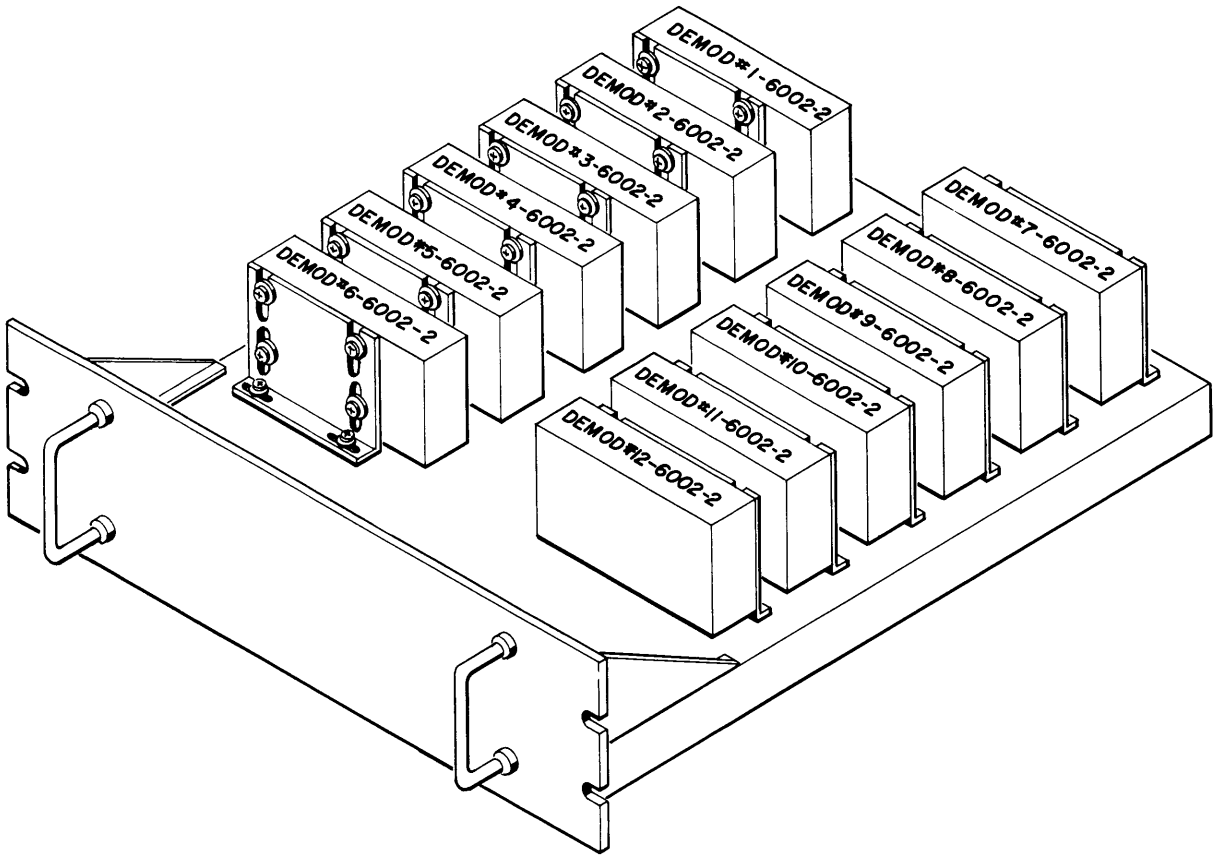


Figure 4-19. AN/FGC-60/19 Demodulator Tone Converter Drawer, Isometric View

series with the line. Pin E of P2 is wired back to terminal 4 of TB1. Terminals 3 and 4 of TB1 connect to the multiplex input terminals of the receive AN/UGC-1A unit, completing the series loop circuit.

4-61. The multiplexed output signal of the transmit AN/UGC-1A unit connectsto TB2, terminals 6 and 8, in the tone converter drawer. P7 is the DC output connector of the 6006 loop supply unit used in the multiplex send circuit, and P8 is the 6002-1 modulator signal connector. The series loop circuit connects from terminal 8 of TB2 to terminal 4 of P7, through the battery, from terminal 2 of P7 to TB2-7, through the strap to TB2-5, through R2 to TB2-6, through the AN/UGC-1A send circuit and back to terminal 8 of TB2. Resistor R2 is a 300-ohm resistor which develops the keying potential for the modulator input circuit. The tone converted (10-kc) multiplexed signal connects from terminals C and E of P8 to terminals 1 and 2 of TB2 across impedance matching resistor R1, and from terminals 1 and 2 of TB2 to a signal pair that terminates on the BLACK MDF.

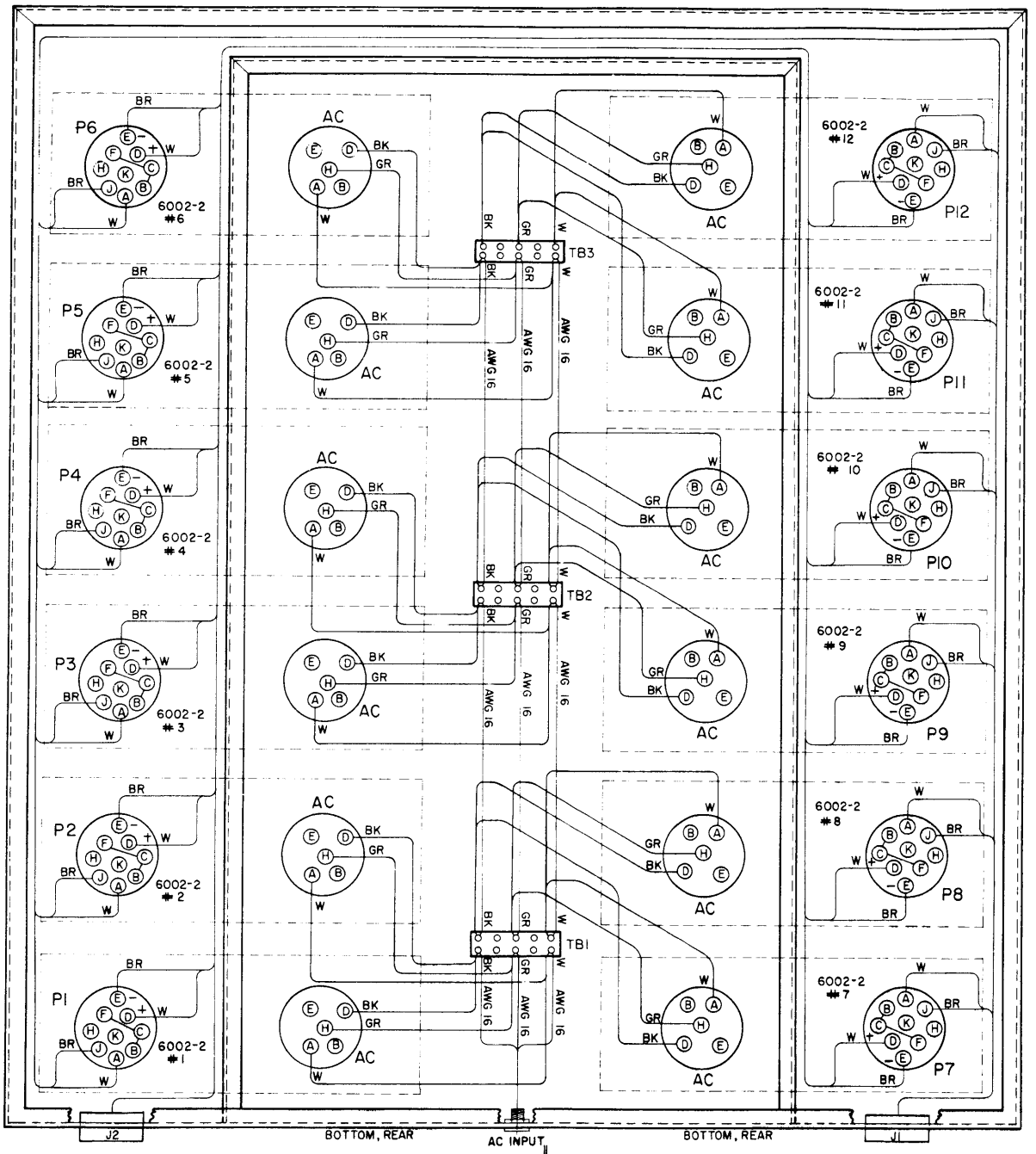
4-62. The AC power input for the modulator, demodulator and loop supply units connects to TB3 and is distributed to the respective AC input connectors using standard 3-wire, single-phase AC wiring.

4-63. AN/UGC-1A RED TONE CONVERTER DRAWER.

The AN/UGC-1A REDtone converter drawer(figure 4-32) mounts four 6002-1 modulators, four 6002-2 demodulators, four 6004-1 trip-control modulators and one DC relay. This drawer provides tone conversion for the RED input and output channels of the AN/UGC-1A and trip control signals for associated TD units that are located in another area of the station. The front panel is equipped with a NORMAL-LOCK-UP switch which is used on the order-wire channel.

4-64. Figure 4-33 is a wiring diagram of the AN/UGC-1A RED tone converter drawer. The RED 10-kc TTY send signals from the RED MDF connect to TB1 and TB2; Channel A to TB1 terminals 7 and 8, channel B to 5 and 6 of TB1, channel C to 7 and 8 of TB2, and channel D to 5 and 6 of TB2. From TB1 and TB2, channel A, B, C and D tones connect to pins A and J of J1, J3, J5 and J7, the demodulator connectors, and to pins E and C of J28, J26, J24, and J22, the 6004-1 trip-control (LOCK-UP) modulator connectors.

4-65. The DC output signals of the 6002-1 demodulators, terminals D and E of the demodulator signal



PIN NO:J2	DESTINATION	COLOR
1	P1-D	W +
2	P1-E	BR -
3	P2-D	W +
4	P2-E	BR -
5	P3-D	W +
6	P3-E	BR -
7	P4-D	W +
8	P4-E	BR -
9	P5-D	W +
10	P5-E	BR -
11	P6-D	W +
12	P6-E	BR -
13	P7-D	W +
14	P7-E	BR -
15	P8-D	W +
16	P8-E	BR -

PIN NO:J2	DESTINATION	COLOR
17	P9-D	W +
18	P9-E	BR -
19	P10-D	W +
20	P10-E	BR -
21	P11-D	W +
22	P11-E	BR -
23	P12-D	W +
24	P12-E	BR -

DEMODS OUT

PIN NO:J1	DESTINATION	COLOR
1	P1-A	W T
2	P1-J	BR R
3	P2-A	W T
4	P2-J	BR R
5	P3-A	W T
6	P3-J	BR R
7	P4-A	W T
8	P4-J	BR R
9	P5-A	W T
10	P5-J	BR R
11	P6-A	W T
12	P6-J	BR R
13	P7-A	W T
14	P7-J	BR R
15	P8-A	W T

PIN NO:J1	DESTINATION	COLOR
16	P8-J	BR R
17	P9-A	W T
18	P9-J	BR R
19	P10-A	W T
20	P10-J	BR R
21	P11-A	W T
22	P11-J	BR R
23	P12-A	W T
24	P12-J	BR R

DEMODS IN

NOTES.
1. ALL WIRES ARE AWG22 UNLESS OTHERWISE SPECIFIED.
2. ALL PLUG-IN MODULES ARE MULTILOCK DEMODULATORS MODEL 6002-2

Figure 4-20. AN/FGC-60/19 Demodulator Tone Converter Drawer, Wiring Diagram

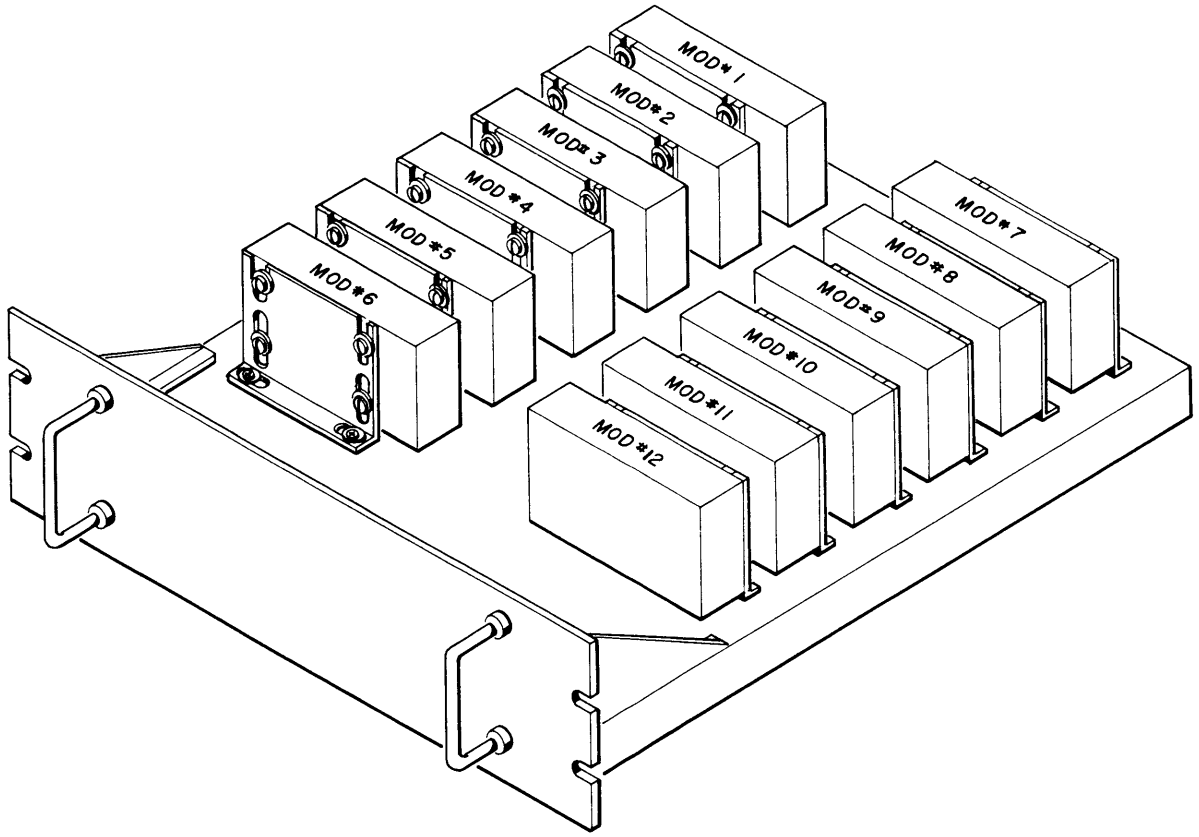


Figure 4-21. AN/FGC-60/19 Modulator Tone Converter Drawer, Isometric View

connectors, are wired back to terminals 1 through 4 of TB1 and TB2, and then to the RED loop supply drawer to pick up battery, as shown in figure 4-34, and to TB5 and TB7 for connections to lock-up circuits as will be described later. The circuit within the RED loop supply drawer is described in the following paragraph.

4-66. The AN/UGC-1A RED loop supply drawer (figure 4-35) mounts eight 6006 loop supply units. This drawer is also used with the KW-37 equipment. Figure 4-36 is a wiring diagram of the RED loop supply drawer. The demodulator DC outputs (RED TTY send signals) from the tone converter drawer terminate on TB5 in the loop supply drawer; channel A to terminals 1 and 2, B to terminals 3 and 4, C to terminals 5 and 6, and D to terminals 7 and 8. Terminals 1, 3, 5 and 7 connect to positive terminals of 6006 loop supplies, and the negative 6006 terminals connect to TB7 terminals 1, 3, 5 and 7. Terminals 2, 4, 6 and 8 of TB5 connect to terminals 2, 4, 6 and 8 of TB7, completing the DC loops within the drawer. The DC send signal circuits from TB7 then connect to the input circuits of the AN/UGC-1A send channels as shown in figure 4-34.

4-67. The DC outputs of the AN/UGC-1A receive channels are connected to TB8 of the RED loop supply drawer as shown in figure 4-34 and 4-36. Terminals 1, 3, 5 and 7 of TB8 are connected to negative terminals (4) of loop supplies 5 through 8, and the positive loop supply terminals connect to TB6 terminals 1, 3, 5 and 7. Terminals 2, 4, 6 and 8 of TB8 are connected to terminals 2, 4, 6 and 8 of TB6 to complete the receive loop circuit within the drawer. The receive loop circuits on TB6 is then connected to TB3 and TB4 in the RED tone converter drawer as described in the following paragraph.

4-68. The AN/UGC-1A receive channel A loop circuit connects to TB3 terminals 3 and 4 and resistor R3. (See figure 4-33.) Resistor R3 is in series with the channel A output loop and the voltage drop across the resistor keys the channel A modulator number 1 input circuit, pins D and A of J9 which are connected to terminals 3 and 4 of TB3 and across R3. Receive channel B output connects to terminals 1 and 2 of TB3, placing R4 in series with the receive loop circuit keying modulator number 2 through pins D and A of J11. Channel C output connects to terminals 3 and 4 of TB4 and resistor R7 keys modulator number 3 in the same manner. Channel D output connects to terminals 1 and 2 of TB4 and resistor R8 keys modulator number 4.

4-69. The channel A modulator output 10-kc signal, terminals C and E of J9, connects to terminals 7 and 8 of TB3, then to the RED MDF over a shielded signal cable. Resistor R1 is an impedance matching resistor connected in parallel with the modulator output. Channel B 10-kc output from J11 connects to terminals 5 and 6 of TB3 and then to the RED MDF, with resistor R2 connected in parallel with the output. Channel C 10-kc output from J13 connects to terminals 7 and 8

of TB4 across resistor R5, and then to the RED MDF. Channel D 10-kc output connects to terminals 5 and 6 of TB4 across resistor R6, and then to the RED MDF.

4-70. The 6004-1 trip-control modulators are dry-contact keyed by relay contacts in the associated KWT-22 equipment. The relay contacts are wired to TB5, channel A trip-control circuit to terminals 1 and 2, channel B to terminals 3 and 4, channel C to terminals 5 and 6, and channel D to terminals 7 and 8. From TB5, the channel A trip-control circuit connects to pins B and D of J28, channel B to J26, channel C to J24, and channel D to J22. The trip-control tone outputs from terminals C and E of the 6004-1 signal connectors are applied to the TTY send lines on TB1 and TB2 as previously described. The 6004-1 furnishes a 2167.5-cps signal for a contact closure or step signal, and a 2082.5-cps signal for an open contact or lock-up signal. The trip-control signal is returned to the sending TD over the TTY send line.

4-71. The AC power input for the tone converters connects to TB9, TB10 and TB11 and is distributed to each component using standard 3-wire, single phase wiring; black wire for the hot lead, white for the neutral and green for the protective ground. The signal ground is carried through the tone converter drawer by connecting the shield wires of associated signal circuits together on the terminal strips designated TS1 through TS8.

4-72. A typical AN/UGC-1A and KW-22 circuit is illustrated in figure 4-37 which shows the send and receive circuits for channel A of the MUX. Channels B, C, and D are connected in the same manner except for the keyboard, printer selector magnet, relay K1 and switch, which are provided in channel A for order wire operations.

4-73. The 10-kc send circuit from a TD is connected through the RED MDF to the AN/UGC-1A tone converter drawer where it is wired in parallel with the inputs of a 6002-2 demodulator and the output of a 6004-1 trip control modulator. The DC send loop from D of the 6002-2 connects through a 6006 loop supply unit to the input of channel A of the AN/UGC-1A unit at 3TB2 terminal 1. The loop circuit returns from terminal 2 of 3TB2 through the coil of relay K1 to contact F of the switch which is shown in the normal position. The circuit continues from F to D through 390-ohm resistor R9, through A and C of the switch, the contacts of the keyboard and then to terminal E of the 6002-2 demodulator completing the send loop circuit.

4-74. The send TTY signal is multiplexed with the other channels signals, fed to the KW-22 for encryption through 3P1-E, the cipher is returned to the AN/UGC-1A through 3P1-F, then fed to the BLACK tone converter through 3TB2, 7 and 8. The multiplexed signal is converted to a 10-kc tone and fed to the BLACK MDF.

4-75. The receive multiplexed 10-kc signal is programmed through the BLACK MDF to the BLACK tone converter, terminating on TB1, 1 and 2. The tone signal is converted to DC by the demodulator. The DC output of the demodulator, pins D and E, connect in series with the loop supply and the input terminals 2TB2-5 and 6 of the receive AN/UGC-1A. The multiplexed signal is applied to the KWR-22 through 2P1-F, decoded and returned to the receive MUX through 2P1-E.

4-76. The signal is demultiplexed and the channel A output loop from 2TB2-1 and 2TB2 is wired to the loop supply drawer to pick up battery and then to the tone converter drawer on TB6 terminal 7 and TB3 terminal 3. The loop circuit continues from TB6-7 through M and K of the switch, through the printer selector magnet, G and J of the switch, the closed contacts of relay K1, to TB3-4 and through a 300-ohm resistor to TB3-3 completing the receive loop. The voltage developed across the resistor keys the input circuit of the 6002-1 modulator and the resultant 10-kc tone is fed to the RED MDF.

4-77. Whenever the keyboard is operated or a message is received from the TD, the printer selector magnet operates (through the contacts of relay K1) to provide page copy of the transmitted message. When the receive circuit is out for any reason, the switch is placed in the opposite position (tongues down), connecting the printer selector magnet in series with the send loop circuit through contacts G-H and K-L of the switch, and thd 390-ohm resistor is placed in series with TB3-4 and TB6-7 through contacts A-B and D-E of the switch, closing the receive loop circuit.

4-78. Relay contacts 4 and 16 of K1601 in the KWT-22 unit provide a step signal (closed contacts) to the 6004-1 trip control modulator which produces a 2167.5-cps step signal that is returned to the sending TD through the send line. When the KWT-22 is down for any reason, relay K1601 contacts reverse providing an open contact or lock-out signal to the 6004-1 which produces a 2082.5-cps lock-out signal that is returned to the sending TD. At the same time, contacts 1 and 7 of K1601 close, lighting an alarm lamp on the RED monitor patch panel in container RB1.

4-79. Figure 4-38 is a wiring diagram of a typical AN/UGC-1A equipment rack, showing the intra-rack signal pairs and their terminations, and the AC power distribution within the rack. The RED and BLACK signal wiring and the AC wiring is run in separate ferrous conduit within the rack. The AC equipment power and the AC utility power is provided from separate circuit breakers in the container power distribution panel.

4-80. KW-37 TONE CONVERTERS.

Separate RED and BLACK tone converter and loop supply drawers are provided for the KW-37 signal circuits. The drawers are mounted in equipment rack RB1.32 which is divided into two sections by a ferrous shield. A loop supply unit is furnished for a TT-176A TTY unit that is used as a KW-37 order-wire machine.

4-81. KW-37 BLACK TONE CONVERTER DRAWER.

The KW-37 black tone converter drawer (figure 4-39) contains four 6002-1 modulator units and four 6002-2 demodulator units. This drawer provides tone

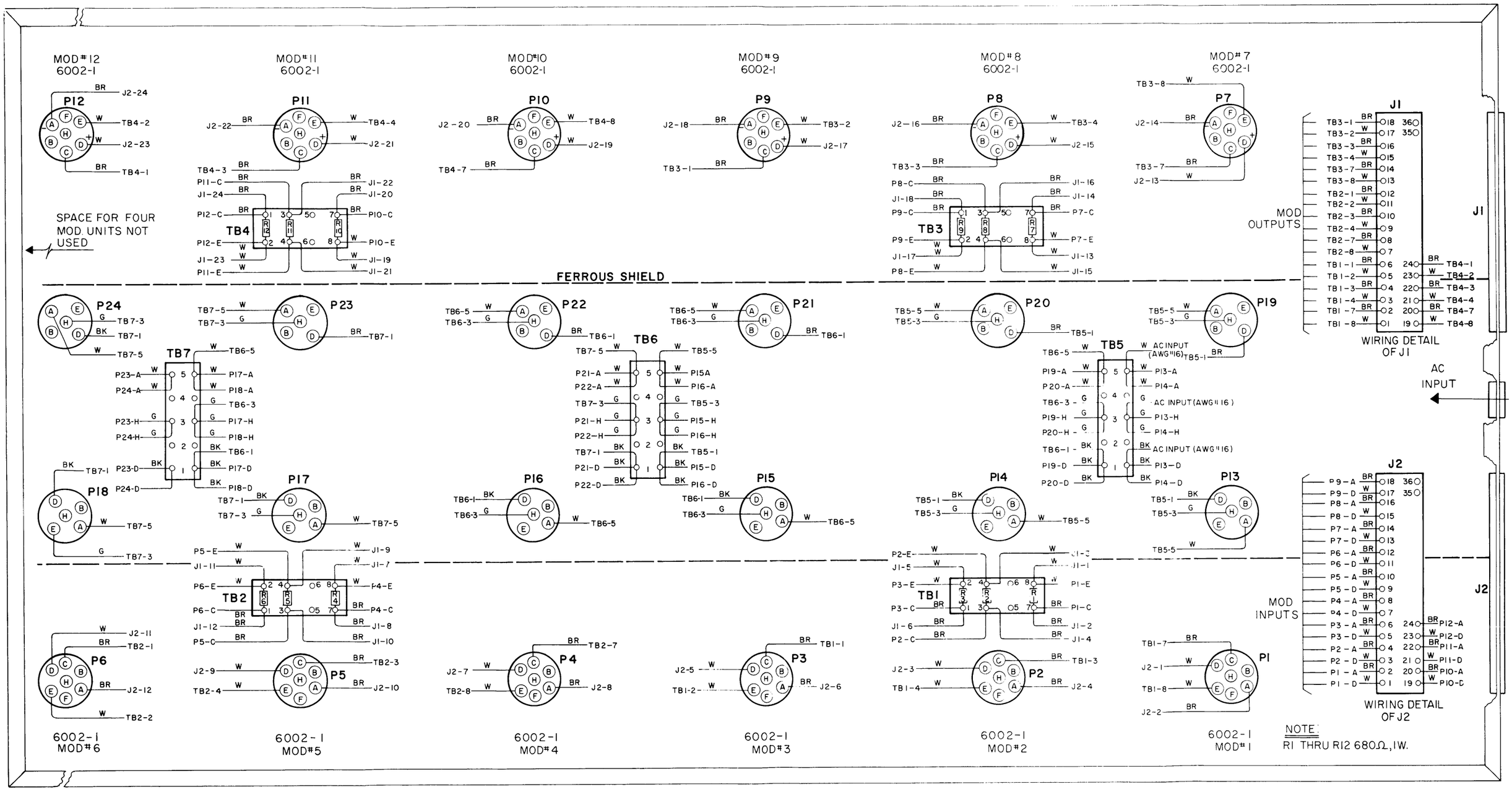


Figure 4-22. AN/FGC-60/19 Modulator Tone Converter Drawer, Wiring Diagram

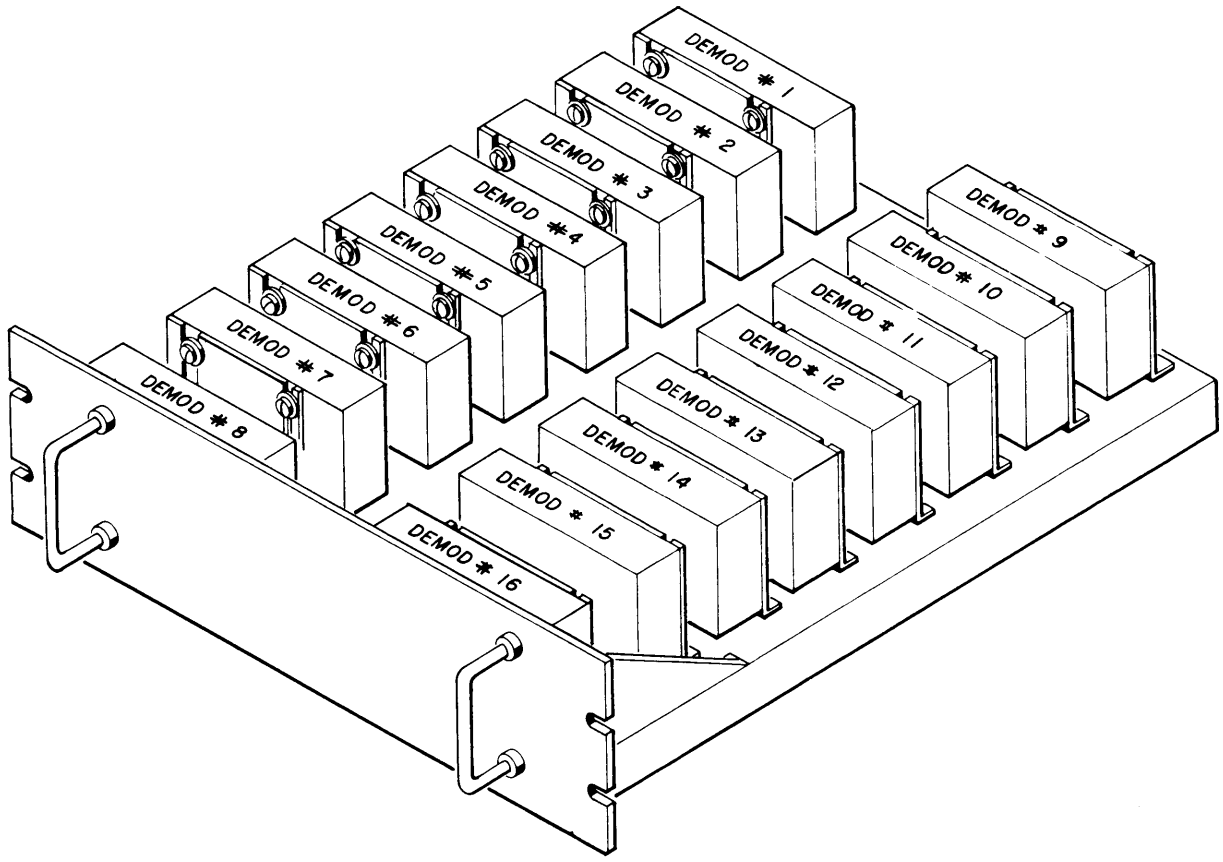


Figure 4-23. AN/FGC-60/22 Demodulator Tone Converter Drawer, Isometric View

conversion for four send and four receive BLACK KW-37 circuits.

4-82. Figure 4-40 is a wiring diagram of the KW-37 BLACK tone converter drawer. Four 10-kc receive signal lines from the BLACK MDF enter the drawer and terminate on TB1. Each pair of terminals on TB1 is wired to pins A and J of a demodulator signal connector. The demodulator signal connectors J9, J11, J13 and J15 are associated with KWR-37 units 1 through 4 respectively. The demodulator DC outputs, pins D and E of the signal connectors, are wired to pairs of terminals on TB3 where they connect through rack signal wiring to the BLACK loop supply drawer.

4-83. The BLACK loop supply drawer is the same as used with the AN/UGC-1A, and is illustrated in figures 4-35 and 4-36. The interconnections between the KW-37 BLACK tone converter and loop supply drawers are shown in rack RB1. 32 wiring diagram, figure 4-41, and the inter-unit cabling for the send and receive circuit of KW-37 number 1 is illustrated in figure 4-42. The demodulator DC outputs on TB3 of the BLACK tone converter drawer connect to TB7 of the BLACK loop supply drawer through rack signal pairs 1 through 4. A 6006 loop supply unit is connected in series with each demodulator DC output circuit (see figure 4-36) and then the four circuits terminate on TB5 in the loop supply drawer. From TB5, each receive circuit is wired to the input of a KWR-37 unit completing the loop circuit.

4-84. The BLACK DC send circuits of the four KWT-37 units are connected to pairs of terminals on TB4 in the tone converter drawer. The KWT-37 outputs are first applied to TB6 of the loop supply drawer (see figures 4-36 and 4-42) where they connect to 6006 loop supply units, and then from TB8 of the loop drawer to TB4 in the tone drawer. From TB4, the send circuits connect to pins D and A of modulator signal connectors. The modulator signal connectors are J26, J28, J30 and J32. R5 through R8 on TB4 are 100-ohm resistors that are connected in series with the KWT-37 output loop circuits. The 60-ma loop current produces a 6-volt drop across the resistors keying the input circuits of the 6002-1 modulators.

4-85. The modulator 10-kc outputs, from pins C and E of the modulator signal connectors, are terminated on pairs of TB2 terminals. Resistors R1 through R4 on TB2 are 680-ohm impedance matching resistors, and are in parallel with the modulator output signal circuits. Shielded signal cables connect the tone converted 10-kc outputs of the KWT-37 units from TB2 to the BLACK MDF in container RE1.

4-86. The AC power for the tone converter modules connects to TB5, and from TB5 to TB6 where the power is distributed over 3-wire circuits to terminals D, A and H on the AC connectors of the modules.

4-87. KW-37 RED TONE CONVERTER DRAWER.

The KW-37 RED tone converter (figure 4-43) contains four 6002-1 modulators, four 6002-2 demodulators and four 6004-1 trip-control (LOCK UP) modulators. This drawer provides tone conversion for the RED send and receive circuits and the trip-control circuits of four KW-37 units. The tone converter drawer, its associated loop supply drawer, and four DC relays are mounted in the bottom of equipment rack RB1. 32.

4-88. Figure 4-44 is a wiring diagram of the KW-37 RED tone converter drawer. The send 10-kc TTY signals from the torn-tape relay area are programmed through the RED MDF (see figure 4-32) to the tone converter drawer where they connect to terminals 5, 6, 7 and 8 of TB1 and TB2. From these terminals, the 10-kc signals are parallel-connected to pins A and J of the demodulators and pins C and E of the trip-control modulators. J1, J3, J5, and J7 are the demodulator connectors, (see figure 4-44) and J26, J28, J30 and J32 are the trip-control modulator connectors.

4-89. The DC outputs of the demodulators, pins D and E, are connected to terminals 1, 2, 3 and 4 of TB1 and TB2 where they connect through rack wiring to the RED loop supply drawer terminal boards 5 and 6. The loop supply drawer is the same as used with the AN/UGC-1A except that it contains only four 6006 units that furnish loop current at 60-ma to the KW-37 send circuits. The 6006 units are connected in series with the loop circuits which then connect from TB7 and TB8 of the loop supply drawer to the inputs of the KWT-37 units.

4-90. The trip-control circuits of the KWT-37 units connect to TB5 of the tone converter drawer then to pins B and D of the 6004-1 units. Pins A and H of the 6004-1 connectors are strapped for dry-contact keying. The output signals of the control modulators are returned to the sending TD over the TD send line.

4-91. The RED receive outputs of the KWR-37 units connect directly to the tone converter drawer since the KWR-37 units furnish loop battery internally for these circuits. The KWR-37 output circuits connect to 100-ohm resistors on terminals 1, 2, 3 and 4 of TB3 and TB4 and then to the modulator input terminals D and A on J9, J11, J13 and J15. The voltage drops across the resistors, approximately 6 volts for a mark signal and zero volts for a space signal, key the associated 6002-1 modulator input circuits. The 10-kc tone outputs from the modulators, pins C and E, are terminated on 5, 6, 7 and 8 of TB3 and TB4. The 680-ohm resistors across these terminals provide the proper loading for the output circuits of the modulators. The RED tone-converted signal outputs of the KWR-37 units are connected from TB3 and TB4 of the tone converter drawer to the RED MDF in container RB1.

4-92. The 3-wire AC input circuit connects in parallel to TB6, TB7, and TB8. The power is then distributed to the AC connectors of the modulators and demodulators over separate 3-wire circuits from the terminal boards.

4-93. KW-37 ORDER-WIRE EQUIPMENT RACK.

A TT-176A unit, send only, is provided as the send order-wire machine for the KW-37 circuits, and a TT-176A unit wired for tone conversion is provided as the receive monitor. The TT-176A units are mounted in rack position RB1. 26.

4-94. The output of the send only TT-176A is wired in series with a 6006 loop supply unit (see figure 4-45) and to a closed circuit jack in the RED signal duct at the top of the KW-37 equipments. When required for order-wire operations, the TT-176A is connected to the KW-37 unit by means of a patchcord. The receive TT-176A tone input circuit is terminated on the RED MDF where it can be programmed to a receive KW-37 equipment, or patched as needed.

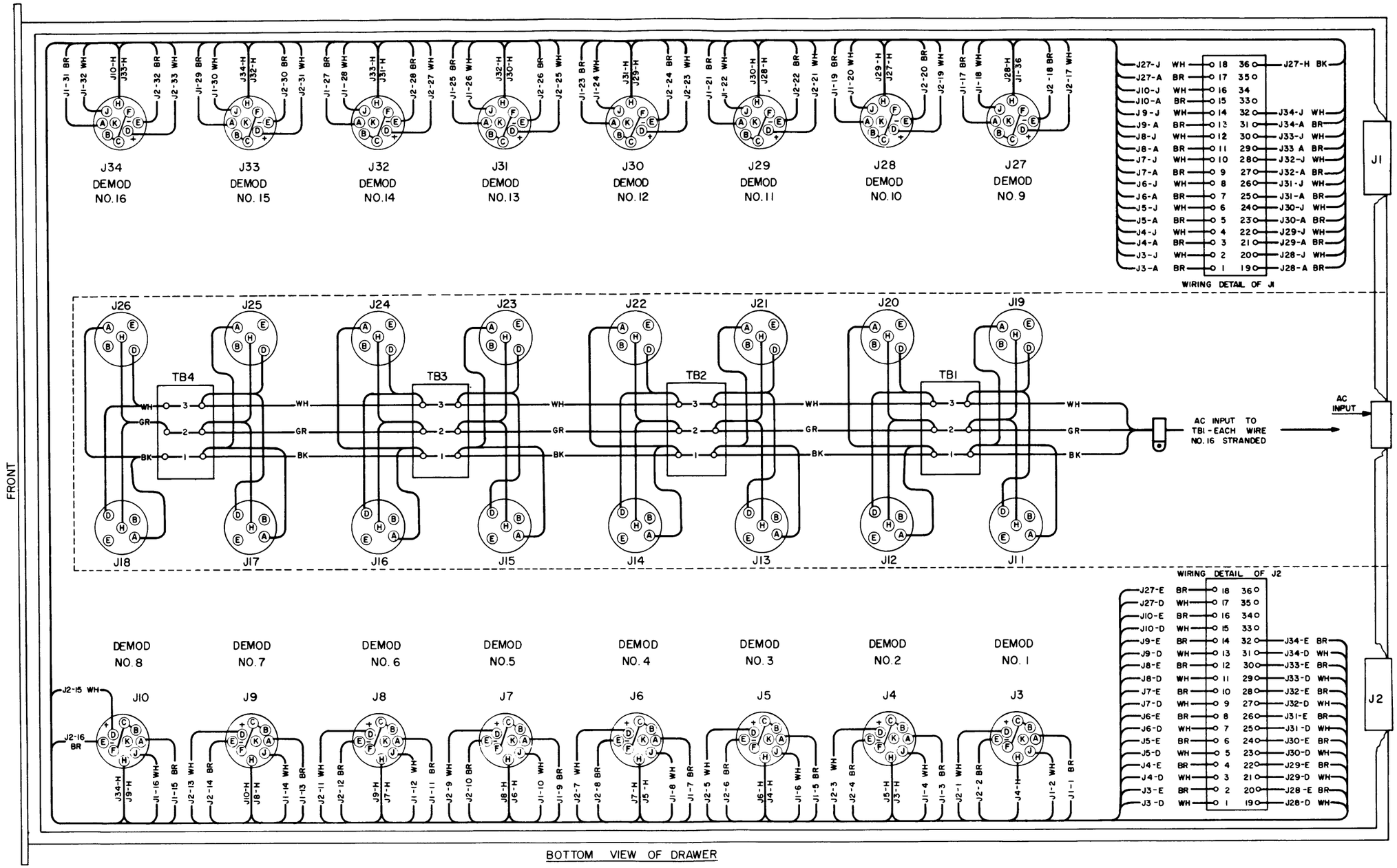
4-95. POINT-TO-POINT ORDER-WIRE TONE CONVERTER PANEL.

The point-to-point order-wire tone converter panel (figure 4-46) is used on both RED and BLACK point-to-point order wire circuits. The panel contains a 6002-1 modulator unit, a 6002-2 demodulator unit, two 6006 loop supply modules, and a lock-up relay. The panel is mounted in the equipment rack behind the associated TT-176A point-to-point order-wire teletype machine.

4-96. Figure 4-47 is a wiring diagram of the point-to-point order-wire tone converter panel. Switch S1 is a lock-up switch that is wired to the panel but is mounted at the front of the equipment rack for the convenience of the operator. The switch is used to close the printer-selector loop circuit in order that send messages may be recorded on the page printer of the TT-176A when the receive side of the circuit is out. The coil of relay K1 is in the send loop circuit and the contacts in the receive loop circuit, providing page copy of the send traffic in either position of the lock-up switch.

4-97. The TT-176A keyboard contacts connect to TB1, terminals 1 and 4. The send loop circuit from terminal 1 connects to the negative terminal of the 6006 unit at J1-4 and the positive terminal from J1-2 returns to TB1-5, through the 300-ohm resistor to TB1-6, to the relay coil at K1-8, through the relay, and from K1-7 back to TB1-4 to complete the loop. The 6002-1 modulator DC input terminals, D and A, are connected across the 300-ohm resistor at J1-2 and TB1-6. The voltage drop across the resistor keys the input circuit of the modulator. The 10-kc tone output of the modulator, pins C and E of J6, connect to TB2 terminals 1 and 2, and then to the respective MDF over a shielded signal cable. The 680-ohm shunt resistor on TB2-1 and TB2-2 provides correct loading for the modulator tone output circuit.

4-98. The receive 10-kc input signal connects to TB2 terminals 3 and 4, then to the demodulator input terminals A and J on J8. Terminals B, C and F of J8 are strapped to de-activate the demodulator mark-hold feature. The receive loop circuit includes the demodulator DC output circuit (pins D and E), a 6006 loop supply, the printer selector magnet and the contacts of relay K1. Terminal D of J8 connects to positive battery at



PRODUCTION NOTES:

1. J1 & J2 - AMPHENOL NO.57-40360 (MATES WITH NO.30360)
2. J3 THRU J10 AND J27 THRU J34 - AMPHENOL NO. 126-013
3. J11 THRU J26 - AMPHENOL NO.126-011
4. TB1 THRU TB4 - GENPRO 441-3
5. ALL DEMODS - ROBERT - SHAW 6002-2
6. STAMP ALL PART DESINATIONS ON CHASSIS AS INDICATED.
7. ALL WIRING NO.22 AWG STRANDED UNLESS OTHERWISE SPECIFIED

Figure 4-24. AN/FGC-60/22 Demodulator Tone Converter Drawer, Wiring Diagram

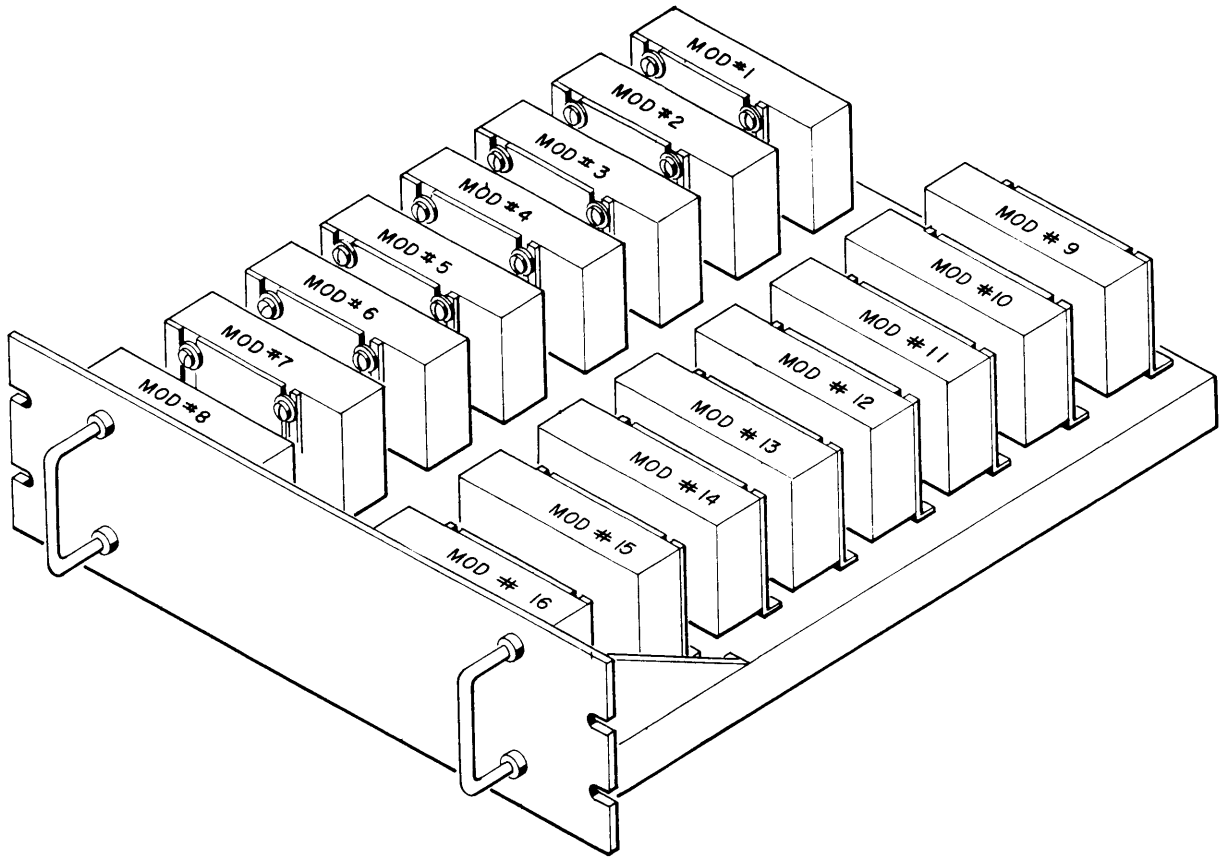


Figure 4-25. AN/FGC-60/22 Modulator Tone Converter Drawer, Isometric View

J2-2, the negative side of the battery from J2-4 connects to TB1-2, connects to the printer selector magnet and returns to TB1-3, to the tongue of relay K1 at terminal 3, and from the relay contact at 2 back to terminal E of J8, completing the receive loop circuit. Terminals G and H of lock-up switch S1 are connected across the demodulator output contacts D and E at K1 terminal 1, and J2 terminal 2. When the switch is closed (LOCK-UP position) the receive loop is closed so that it may be keyed by the relay contacts that are actuated by the relay coil in the send loop circuit.

4-99. The AC power input to the panel connects to TB2 terminals 5, 6 and 7 and is then distributed to the AC input connector of each module on the panel. The signal ground circuits of the send and receive lines are carried through the panel by connections on TB3.

4-100. Figure 4-48 is a wiring diagram of a point-to-point order wire rack in RE1 and is typical for order-wire racks used on BLACK point-to-point circuits. The signal circuits of the tone converter panels for the point-to-point and monitor TTY equipment are terminated on jacks, and the TT-176A signal circuits are equipped with patchcords terminated with plugs. The TTY input and output 10-kc tone signals terminate on a coaxicon connector block in the base of the rack.

4-101. Figure 4-49 is a wiring diagram of a point-to-point order-wire equipment rack that is typical of order-wire racks used on RED circuits. The TTY equipment is wired directly to the tone converter panels to reduce the possibility of radiation or stray pick-up in the signal leads. The AC and signal wiring within the rack is run in ferrous conduit and ferrous shielding is used in the rack base.

4-102. INTERNAL ORDER-WIRE TONE CONVERTER PANEL.

The internal order-wire tone converter panel (figure 4-50) contains a 6002-1 modulator, a 6002-2 demodulator and a 6006 loop supply unit. A foot-operated switch, which is wired to the panel, is provided with each of these panels.

4-103. Figure 4-51 is a wiring diagram of the internal order-wire panel. The keyboard contacts of the TTY equipment, which may be a TT-176A or a TT-47, connect to TB1 terminals 13 and 14, and then directly to the modulator input terminals B and D on J1. The modulator is dry-contact keyed and terminals A and H of J1 are strapped to implement this function. The printer selector magnet of the TTY unit connects to terminals 11 and 12 of TB1, terminal 11 connects to the negative terminal of the 6006 on S1-4, and the positive terminal from S1-2 connects to demodulator input connector J2-D, and terminal E of J2 returns to TB1-12 to complete the receive loop circuit.

4-104. The tone output of the modulator from terminals E and C of J1 connect to TB1-7 and TB1-9, through the contacts of the foot switch to TB1-8 and TB1-10 and then to the order-wire tone line on TB1-4 and TB1-6. The demodulator tone input circuit from J2-A and J2-J also connects to TB1-4 and TB1-6 and the order-wire tone line. The demodulator MARK-HOLD feature is used on the order-wire circuits to prevent the printers from running open when there is no 10-kc signal on the line. The 10-kc output of the modulator is on the line only when the foot switch is depressed to close the contacts during transmission of a message from the keyboard. All printers on the order-wire circuit record the transmission from all keyboards on the circuit.

4-105. Figure 4-52 is a diagram of order-wire rack RE1.23 which is typical for the rack mounted internal order-wire equipment. The AC power input to the tone converter connects to TB1 terminals 1, 2 and 3 and is then distributed to the modulator, demodulator and loop supply AC input terminals using standard black, white and green AC wiring. The modulator and demodulator DC circuits are terminated on jacks that are mounted at the front of the rack, and the TTY send and receive circuits connect to patchcords. The order-wire tone line enters the rack through a coaxicon connector in the rack base. The foot-switch is mounted on the rack base.

4-106. TTY MONITOR TONE CONVERTER PANEL.

The TTY monitor tone converter panel (figure 4-53) contains one 6002-2 demodulator and one 6006 loop supply unit. This panel is used with most TTY monitor machines at the station and is mounted at the rear of the equipment rack behind the monitor TTY unit.

4-107. Figure 4-54 is a wiring diagram of a TTY monitor tone converter panel. The 10-kc TTY tone input connects to TB4 terminals 1 and 3 then to the demodulator input terminals on P2-A and P2-J. The demodulator DC output loop connects from P2-E to TB4-6, through the printer selector magnet back to TB4-4, to negative battery terminal J2-4 and from the positive battery terminal J2-2 to P2-D completing the loop circuit. The AC power input connects to TB5 terminals 4, 5 and 6 and then to the demodulator and loop supply AC input connectors.

4-108. Figure 4-55 is a wiring diagram of a typical monitor TTY rack showing the intra-rack cabling and power distribution within the rack. Three TT-176A monitor units and three associated TTY monitor tone converter panels are contained in each of the racks listed on the figure.

4-109. The TTY monitor tone converter drawer that is provided for the TT-176A monitor TTY in rack RF2.17 is illustrated in figures 4-56 and 4-57. The drawer is equipped with one 6002-2 demodulator and one 6006 loop supply unit. The 10-kc input signal line connects to terminals 1 and 3 of J1 and then to pins A and J of the demodulator signal connector J2. The DC output of the demodulator connects from J2-D to the positive battery terminal P1-2, from the negative battery terminal P1-4 to J1-8, through the printer selector magnet and back to J1-6, and then to demodulator terminal J2-E to complete the loop circuit. The AC input to the drawer connects to TB1 terminals 1, 2 and 3, and then to J4 and J3, the demodulator and loop supply unit AC input terminals.

4-110. AN/UGC-5, AN/UGC-6 TONE CONVERTER PANEL.

The AN/UGC-5 and AN/UGC-6 tone converter panel (figure 4-58) mounts one 6002-1 modulator and one 6006 loop supply unit, and is used with all AN/UGC-5 and AN/UGC-6 send only TTY equipment. The panel is designed for mounting in the cabinets of the associated TTY units.

4-111. Figure 4-59 is a wiring diagram of the panel. The send circuit of the associated TTY unit connects to terminals 4 and 7 of TB1. The loop circuit on the panel connects from TB1-4 through 300-ohm resistor to TB1-6, to negative battery terminal P1-4, and from positive battery terminal P1-2 to TB1-7 completing the loop circuit. The modulator DC input terminals, D and A, are connected across the 300-ohm resistor which provides the keying potential to the modulator input circuit. The AC input to the panel is connected to terminals 1, 2 and 3 of TB1.

4-112. AN/UGC-8, TT-47, TT-171 TONE CONVERTER PANEL.

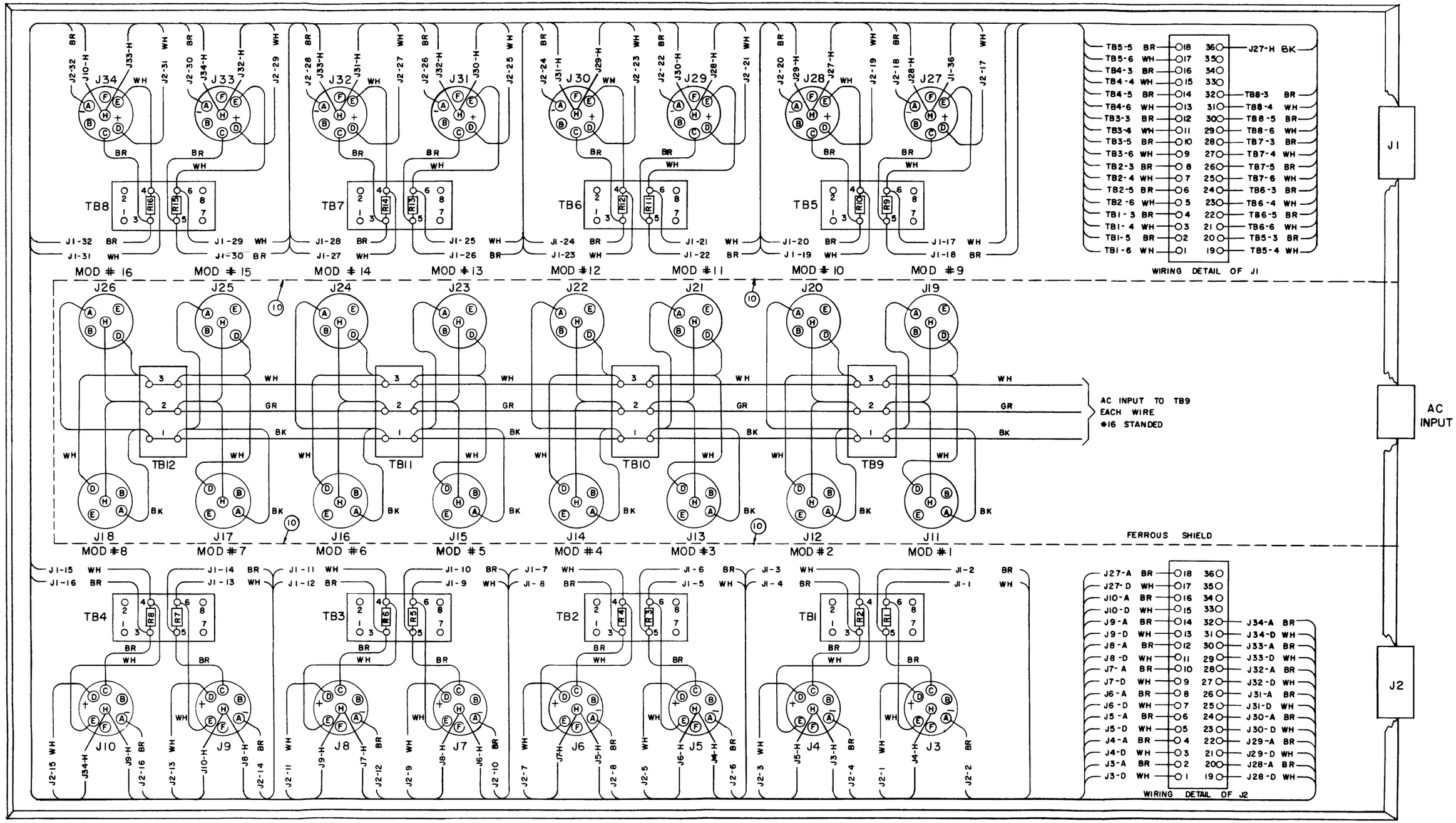
This tone converter panel (figure 4-60) mounts one 6002-2 demodulator unit and one 6006 loop supply unit, and is designed for installation in the AN/UGC-8, TT-47 and TT-171 TTY equipment cabinets. It provides tone conversion for the receive TTY tone signals to these units.

4-113. The incoming tone signal (see figure 4-61) connects to terminals 9 and 10 of TB1, then to the demodulator input terminals pins A and J of the signal connector. The demodulator DC output loop connects from pin D of the signal connector J2 to TB1-6, to positive battery terminal P1-2, from the negative battery terminal P1-4 to TB1-7, to the TTY printer selector magnet and back to TB1-5, and then to pin E of the signal connector J2 to complete the loop. The AC power input to the panel terminates on TB1 terminals 1, 2 and 3 and then connects to J1 and J3, the demodulator and loop supply unit AC input connectors.

4-114. 2067 SYSTEM TONE CONVERTER DRAWER.

The 2067 system tone converter drawer (figure 4-62) contains two 6002-1 modulators, one 6002-2 demodulator and two 6006 loop supply units, and is the interface unit between the 2067 system and the send and receive teletype equipment. The drawer also provides a control signal that may be used to key a transmitter. The drawer is slide mounted in rack RE2.27 with the 2067 system tone keyer unit.

4-115. Figure 4-63 is a wiring diagram of the 2067 system tone converter drawer. TTY 10-kc send tone signals from the BLACK MDF connect to J2, terminals 1 and 3, at the rear of the drawer, and then to pins A and J of J3, the demodulator signal connector. The demodulator pins B, C and F are strapped to deactivate the mark-hold circuit. The demodulator DC



BOTTOM VIEW OF DRAWER

Figure 4-26. AN/FGC-60/22 Modulator Tone Converter Drawer, Wiring Diagram

J1 TERM	DESTINATION	COLOR	J1 TERM	DESTINATION	COLOR
1	J3-A	WH	13	J21-A	WH
2	J3-J	BR	14	J21-J	BR
3	J4-A	WH	15	J22-A	WH
4	J4-J	BR	16	J22-J	BR
5	J5-A	WH	17	J23-A	WH
6	J5-J	BR	18	J23-J	BR
7	J6-A	WH	19	J24-A	WH
8	J6-J	BR	20	J24-J	BR
9	J7-A	WH	21	J25-A	WH
10	J7-J	BR	22	J25-J	BR
11	J8-A	WH	23	J26-A	WH
12	J8-J	BR	24	J26-J	BR
	10KC INPUT		36	J8-H	BK

J2 TERM	DESTINATION	COLOR	J2 TERM	DESTINATION	COLOR
1	J3-D	WH	13	J21-D	WH
2	J3-E	BR	14	J21-E	BR
3	J4-D	WH	15	J22-D	WH
4	J4-E	BR	16	J22-E	BR
5	J5-D	WH	17	J23-D	WH
6	J5-E	BR	18	J23-E	BR
7	J6-D	WH	19	J24-D	WH
8	J6-E	BR	20	J24-E	BR
9	J7-D	WH	21	J25-D	WH
10	J7-E	BR	22	J25-E	BR
11	J8-D	WH	23	J26-D	WH
12	J8-E	BR	24	J26-E	BR

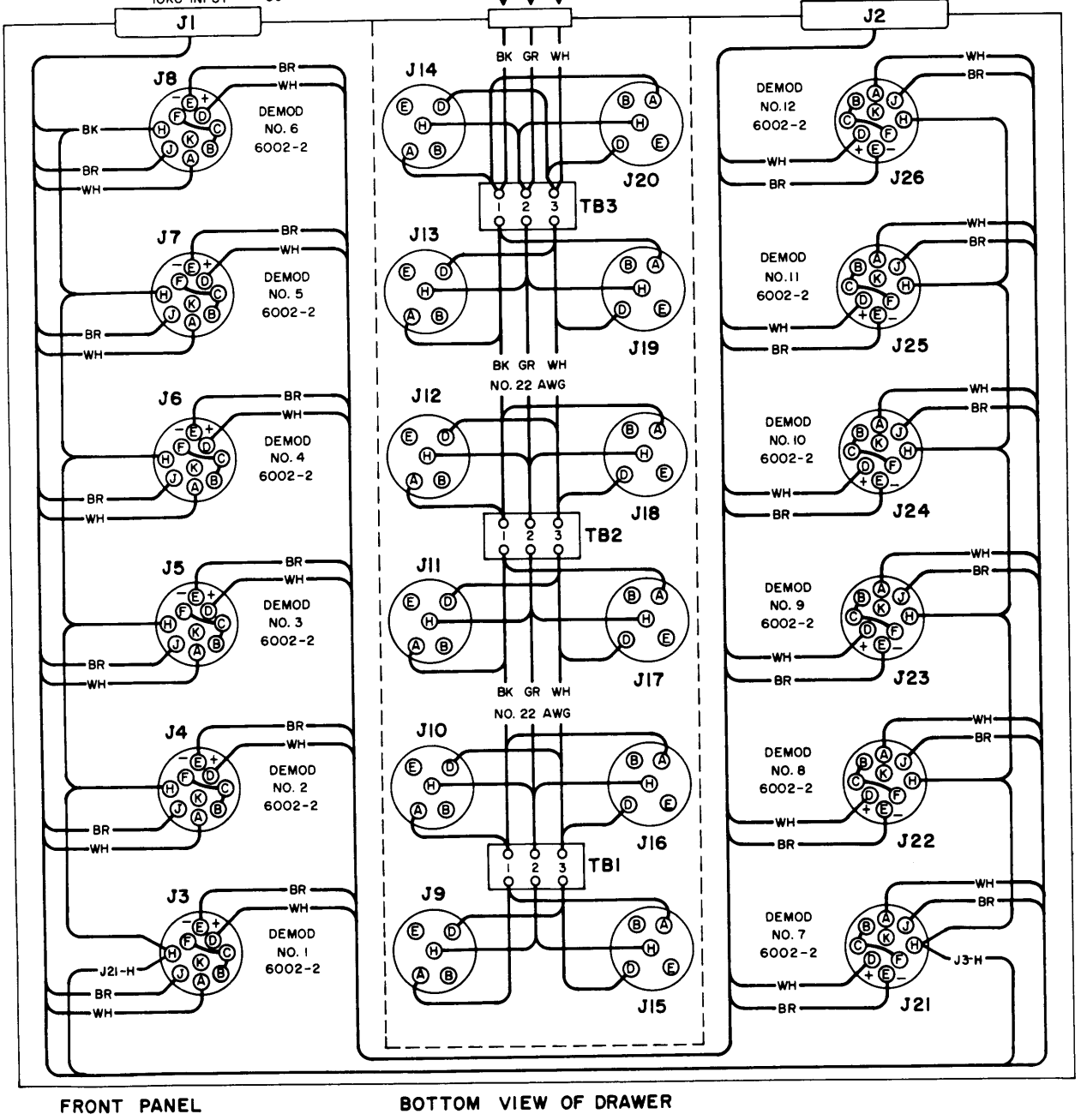


Figure 4-27. AN/FGC-60/23A Demodulator Tone Converter Drawer, Wiring Diagram

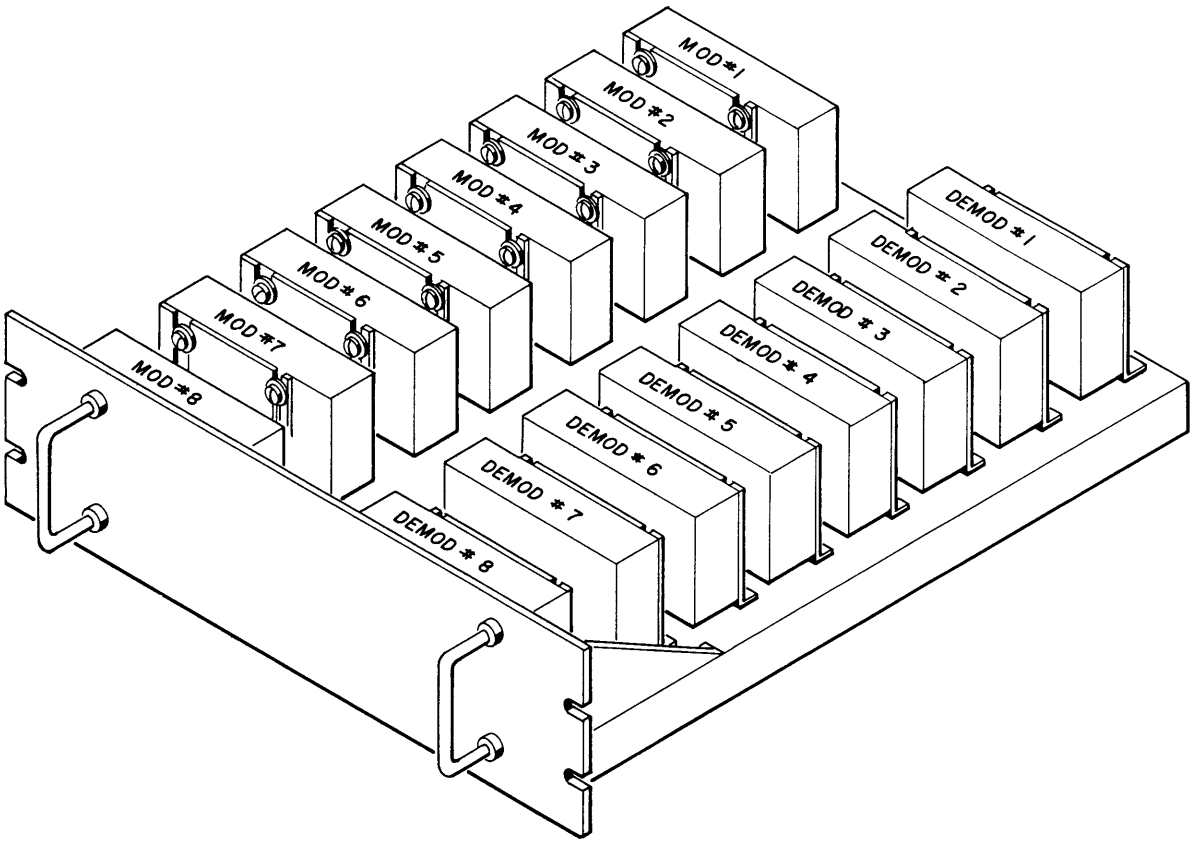


Figure 4-28. AN/FGC-60/24 Tone Converter Drawer, Isometric View

output terminal J3-D connects to the positive terminal of loop supply number 1 at P1-2, and the negative battery terminal P1-4 connects to J1-1. Output terminal J3-E of the demodulator connects to J1-3. Terminals 1 and 3 of J1 then connect to the send DC input of the 2067 unit.

4-116. The receive DC output of the 2067 unit connects to terminals 5 and 7 of DC connector J1 at the rear of the drawer. The series loop circuit in the drawer connects from J1-5 to negative loop supply terminal P2-2 to TB2-5, through 100-ohm resistor R2 to TB2-6, and back to J1-7 completing the loop circuit. The voltage drop across R2 keys the modulator number 1 input circuit through terminals D and A of J11 which connects to the resistor at TB2-5 and TB2-6. The 10-kc tone output of modulator number 1 on pins E and C of J11 connect across impedance matching resistor R3 on TB2 terminals 7 and 8, and then to terminals 5 and 7 of audio connector J2 at the rear of the drawer. The 10-kc receive signal connects from terminals 5 and 7 of J2 to the BLACK MDF in container RE1.

4-117. The 6002-1 modulator number 2 is used for transmitter control. The DC input circuit of the modulator is dry-contact keyed by relay contacts in the 2067 system unit. The relay contact circuit from the 2067 unit connects to terminal 9 and 11 of J1 then to pins B and D of J12, the modulator signal connector. The 10-kc tone output of the modulator, pins E and C of J12, connect across impedance matching resistor R1 on TB2, then from terminals 1 and 2 of TB2 to J2 terminals 9 and 11 where the 10-kc tone signal connects to a signal line to the BLACK MDF.

4-118. The AC power input to the drawer terminates on TB1 and is then distributed to the AC input connectors of the modules. The AC wiring compartment is ferrous shielded from the signal compartments.

4-119. FSK TONE CONVERTER PANELS.

The FSK tone converter panels provide tone conversion for the DC outputs of the model D3, CFA-1 and CFA-1LB frequency shift converter units used on FSK circuits in container RE3. Two models of the FSK tone converter panels are provided; one model is wired for dry-contact keying and is used with most of the D3 demodulator units, and the other model is used with the CFA-1, CFA-1LB, and one D3 unit using current keying or wet key operation. The tone converter panels are installed in the FSK equipment racks with the associated frequency-shift converter units and are mounted at the rear of the racks.

4-120. A typical FSK tone converter panel is illustrated in figure 4-64. This panel is equipped with two 6002-1 modulator units and is used for dry contact

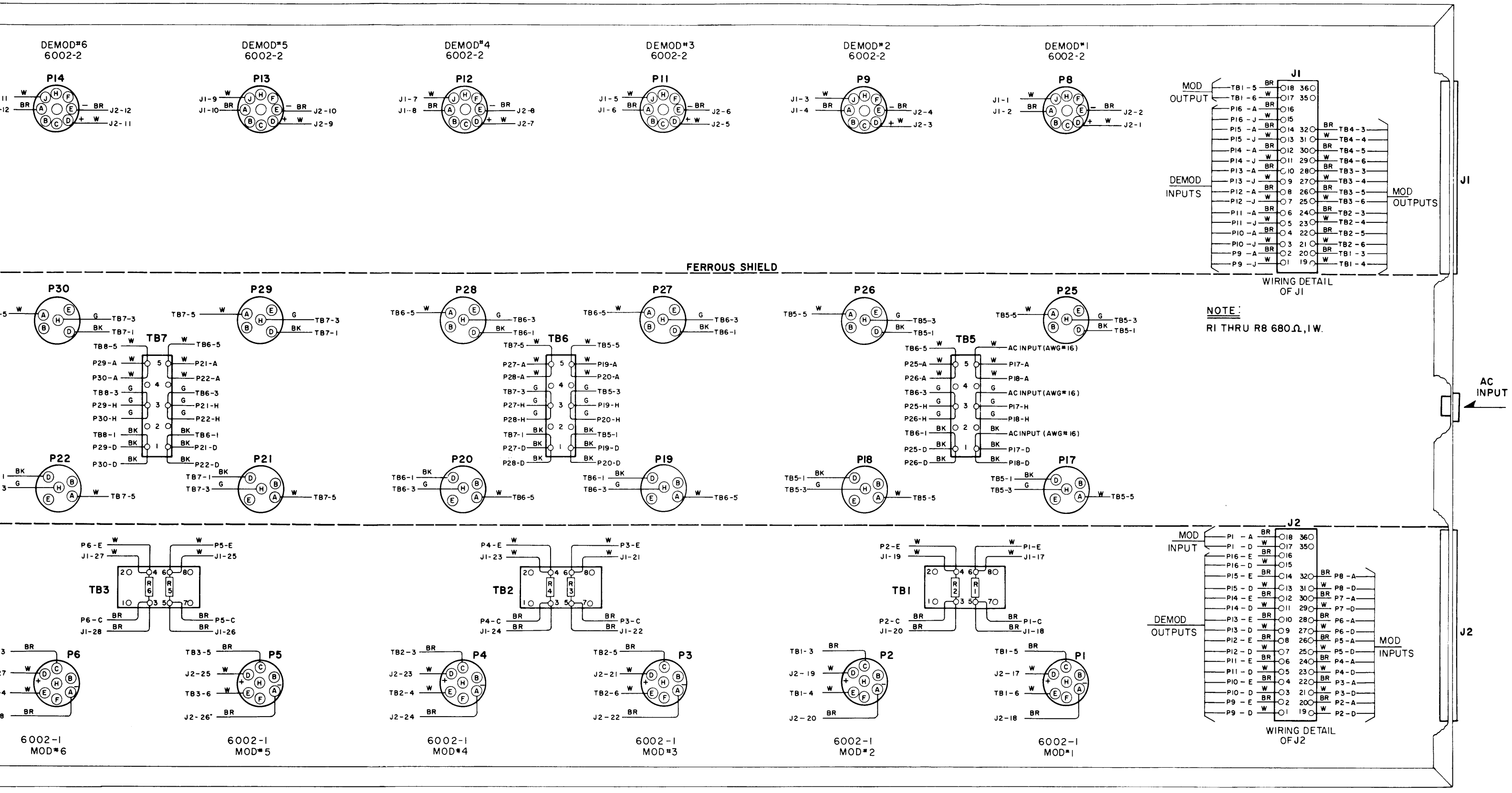
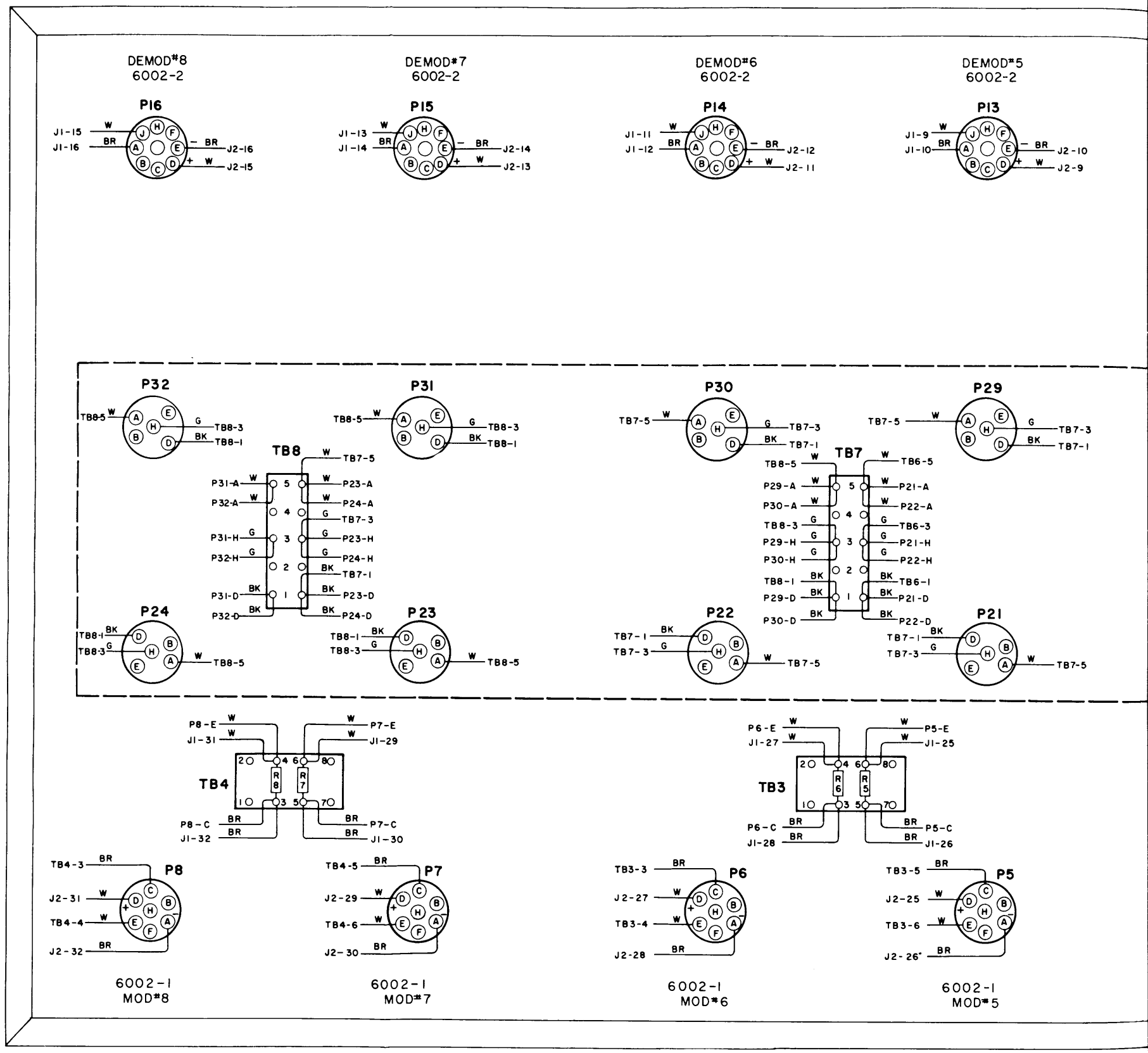


Figure 4-29. AN/FGC-60/24 Tone Converter Drawer, Wiring Diagram


DEMOD#8
6002-2
P16
J1-15
J1-16
W
BR
J2-16
J2-15
DEMOD#7
6002-2
P15
J1-13
J1-14
J2-14
J2-13
DEMOD#6
6002-2
P14
J1-11
J1-12
J2-12
J2-11
DEMOD#5
6002-2
P13
J1-9
J1-10
J2-10
J2-9
P32
P31
P30
P29
TB8
TB7
P24
P23
P22
P21
TB4
TB3
P8
P7
P6
P5
6002-1
MOD#8
6002-1
MOD#7
6002-1
MOD#6
6002-1
MOD#5

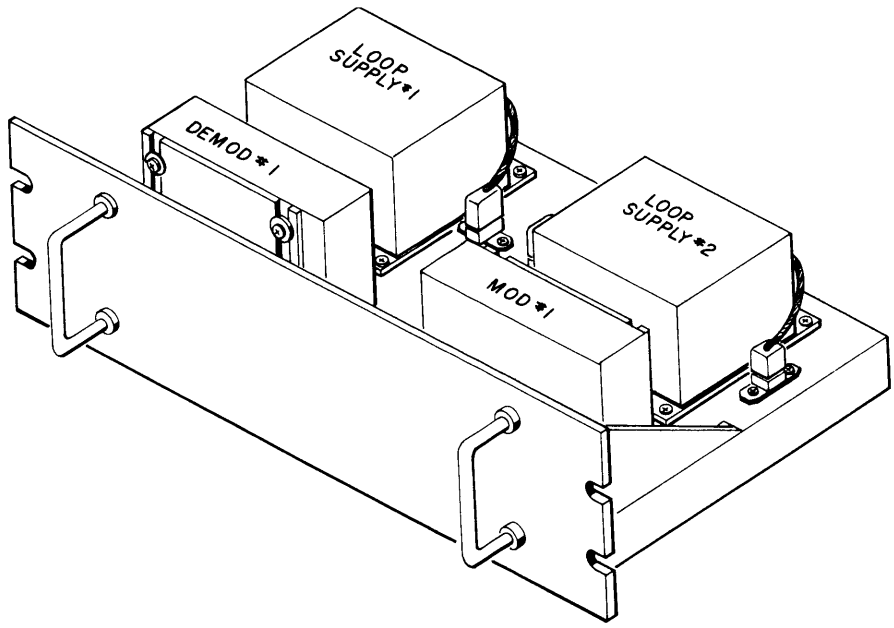


Figure 4-30. AN/UGC-1A BLACK Tone Converter Drawer, Isometric View

keying. The wet key FSK tone converter panel is identical in appearance except that two 6006 loop supply units are mounted on the top of the chassis, opposite the two modulator units.

4-121. FSK TONE CONVERTER PANEL, DRY KEY.

Figure 4-65 is a wiring diagram of the dry-key model FSK tone converter panel. Though 6006 loop supply units are not used on this model, the existing loop supply wiring allows this panel to be easily converted for wet-key operation should the need arise. This panel is used with two D3 units working together in diversity and provides tone conversion for the output of both units.

4-122. The DC output of one D3 unit connects to terminals 1 and 4 of TB2. Terminal 3 is strapped to terminal 2, and the D3 output connects from 1 and 2 to pins D and B of J2, the signal connector of modulator number 1. Pins A and H are strapped for dry-contact keying at TB2 terminal 3. The 10-kc tone output of the modulator, pins C and E, is connected to TB2 terminals 5 and 6 where it connects to a signal line to the receivers IDF program board. The output of the second D3 unit connects to modulator number 2 input at terminals 7 and 10 of TB2, 10 is strapped to 8, and 7 and 8 connect to D and B of J4. The 10-kc tone output from C and E of J4 connects to terminals 11 and 12 of TB2 and then to a signal line to the IDF. Resistors R1 and R2 provide shunt loading for the modulator output circuits.

4-123. Signal ground circuits are carried through the panel on terminals 3 and 9 of TB2 where the drain wires of the associated shielded signal pairs are tied together and to pin H of the associated modulator unit. The AC input cable connects to TB1 and the AC power is distributed over separate 3-wire circuits to each AC connector of the modules on the panel.

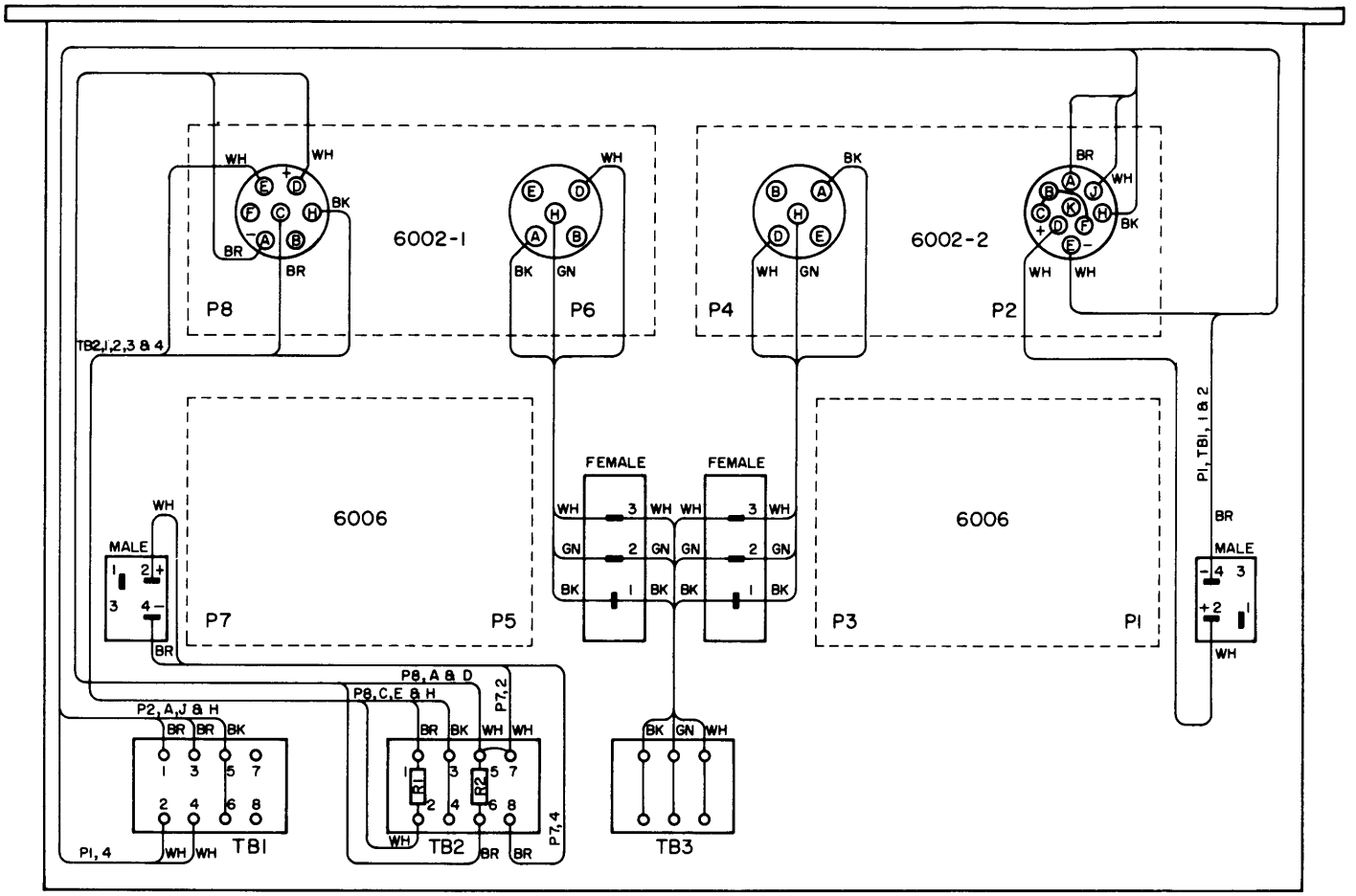
4-124. FSK TONE CONVERTER PANEL, WET KEY.

Figure 4-66 is a wiring diagram of a wet-key FSK tone converter panel. The DC output circuit of one FSK converter unit (CFA-1, CFA-1LB or D3) connects to terminals 1 and 4 of TB2, and the DC output circuits of another FSK converter unit connects to terminals 7 and 10 of TB2. The FSK converter units are arranged for current keying when used with this tone converter panel.

4-125. Loop circuit number 1 in the panel connects from TB2-1 through R1 to TB-2, to the positive terminal of loop supply number 1 at P1-2, and from the negative battery terminal P1-4 to TB2-4, completing the loop. Loop circuit number 2 connects from TB2-7, through R3 and TB2-8 to the positive terminal of loop supply number 2 at P2-2, and from the negative terminal P2-4 to TB2-10 to complete the loop. Modulator number 1 input circuit, pins D and A of J2, connects to TB2 terminal 1 and 2 across resistor R1. Modulator number 2 input circuit, pins D and A of J4, is connected to terminals 7 and 8 of TB2 across resistor R3. The voltage drops across the resistors key the modulator input circuits.

4-126. The 10-kc tone output of modulator number 1 from pins E and C connects to TB2-5 and TB2-6, and the tone output of modulator number 2 is connected to TB2-11 and TB2-12. Both tone signals then connect from the TB2 terminals to the receivers IDF. AC power distribution in this panel is the same as in the dry key model.

4-127. The FSK tone converter panels are installed in ten adjoining equipment racks that are located in positions RE3.15 through RE3.33 on the left side of container RE3. The intra-rack cabling and power distribution within the FSK equipment racks is illustrated



NOTES:

TB1 & 2 – USECO TYPE 1181
TB3 – GEN PRO. 37TB3
P3, 5 – CINCH-JONES, S303AB-FEMALE
P1-7 – CINCH-JONES, P304AB-MALE

P2, 4, 6 & 8 – 6002-1 & 2
R1 – 680 Ω, 1W
R2 – 300 Ω, 1W

Figure 4-31. AN/UGC-1A BLACK Tone Converter Drawer, Wiring Diagram

in figures 4-67, 4-68, 4-69, 4-70, 4-71, and 4-72. The inter-connections between the CFA-1LB converters and a wet key model tone converter panel in rack RE3.31 are shown in figure 4-71. Figure 4-72 shows one D3 demodulator and one CFA-1 converter in rack position RE3.33 inter-connected with a wet key tone converter panel. The remaining FSK equipment racks are equipped with model D3 FSK demodulators that are connected to tone converter panels wired for dry-contact keying as illustrated in figures 4-67 through 4-70.

4-128. AN/GGM-1 TONE CONVERTER PANEL.

The AN/GGM-1 tone converter panel (figure 4-73) contains one 6002-1 modulator, one 6002-2 demodulator, one 6004-1 trip control modulator and one 6006 loop supply unit. This panel is used with the AN/GGM-1 distortion measuring equipment installed in RB1 and RE1. The 10-kc tone input and output circuits of the panel are wired to the respective MDF's in these containers where they may be patched to TTY equipment in other areas of the Receiving Central.

4-129. Figure 4-74 is a wiring diagram of the AN/GGM-1 tone converter panel. The DC input and output circuits of the AN/GGM-1 unit terminate on TB1 and the 10-kc tone input and output circuits from the MDF terminate on TB3. The 10-kc signal from a transmitter distributor connects to terminals 1 and 2 of TB3 which are connected in parallel to the demodulator input at J3, A and J, and the trip control modulator output at J8C and E. The demodulator DC output pin D connects to loop supply at J2-1 and J2-2 and is returned to TB1-1. The demodulator DC output pin E connects

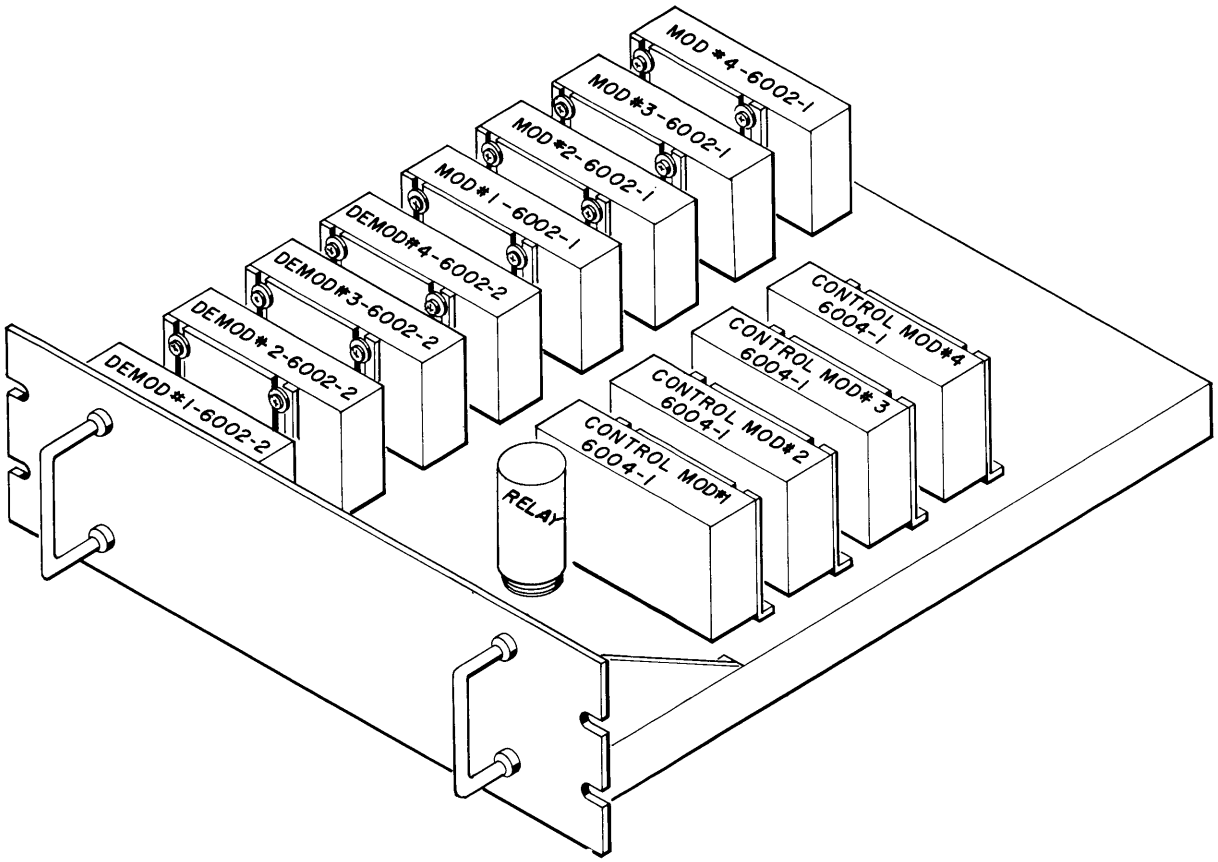


Figure 4-32. AN/UGC-1A RED Tone Converter Drawer, Isometric View

to TB1-2. Terminals 1 and 2 of TB1 connect to the signal input of the AN/GGM-1 at terminal board 1TB-1.

4-130. The AN/GGM-1 send circuit is connected to terminals 3 and 4 of TB1 where it connects with the input circuit of the modulator, pins D and B of J5. The modulator is dry-contact keyed, and terminals A and H are strapped. The tone output of the modulator connects from pins E and C of J5 to terminals 4 and 3 of TB3. The 680-ohm resistor provides the proper loading for the modulator output circuit. The trip-control modulator is strapped for dry-contact keying, and terminals B and D of J8, the input keying terminals, are strapped to provide a continuous stepping signal of 2167.5 cps. The stepping signal is returned to the sending TD over the send signal line.

4-131. The AC power input to the panel terminates on TB2 and is distributed to the AC input connectors of the modules over separate 3-wire circuits.

4-132. CONTAINER RA3 TONE CONVERTERS.

Tone converters provided for container RA3 include one RED and one BLACK tone converter drawer which are used as required when signals are remoted to areas outside of the container. The tone converter audio and DC circuits are terminated on the respective audio and DC SDF program boards in the container. 6006 loop supply units, which are mounted on separate drawers, are also terminated on the respective SDF program boards where they may be programmed to tone converter or other circuits as required.

4-133. RED TONE CONVERTER DRAWER, RA3.16.

The RED tone converter drawer (figure 4-75) contains four 6002-1 modulators, four 6002-2 demodulators and four 6004-2 trip control demodulators. The tone converter units on this drawer are used when remote cryptographic equipment is programmed to the teletype equipment in container RA3.

4-134. Figure 4-76 is a wiring diagram of the RED tone converter drawer. All DC circuits of the tone converter units are terminated on TB1 and TB2. The 6002-2 demodulators connect to TB1, the 6002-1 modulators to TB2 terminals 1 through 12, and the 6004-2 demodulators to TB2 terminals 13 through 24. The audio circuits of the 6002-2 demodulators connect to TB8, the audio circuits of the 6002-1 modulators to TB9 terminals 1 through 12, and the audio circuits of the 6004-2 demodulators to TB9 terminals 13 through 24.

4-135. The DC circuits are wired to the RED SDF DC program board and the audio circuits to the audio section of the RED SDF, using shielded pair wiring. A description of typical programming for the tone converter circuits in RA3 is provided in section 3 of this

volume. The AC input to the drawer connects to TB5, TB6 and TB7, and the AC power is then distributed to the AC input connector of each module. The AC compartment is ferrous shielded from the signal compartments.

4-136. BLACK TONE CONVERTER DRAWER. RA3.15.

The black tone converter drawer is the same as illustrated in figure 4-75 except that it is not equipped with 6004-2 trip control demodulators. The drawer contains four 6002-1 modulators and four 6002-2 demodulators.

4-137. Figure 4-77 is a wiring diagram of the black tone converter drawer installed in control rack RA3.15. All tone converter DC circuits terminate on TB1 and the tone circuits on TB6. The DC inputs of the modulators connect to terminals 1 through 12 of TB1 and the demodulator DC outputs to terminals 13 through 24 of TB1. The tone outputs of the modulators are terminated on TB6 terminals 1 through 12, and the demodulator tone outputs connect to terminals 13 through 24 of TB1. The tone outputs of the modulators are terminated on TB6 terminals 1 through 12, and the demodulator tone outputs connect to terminals 13 through 24 of TB6.

4-138. The tone converter DC circuits are wired to the BLACK SDF DC program board and the audio circuits to the audio program board. The AC input to the drawer is brought into TB4 and TB5 and then distributed to the individual AC connectors of the modules. A ferrous shield separates the AC compartment from the signal compartments.

4-139. LOOP SUPPLY DRAWERS, RA3.

The loop supply drawers provided for container RA3 circuits include two 6-unit and two 4-unit drawers. Figure 4-78 is a wiring diagram of the 6-unit loop supply drawer. One 6-unit drawer is mounted in the RED control rack and one in the BLACK control rack.

4-140. The DC circuits of each 6006 unit are connected to a terminal board in the drawer and then extended to a coaxicon connector on the DC SDF using shielded pair wiring. Loop supply units numbered 1 through 3 terminate on TB1 and units 4 through 6 terminate on TB3. The AC power wiring is brought into the ferrous-shielded AC compartment and terminated on TB2. AC power is then distributed to each loop supply unit through a 3-wire circuit.

4-141. Figure 4-79 is a wiring diagram of a 4-unit loop supply drawer. The DC outputs of the 6006 units terminate on TB1 and TB3 and are wired to the respective SDF program board in the same manner as the 6-unit circuits. The 4-unit drawer in the RED control rack is strapped for 60-ma current output for use with the trip-control circuits of the AN/UGC-6 TTY units installed in RA3.

4-142. Figure 4-80 is a wiring diagram of the RED control rack in container RA3 showing the intra-rack cabling and power distribution in the rack.

4-143. 660A TONE CONVERTER DRAWER.

The 660A tone converter drawer (figure 4-81) is used in the code format converter systems that are installed in container RF2. The drawer contains two 6002-1 modulator units, four 6006 loop supplies and four front panel controls. Half of the equipment on this drawer is used with each of the two code format converter systems.

4-144. Figure 4-82 is a wiring diagram of the 660A tone converter drawer. The inter-connections between the drawer and the system components is illustrated in figure 3-23 in section 3 of this volume. Switches S1 and S4 are monitor ON-OFF controls that are used to connect the side-tone outputs of the model 660A code converters to monitor speaker amplifier units. Switches S2 and S3 are the system function switches, one for each system, which provide CW operation, RATT operation, or turn the system off.

4-145. The code converter system DC circuits connect to J2 and the audio circuits to J1 at the rear of the drawer. The AN/UGC-6 DC output of system 1 connects to terminals 10 and 12 of J2, and of system 2 to terminals 28 and 30. The 10-kc output of system 1 connects to J1 terminals 7 and 9, and of system 2 to terminals 25 and 27. The 10-kc output of each system is then wired to the BLACK MDF in container RE1.

4-146. Figure 4-83 is a wiring diagram of the 660A code format converter system rack RF2.17 showing the intra-rack cable pairs that connect the system components. The TT-176A at the top of the rack is used for off-air monitoring of transmissions from the code converter system. The tone converter drawer at the bottom of the rack in position G is used with the monitor TT-176A unit.

4-147. HW-19 TONE CONVERTER DRAWER.

The HW-19 tone converter drawer (figure 4-84) provides tone conversion for the HW-19 send, receive and monitor circuits. The drawer contains one 6002-1 modulator unit, two 6002-2 demodulator units, and two 6006 loop supply units, and is mounted on the HW-19 rack RA2.6.

4-148. Figure 4-85 is a wiring diagram of the HW-19 tone converter drawer. Demodulator number 1 and loop supply unit number 1 are used for the HW-19 receive circuit. The HW-19 receive circuit from the RED MDF connects to terminals 1 and 3 of J1 which connect directly to pins A and J of J3, the demodulator signal connector. The HW-19 input loop circuit is wired from pin D of J3 to positive terminal 2 of loop supply unit 1, from the negative terminal 4 to terminal 1 of J2 at the rear of the drawer, to the input of the HW-19 unit returning on J2-2 and to terminal E of J3, completing the loop circuit.

4-149. The HW-19 send DC circuit connects to terminals 4 and 6 of J2. The send loop circuit connects from terminal 4 of J2 to negative terminal 4 of loop supply number 2, from the positive terminal 2 (P2) to terminal 3 of TB2, through R2 and terminal 4 of TB2 to terminal 6 of J2, completing the loop circuit.

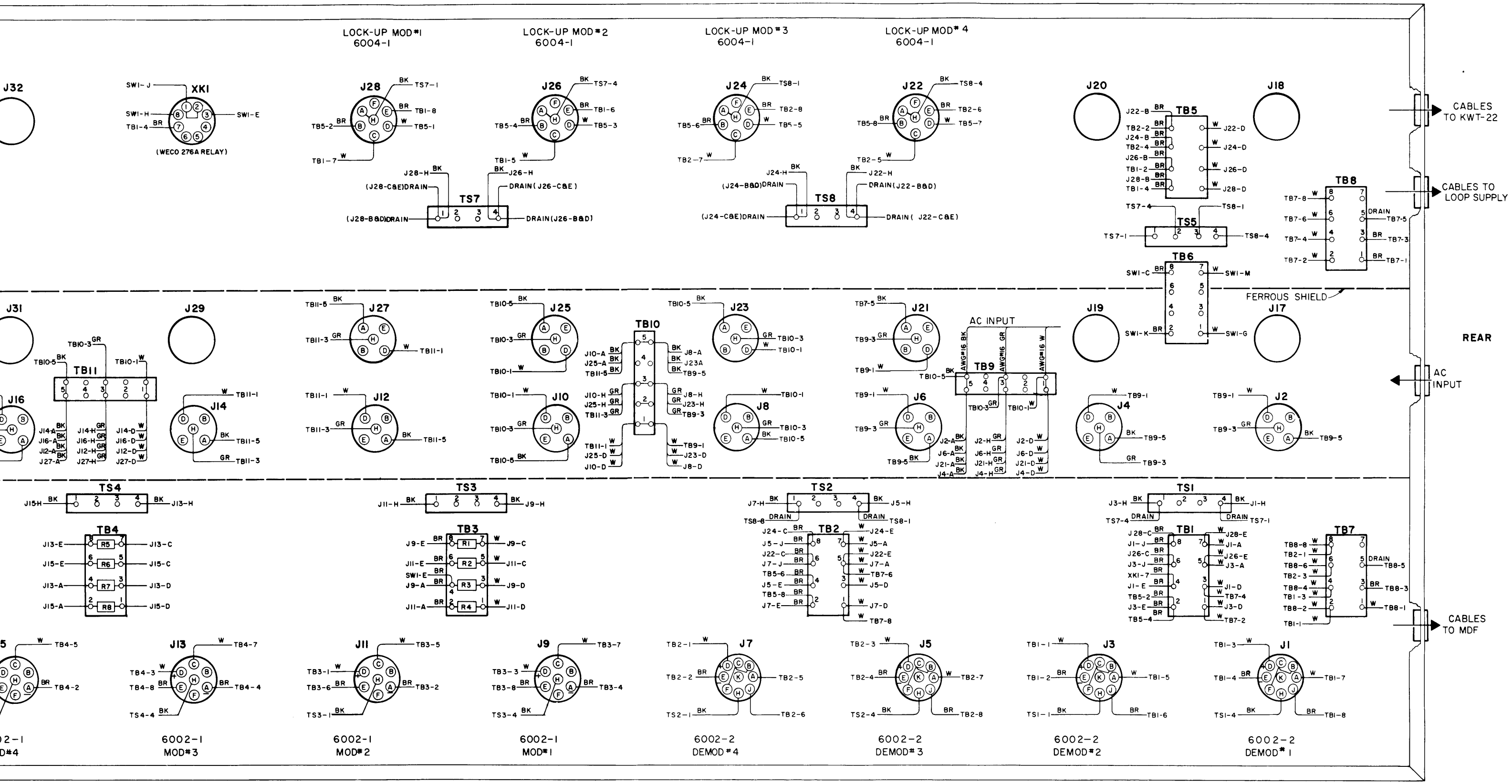
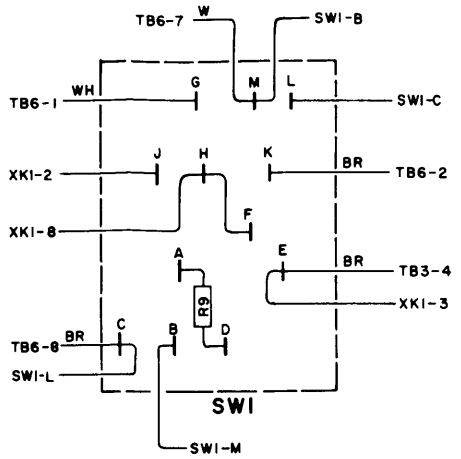
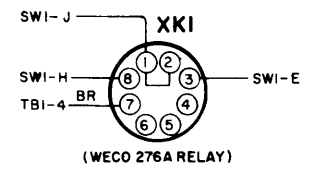


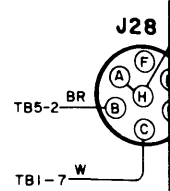
Figure 4-33. AN/UGC-1A RED Tone Converter Drawer, Wiring Diagram

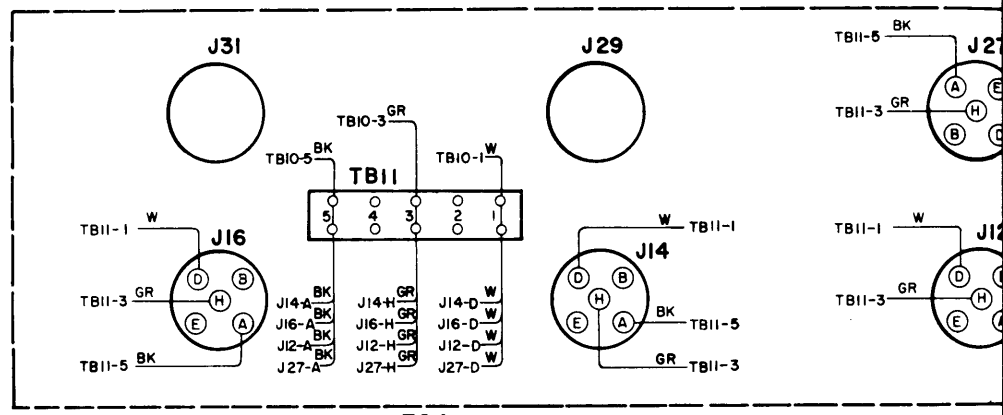
LOCK-UP
6004-

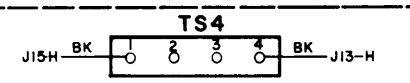


J32



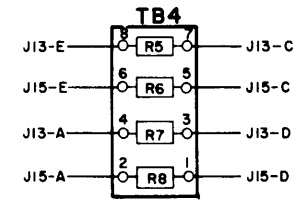


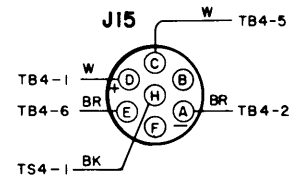




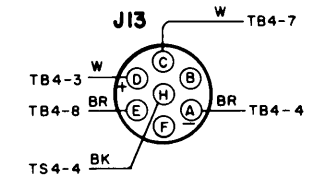
NOTES:

1. R1, R2, R5 & R6 680Ω 1W.
2. R3, R4, R7 & R8 100Ω 1W.
3. R9 390Ω 1W
4. XK1 & SWI ARE PART OF ORDER WIRE CIRCUIT.
5. FOR INTERCONNECTING CABLES, REFER TO KWT 22 RED TONE CONVERTOR & LOOP SUPPLY DRAWERS INTERCONNECTING DIAGRAM.

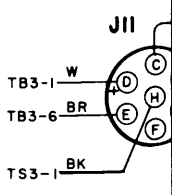




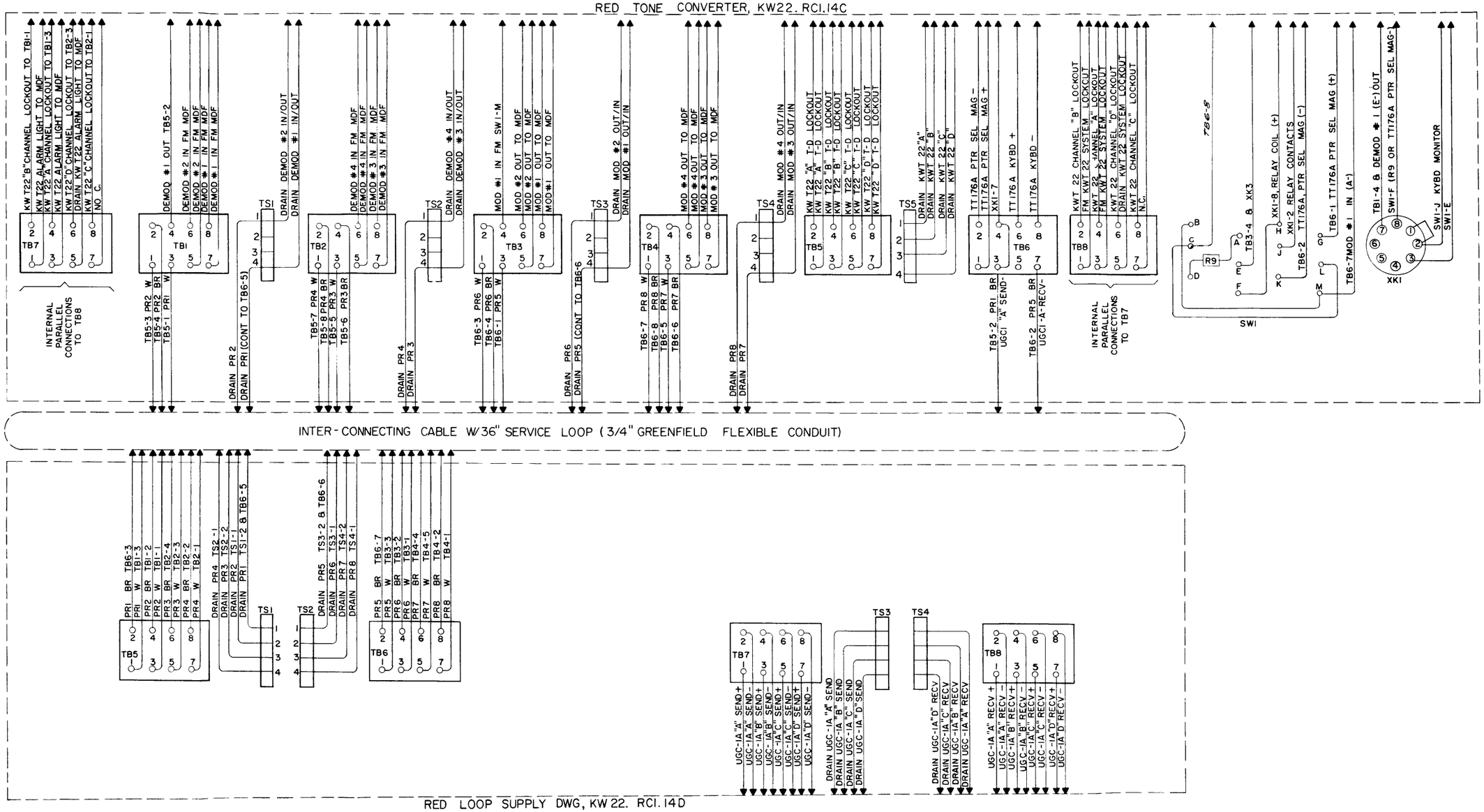
6002-1
MOD#4



6002-1
MOD#3



6002-1
MOD#2



NOTE:
MAKE FOLLOWING CONNECTION WITHIN RED TONE CONVERTER DWR
STRAP TERMINALS 3&4 OF TB6
JUMPER TERM 4 OF TB7 TO TERM 3 OF TBI
JUMPER TERM 2 OF TB7 TO TERM 1 OF TBI
JUMPER TERM 6 OF TB7 TO TERM 3 OF TB2
JUMPER TERM 8 OF TB7 TO TERM 1 OF TB2

REFERENCE
DWG E66-RCI-0250 RED TONE CONVERTER FOR KW 22
DWG E66-RBI-0190 LOOP SUPPLY DRAWER

Figure 4-34. AN/UGC-1A RED Tone Converter and Loop Supply Interconnecting Wiring

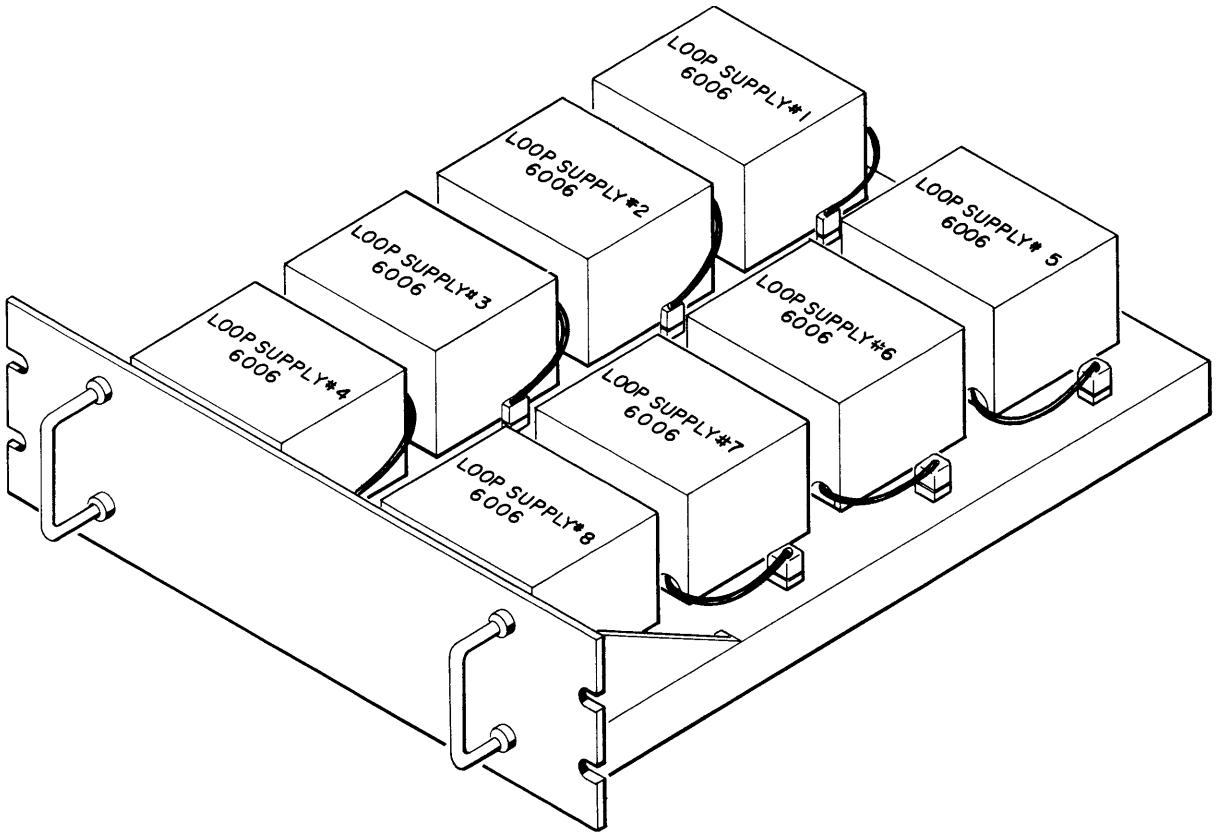


Figure 4-35. AN/UGC-1A RED Loop Supply Drawer, Isometric View

Resistor R2 is connected across the modulator input circuit, pins A and D, providing a keying potential for the modulator input circuit. The tone output of the modulator from pins C and E connects across resistor R1 on TB2 and then to terminals 4 and 6 of J1 where the tone circuit connects to a cable that terminates on the RED MDF.

4-150. Demodulator number 2 provides monitoring of the HW-19 send circuit by converting the tone output of the modulator back to DC which can then be applied to a monitor TTY equipment. The tone input terminals of the demodulator, pins J and A of J4, connect to TB2 terminals 1 and 2, in parallel with the output of the modulator. The DC output circuit of the demodulator, pins D and E, are connected to terminals 9 and 7 of J2 where they may be connected to a TTY receive unit which is equipped with a loop supply or internal battery.

4-151. AC input power to the drawer is connected to TB1 in the AC compartment of the chassis, and then distributed to the AC input connectors of the tone converter and loop supply modules. A ferrous shield encloses the AC compartment. Rack wiring of the HW-19 equipment rack is illustrated in figure 4-86.

4-152. VOICE OPERATING POSITION, RE2.

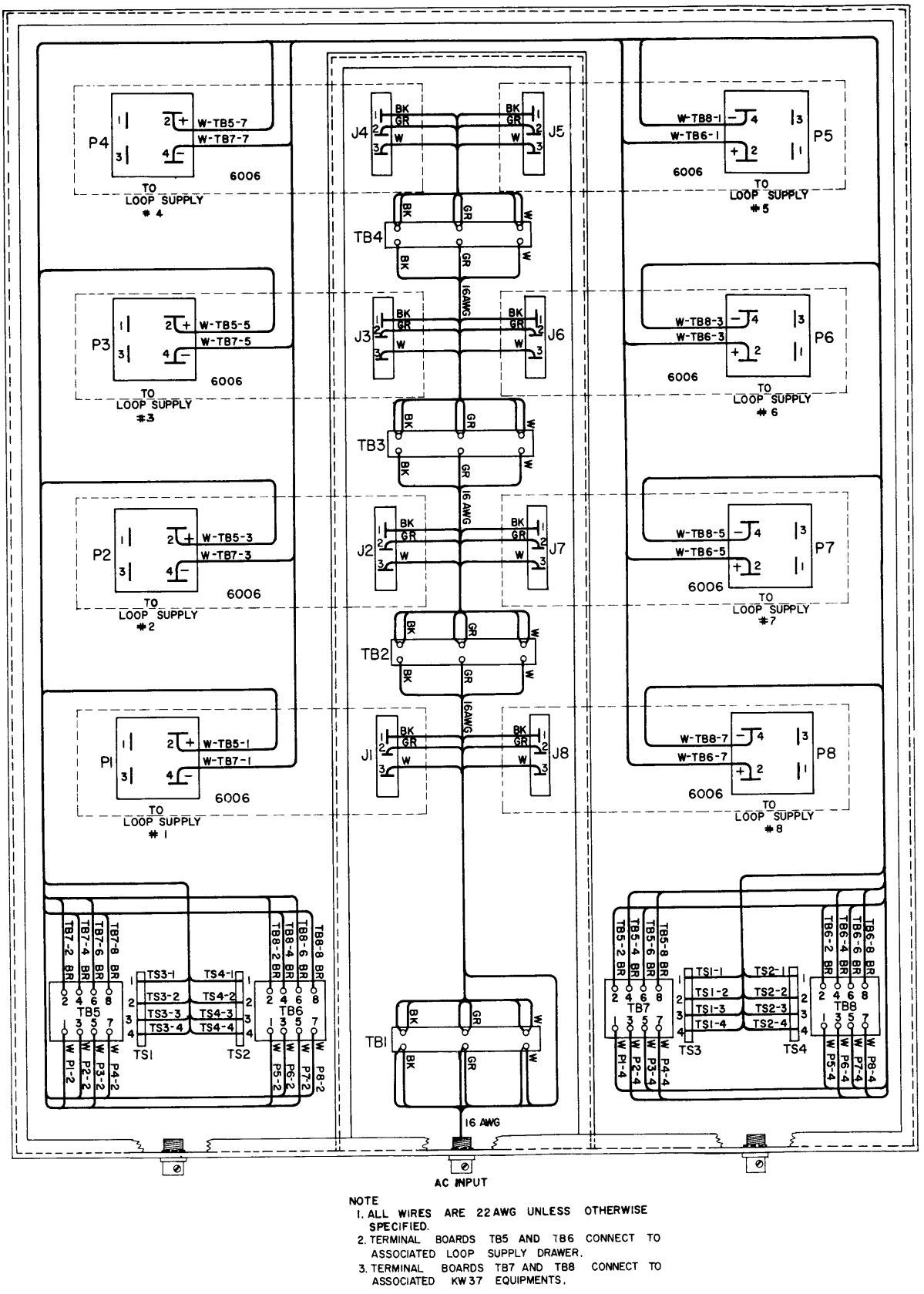
A functional description of the voice operating position in container RE2 is contained in paragraph 3-119 of this volume. Figure 4-87 is a wiring diagram of the microphone control unit at the voice operating position, and figure 4-88 illustrates the connections to an SPU-2 speech processing unit. The microphone control unit used in the RF2 operating positions is identical except that it is not equipped with the SPU-2 SELECTOR switch S2 and the wiring from S1-1 and S1-2 terminates directly on the terminal board of the unit. Figure 4-89 is a wiring diagram of the receiver control panel in RE2, and figure 4-90 shows the transmitter control panel interconnections to the SDF.

4-153. OPERATING POSITIONS RF2, RF3.

A functional description of the operating positions in containers RF2 and RF3 is contained in paragraph 3-131 through 3-146. Figures 4-91 through 4-104 include schematic and wiring diagrams for the control panels at these operating positions, and figure 4-105 illustrates a typical control panel lever switch showing the switch pile-up and a schematic of the switch contacts.

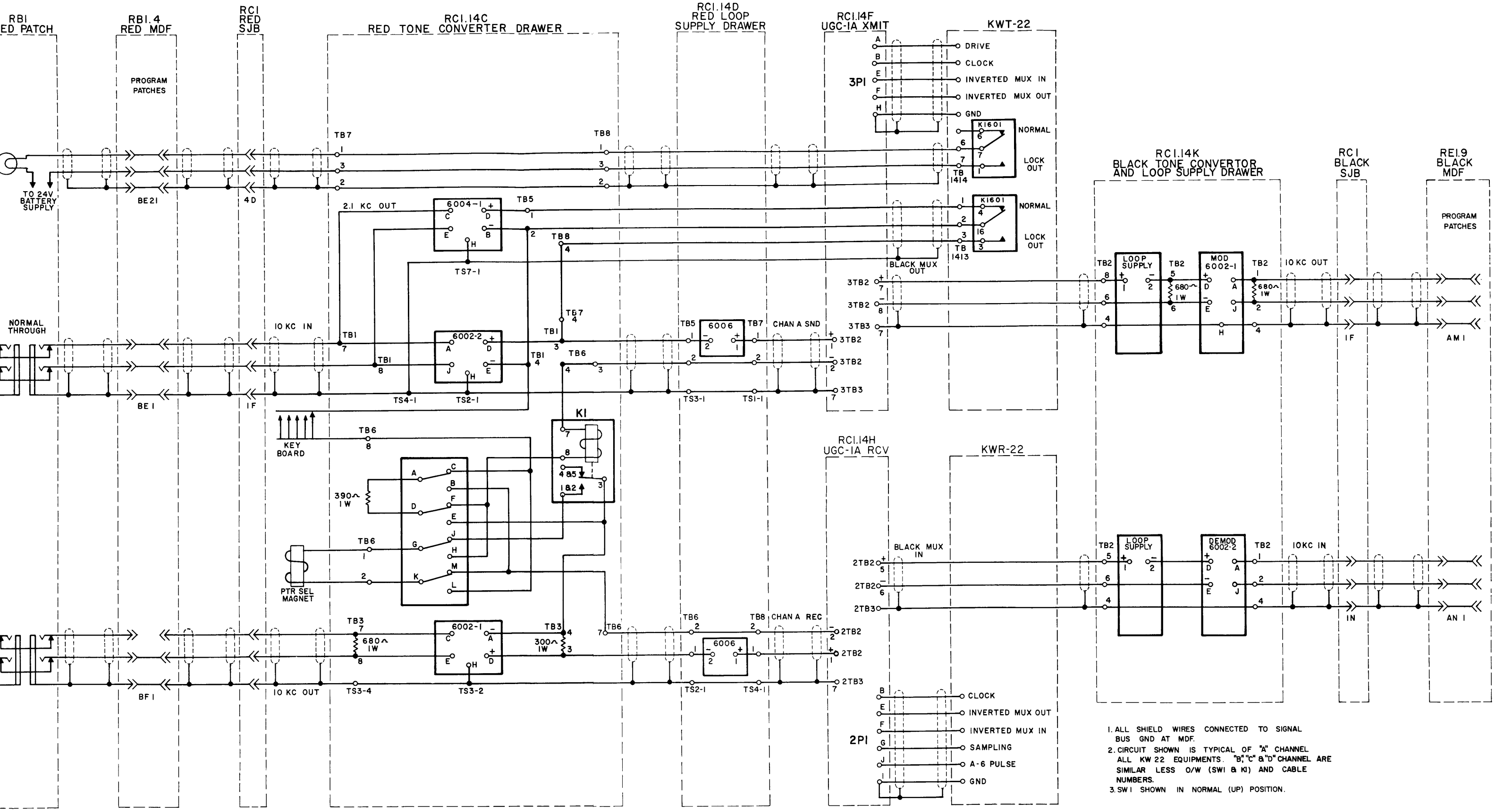
4-154. FACSIMILE POSITION WIRING.

Figure 4-106 shows the signal and power cabling at the facsimile position in container RE4, and figure 4-107 is a wiring diagram of the facsimile equipment rack RE4.27.



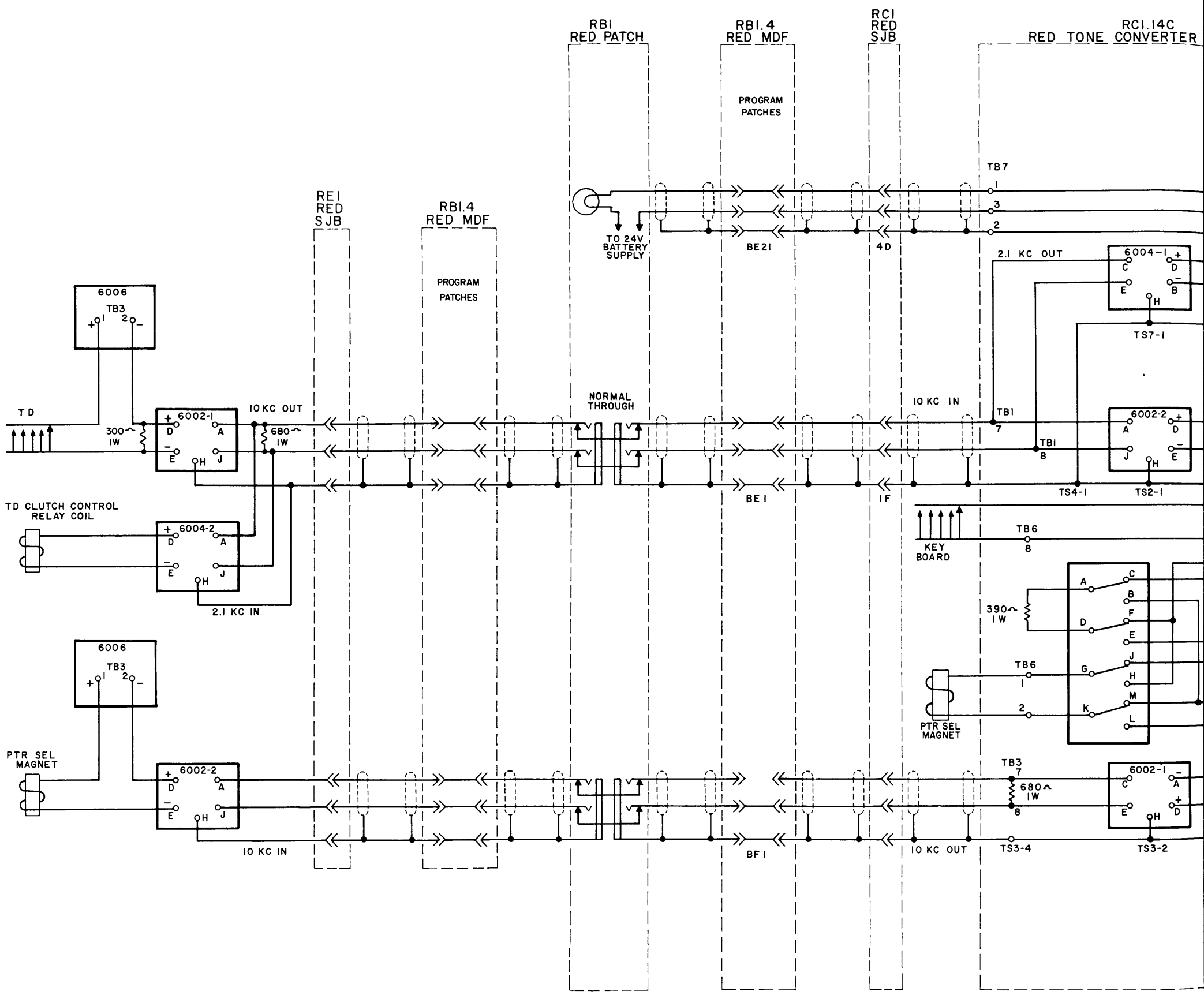
NOTE
1. ALL WIRES ARE 22 AWG UNLESS OTHERWISE SPECIFIED.
2. TERMINAL BOARDS TB5 AND TB6 CONNECT TO ASSOCIATED LOOP SUPPLY DRAWER.
3. TERMINAL BOARDS TB7 AND TB8 CONNECT TO ASSOCIATED KW37 EQUIPMENTS.

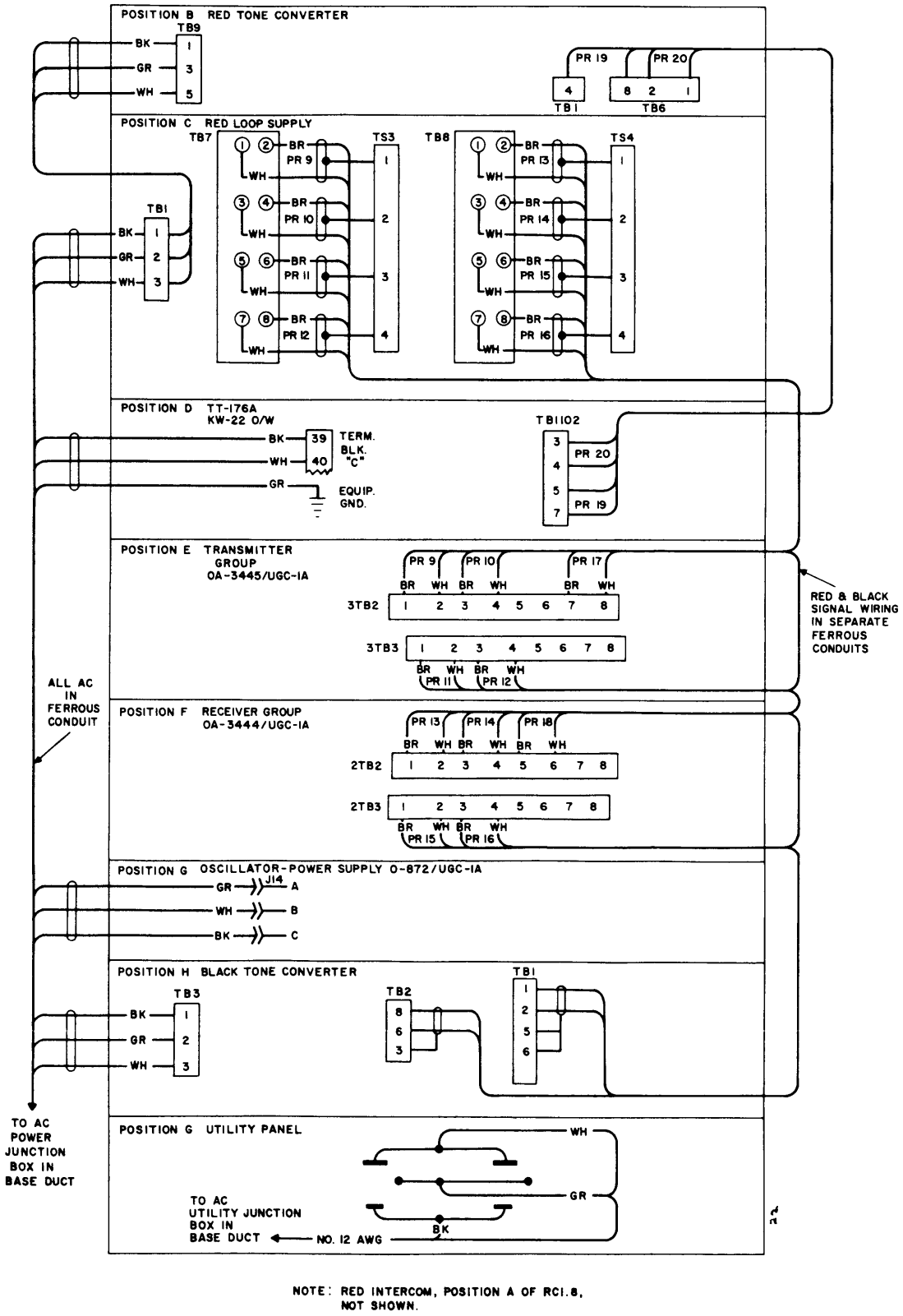
Figure 4-36. AN/UGC-1 RED Loop Supply Drawer, Wiring Diagram



1. ALL SHIELD WIRES CONNECTED TO SIGNAL BUS GND AT MDF.
2. CIRCUIT SHOWN IS TYPICAL OF "A" CHANNEL ALL KW 22 EQUIPMENTS. "B", "C" & "D" CHANNEL ARE SIMILAR LESS O/W (SW1 & K1) AND CABLE NUMBERS.
3. SW 1 SHOWN IN NORMAL (UP) POSITION.

Figure 4-37. AN/UGC-1A Typical Circuit, Block Diagram


RB1
RED PATCH
RB1.4
RED MDF
RC1
RED
SJB
RC1.14C
RED TONE CONVERTER
PROGRAM
PATCHES
TB7
1
3
2
TO 24V
BATTERY
SUPPLY
BE21
4D
RE1
RED
SJB
RB1.4
RED MDF
PROGRAM
PATCHES
2.1 KC OUT
6004-1
6006
TB3
TS7-1
TD
10 KC OUT
6002-1
300Ω
1W
680Ω
1W
NORMAL
THROUGH
10 KC IN
TB1
7
6002-2
TB1
8
TS4-1
TS2-1
BE1
1F
TD CLUTCH CONTROL
RELAY COIL
6004-2
2.1 KC IN
KEY
BOARD
TB6
8
390Ω
1W
TB6
1
2
PTR SEL
MAGNET
6006
TB3
PTR SEL
MAGNET
6002-2
10 KC IN
TB3
7
680Ω
1W
8
6002-1
BF1
10 KC OUT
TS3-4
TS3-2



NOTE: RED INTERCOM, POSITION A OF RC1.8, NOT SHOWN.

Figure 4-38. AN/UGC-1A Racks RC1.8, 1.11, and 1.14, Wiring Diagram

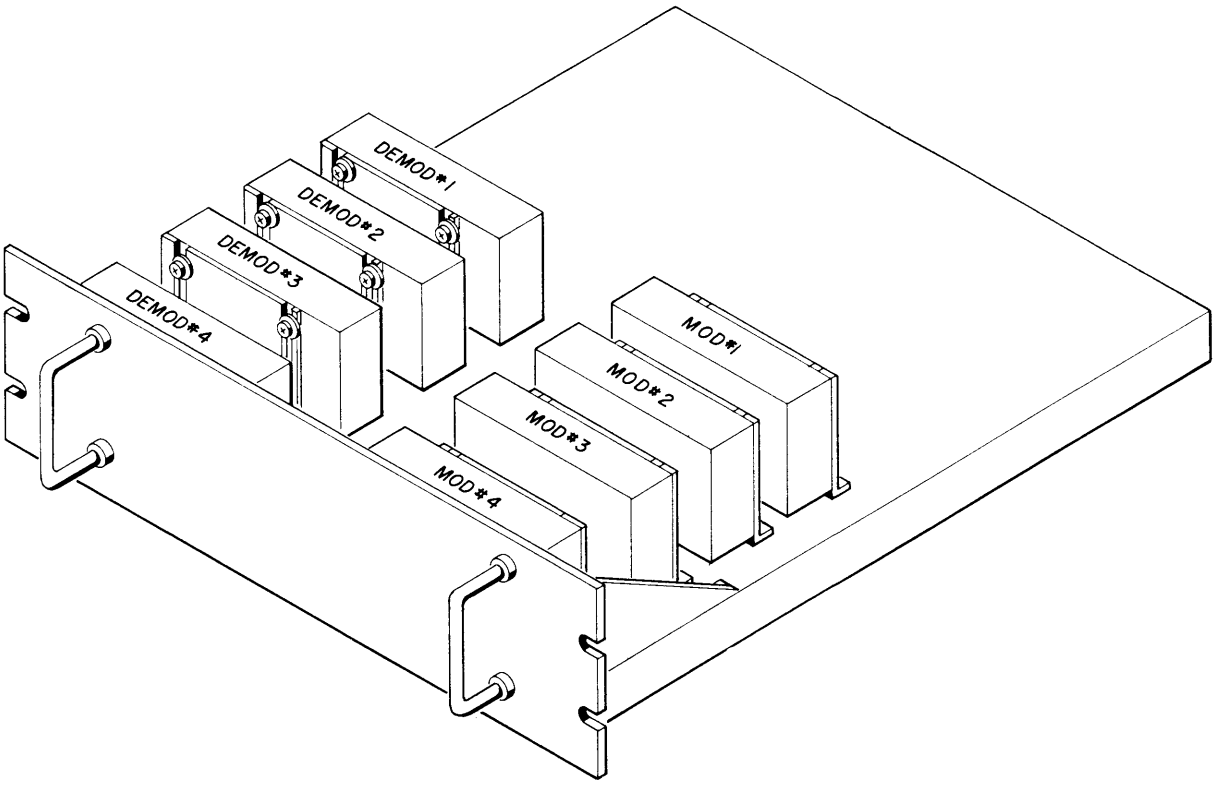


Figure 4-39. KW-37 BLACK Tone Converter Drawer, Isometric View

4-155. TEST BENCH WIRING, RH1.

Figures 4-108, 4-109 and 4-110 are wiring diagrams of the printer, reperforator and transmitter distributor test positions in container RH1.

4-156. EQUIPMENT RACK WIRING RE2.

Figure 4-111 illustrates the signal wiring in voice equipment rack RE2.21 and the inter-connection cabling to the RE2 SDF. Figure 4-112 is a wiring diagram of the VHF equipment rack RE2.27, figure 4-113 is a wiring diagram of UHF equipment rack RE2.29, and figure 4-114 is a wiring diagram of the AN/SRC-20 rack RE2.31.

4-157. ANTENNA PATCH AND MULTICOUPLER RACK RA3.19.

Figure 4-115 is a cabling diagram of the antenna patch and multicoupler rack installed in container RA3.

4-158. TD-411/UGC DEMULTIPLEXER RACK RE3.11.

The TD-411 demultiplexer rack wiring is shown in figure 4-116.

4-159. AN/FCC-17 CABLING.

Figures 4-117 and 4-118 illustrate the voice-frequency circuit cabling of the AN/FCC-17 equipment installed in containers RE2 and TC1.

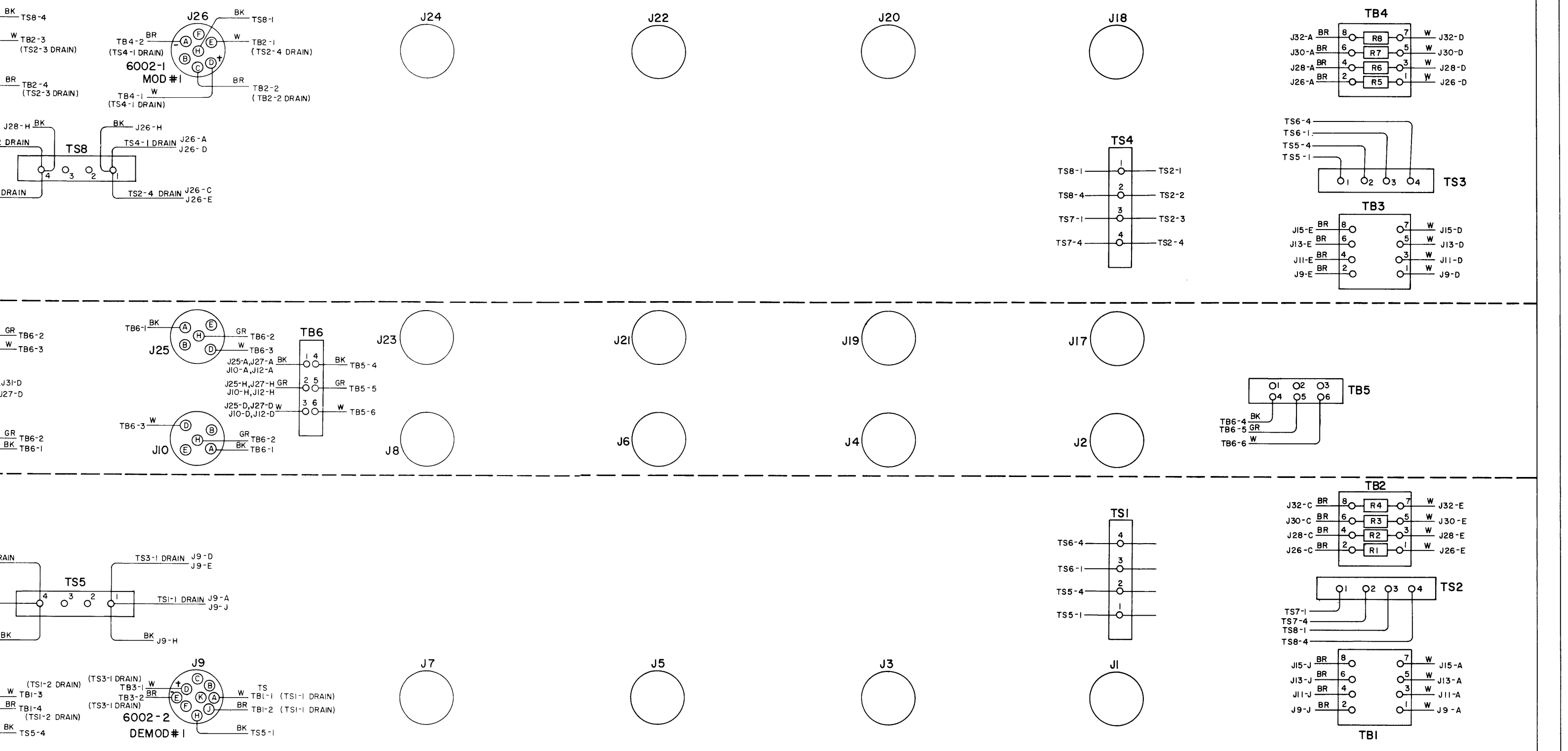
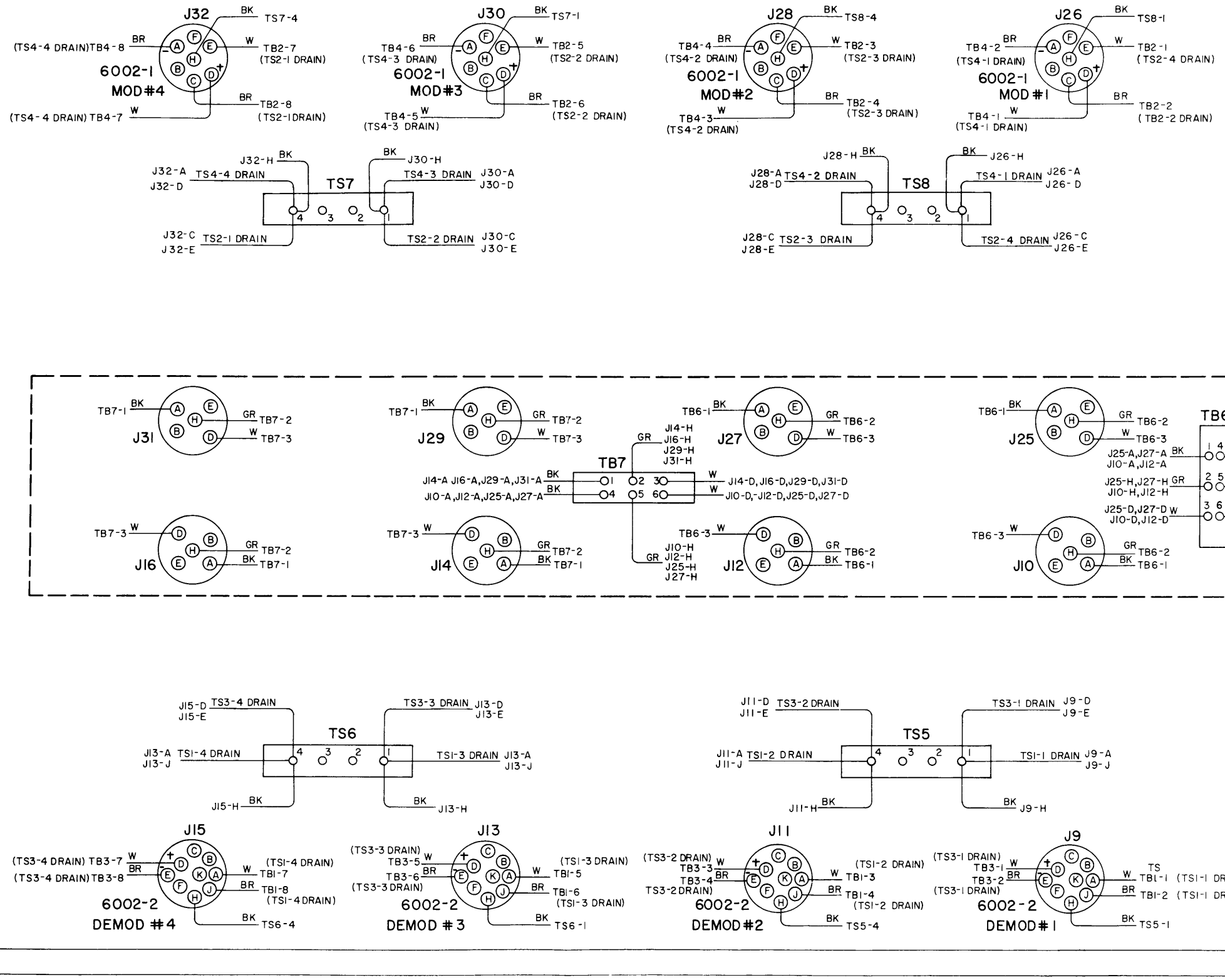


Figure 4-40. KW-37 BLACK Tone Converter Drawer, Wiring Diagram


J32
BK TS7-4
(TS4-4 DRAIN) TB4-8 BR
W TB2-7 (TS2-1 DRAIN)
6002-1 MOD#4
BR TB2-8 (TS2-1 DRAIN)
(TS4-4 DRAIN) TB4-7 W
J30
BK TS7-1
TB4-6 BR (TS4-3 DRAIN)
W TB2-5 (TS2-2 DRAIN)
6002-1 MOD#3
BR TB2-6 (TS2-2 DRAIN)
TB4-5 W (TS4-3 DRAIN)
J28
BK TS8-4
TB4-4 BR (TS4-2 DRAIN)
W TB2-3 (TS2-3 DRAIN)
6002-1 MOD#2
BR TB2-4 (TS2-3 DRAIN)
TB4-3 W (TS4-2 DRAIN)
J26
BK TS8-1
TB4-2 BR (TS4-1 DRAIN)
W TB2-1 (TS2-4 DRAIN)
6002-1 MOD#1
BR TB2-2 (TB2-2 DRAIN)
TB4-1 W (TS4-1 DRAIN)
J32-H BK
J32-A TS4-4 DRAIN
J32-D
TS7
BK J30-H
TS4-3 DRAIN J30-A
J30-D
J32-C TS2-1 DRAIN
J32-E
TS2-2 DRAIN J30-C
J30-E
J28-H BK
J28-A TS4-2 DRAIN
J28-D
TS8
BK J26-H
TS4-1 DRAIN J26-A
J26-D
J28-C TS2-3 DRAIN
J28-E
TS2-4 DRAIN J26-C
J26-E
J31
J29
J27
J25
TB7
TB6
J23
J16
J14
J12
J10
J8
J15
J13
J11
J9
6002-2 DEMOD #4
6002-2 DEMOD #3
6002-2 DEMOD#2
6002-2 DEMOD#1
TS6
TS5
BK TS6-4
BK TS6-1
BK TS5-4
BK TS5-1

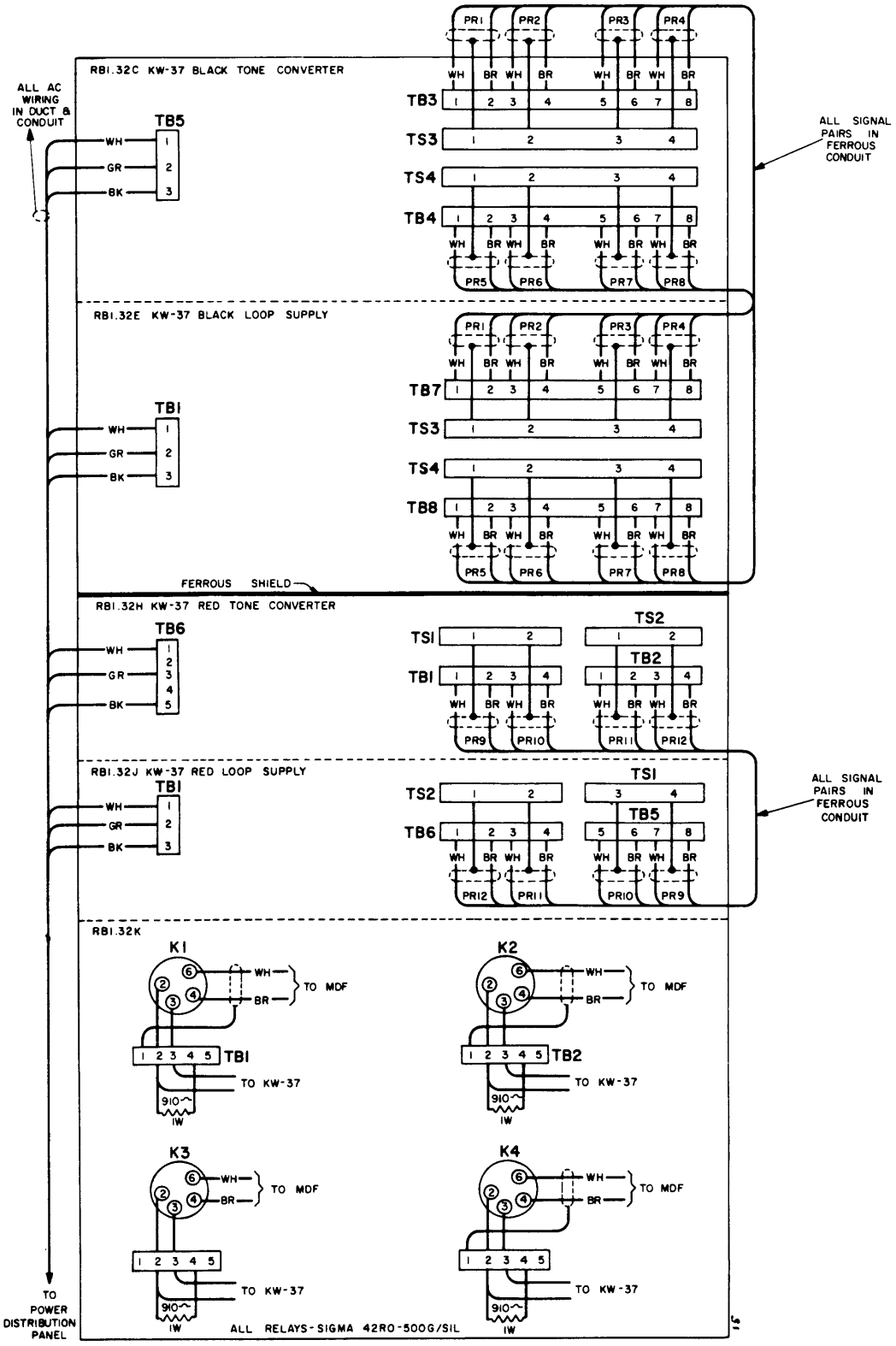
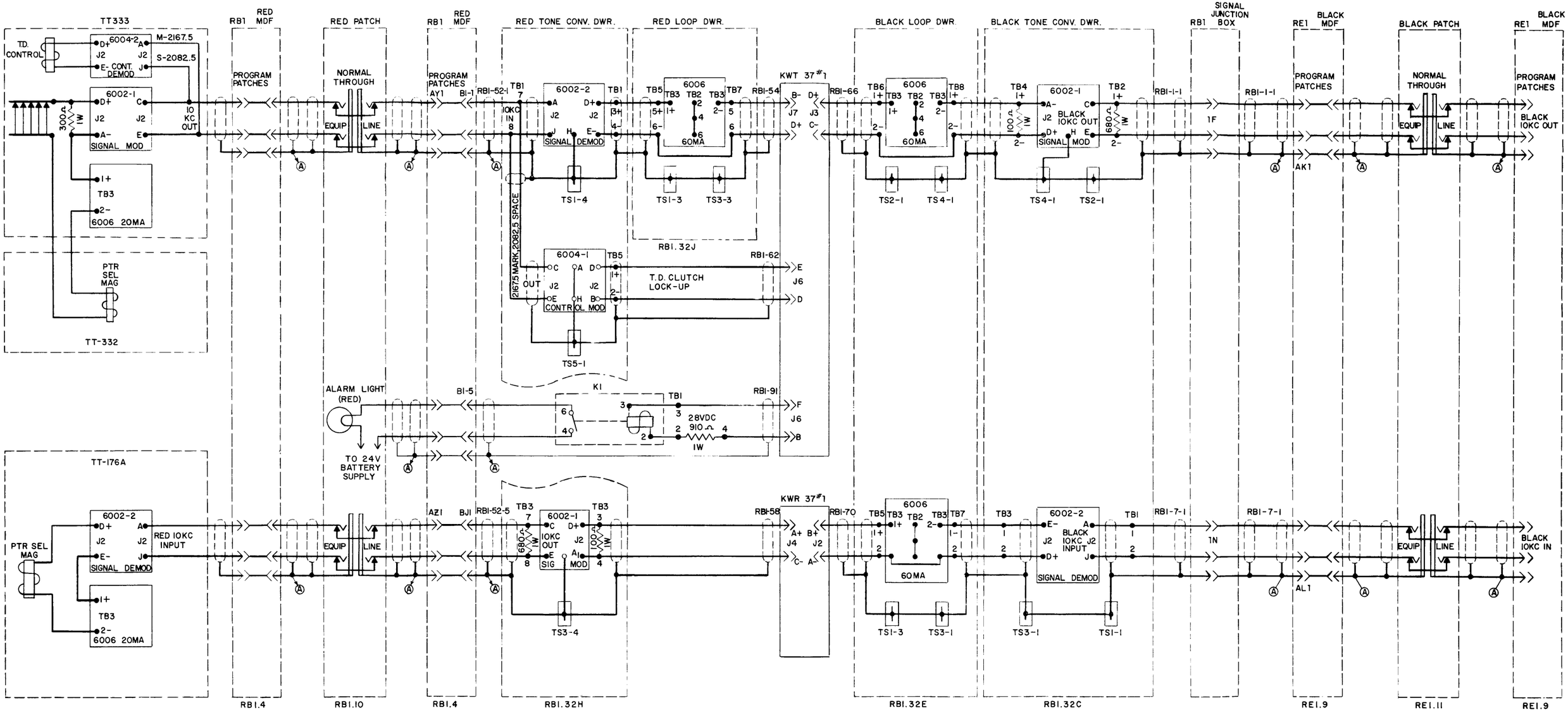


Figure 4-41. KW-37 Tone Converter/Loop Supply Rack RB1.32, Wiring Diagram



NOTES: 1. MOD 6002-1, MOD 6004-1, AND DEMOD 6002-2 EQUIPMENTS MOUNTED IN TONE CONVERTER DRAWERS OF RACK RB1.32.
2. THIS DIAGRAM ILLUSTRATES KW37#1 COMPLETE CIRCUIT TO IDF'S AND IS TYPICAL (EXCEPT FOR CABLE NUMBERS) FOR ALL KW37 EQUIPMENTS.

Ⓐ ALL SHIELD WIRES CONNECT TO SIGNAL GROUND BUS IN MDF CABINETS.

Figure 4-42. KW-37 Typical Circuit Cabling, Block Diagram

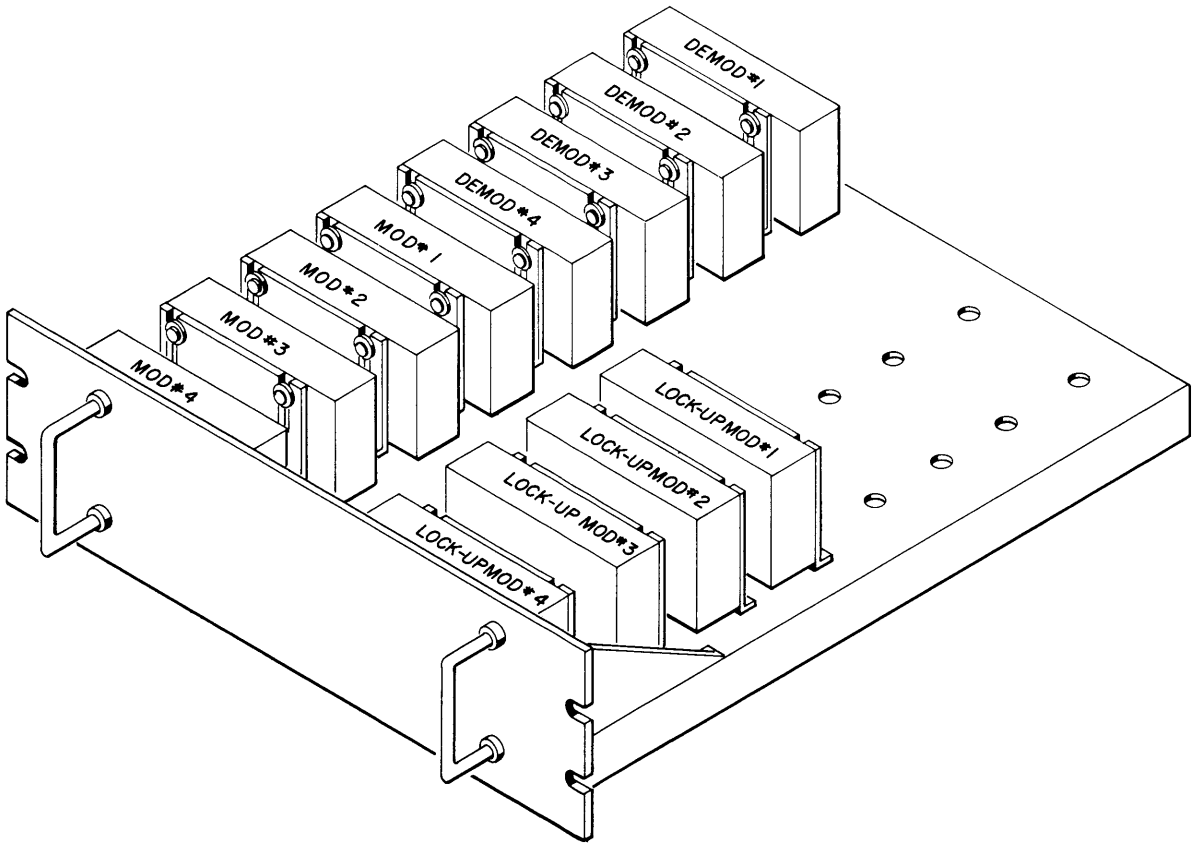


Figure 4-43. KW-37 RED Tone Converter Drawer, Isometric View

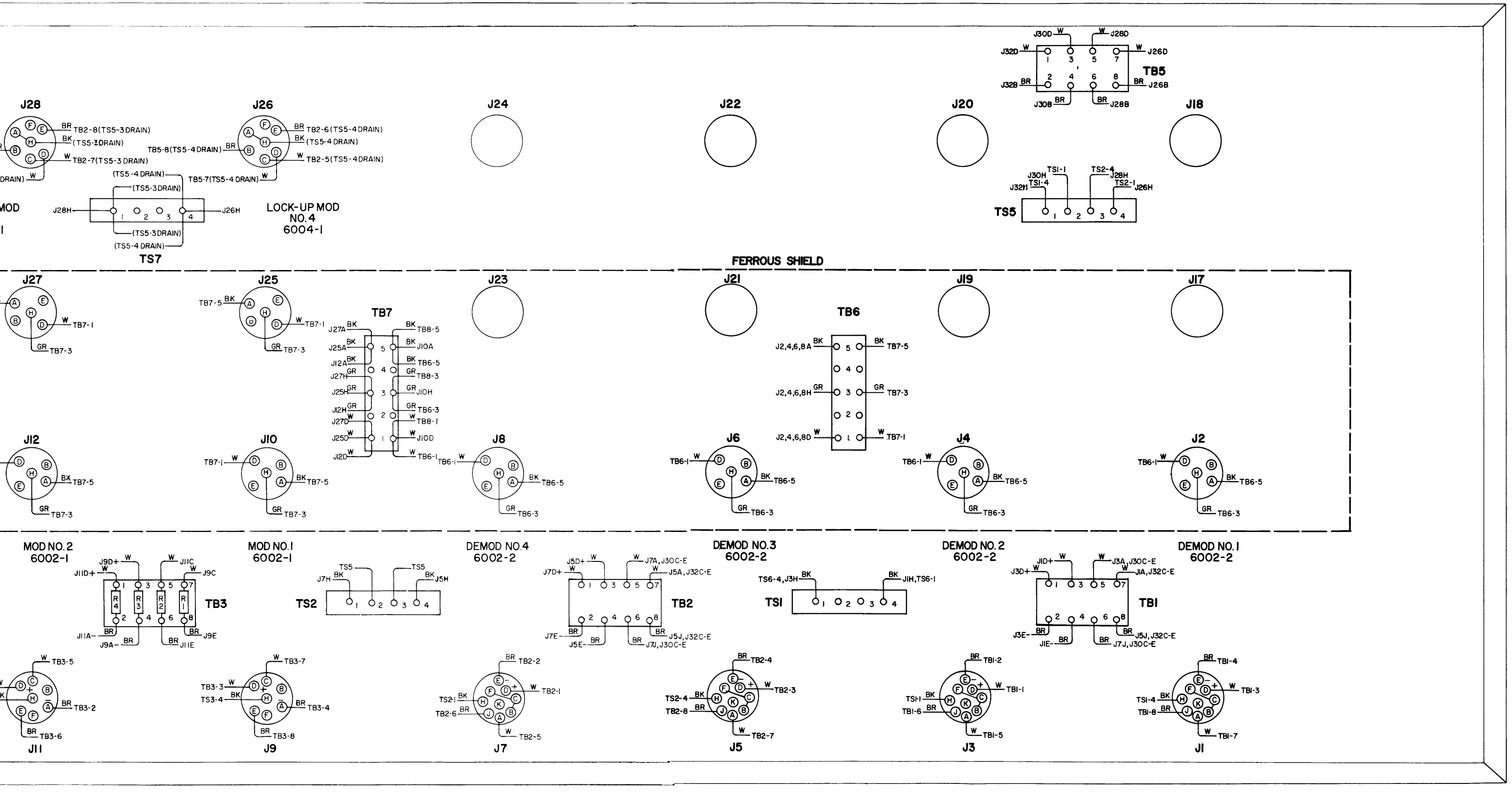
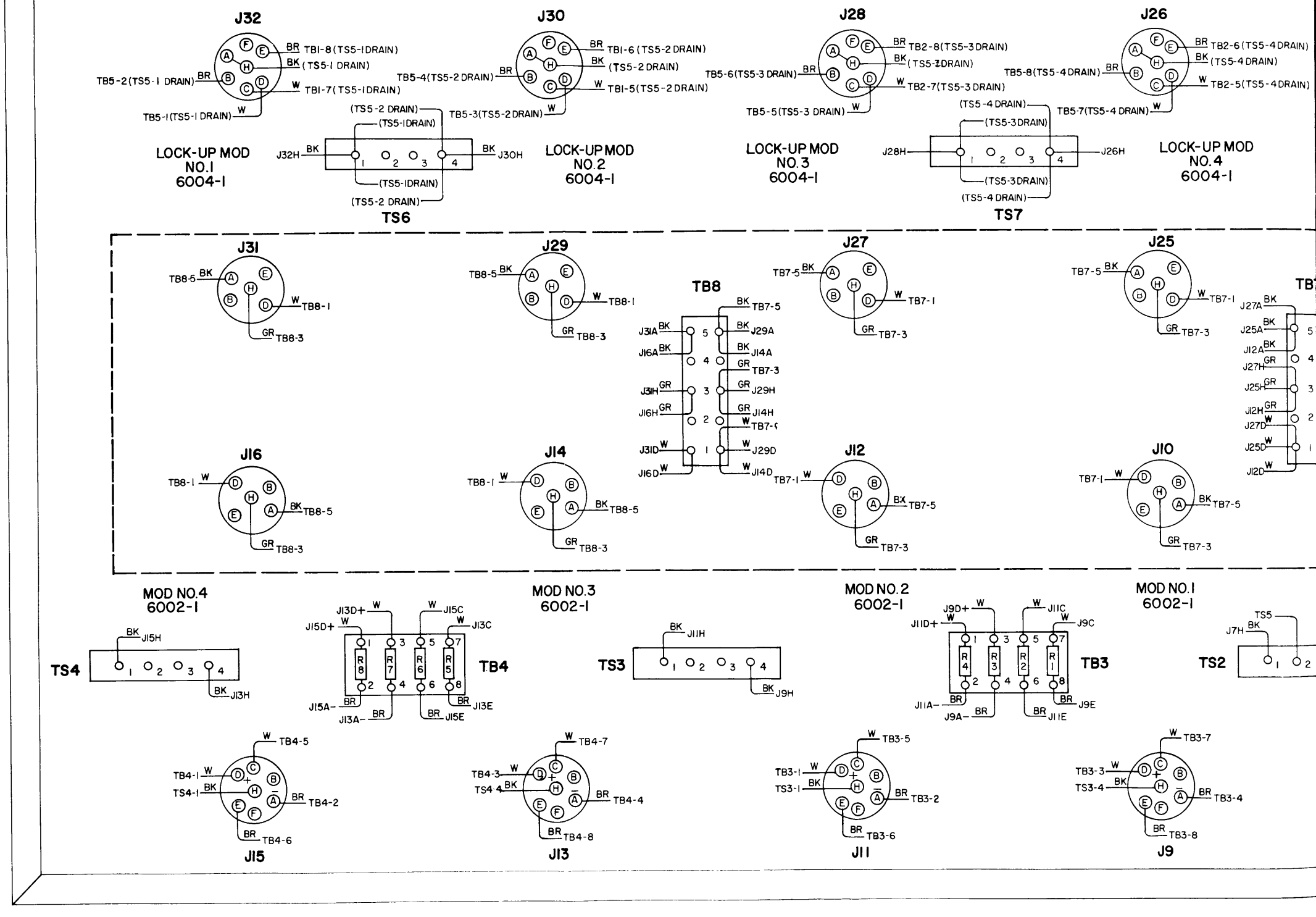


Figure 4-44. KW-37 RED Tone Converter Drawer, Wiring Diagram


J32
TB5-2(TS5-1 DRAIN)
TB5-1(TS5-1 DRAIN)
TBI-8(TS5-1DRAIN)
(TS5-1 DRAIN)
TBI-7(TS5-1DRAIN)
J30
TB5-4(TS5-2 DRAIN)
TB5-3(TS5-2 DRAIN)
TBI-6(TS5-2 DRAIN)
(TS5-2 DRAIN)
TBI-5(TS5-2 DRAIN)
J28
TB5-6(TS5-3 DRAIN)
TB5-5(TS5-3 DRAIN)
TB2-8(TS5-3 DRAIN)
(TS5-3 DRAIN)
TB2-7(TS5-3 DRAIN)
J26
TB5-8(TS5-4 DRAIN)
TB5-7(TS5-4 DRAIN)
TB2-6(TS5-4 DRAIN)
(TS5-4 DRAIN)
TB2-5(TS5-4 DRAIN)
LOCK-UP MOD NO.1 6004-1
LOCK-UP MOD NO.2 6004-1
LOCK-UP MOD NO.3 6004-1
LOCK-UP MOD NO.4 6004-1
J32H
J30H
J28H
J26H
(TS5-2 DRAIN)
(TS5-1DRAIN)
(TS5-3DRAIN)
(TS5-4 DRAIN)
TS6
TS7
J31
TB8-5
TB8-1
TB8-3
J29
TB8-5
TB8-1
TB8-3
TB8
J27
TB7-5
TB7-1
TB7-3
J25
TB7-5
TB7-1
TB7-3
J16
TB8-1
TB8-5
TB8-3
J14
TB8-1
TB8-5
TB8-3
J12
TB7-1
TB7-5
TB7-3
J10
TB7-1
TB7-5
TB7-3
MOD NO.4 6002-1
MOD NO.3 6002-1
MOD NO.2 6002-1
MOD NO.1 6002-1
TS4
TS4-1
J13D+
J15D+
J15C
J13C
J15A
J13A
J13E
J15E
TB4
TS3
J11H
J9H
J9D+
J11D+
J11C
J9C
J11A
J9A
J11E
J9E
TB3
TS2
J7H
TS5
TB4-5
TB4-1
TB4-2
TB4-6
J15
TB4-7
TB4-3
TS4-4
TB4-4
TB4-8
J13
TB3-5
TB3-1
TS3-1
TB3-2
TB3-6
J11
TB3-7
TB3-3
TS3-4
TB3-4
TB3-8
J9

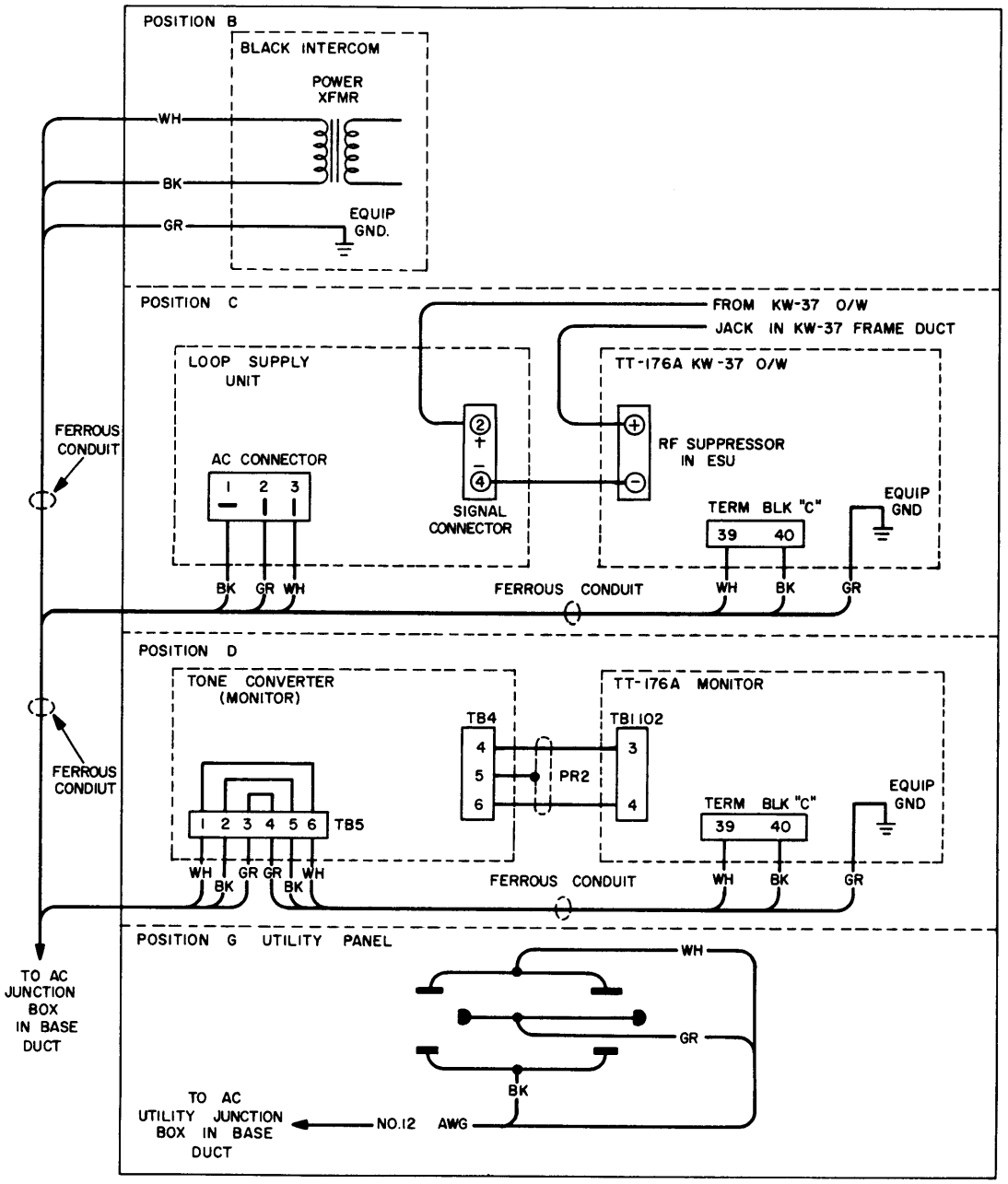


Figure 4-45. KW-37 Order-Wire Rack RB1.26, Wiring Diagram

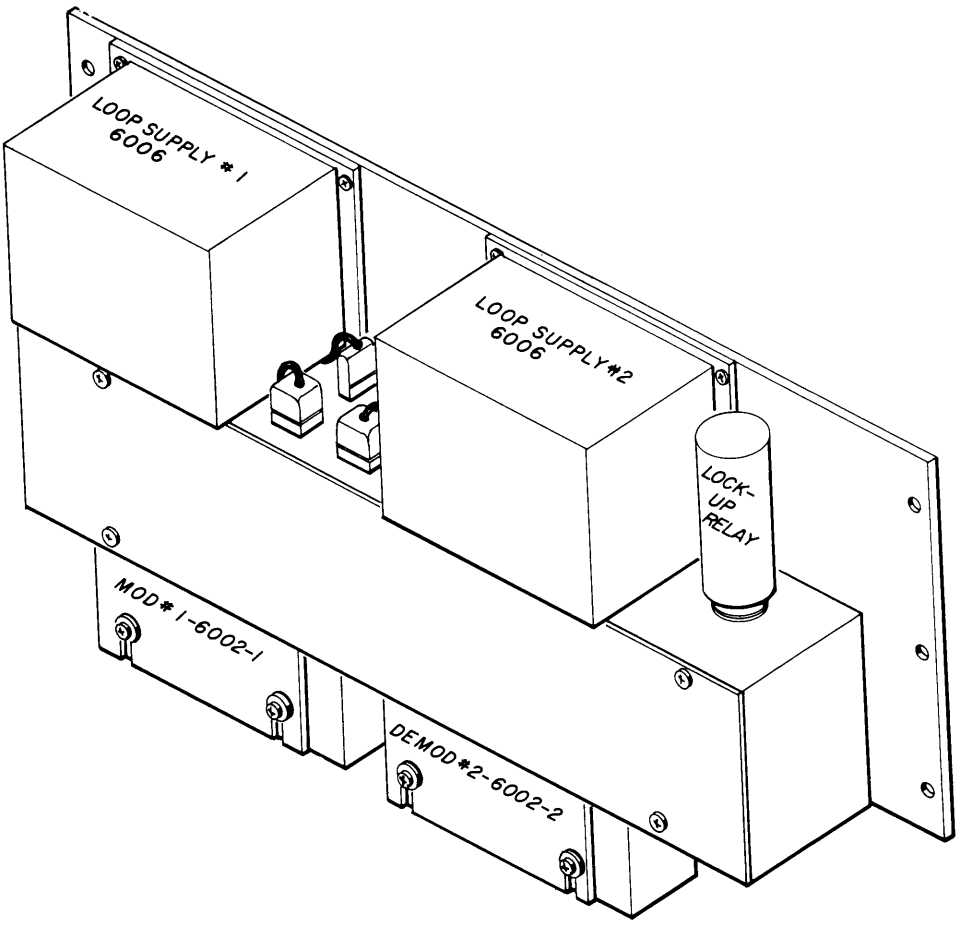


Figure 4-46. Point-To-Point Order-Wire Tone Converter Panel, Isometric View

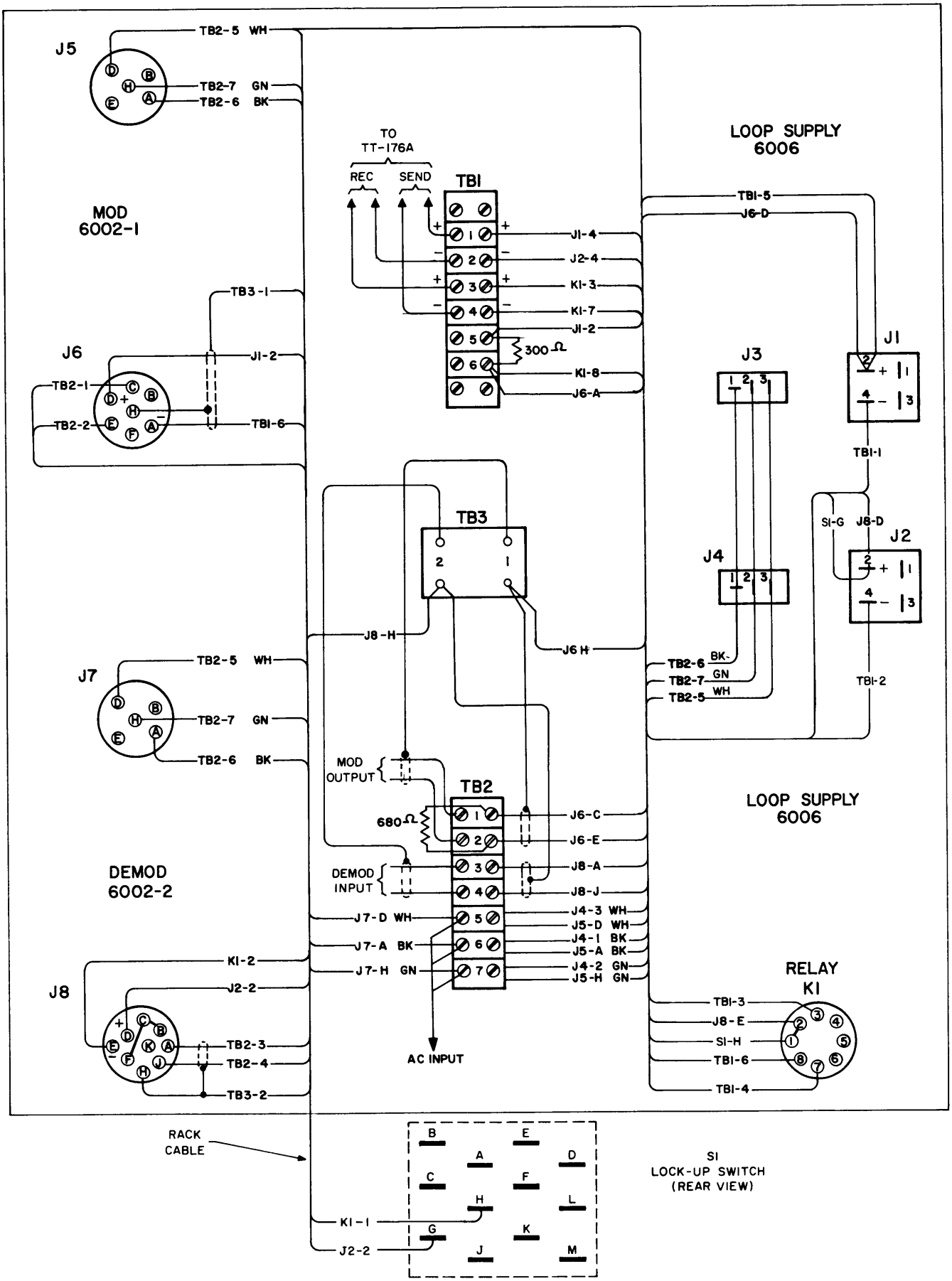


Figure 4-47. Point-To-Point Order-Wire Tone Converter Panel, Wiring Diagram

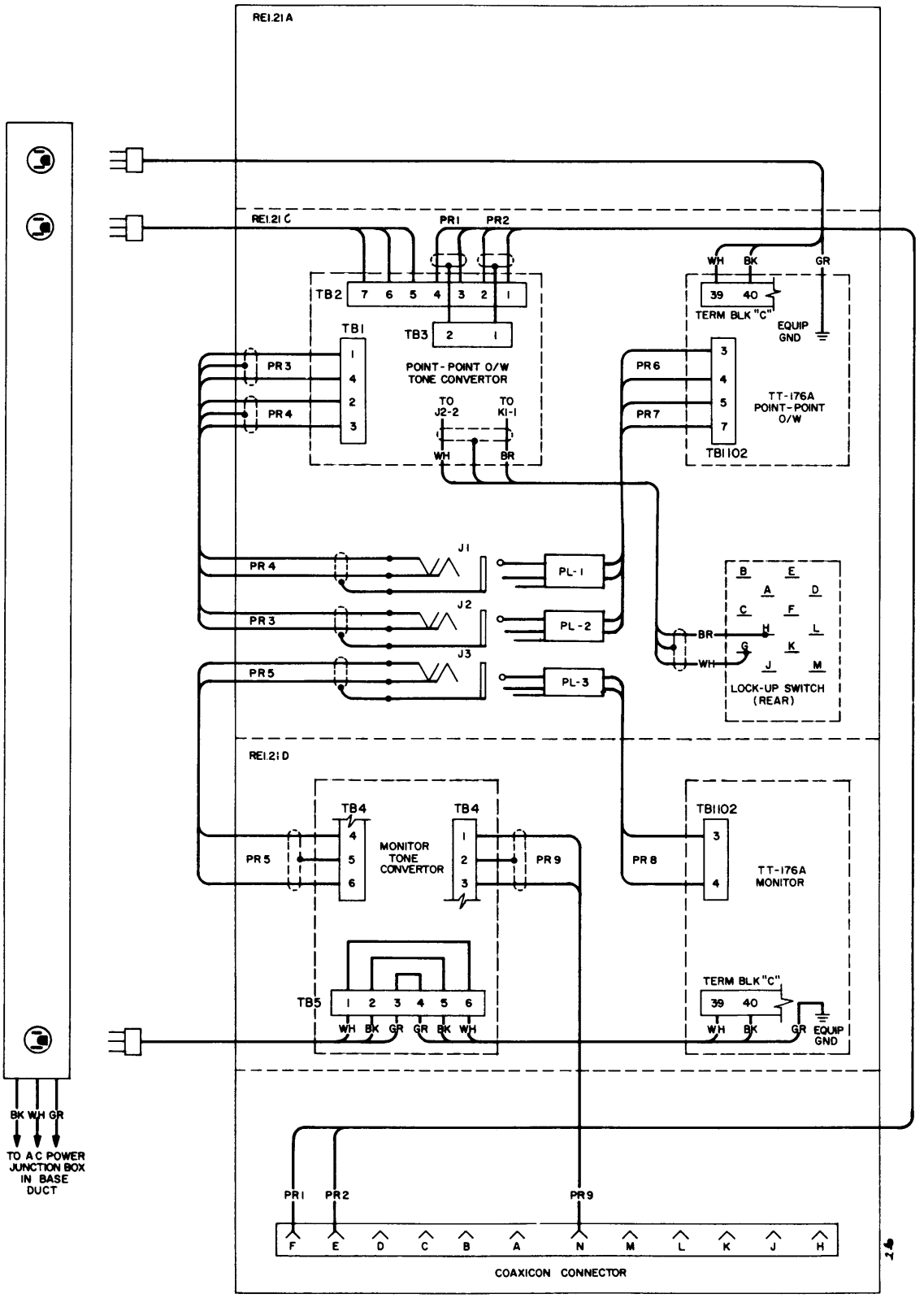


Figure 4-48. Point-To-Point Order-Wire & Monitor TTY Rack RE1.21, Wiring Diagram

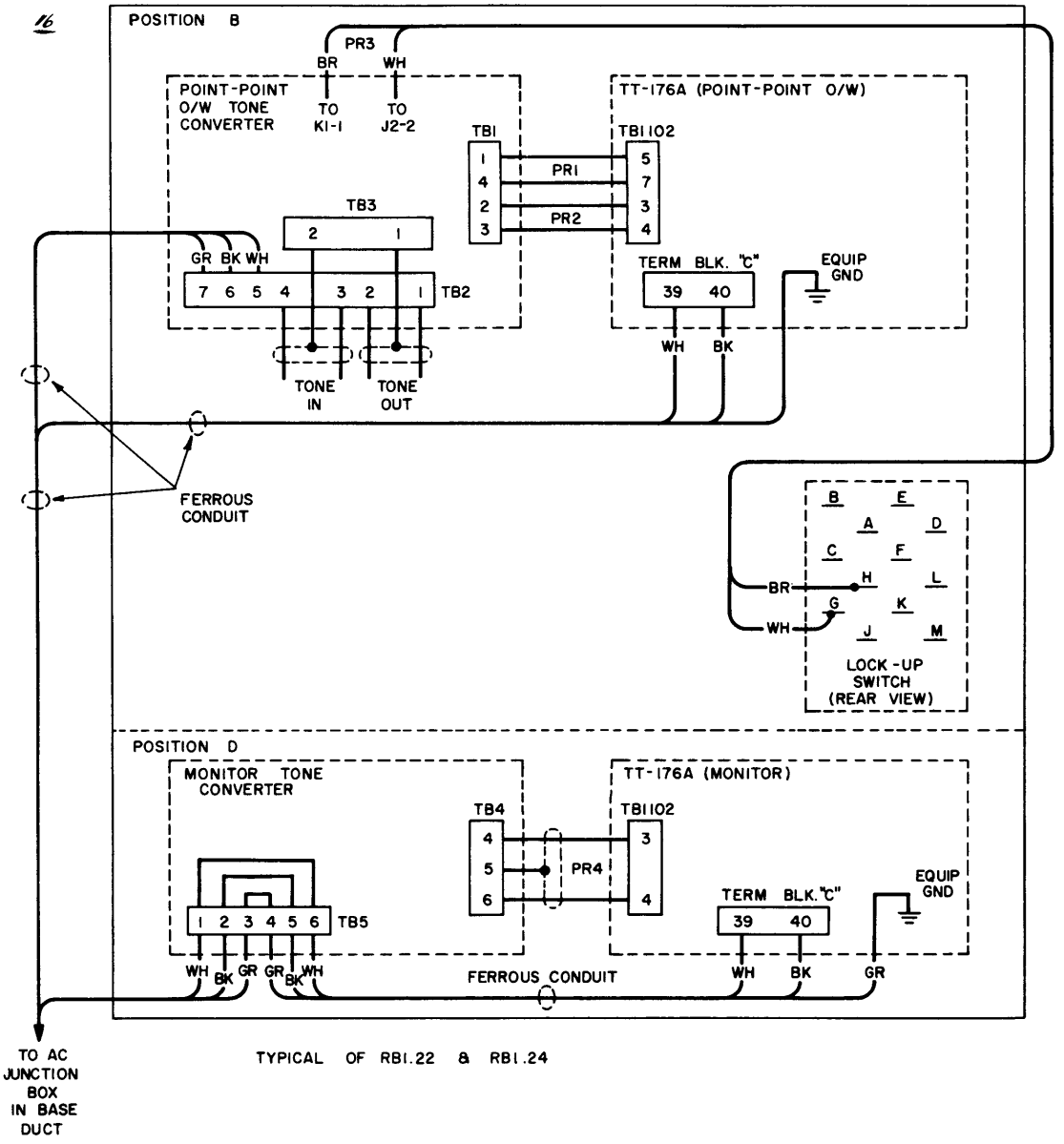


Figure 4-49. RED Point/Point Order-Wire & Monitor Rack, Typical Wiring Diagram

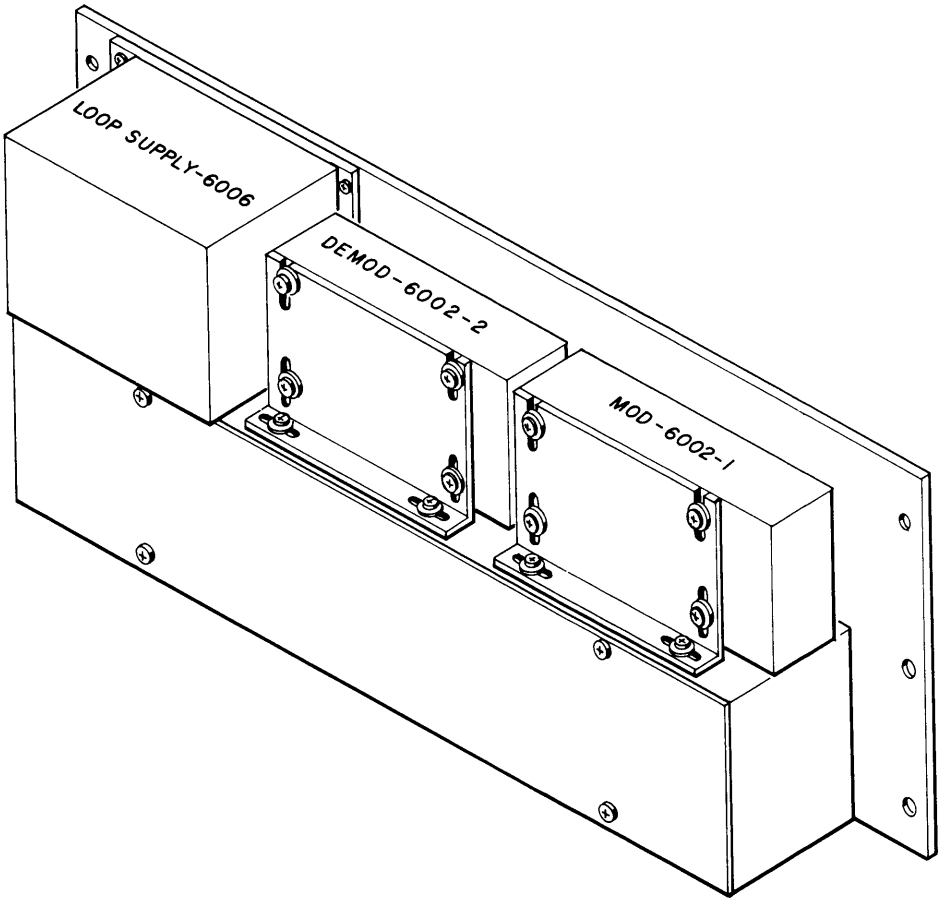
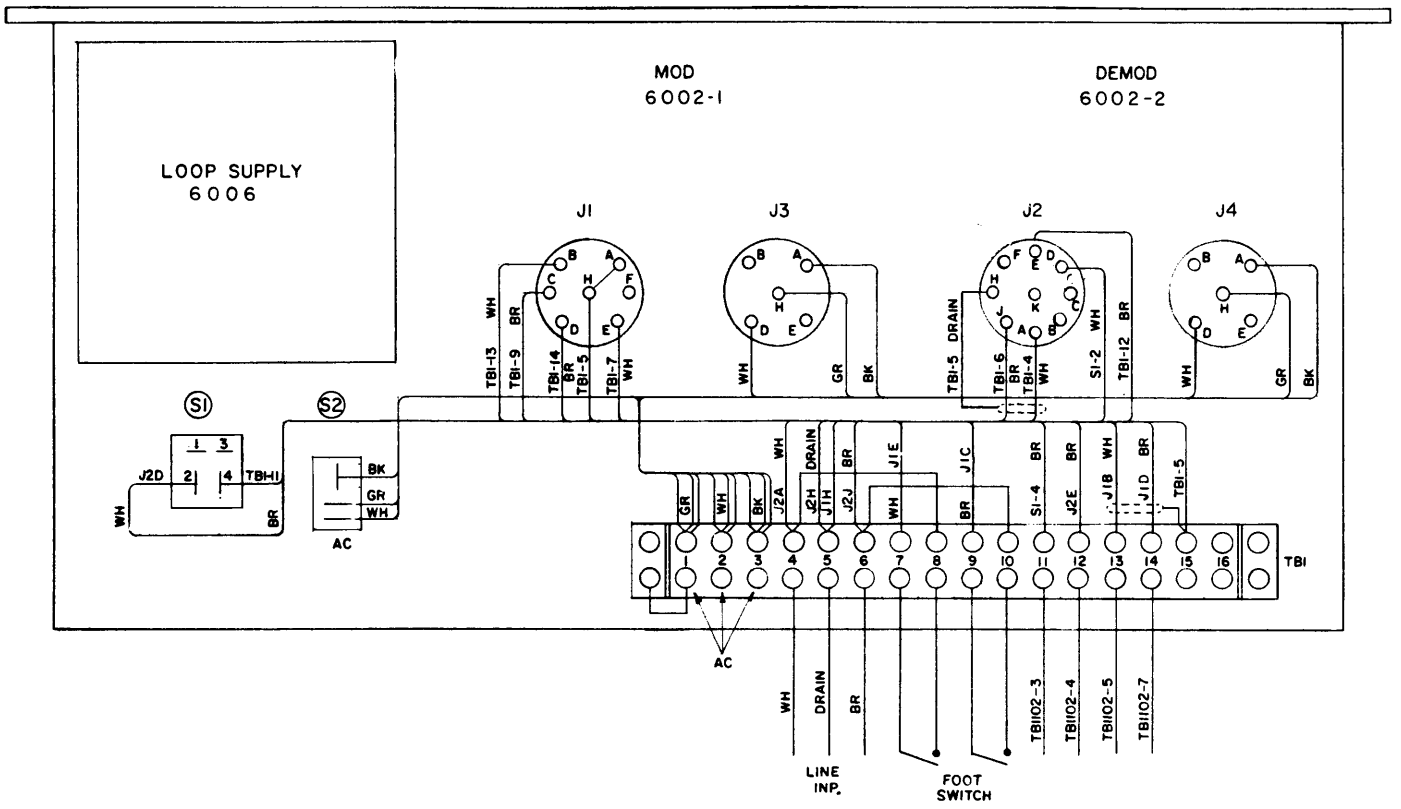


Figure 4-50. Internal O/W Tone Converter Panel, Isometric View



NOTE: PLACE A 1000 OHM, 1 WATT, 10% TOLERANCES RESISTOR (WITH LUGS) BETWEEN 7 & 9 TERMINAL TBI.

Figure 4-51. Internal Order-Wire Tone Converter Panel, Wiring Diagram

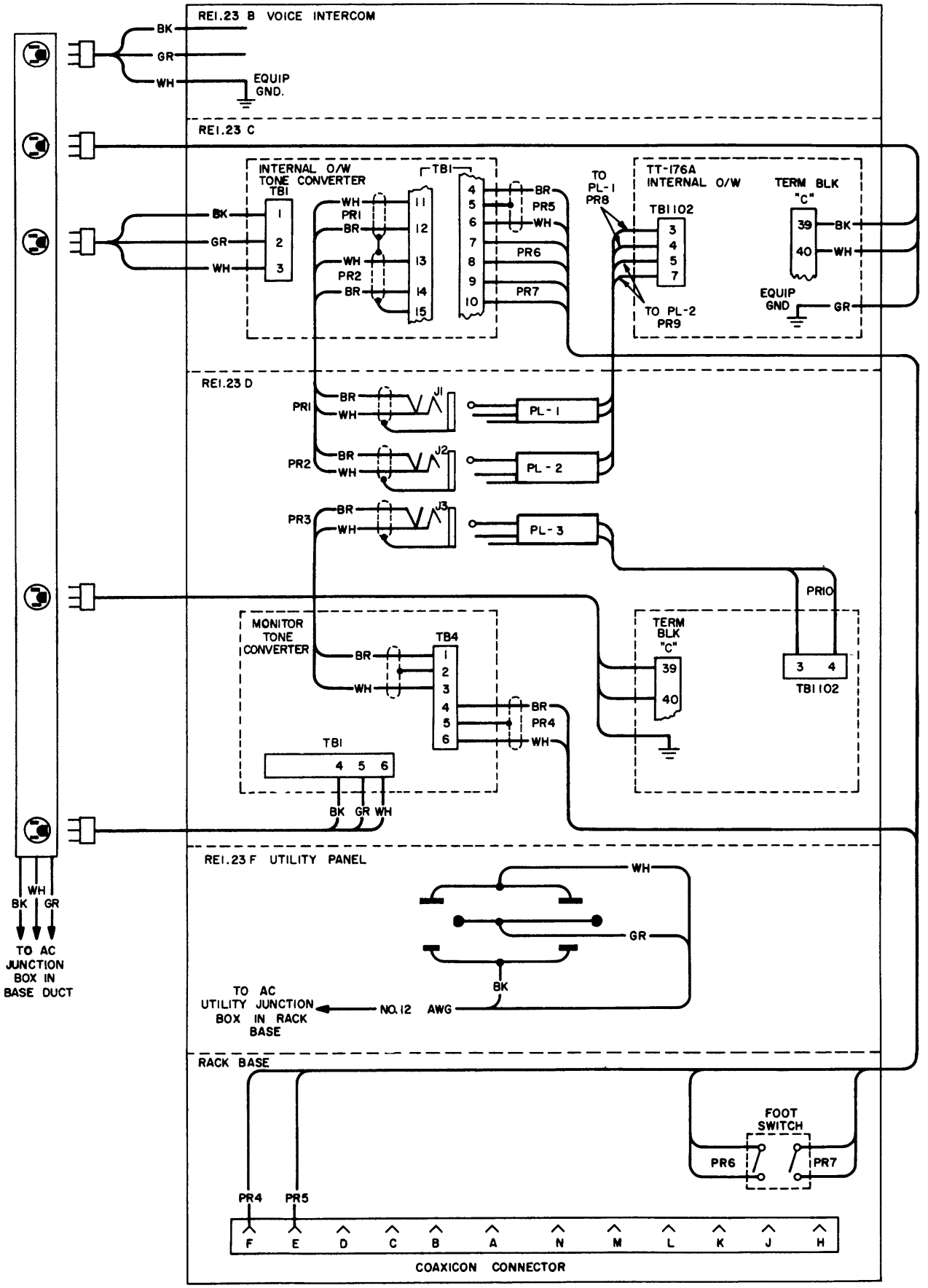


Figure 4-52. Internal Order-Wire & Monitor TTY Rack RE1.23, Wiring Diagram

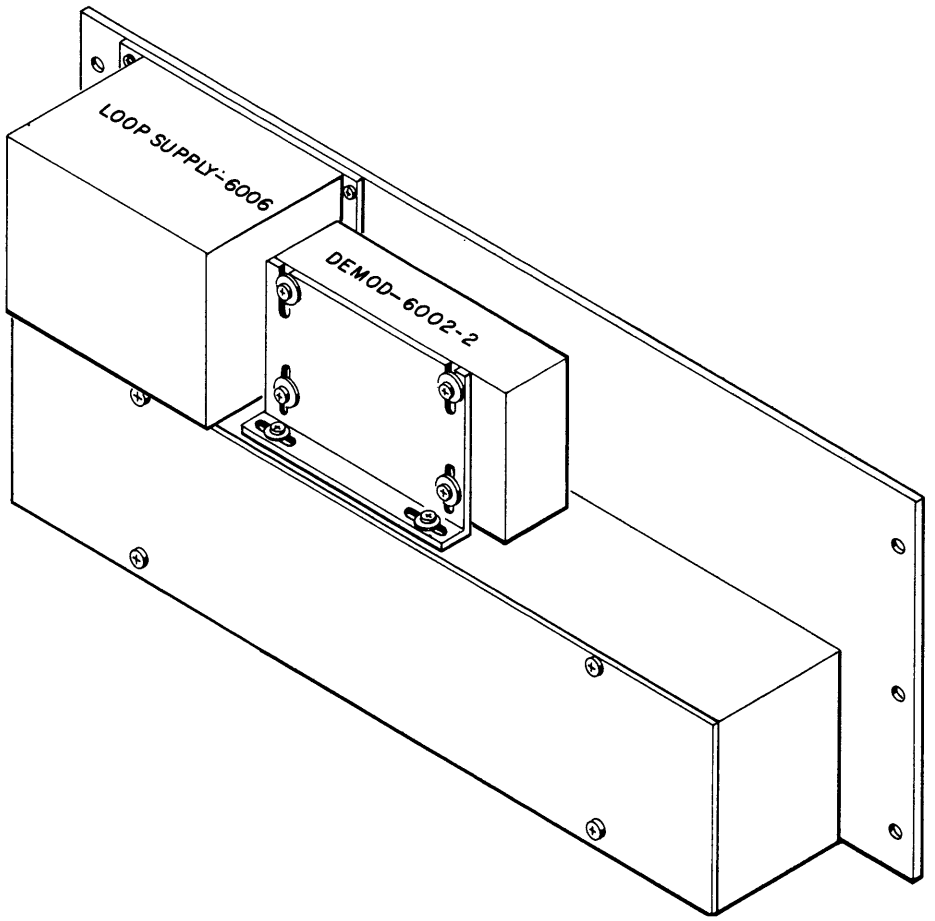


Figure 4-53. TTY Monitor Tone Converter Panel, Isometric View

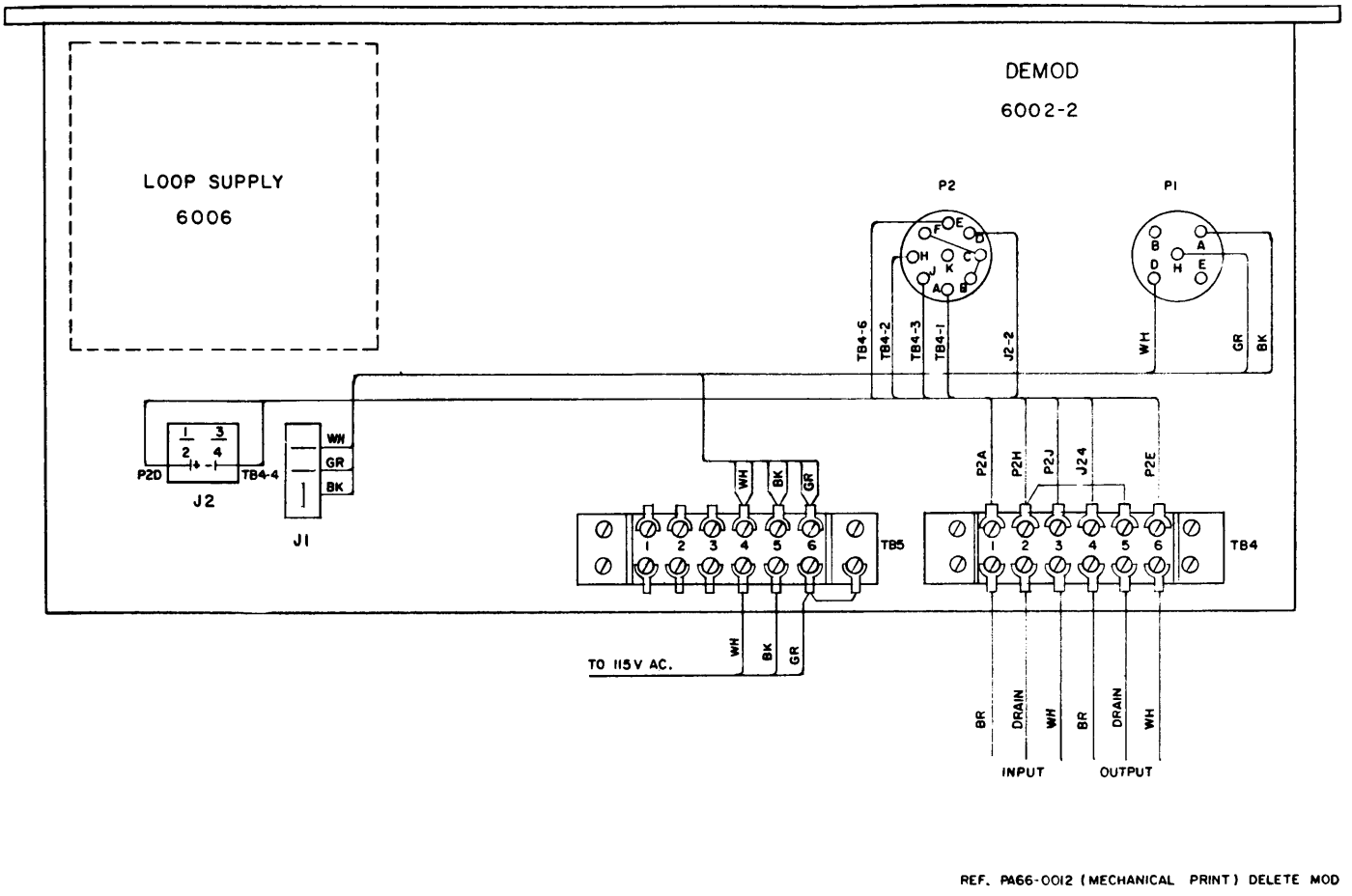


Figure 4-54. TTY Monitor Tone Converter Panel, Wiring Diagram

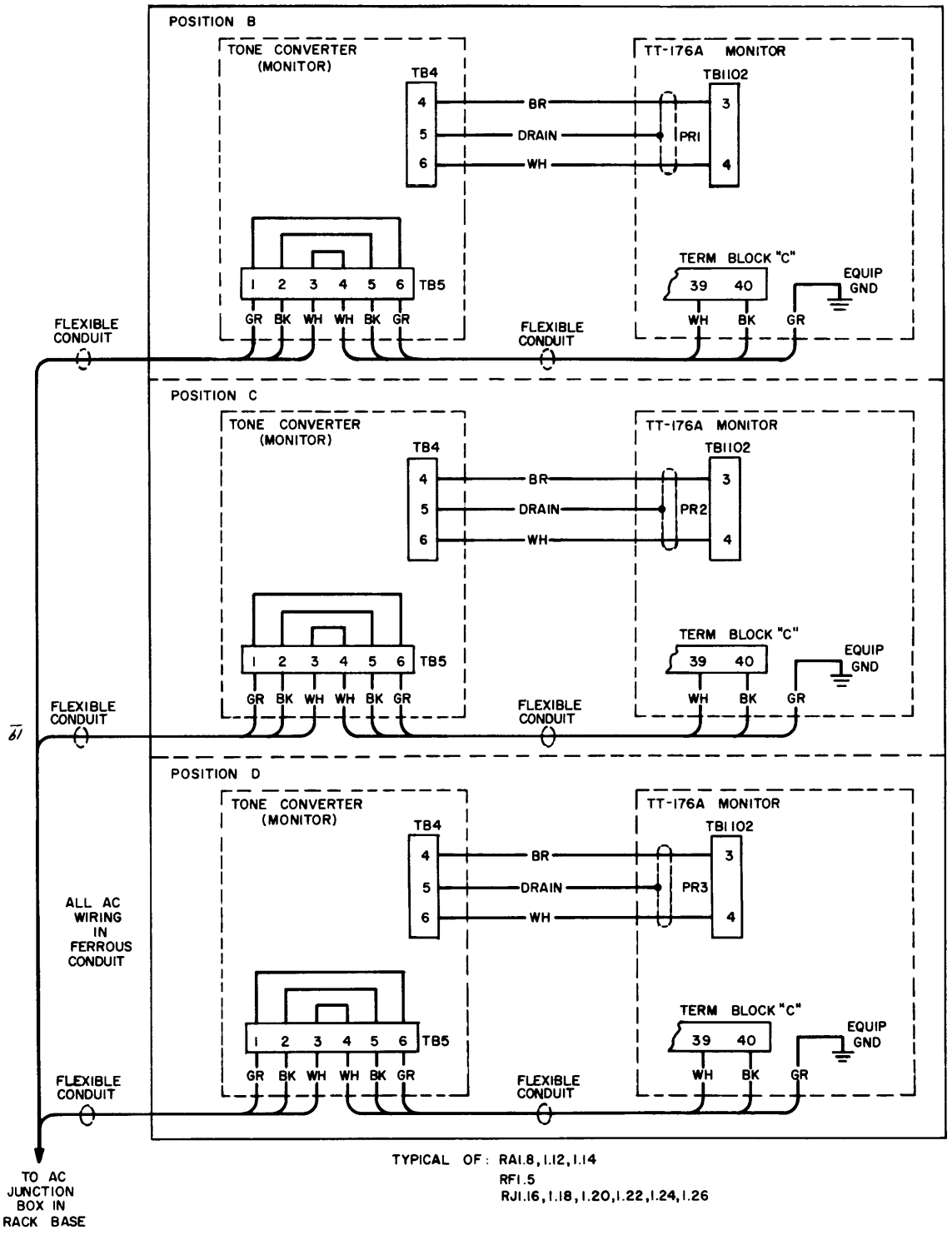


Figure 4-55. Typical Monitor TTY Rack, Wiring Diagram

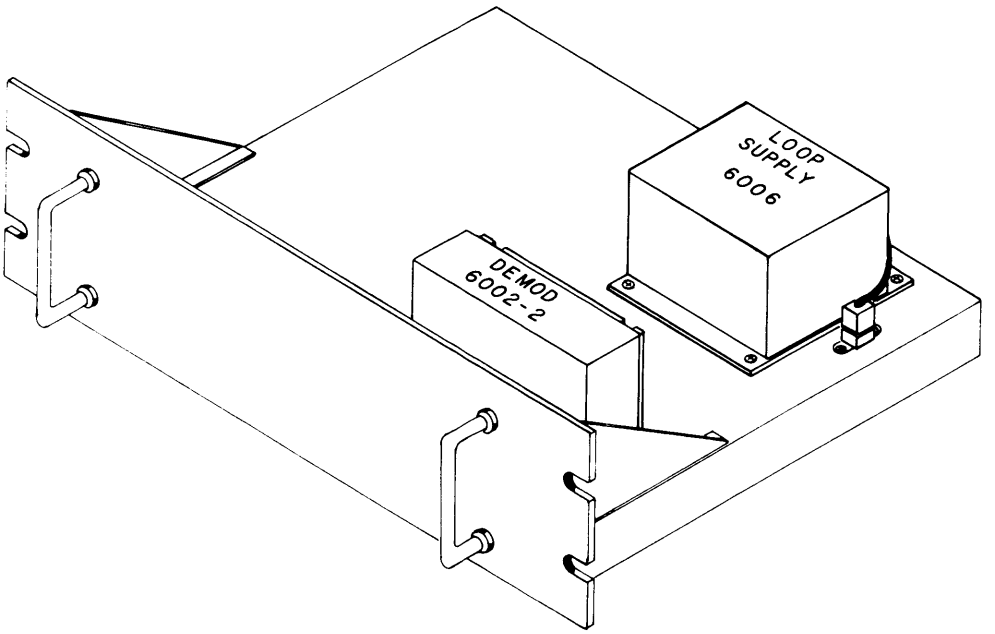


Figure 4-56. TT-176A Monitor Tone Converter Drawer RF2.17, Isometric View

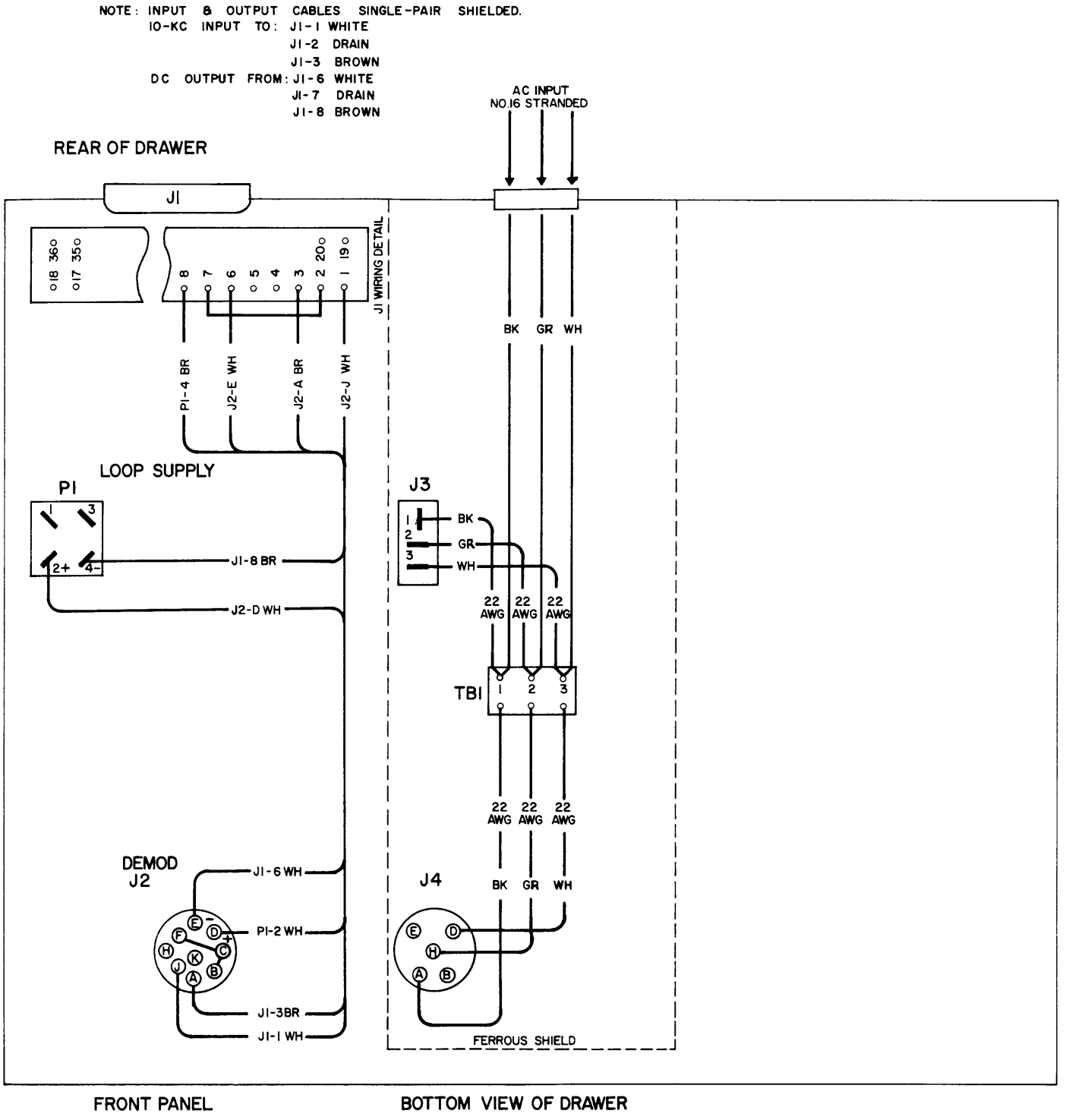


Figure 4-57. TT-176A Tone Converter Drawer RF2.17, Wiring Diagram

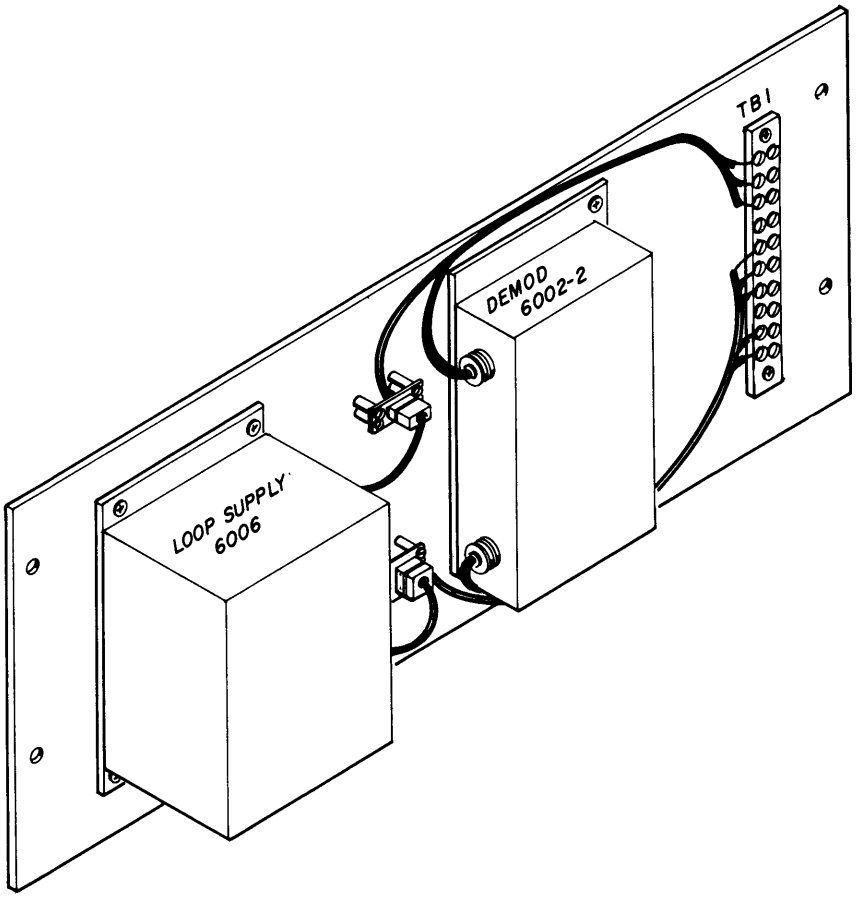
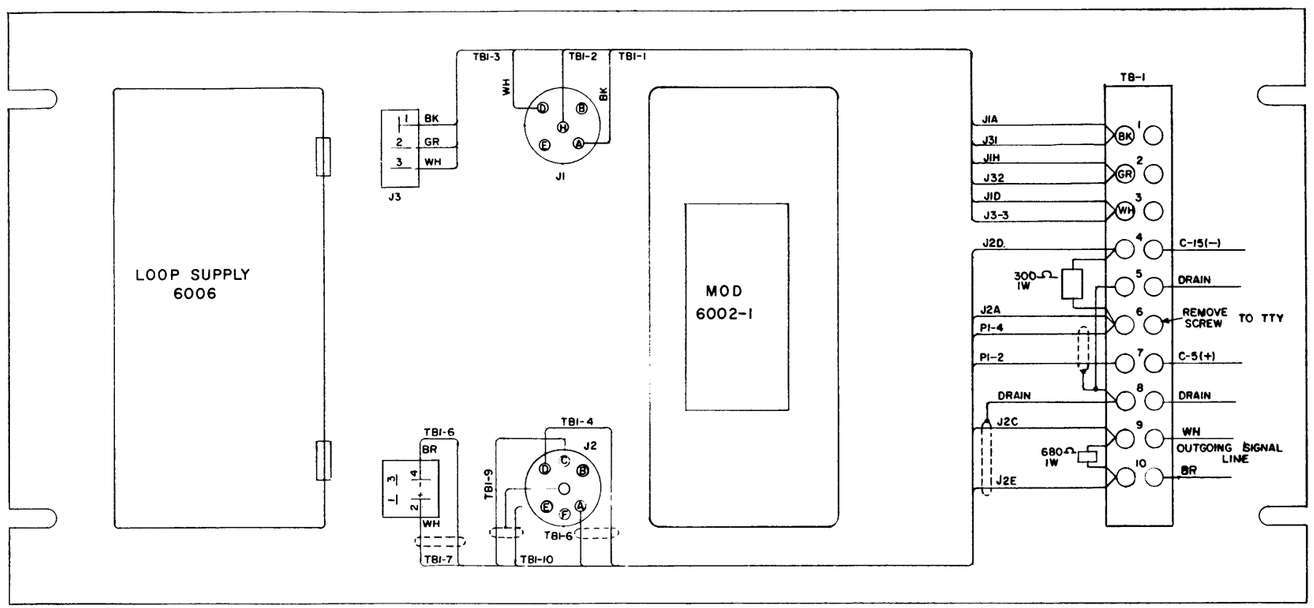


Figure 4-58. AN/UGC-5 and AN/UGC-6 Tone Converter Panel, Isometric View



INTER CABINET WIRING E66-RA2-0265

TYP. RF1.11, RF1.13, RF2.9, RA2.3

Figure 4-59. AN/UGC-5 and AN/UGC-6 Tone Converter Panel, Wiring Diagram

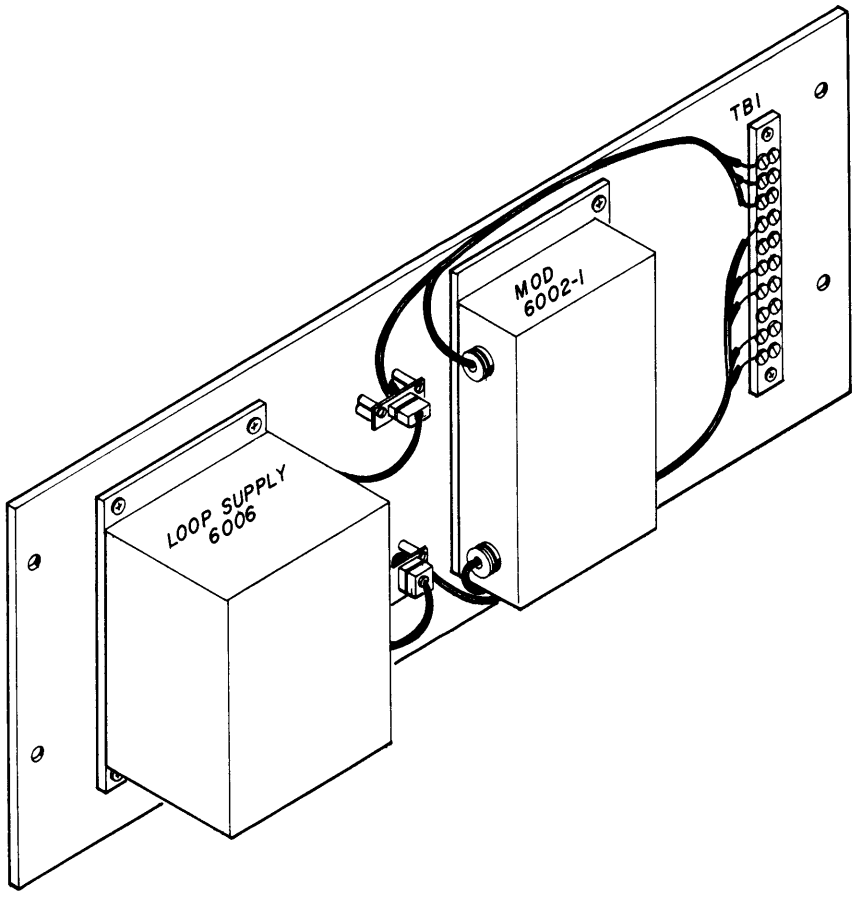


Figure 4-60. AN/UGC-8, TT-47, TT-171 Tone Converter Panel, Isometric View

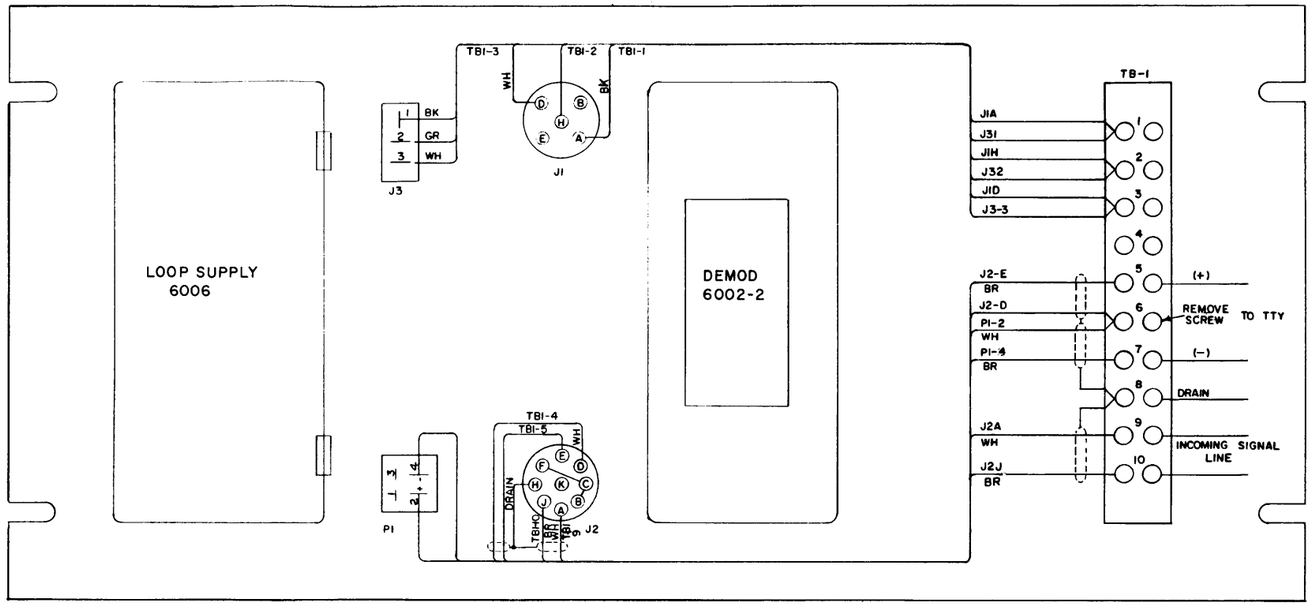


Figure 4-61. AN/UGC-8, TT-47, TT-171 Tone Converter Panel, Wiring Diagram

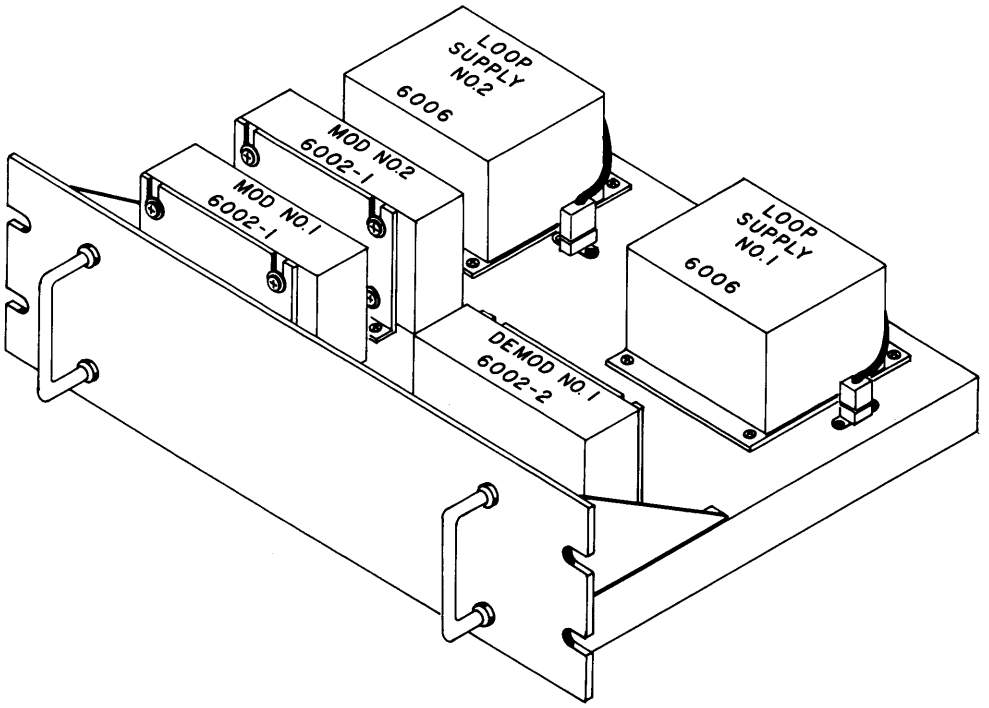
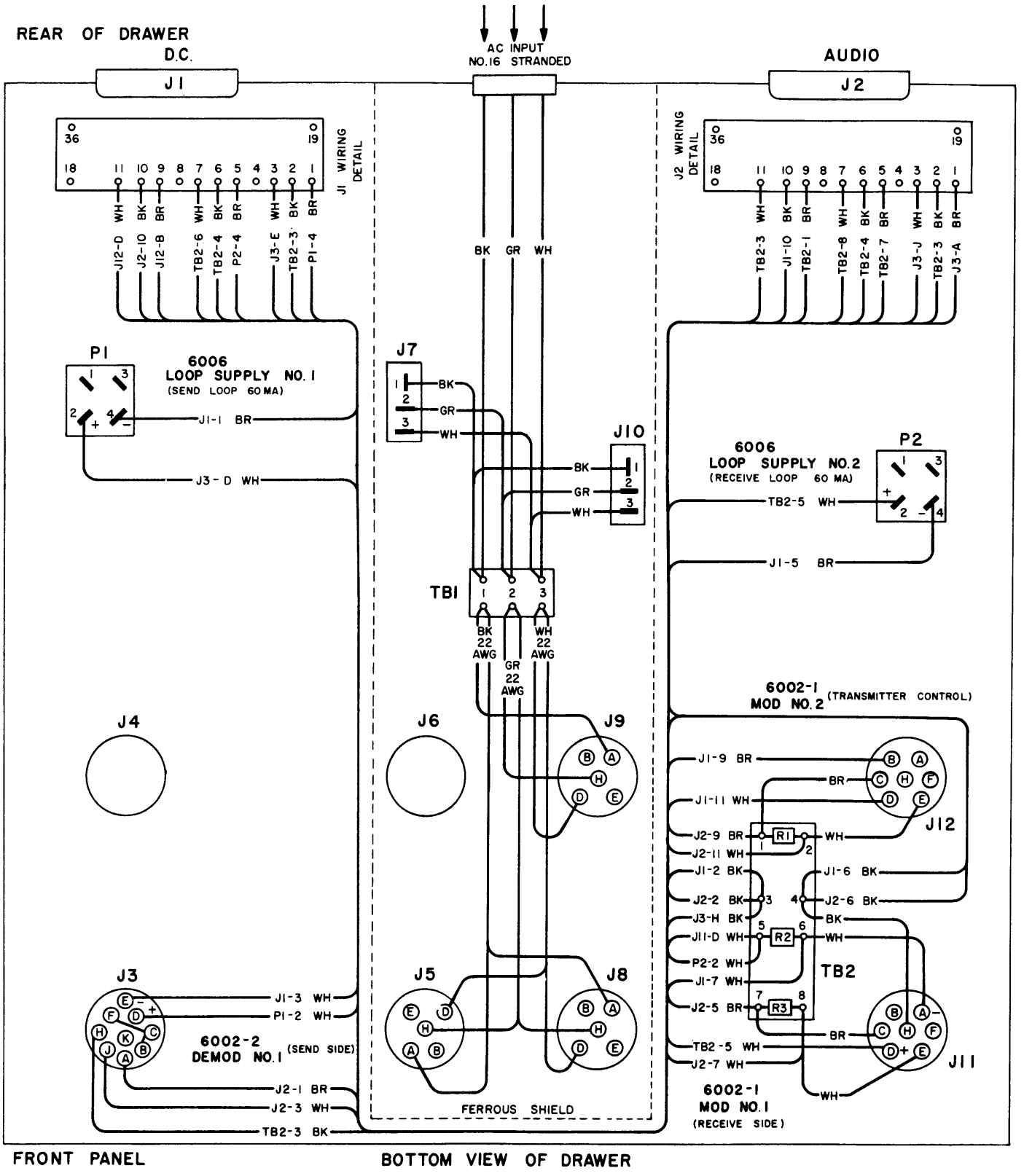


Figure 4-62. 2067 System Tone Converter Drawer RE2.27, Isometric View



NOTES: 1. R1 & R3 = 680-OHM, 1W, ± 10%
2. R2 = 100-OHM, 1 W, ± 10%

Figure 4-63. 2067 System Tone Converter Drawer RE2.27, Wiring Diagram

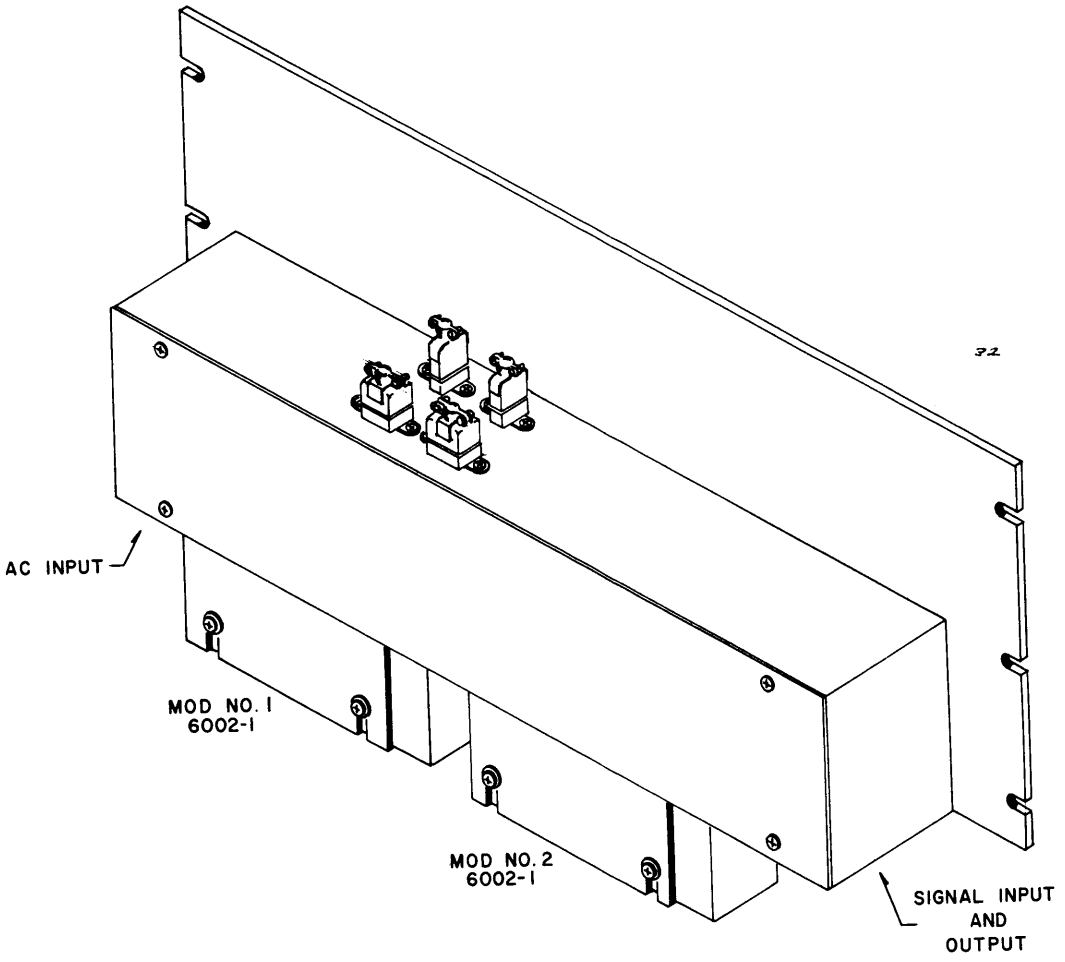
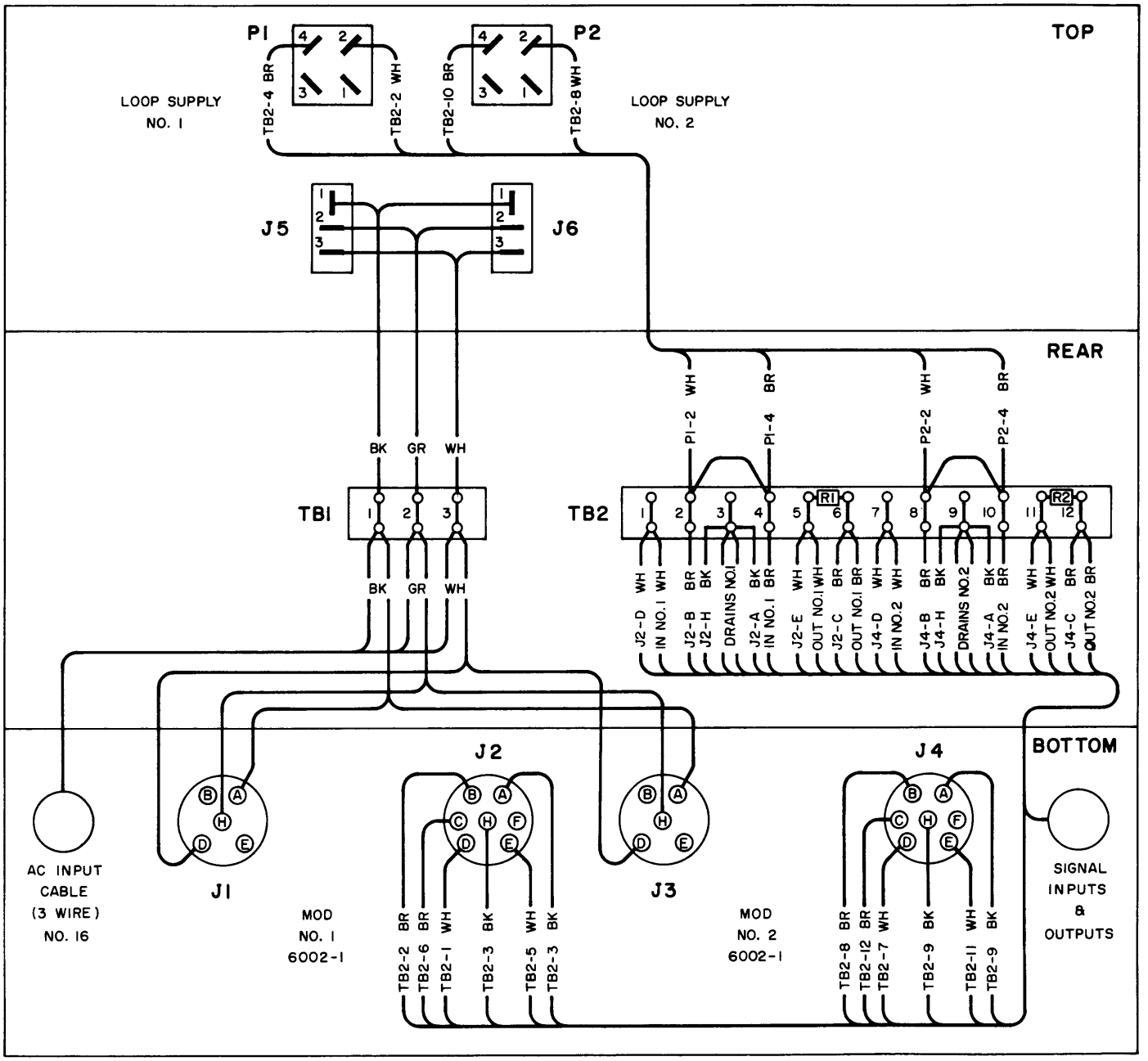


Figure 4-64. FSK Tone Converter Panel, Isometric View

NOTES:

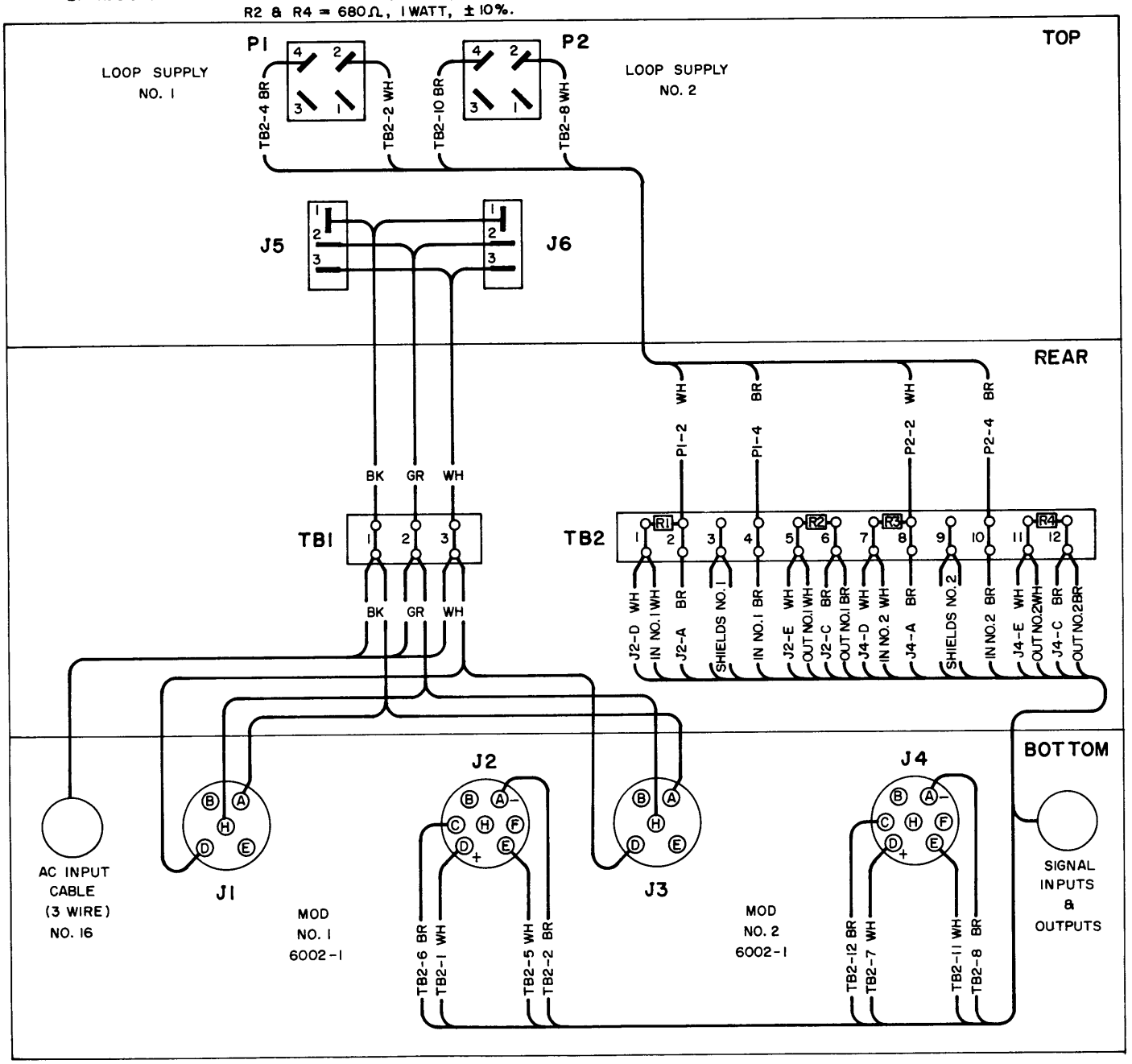
1. UNLESS OTHERWISE INDICATED, ALL WIRES ARE NO. 22 AWG STRANDED.
2. RESISTOR VALUES: R1 & R2 = 680Ω, 1 WATT, ± 10%.
3. LOOP SUPPLIES NO.1 & NO.2 NOT REQUIRED IN DRY KEY OPERATION.



FOLD OUT VIEW

Figure 4-65. FSK Diversity Tone Converter Panel (Dry Key), Wiring Diagram

NOTES:
1. UNLESS OTHERWISE INDICATED, ALL WIRES ARE NO. 22 AWG STRANDED.
2. RESISTOR VALUES: R1 & R3 = 300Ω, 1 WATT, ±10%.
R2 & R4 = 680Ω, 1 WATT, ±10%.



FOLD OUT VIEW

Figure 4-66. FSK Tone Converter Panel (Wet Key), Wiring Diagram

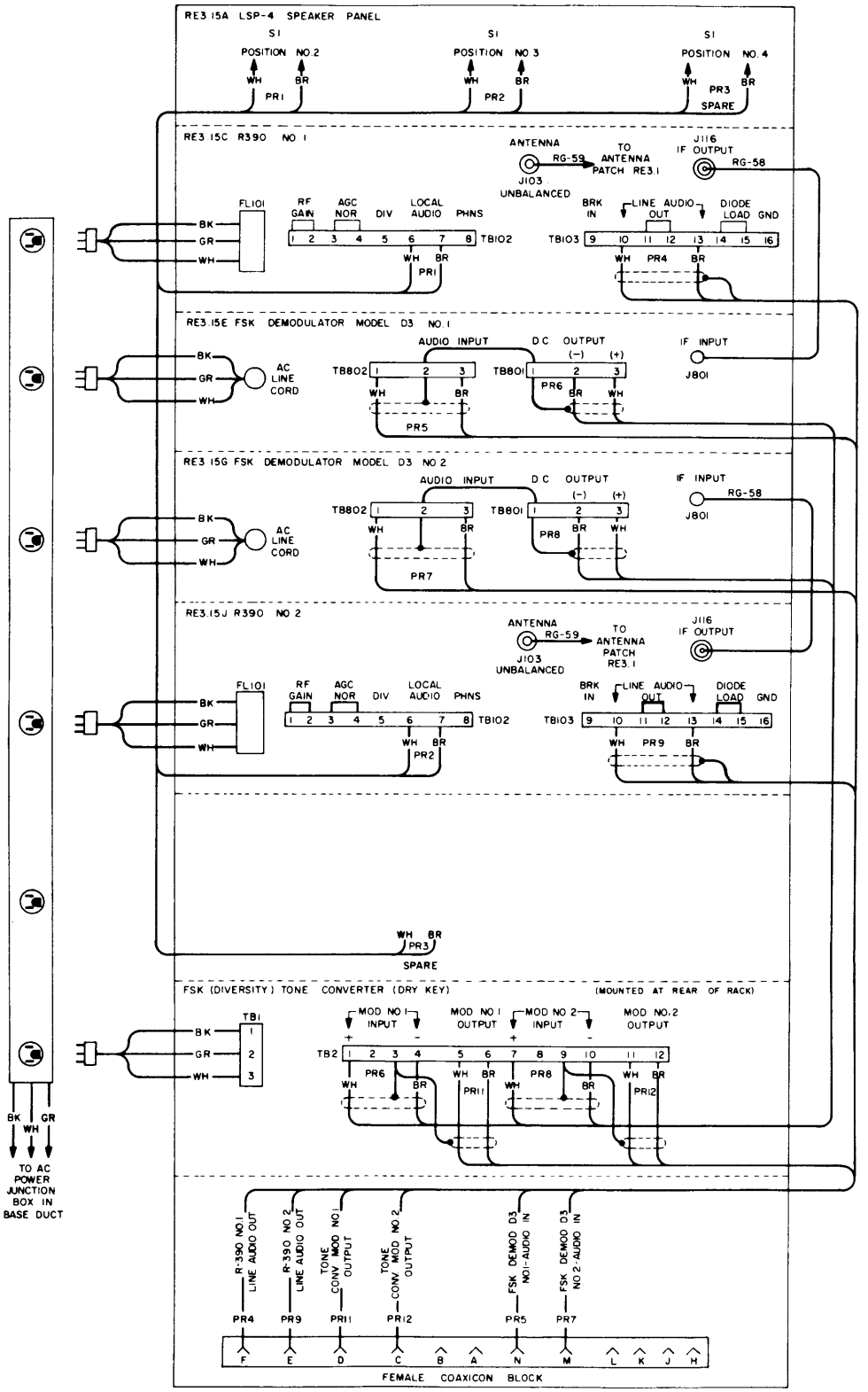


Figure 4-67. FSK Equipment Rack RE3.15, Wiring Diagram

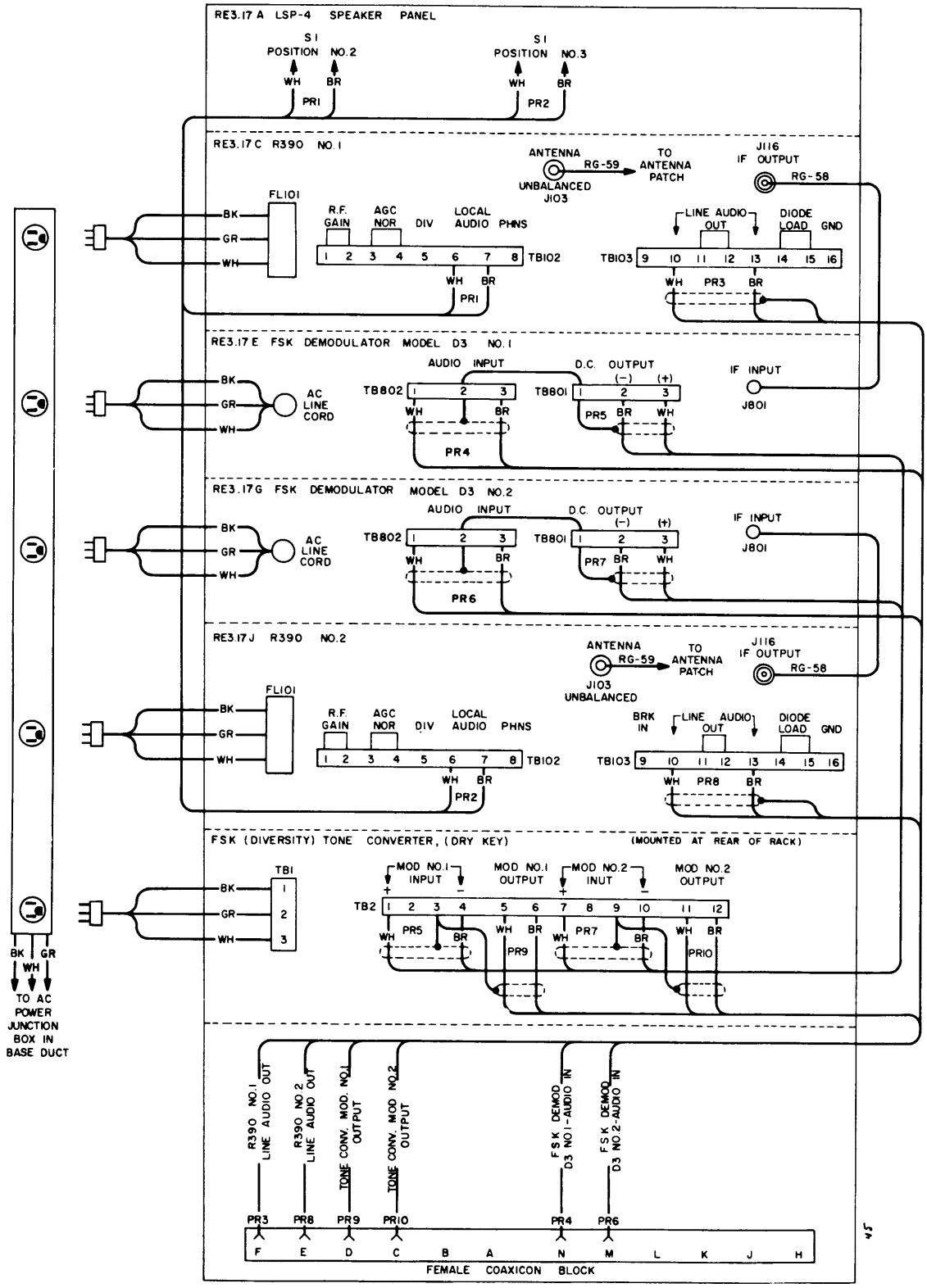


Figure 4-68. FSK Equipment Racks RE3.17, 3.21, 3.23 and 3.27, Wiring Diagram

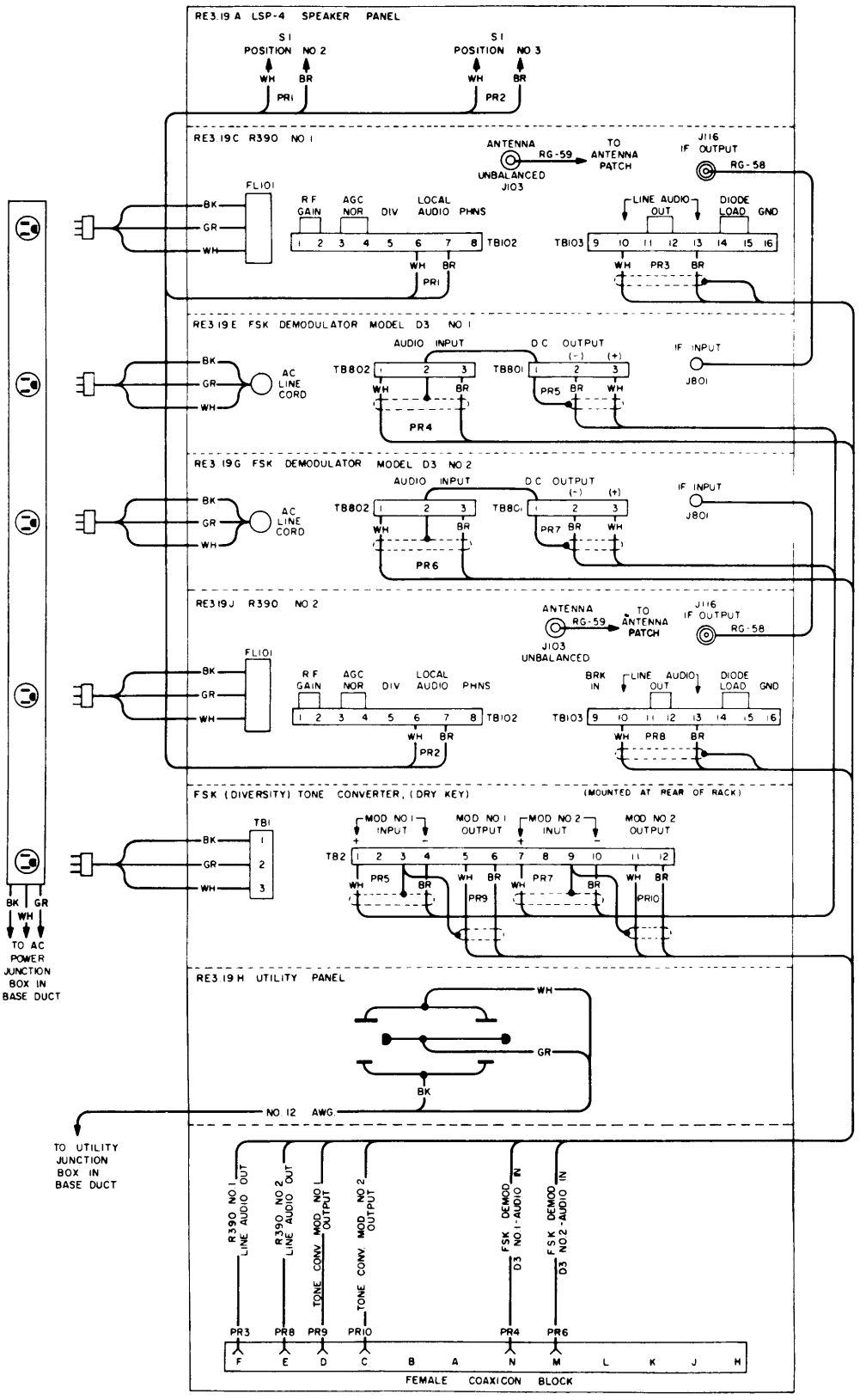


Figure 4-69. FSK Equipment Racks RE3.19 and RE3.25, Wiring Diagram

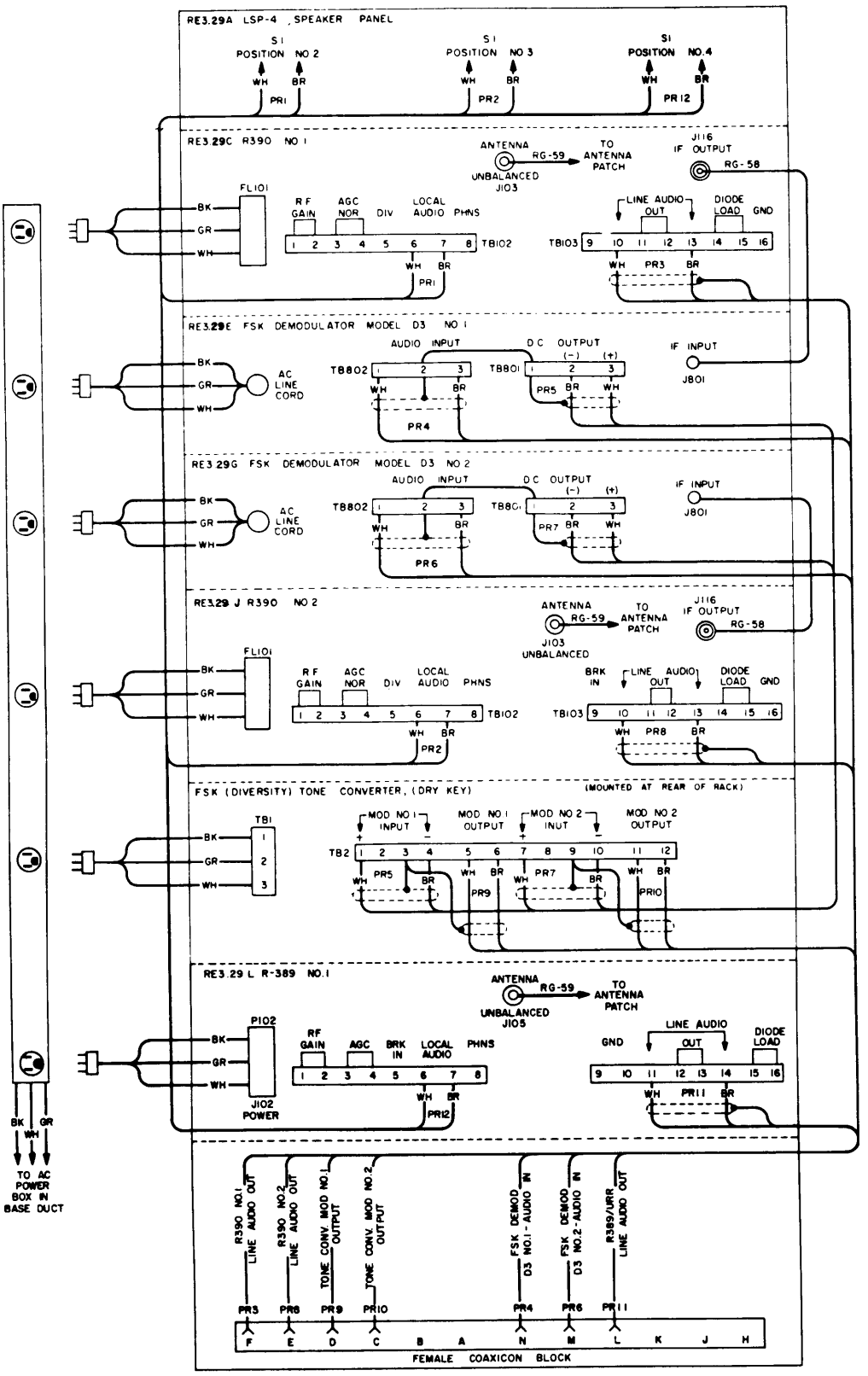


Figure 4-70. FSK Equipment Rack RE3.29, Wiring Diagram

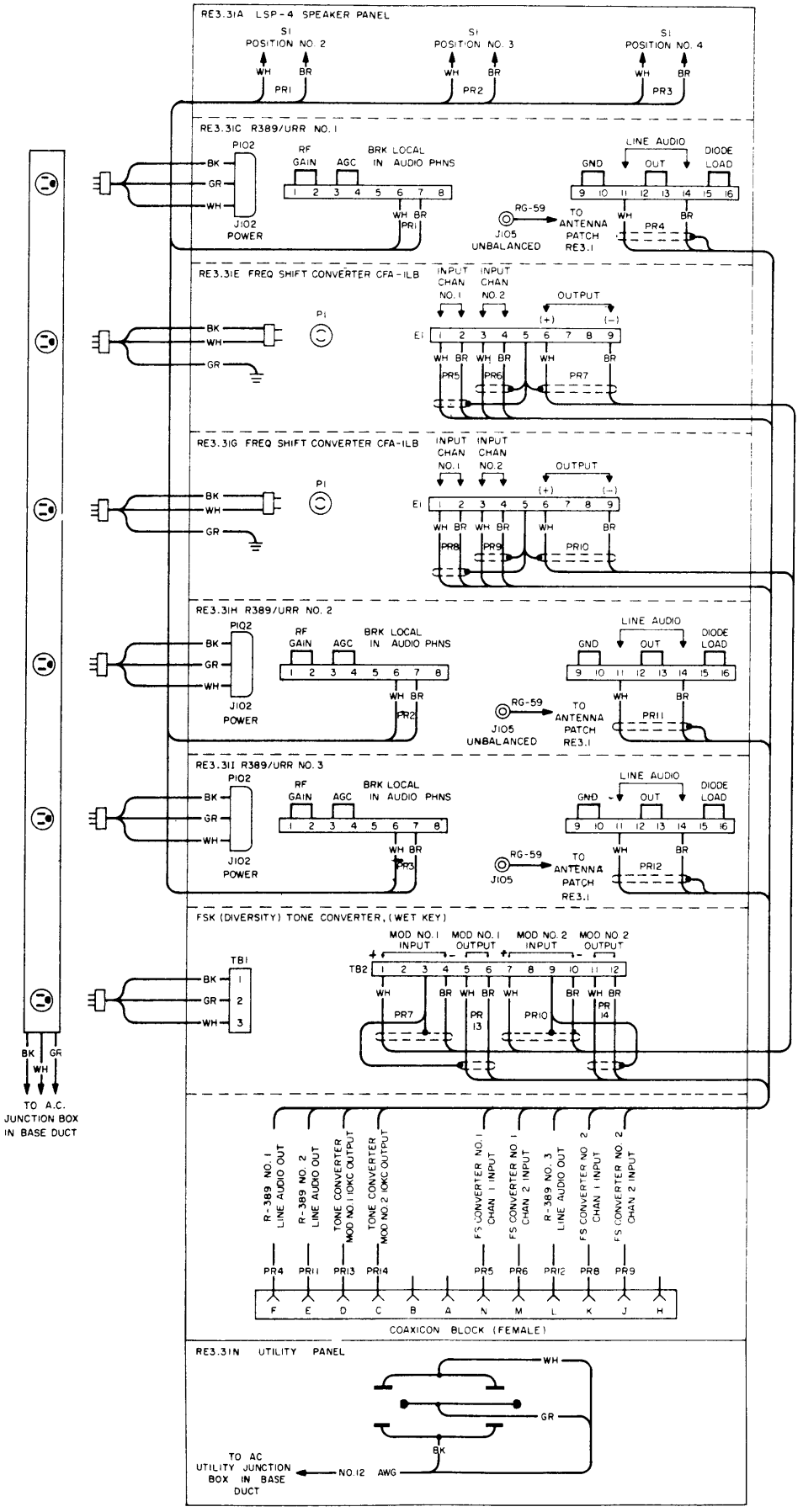


Figure 4-71. FSK Equipment Rack RE3.31, Wiring Diagram

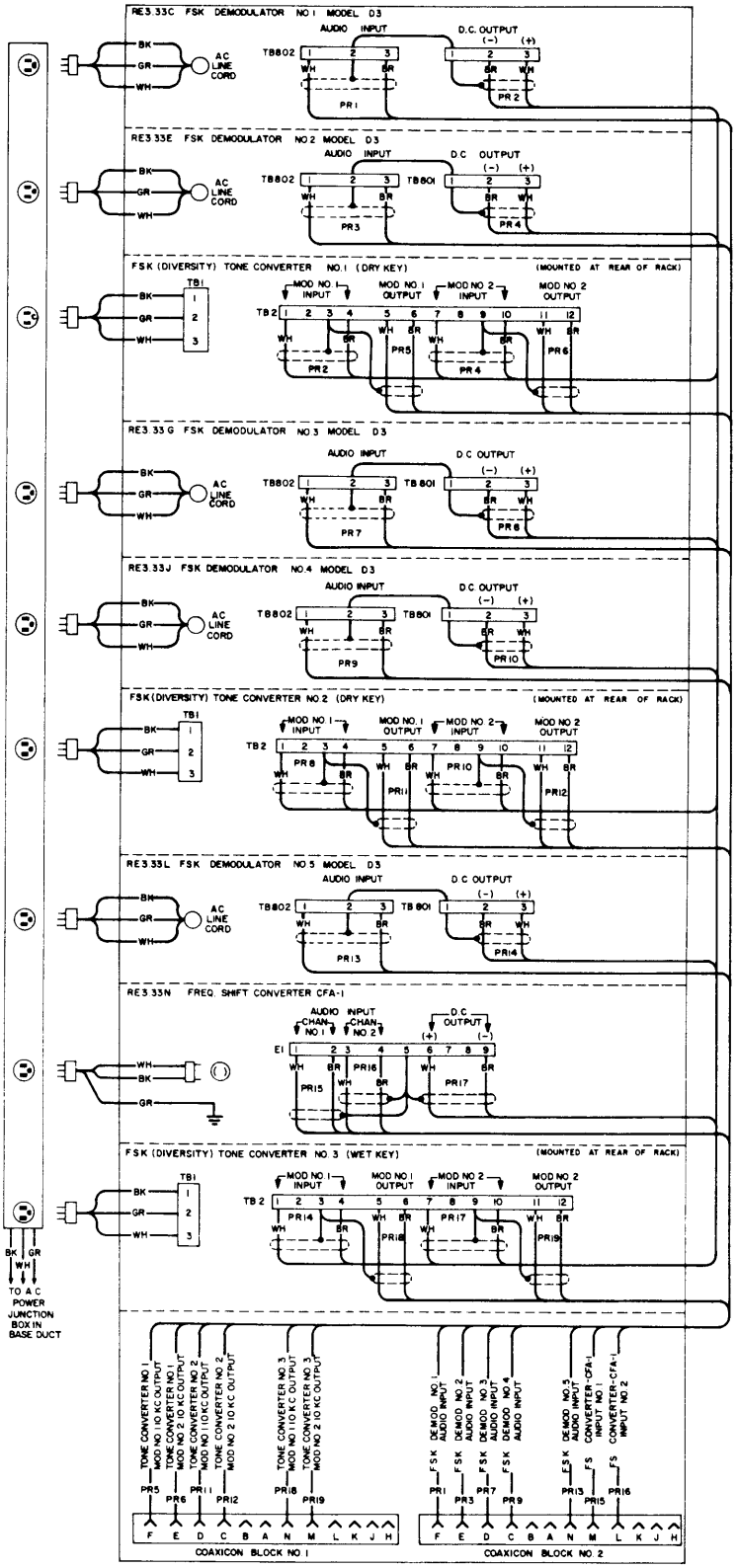


Figure 4-72. FSK Equipment Rack RE3.33, Wiring Diagram

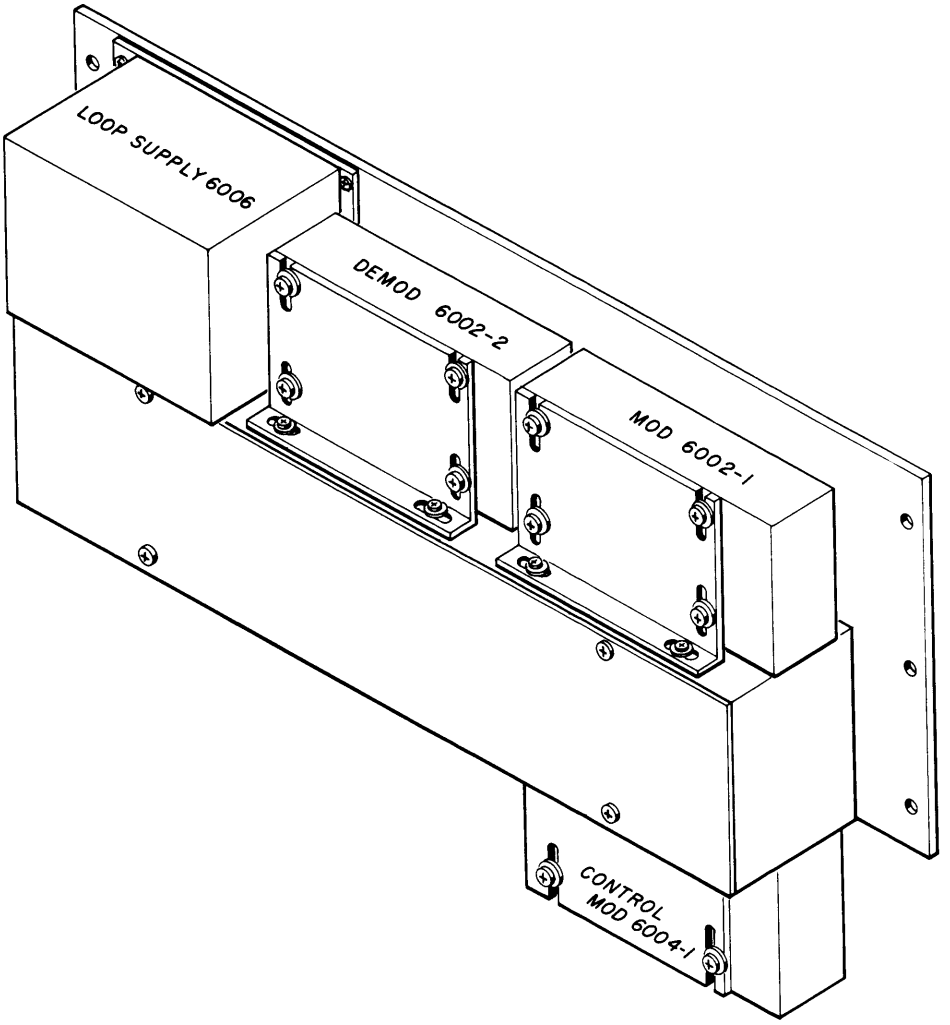
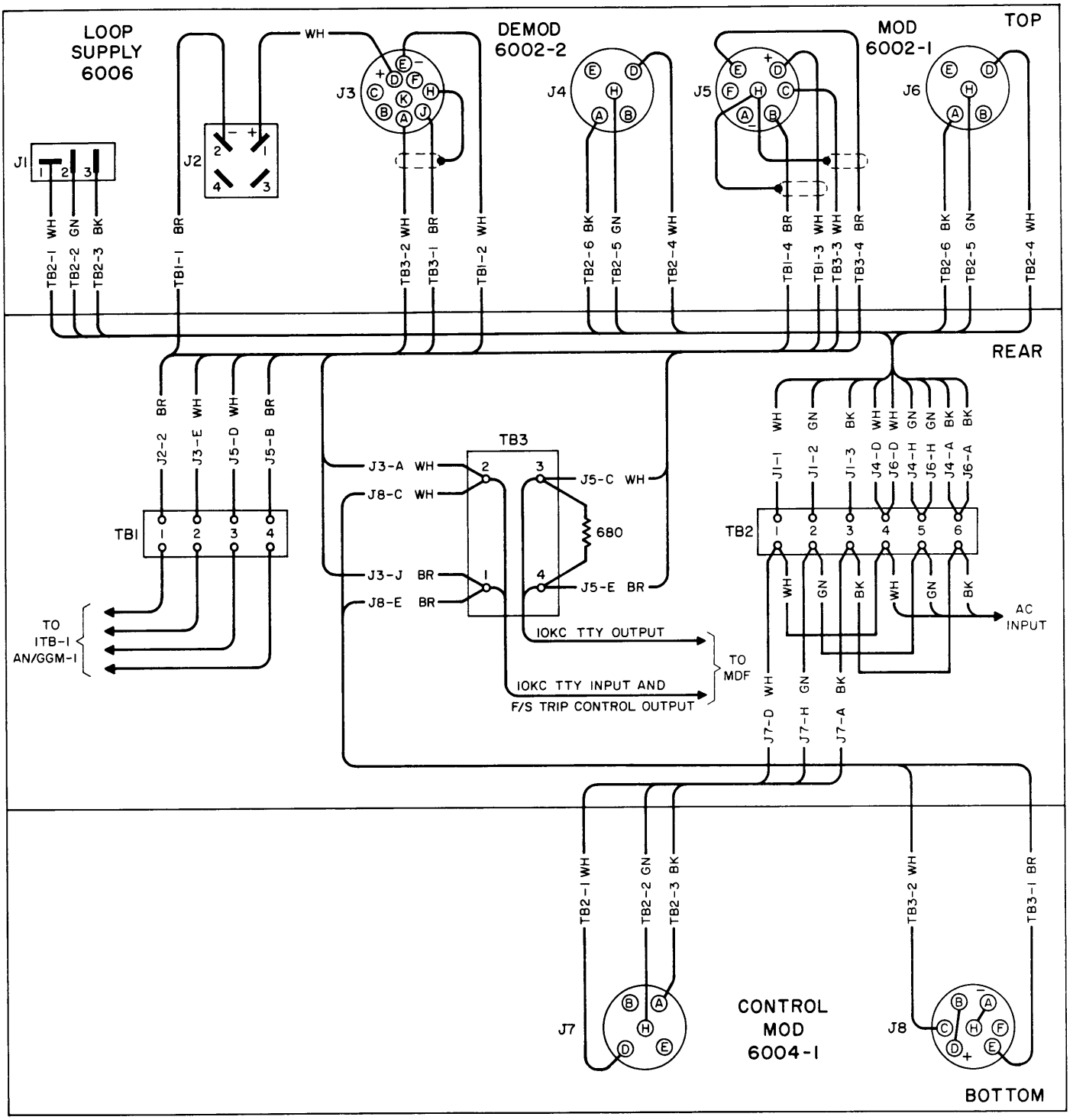


Figure 4-73. AN/GGM-1 Tone Converter Panel, Isometric View



NOTES:

1. TERMINALS B & D OF J8 STRAPPED TO PROVIDE CONTINUOUS STEPPING OPERATION.

Figure 4-74. AN/GGM-1 Tone Converter Panel, Wiring Diagram

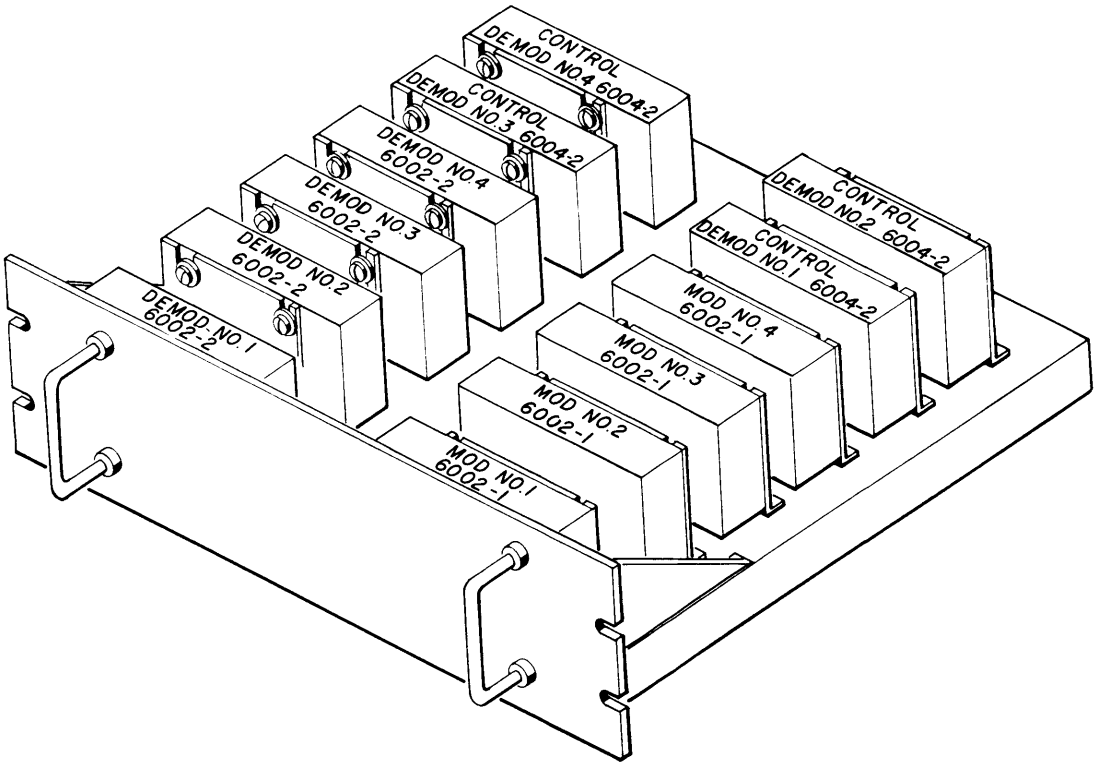


Figure 4-75. RED Tone Converter Drawer RA3.16, Isometric View

TB1 TERM	DESTINATION	COLOR
1	J19-D	WH
2	TB8-2	BK
3	J19-E	BR
4	J20-D	WH
5	TB8-5	BK
6	J20-E	BR
7	J21-D	WH
8	TB8-8	BK
9	J21-E	BR
10	J22-D	WH
11	TB8-11	BK
12	J22-E	BR

TB2 TERM	DESTINATION	COLOR
1	TB3-6	WH
2	J1-H,TB9-2	BK
3	TB3-5	BR
4	TB3-4	WH
5	J2-H,TB9-5	BK
6	TB3-3	BR
7	TB4-6	WH
8	J3-H,TB9-8	BK
9	TB4-5	BR
10	TB4-4	WH
11	J4-H,TB9-11	BK
12	TB4-3	BR

TB2 TERM	DESTINATION	COLOR
13	J5-D	WH
14	J5-H,TB9-14	BK
15	J5-E	BR
16	J6-D	WH
17	J6-H,TB9-17	BK
18	J6-E	BR
19	J23-D	WH
20	TB9-20	BK
21	J23-E	BR
22	J24-D	WH
23	TB9-23	BK
24	J24-E	BR

TB8 TERM	DESTINATION	COLOR
1	J19-J	WH
2	J19-H,TB1-2	BK
3	J19-A	BR
4	J20-J	WH
5	J20-H,TB1-5	BK
6	J20-A	BR
7	J21-J	WH
8	J21-H,TB1-8	BK
9	J21-A	BR
10	J22-J	WH
11	J22-H,TB1-11	BK
12	J22-A	BR

TB9 TERM	DESTINATION	COLOR
1	TB3-8	WH
2	TB2-2	BK
3	TB3-7	BR
4	TB3-2	WH
5	TB2-5	BK
6	TB3-1	BR
7	TB4-8	WH
8	TB2-8	BK
9	TB4-7	BR
10	TB4-2	WH
11	TB2-11	BK
12	TB4-1	BR

TB9 TERM	DESTINATION	COLOR
13	J5-J	WH
14	TB2-14	BK
15	J5-A	BR
16	J6-J	WH
17	TB2-17	BK
18	J6-A	BR
19	J23-J	WH
20	J23-H,TB2-20	BK
21	J23-A	BR
22	J24-J	WH
23	J24-H,TB2-23	BK
24	J24-A	BR

NOTES: 1 - R2,R3,R6,R7 = 300 Ω 1W ± 10%
R1,R4,R5,R8 = 680 Ω 1W ± 10%

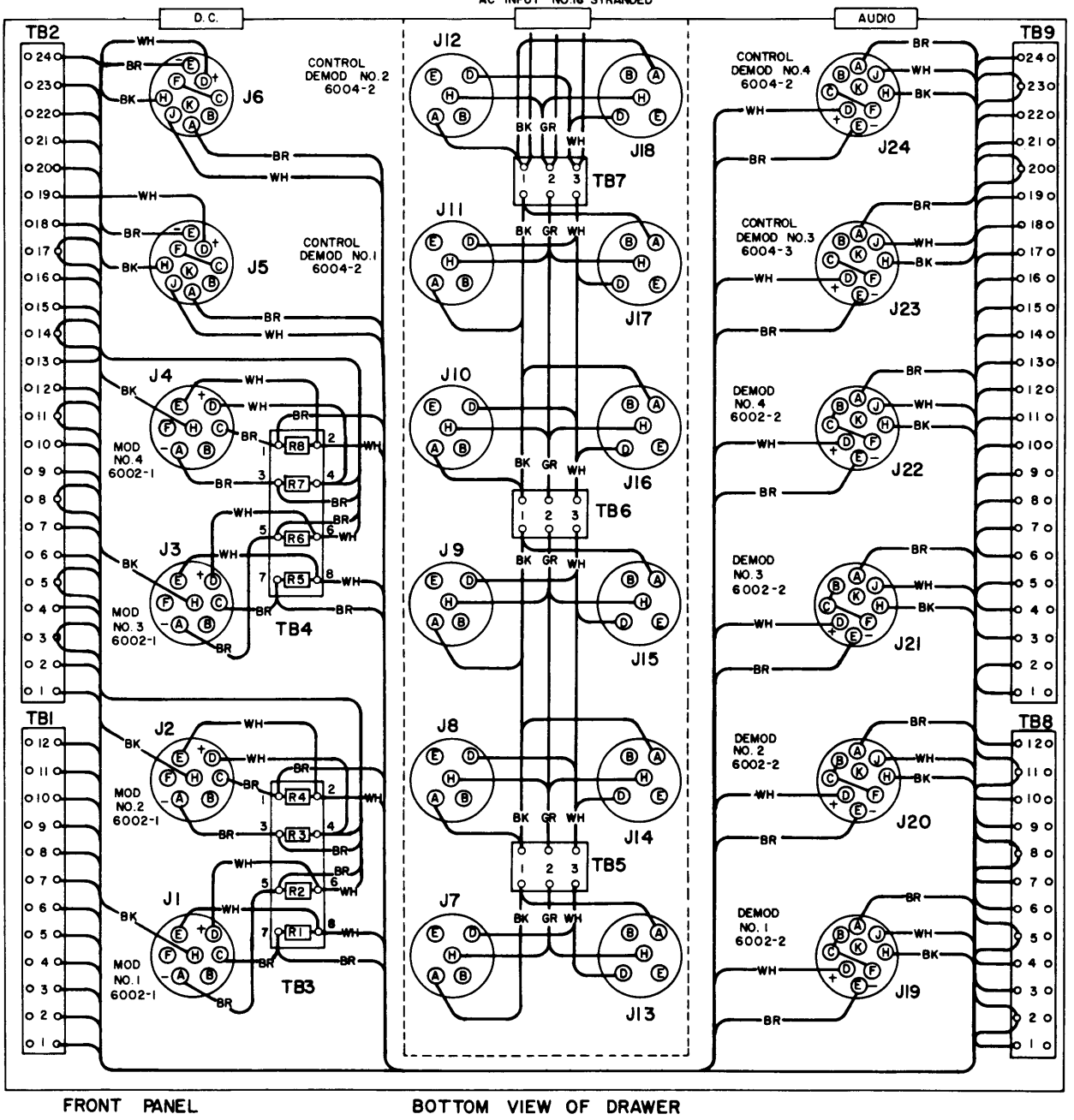


Figure 4-76. RED Tone Converter Drawer RA3.16, Wiring Diagram

TB1 TERM	DESTINATION	COLOR	TB1 TERM	DESTINATION	COLOR	TB6 TERM	DESTINATION	COLOR	TB6 TERM	DESTINATION	COLOR
1	TB2-8	WH	13	J13-D	WH	1	TB2-6	WH	13	J13-J	WH
2	TB6-2,J1-H	BK	14	TB6-14,	BK	2	TB1-2	BK	14	TB1-14,J13-H	BK
3	TB2-7	BR	15	J13-E	BR	3	TB2-5	BR	15	J13-A	BR
4	TB2-2	WH	16	J14-D	WH	4	TB2-4	WH	16	J14-J	WH
5	TB6-5,J2-H	BK	17	TB6-17	BK	5	TB1-5	BK	17	TB1-17,J14-H	BK
6	TB2-1	BR	18	J14-E	BR	6	TB2-3	BR	18	J14-A	BR
7	TB3-8	WH	19	J15-D	WH	7	TB3-6	WH	19	J15-J	WH
8	TB6-8,J3-H	BK	20	TB6-20	BK	8	TB1-8	BK	20	TB1-20,J15-H	BK
9	TB3-7	BR	21	J15-E	BR	9	TB3-5	BR	21	J15-A	BR
10	TB3-2	WH	22	J16-D	WH	10	TB3-4	WH	22	J16-J	WH
11	TB6-11,J4-H	BK	23	TB6-23	BK	11	TB1-11	BK	23	TB1-23,J16-H	BK
12	TB3-1	BR	24	J16-E	BR	12	TB3-3	BR	24	J16-A	BR

NOTES:
1 - R2,R3,R6,R7 = 680 ~ 1 W ± 10%
R1,R4,R5,R8 = 300 ~ 1 W ± 10%

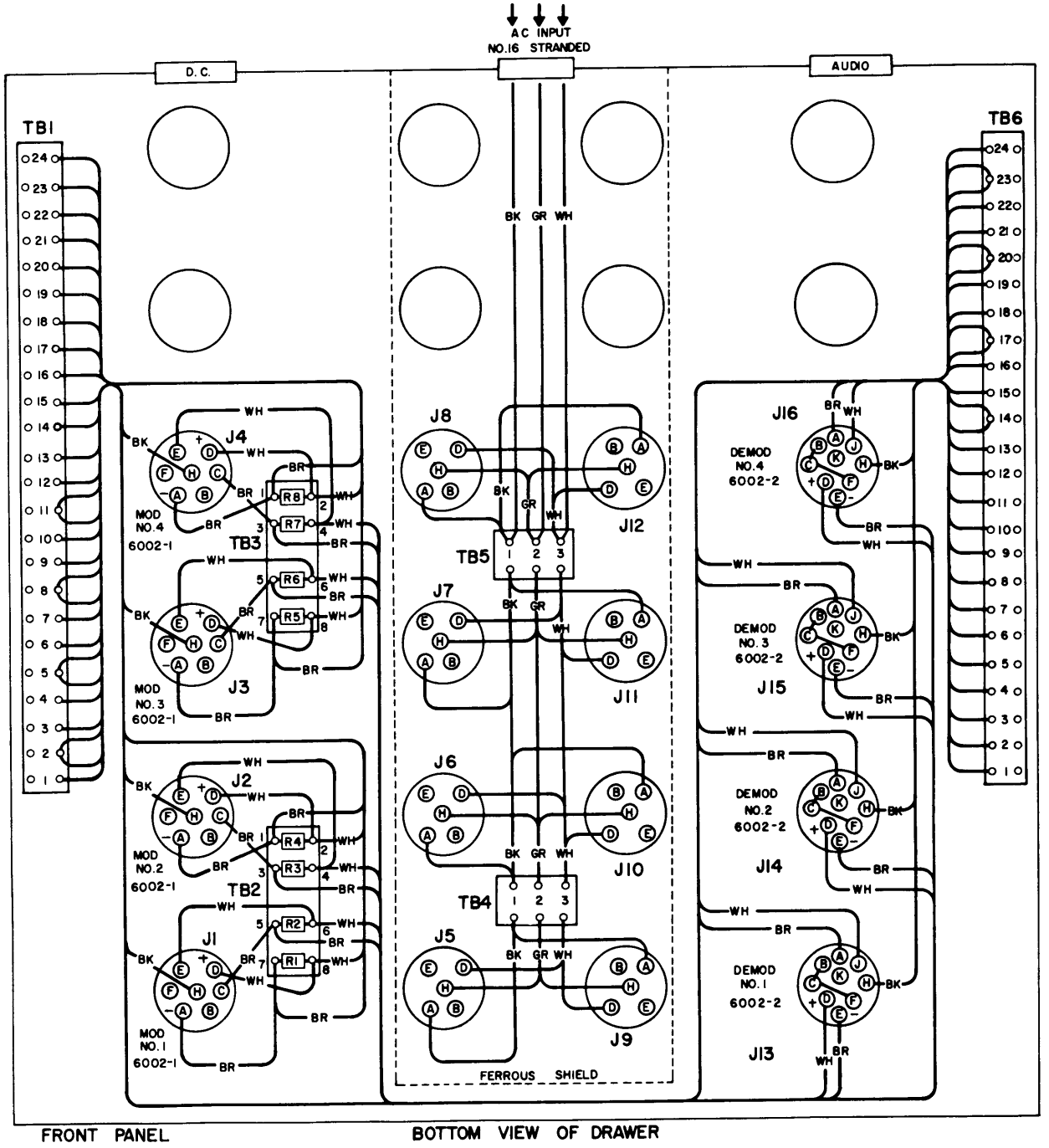


Figure 4-77. BLACK Tone Converter Drawer RA3.15, Wiring Diagram

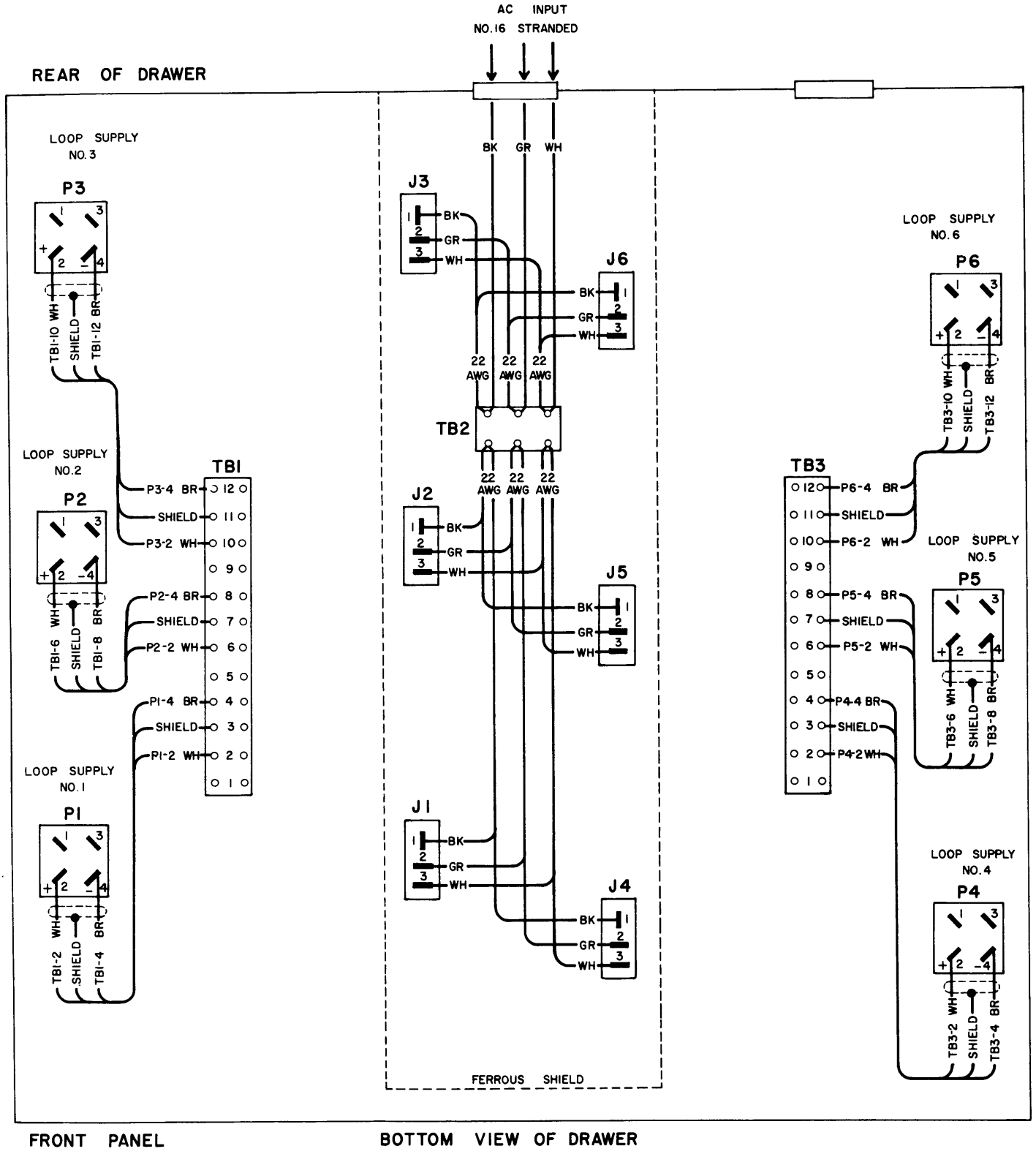


Figure 4-78. Loop Supply Drawer, 6 Unit, RA3.15 & 3.16, Wiring Diagram

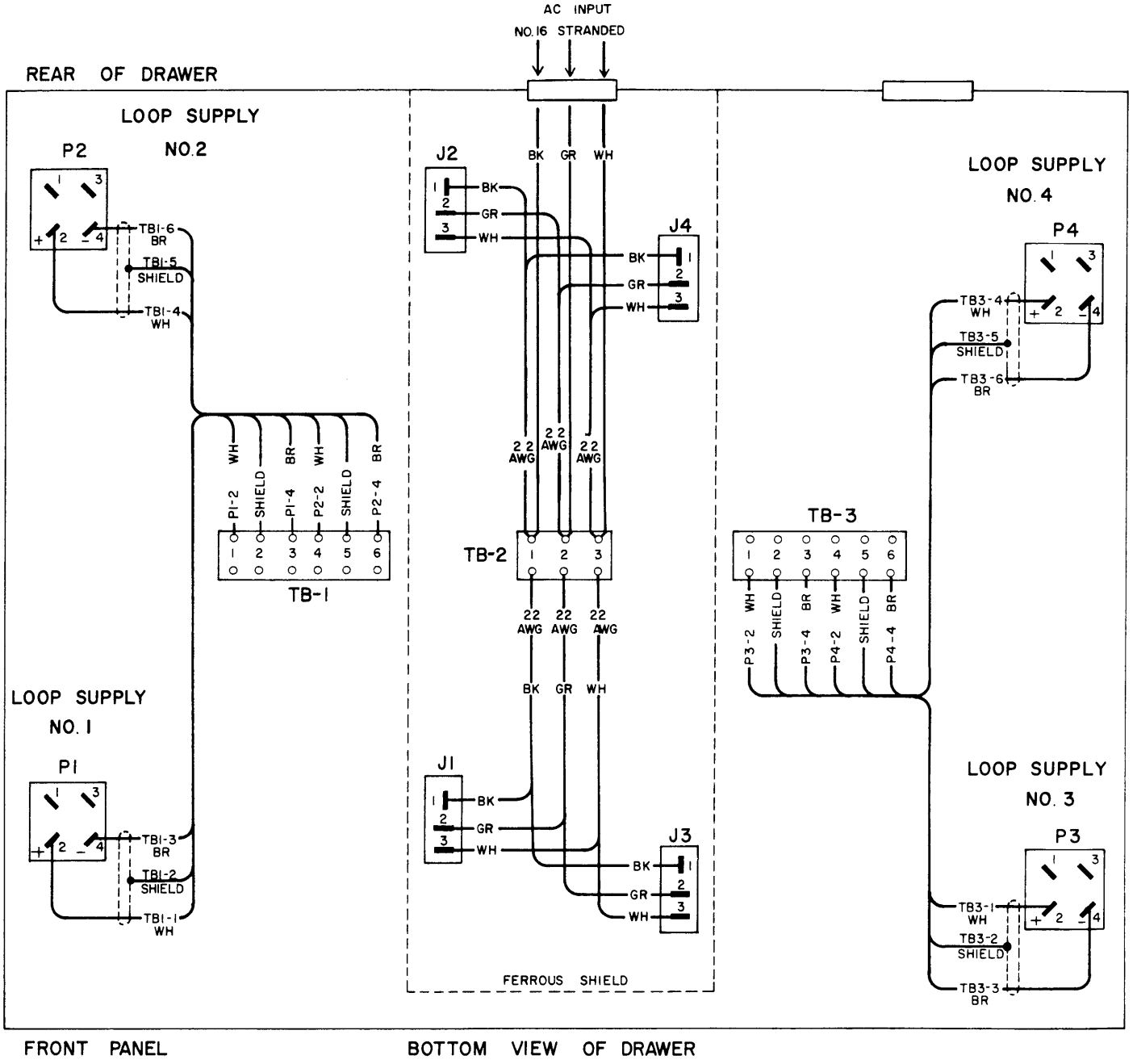


Figure 4-79. Loop Supply Drawer, 4 Unit, RA3.15 and RA3.16, Wiring Diagram

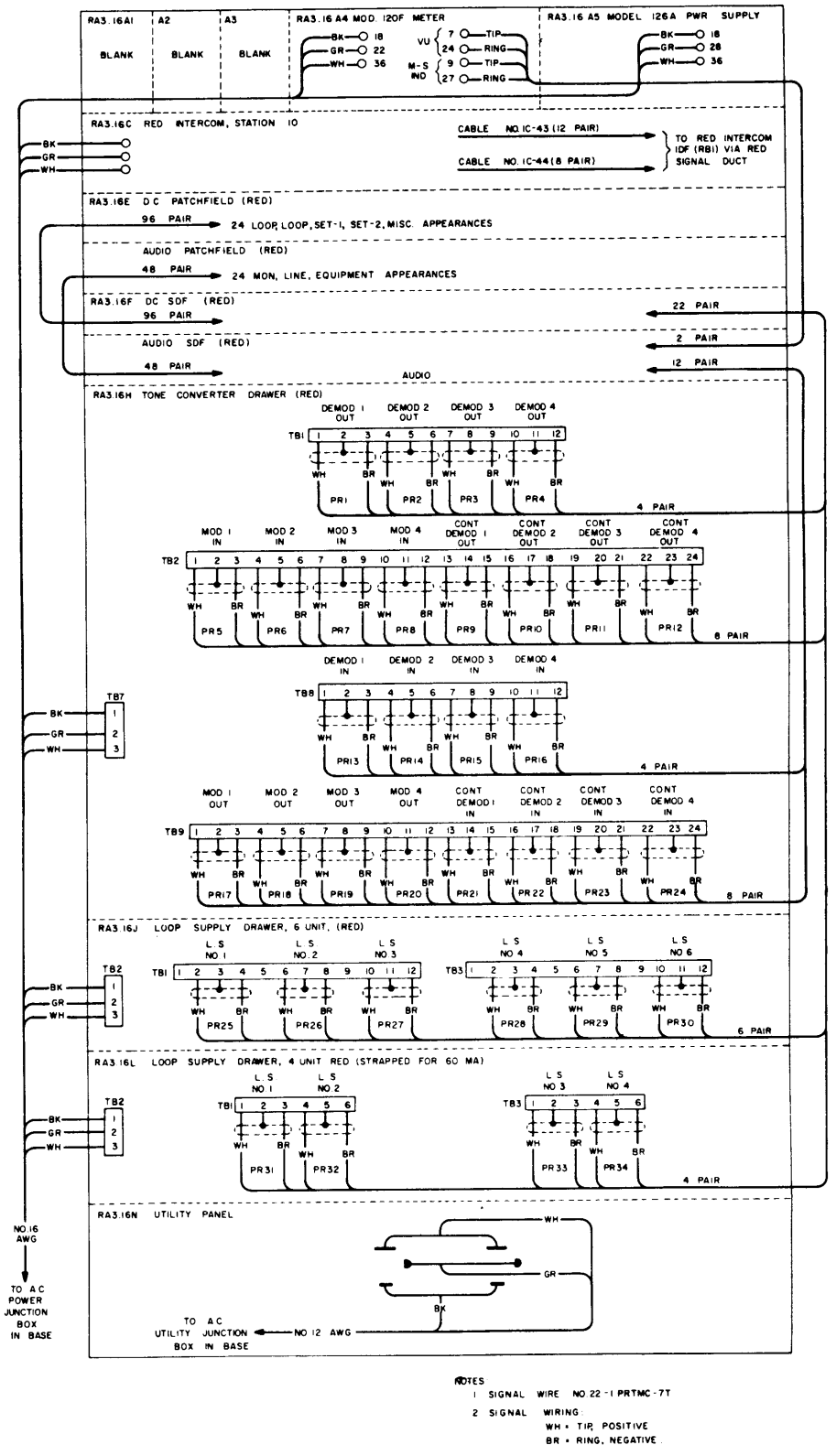


Figure 4-80. RED Control Rack RA3.16, Wiring Diagram

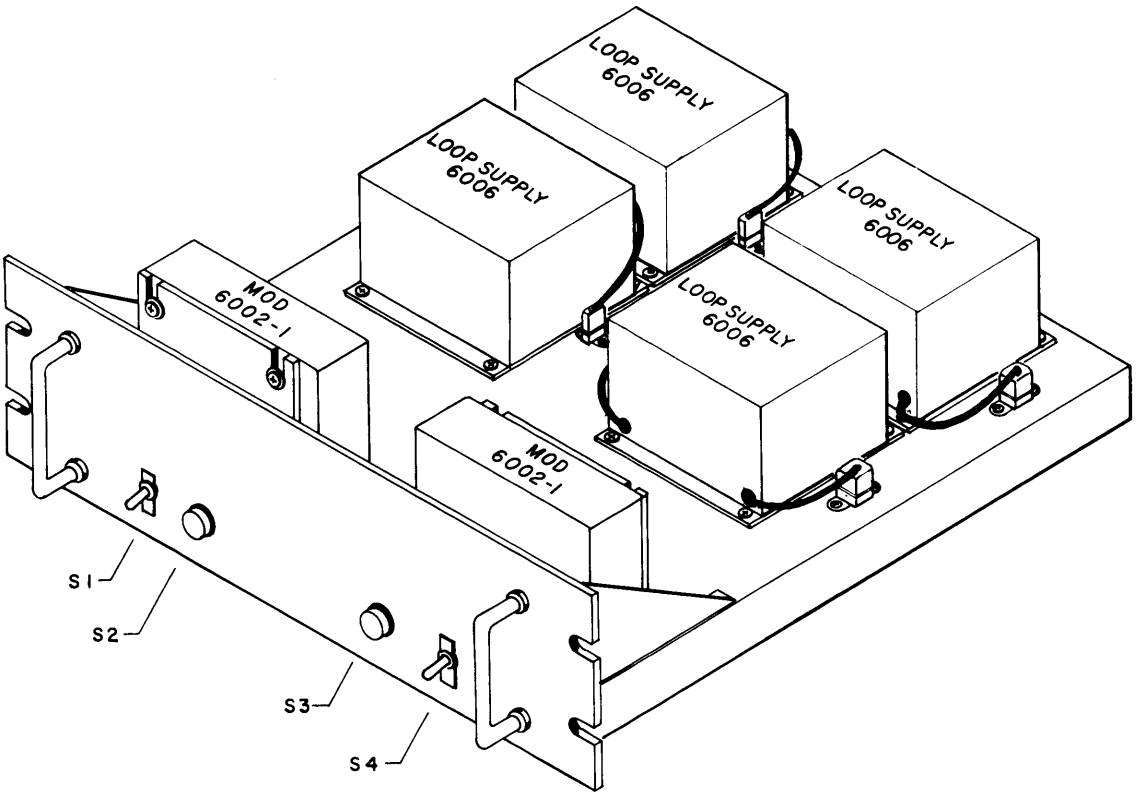


Figure 4-81. 660A Tone Converter Drawer RF2.17, Isometric View

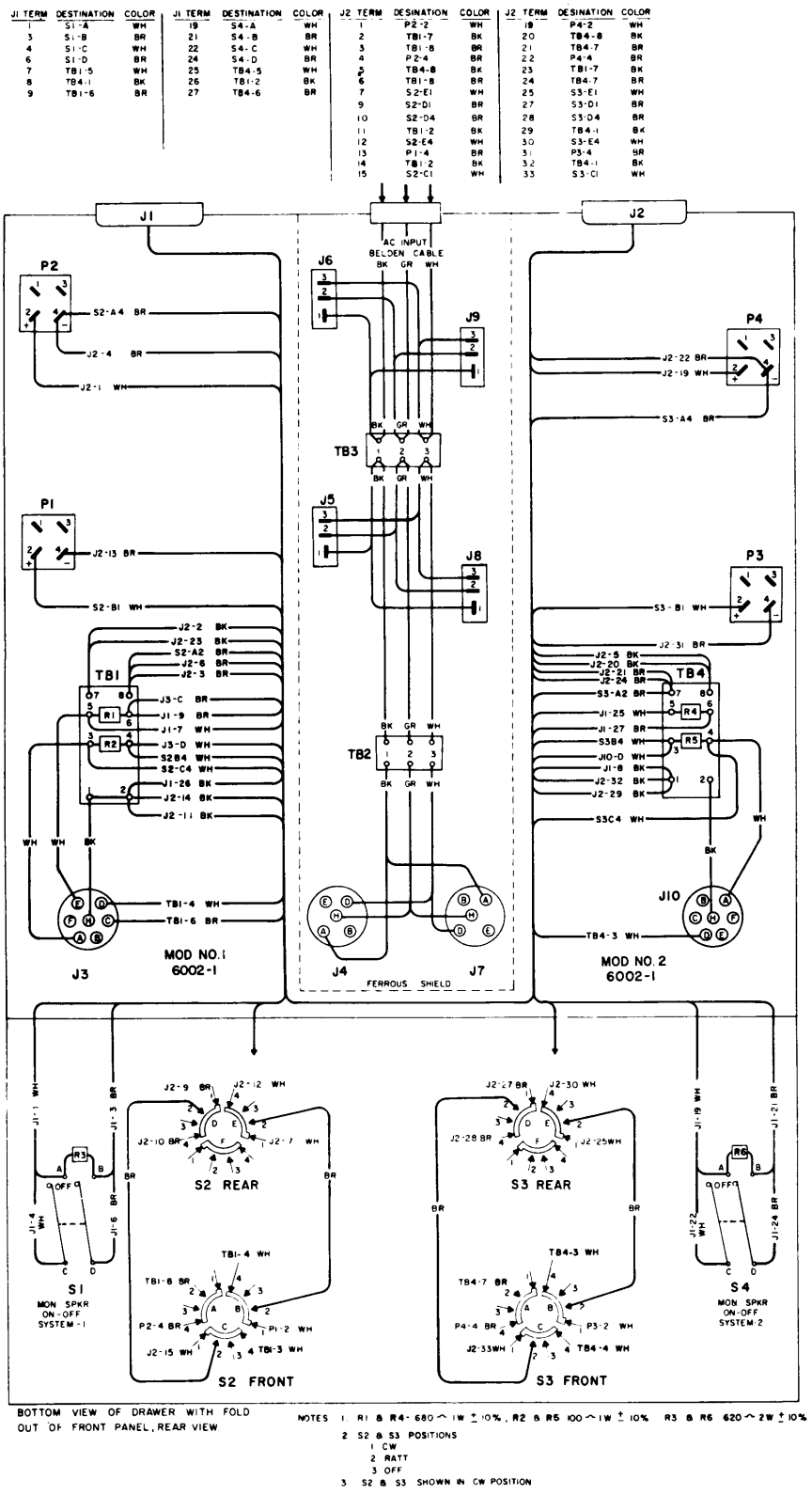


Figure 4-82. 660A Tone Converter Drawer RF2.17, Wiring Diagram

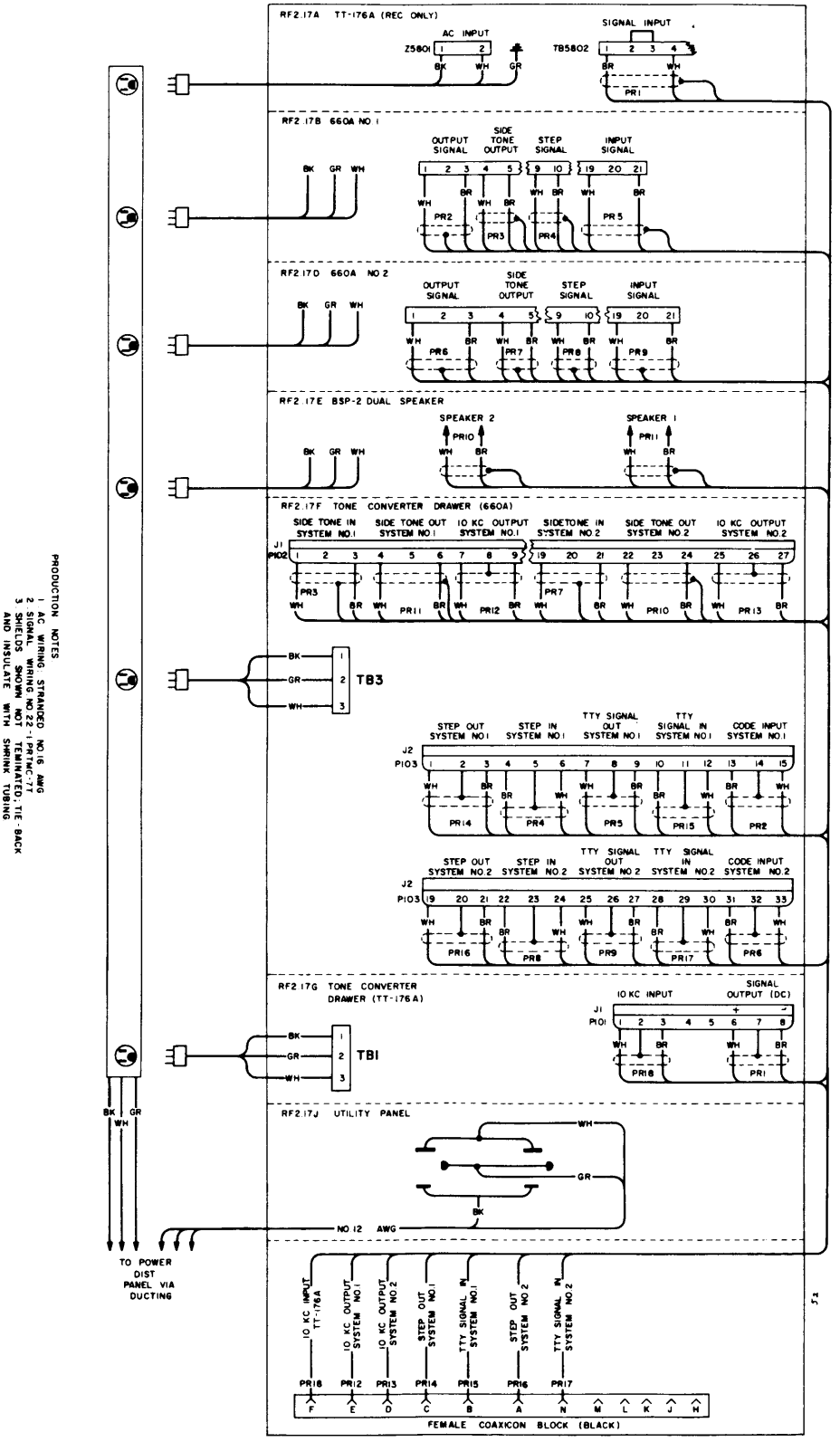


Figure 4-83. 660A Code Format Converter Rack RF2.17, Wiring Diagram

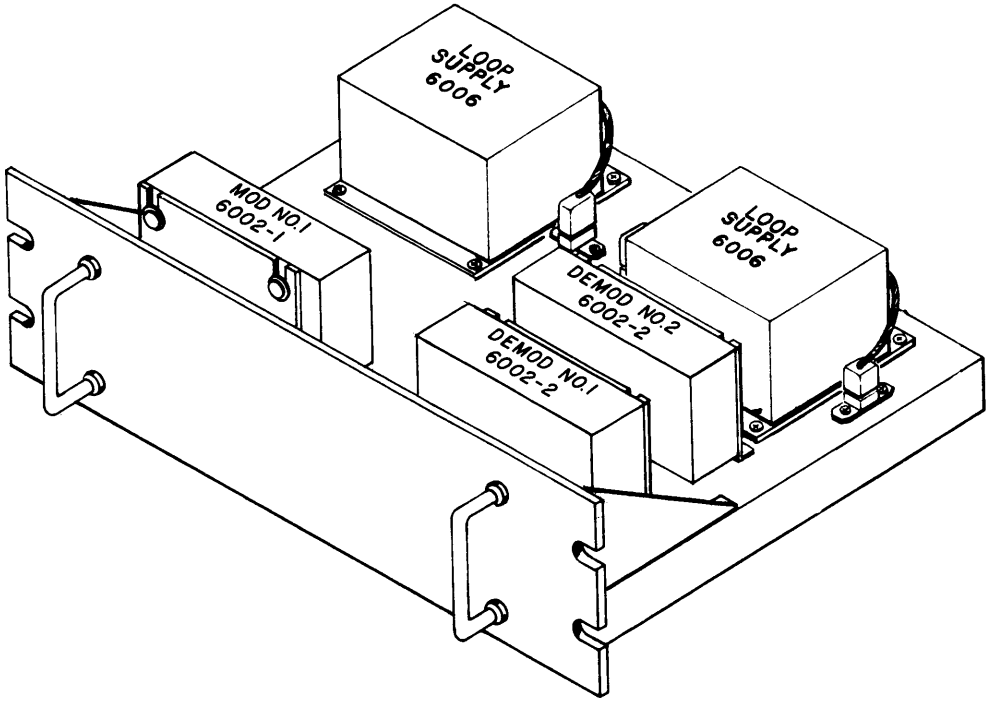


Figure 4-84. HW-19 Tone Converter Drawer, Isometric View

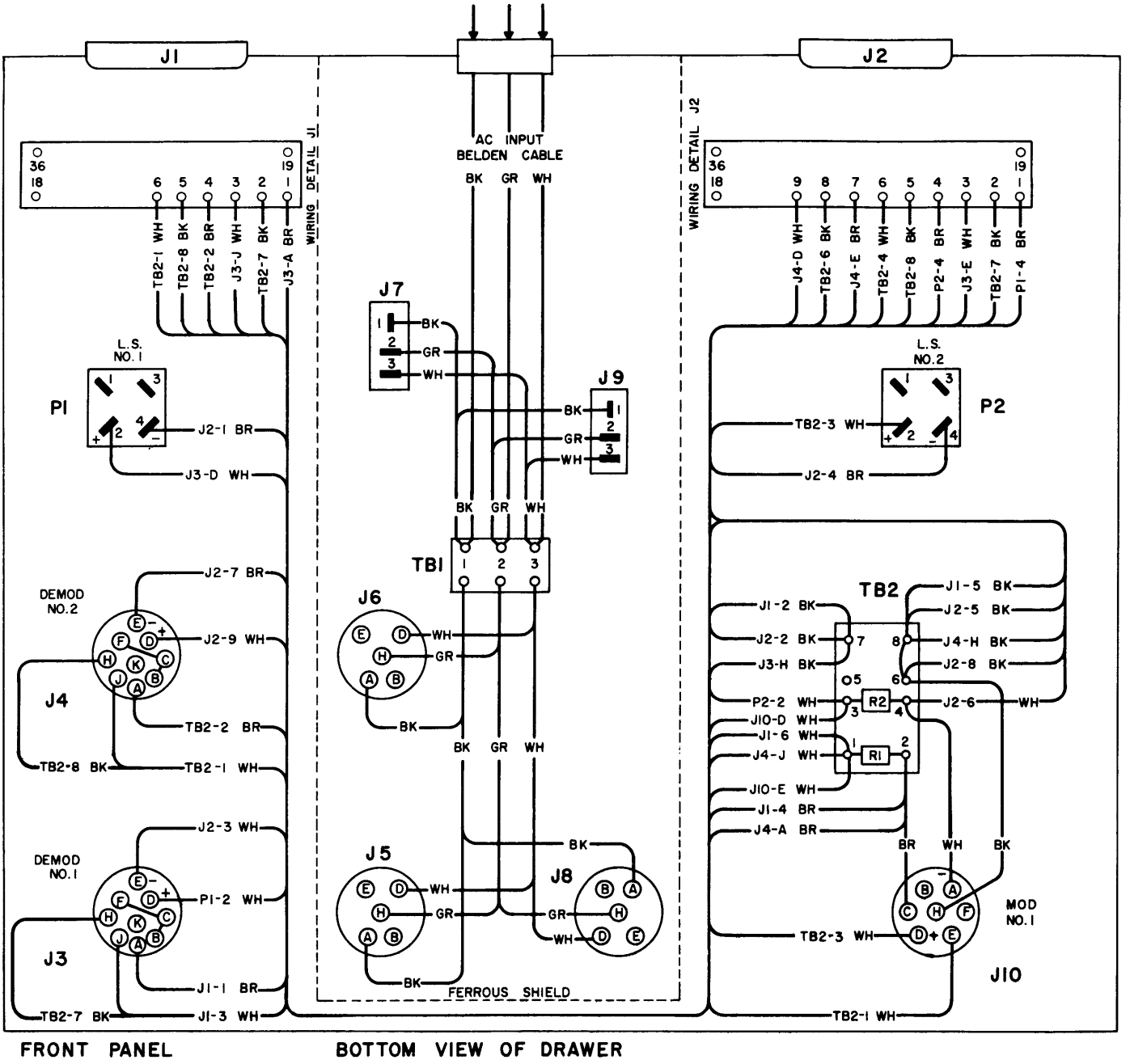


Figure 4-85. HW-19 Tone Converter Drawer, Wiring Diagram

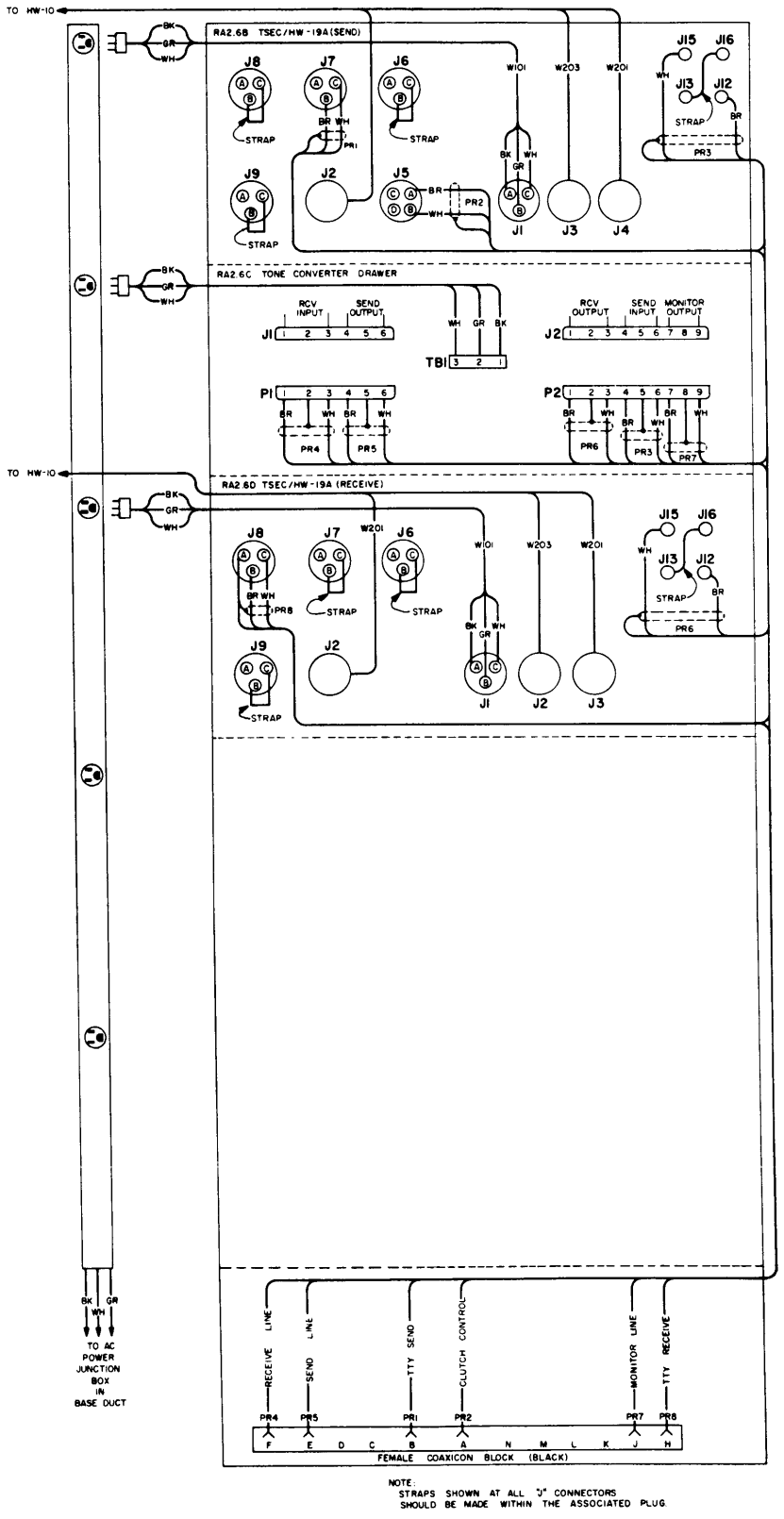
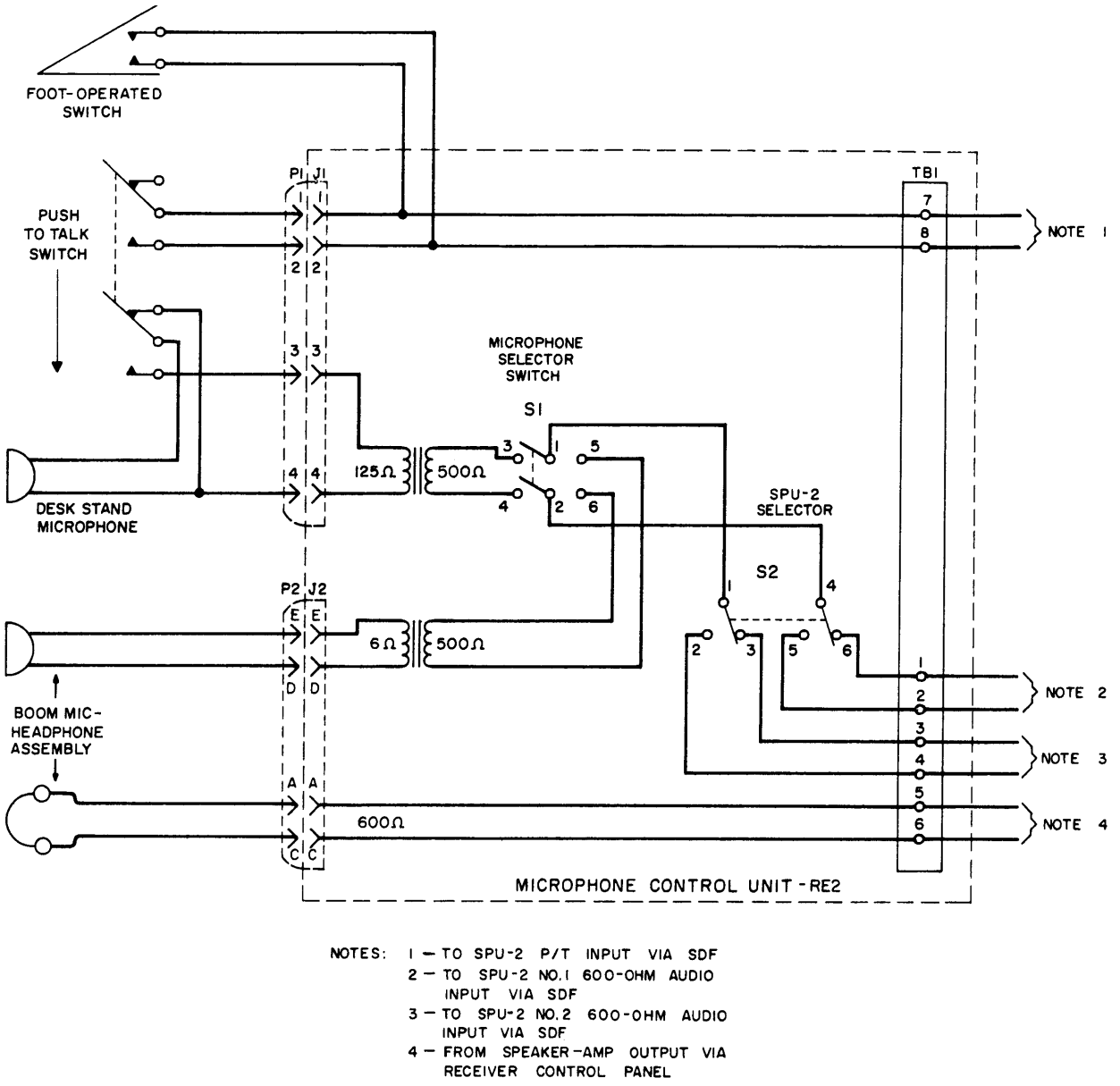


Figure 4-86. HW-19/10 Rack RA2.6, Wiring Diagram



NOTES: 1 — TO SPU-2 P/T INPUT VIA SDF
2 — TO SPU-2 NO.1 600-OHM AUDIO INPUT VIA SDF
3 — TO SPU-2 NO.2 600-OHM AUDIO INPUT VIA SDF
4 — FROM SPEAKER-AMP OUTPUT VIA RECEIVER CONTROL PANEL

Figure 4-87. Microphone Control Unit RE2, Wiring Diagram

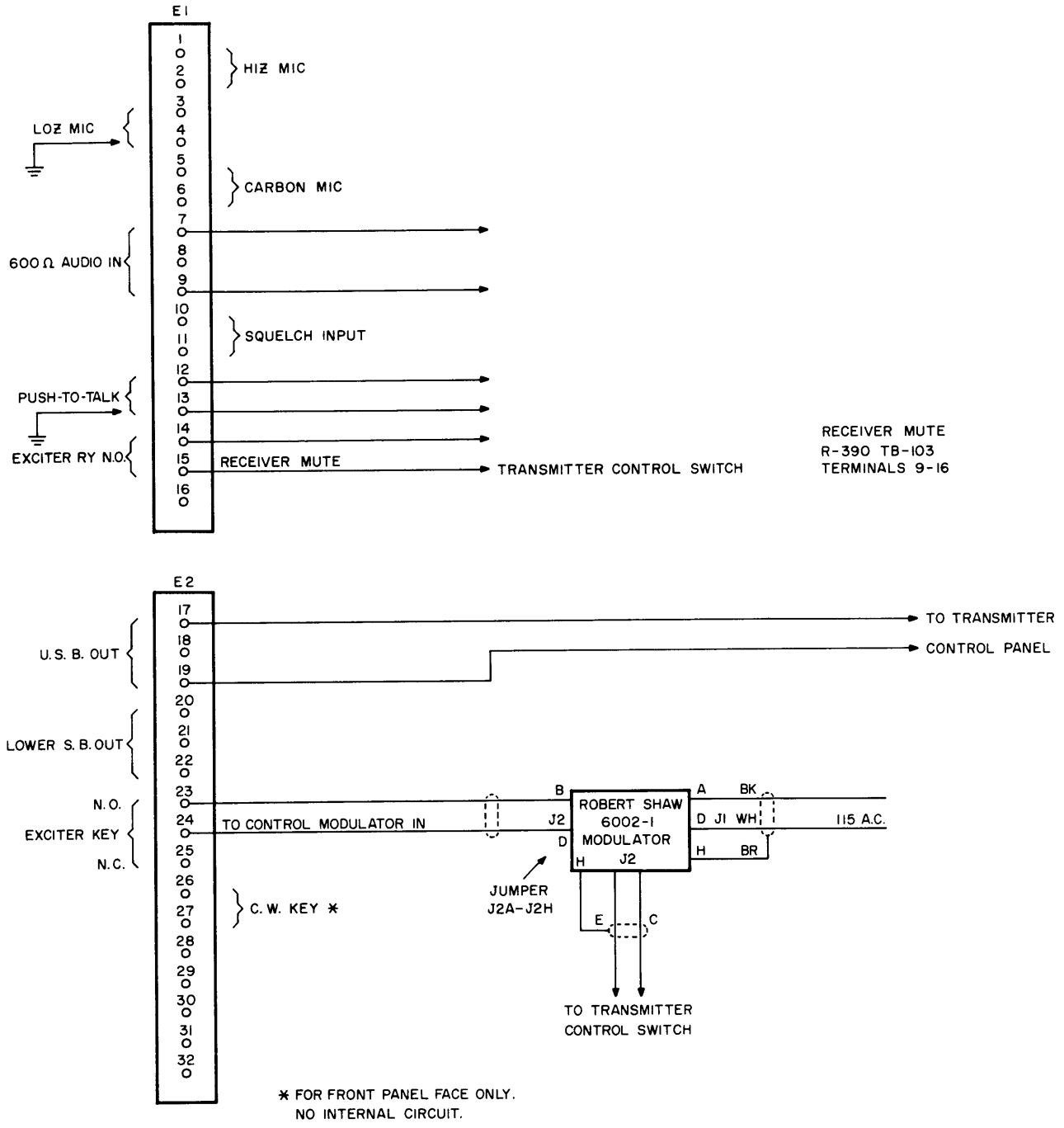


Figure 4-88. SPU-2 Connections to Audio Control Circuits

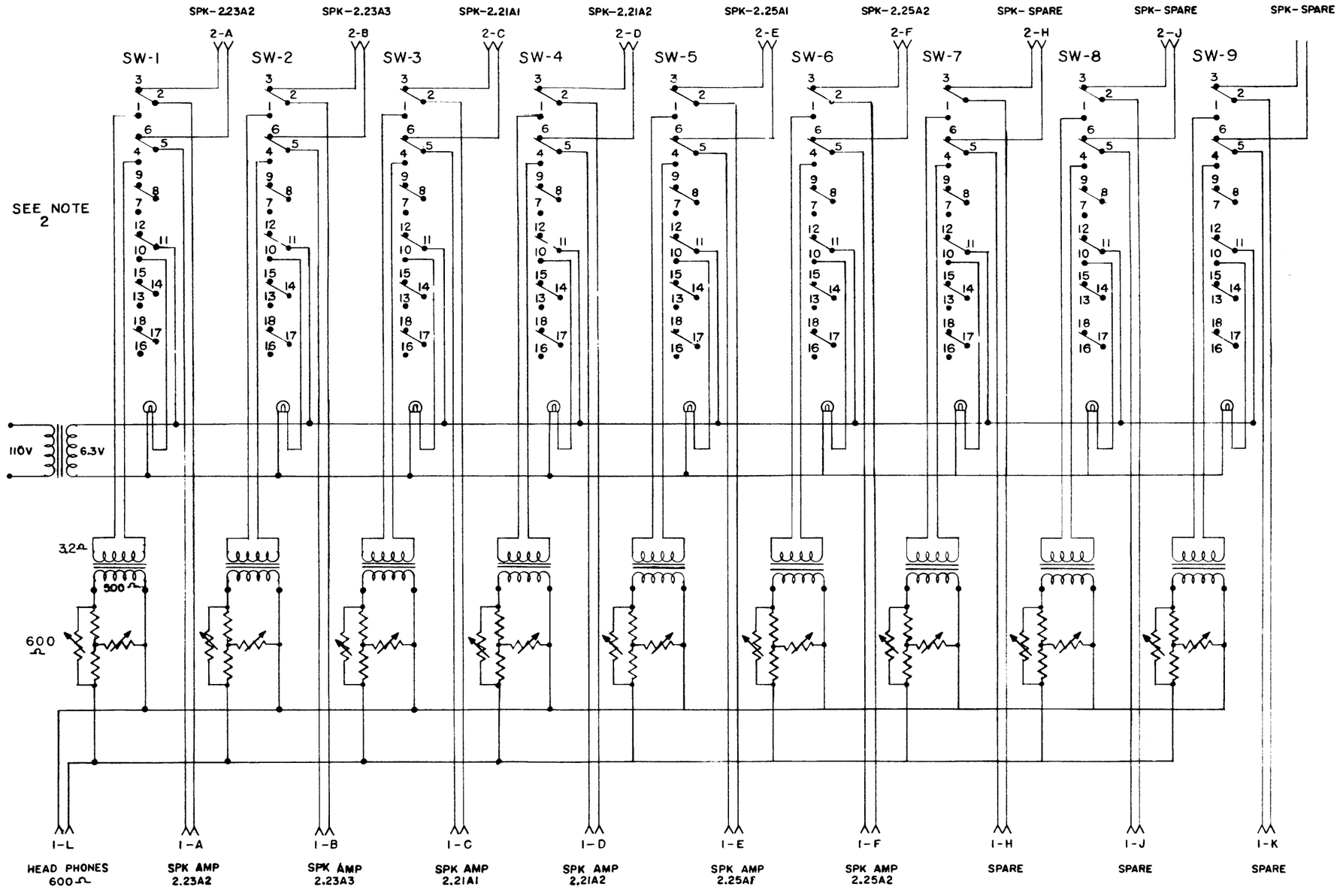


Figure 4-89. RE2 Receiver Control Panel, Schematic Diagram

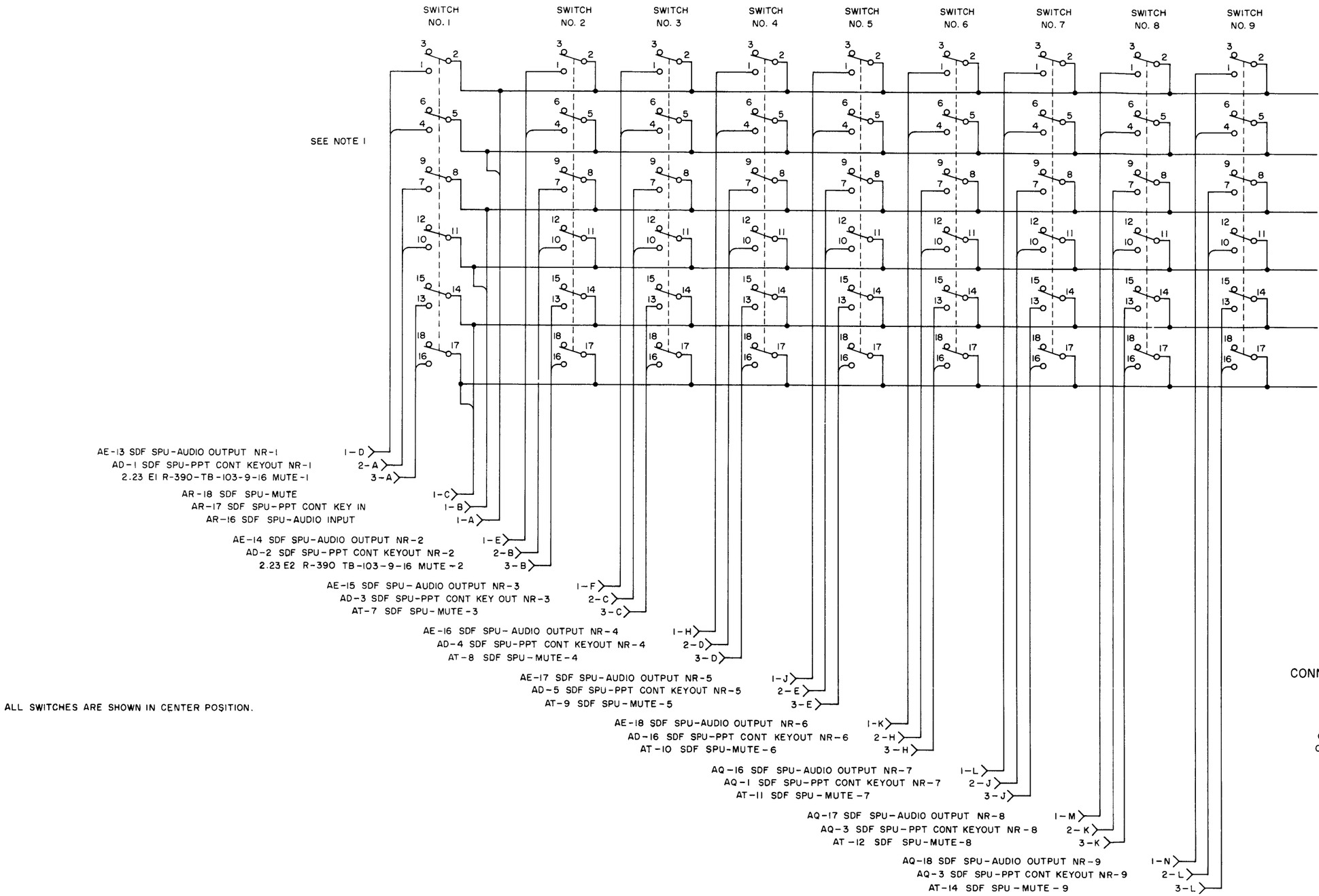


Figure 4-90. RE2 Transmitter Control Panel, Schematic Diagram

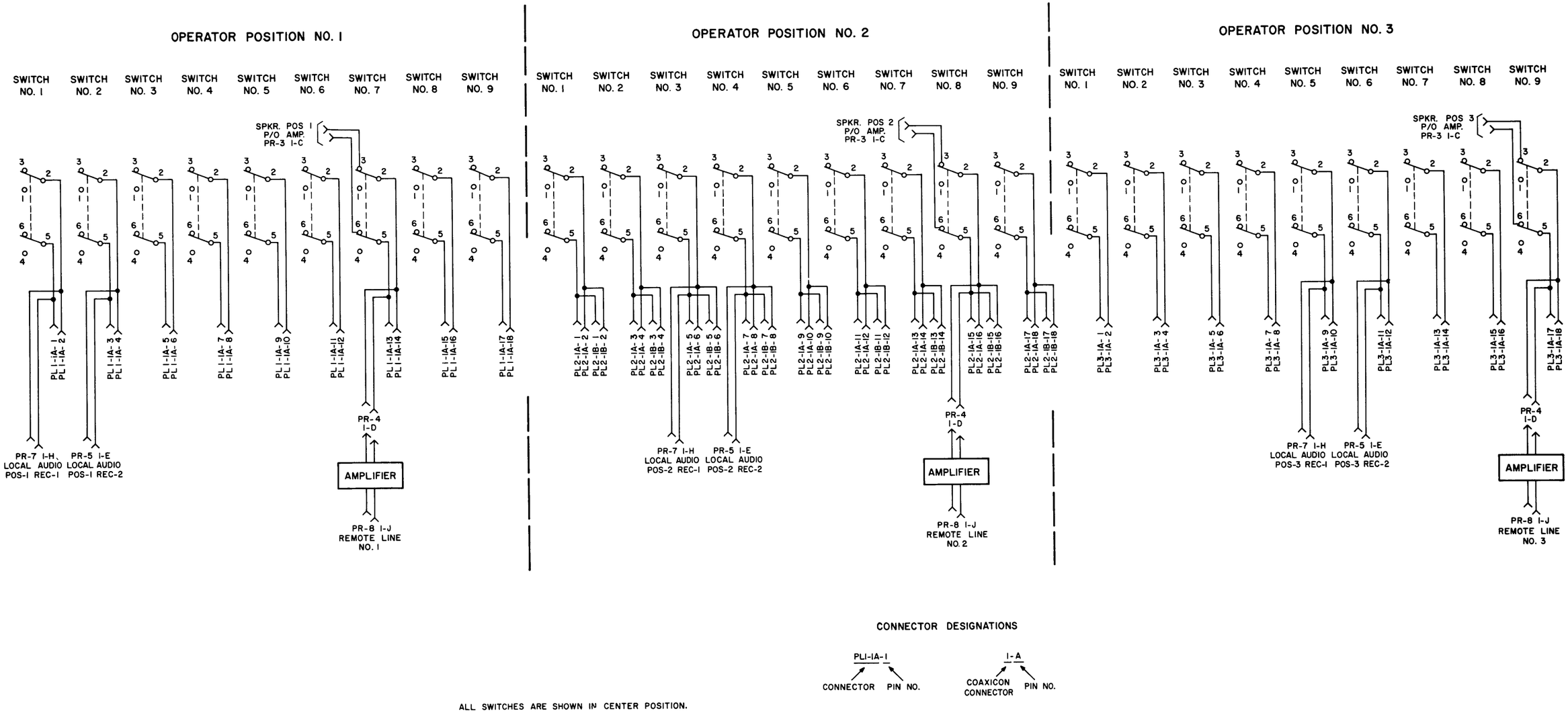


Figure 4-91. RF2 and RF3 Receiver Control Panel (Typical), Schematic Diagram

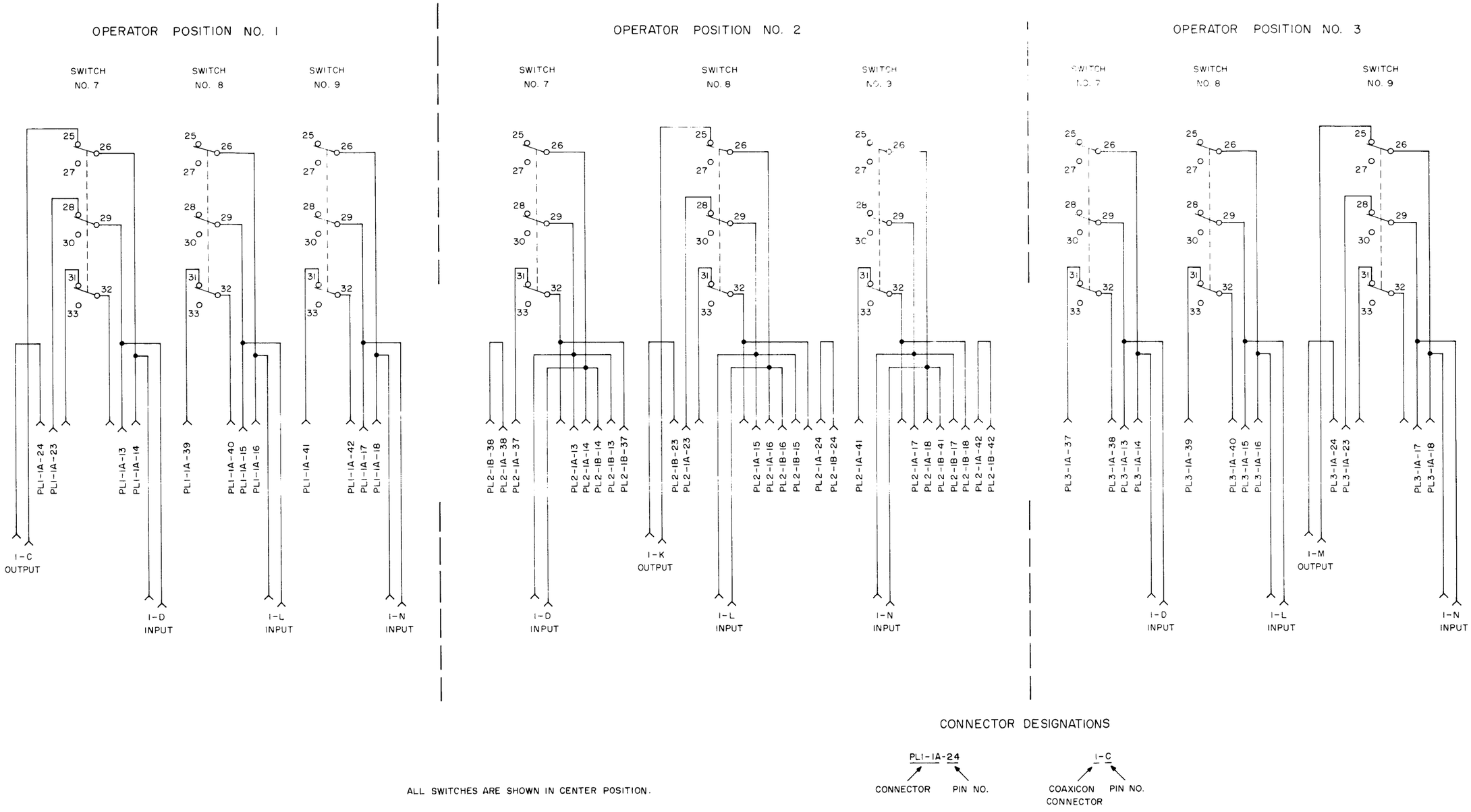
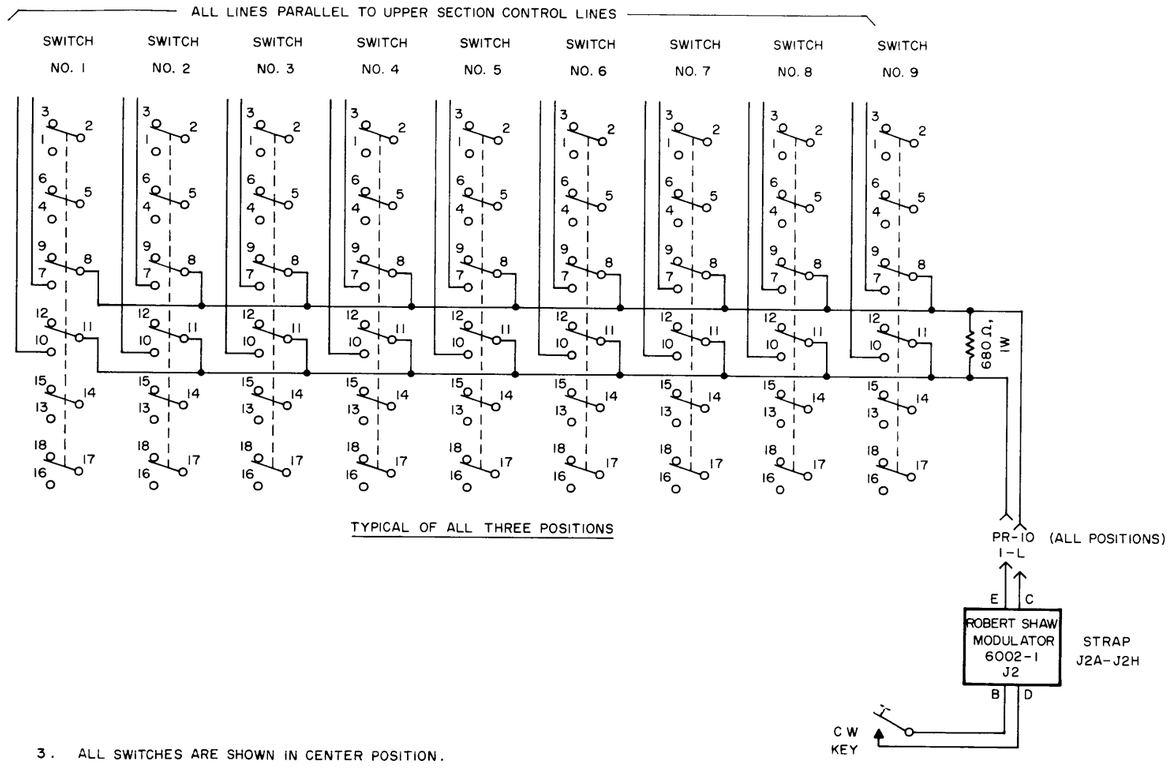
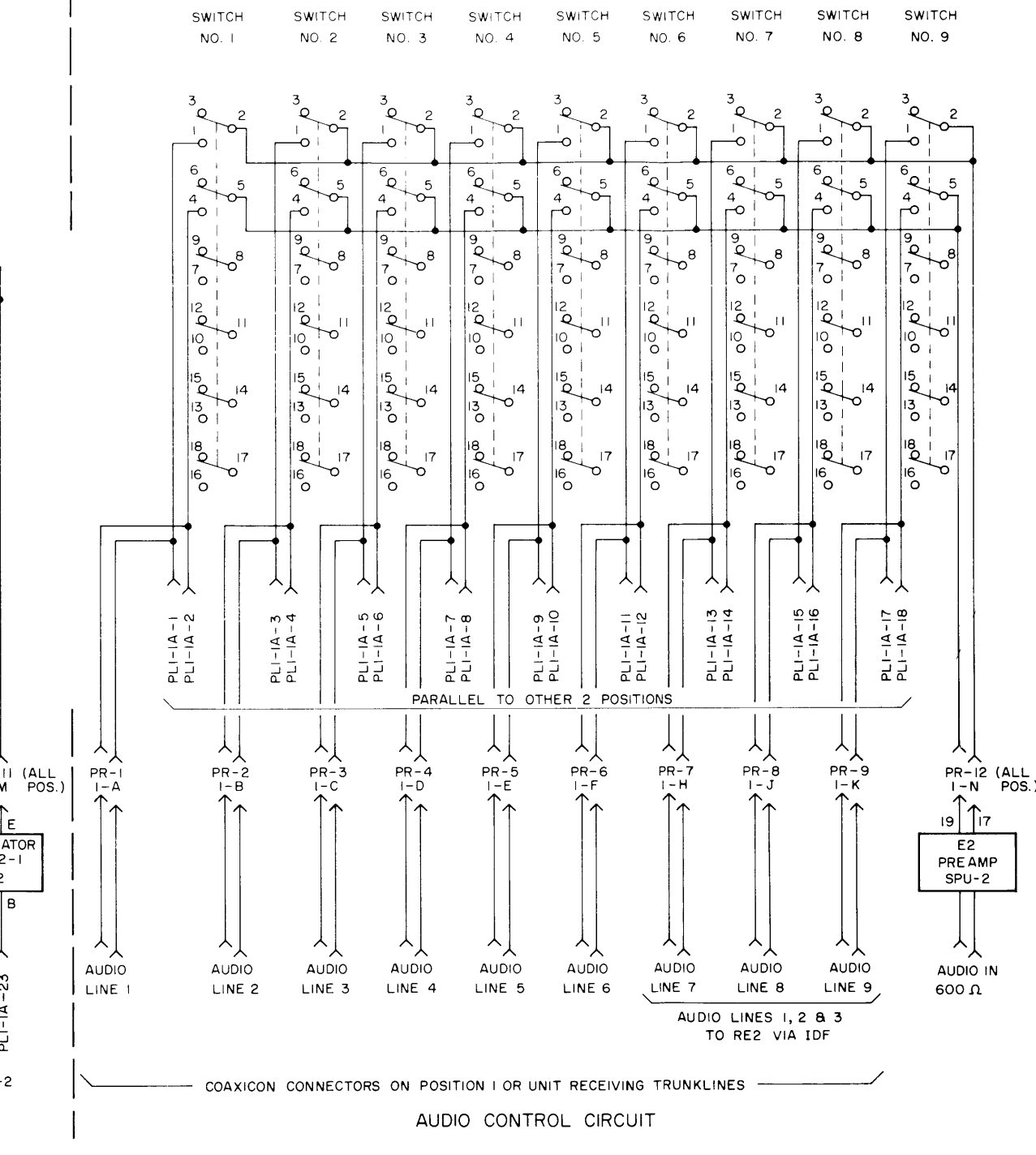


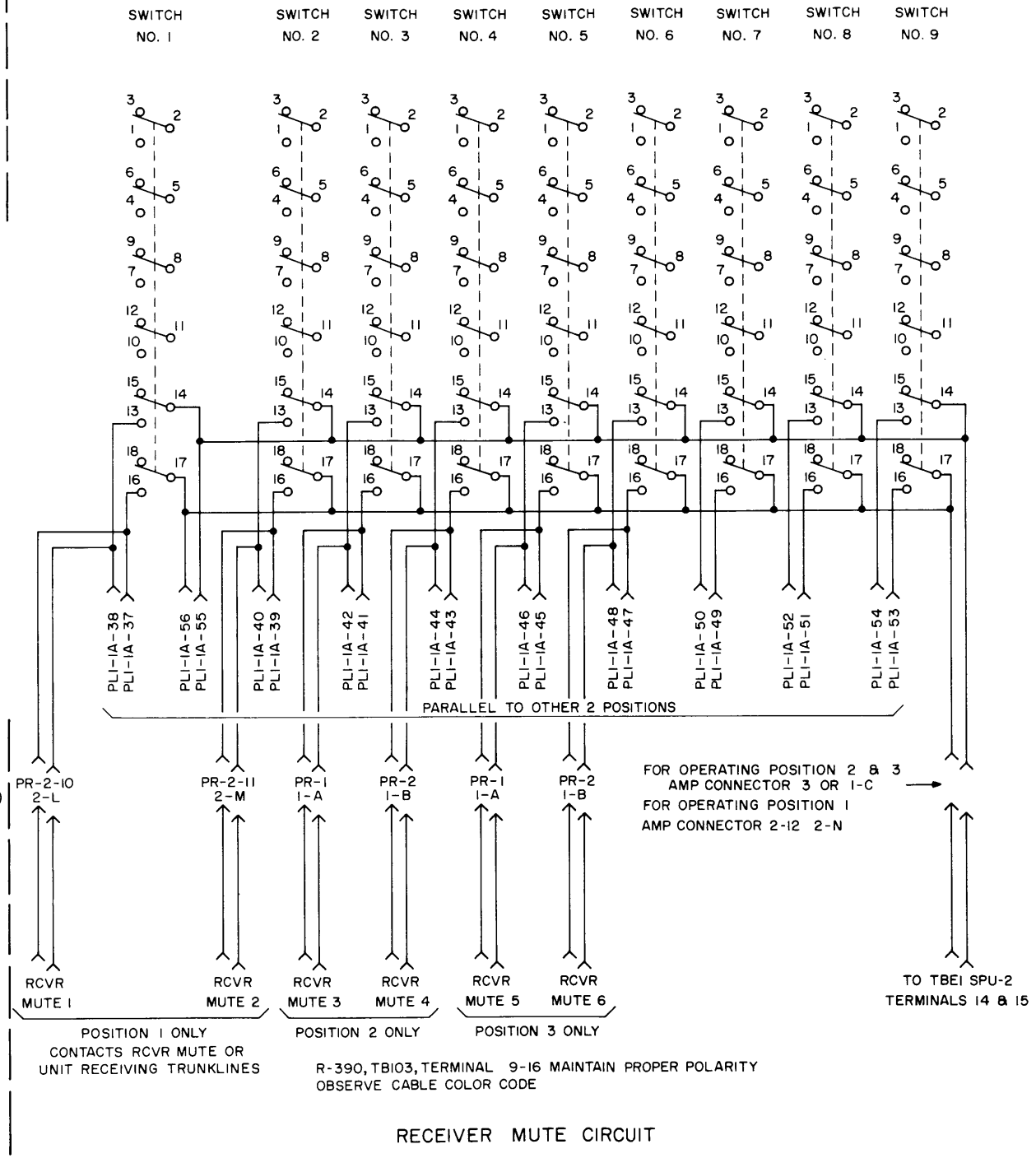
Figure 4-92. RF2 Receiver Control Panel, Schematic Diagram



3. ALL SWITCHES ARE SHOWN IN CENTER POSITION.

Figure 4-93. RF2 and RF3 Transmitter Control Panel, Schematic Diagram (Typical CW Circuits)





NOTES:

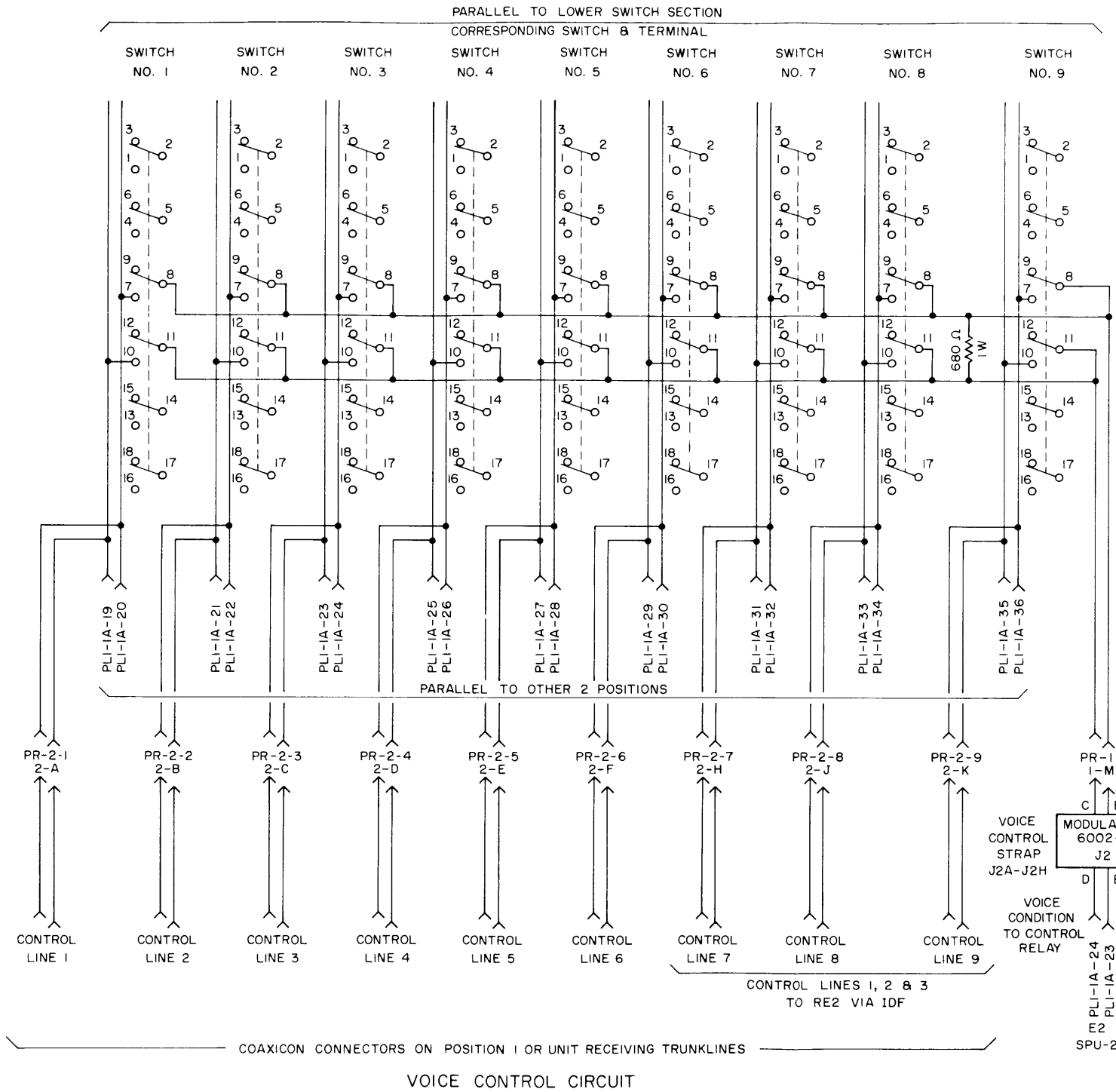
1. EACH PANEL DRAWING IS DUPLICATED AT EACH POSITION PARALLEL ARRANGEMENT SAME AS FOR AUDIO.
2. REF. RECEIVER CONTROL INTER-CONNECTING CABLE DIAGRAM FOR RF3 OPERATOR POSITIONS.
3. REF. MOSSMAN TYPE C (8-8) SWITCH, SCHEMATIC DIAGRAM.
4. ALL SWITCHES ARE SHOWN IN CENTER POSITION.
5. CENTER POSITION (2) HAS WINCHESTER PARALLELING "B" CONNECTOR (CARRIES SAME TERMINAL NUMBER AS PRIMARY BLOCK) WHICH COUPLES TO POSITION 3: THAT IS ARRANGEMENT 1-2 & 2-3.
6. ALL LINES ENTER POSITION 1, 24 AMP CONNECTIONS.
7. POSITIONS 2 & 3 USE AMP CONNECTIONS 1, 2 & 3B CONNECTIONS 10, 11 & 12.

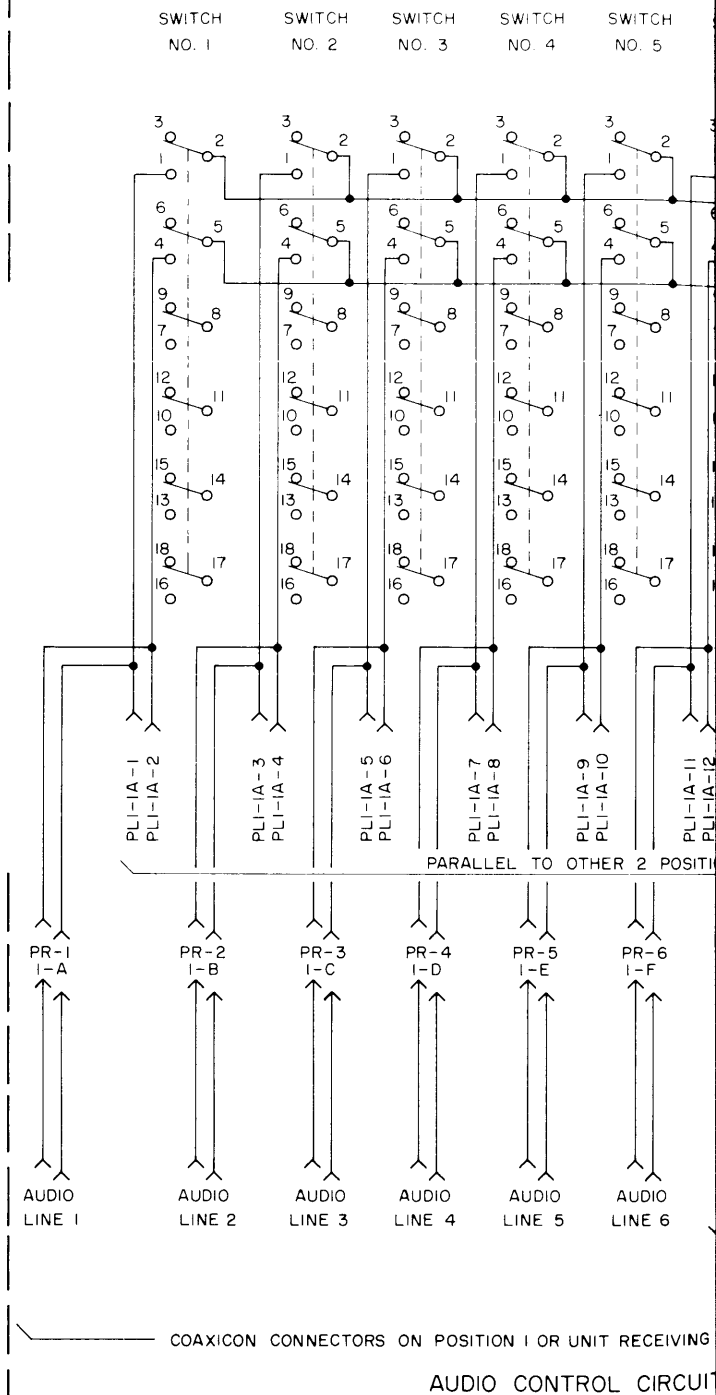
CONNECTOR DESIGNATIONS

PLI-1A-1 — CONNECTOR, PIN NO.

1-A — COAXICON CONNECTOR, PIN NO.

Figure 4-94. RF3 Transmitter Control Panel, Audio Circuit Schematic Diagram (Typical for three positions)


PARALLEL TO LOWER SWITCH SECTION
CORRESPONDING SWITCH & TERMINAL
SWITCH NO. 1
SWITCH NO. 2
SWITCH NO. 3
SWITCH NO. 4
SWITCH NO. 5
SWITCH NO. 6
SWITCH NO. 7
SWITCH NO. 8
SWITCH NO. 9
680 Ω 1W
PLI-IA-19 PLI-IA-20
PLI-IA-21 PLI-IA-22
PLI-IA-23 PLI-IA-24
PLI-IA-25 PLI-IA-26
PLI-IA-27 PLI-IA-28
PLI-IA-29 PLI-IA-30
PLI-IA-31 PLI-IA-32
PLI-IA-33 PLI-IA-34
PLI-IA-35 PLI-IA-36
PARALLEL TO OTHER 2 POSITIONS
PR-2-1 2-A
PR-2-2 2-B
PR-2-3 2-C
PR-2-4 2-D
PR-2-5 2-E
PR-2-6 2-F
PR-2-7 2-H
PR-2-8 2-J
PR-2-9 2-K
PR-11 I-M (ALL POS.)
C
E
VOICE CONTROL STRAP J2A-J2H
MODULATOR 6002-1 J2
D
B
VOICE CONDITION TO CONTROL RELAY
PLI-IA-24
PLI-IA-23
E2
SPU-2
CONTROL LINE 1
CONTROL LINE 2
CONTROL LINE 3
CONTROL LINE 4
CONTROL LINE 5
CONTROL LINE 6
CONTROL LINE 7
CONTROL LINE 8
CONTROL LINE 9
CONTROL LINES 1, 2 & 3 TO RE2 VIA IDF
COAXICON CONNECTORS ON POSITION 1 OR UNIT RECEIVING TRUNKLINES
VOICE CONTROL CIRCUIT


SWITCH NO. 1
SWITCH NO. 2
SWITCH NO. 3
SWITCH NO. 4
SWITCH NO. 5
PLI-IA-1 PLI-IA-2
PLI-IA-3 PLI-IA-4
PLI-IA-5 PLI-IA-6
PLI-IA-7 PLI-IA-8
PLI-IA-9 PLI-IA-10
PLI-IA-11
PARALLEL TO OTHER 2 POSITI
PR-1 1-A
PR-2 1-B
PR-3 1-C
PR-4 1-D
PR-5 1-E
PR-6 1-F
AUDIO LINE 1
AUDIO LINE 2
AUDIO LINE 3
AUDIO LINE 4
AUDIO LINE 5
AUDIO LINE 6
COAXICON CONNECTORS ON POSITION 1 OR UNIT RECEIVING
AUDIO CONTROL CIRCUIT

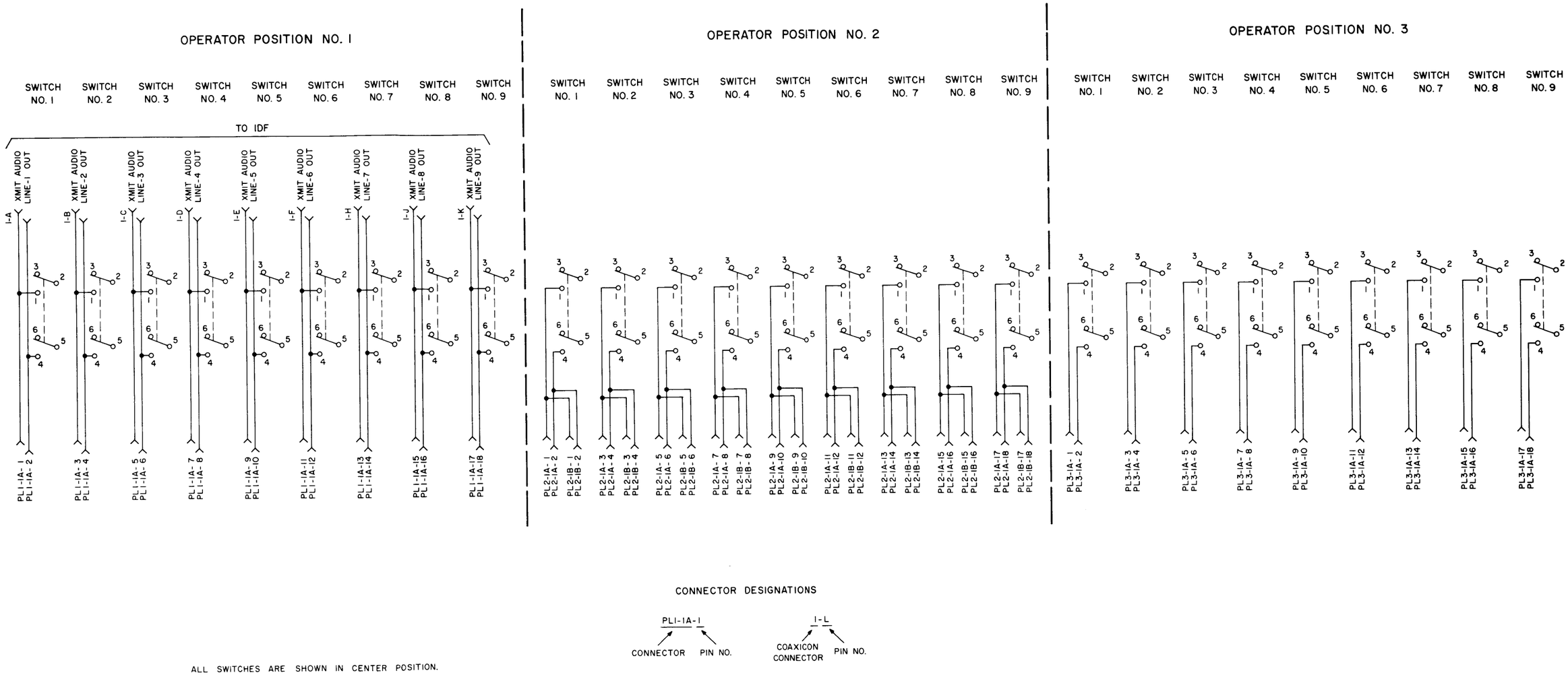


Figure 4-95. RF3 Transmitter Control Panel Audio Output Circuit, Schematic Diagram

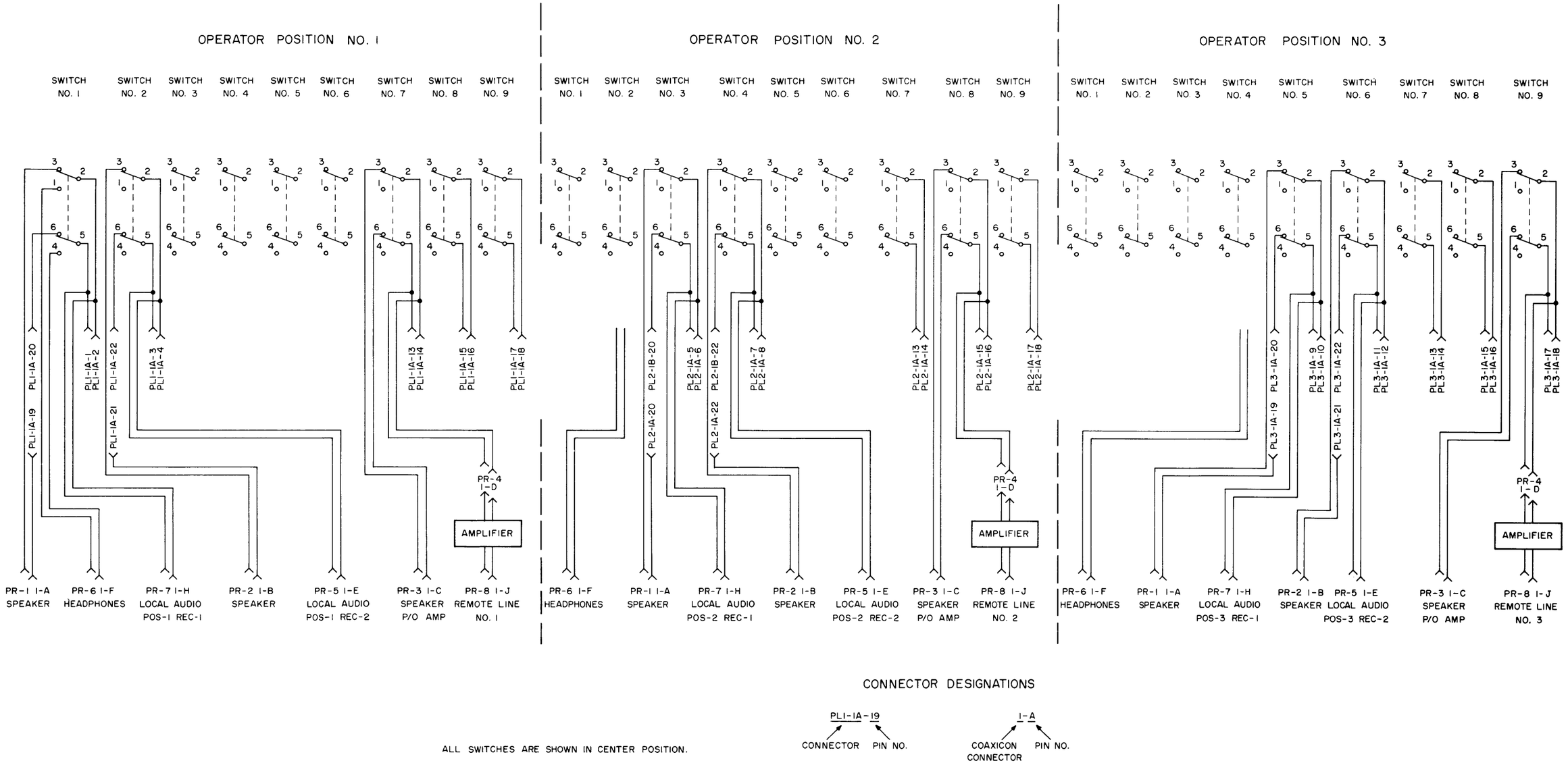
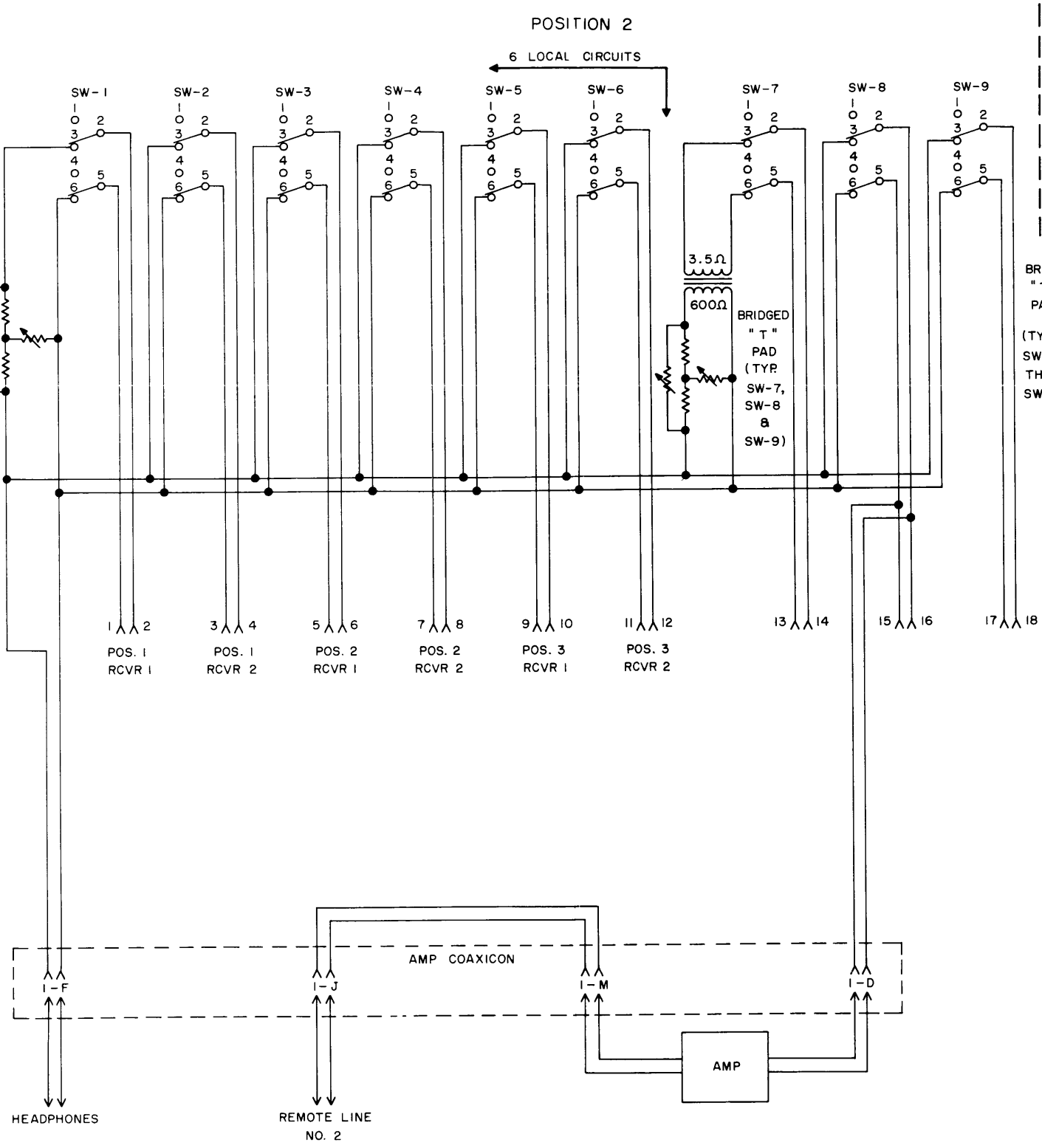
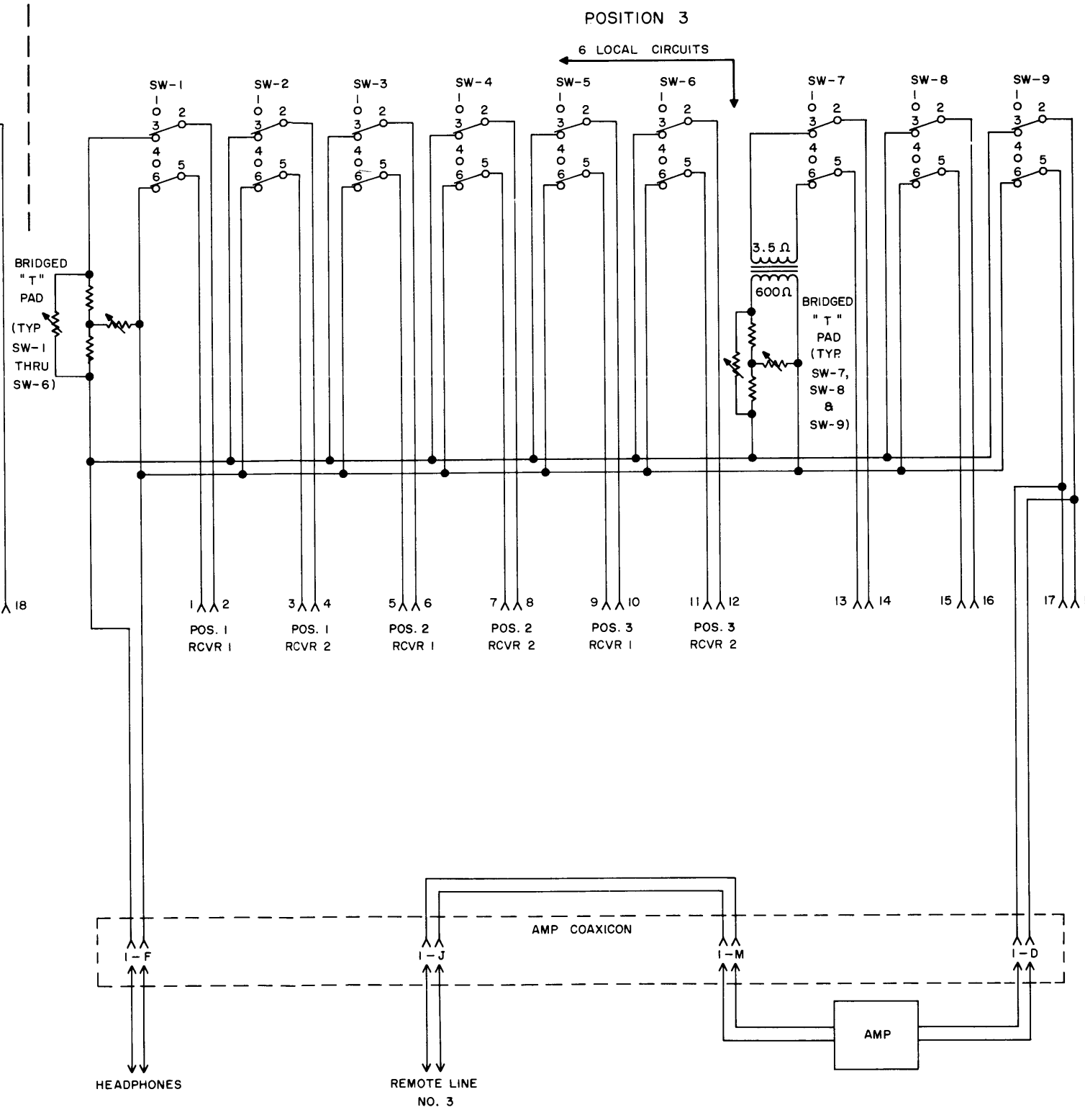


Figure 4-96. RF3 Receiver Control Panel, Schematic Diagram (Remote Line & Local Audio Inputs)

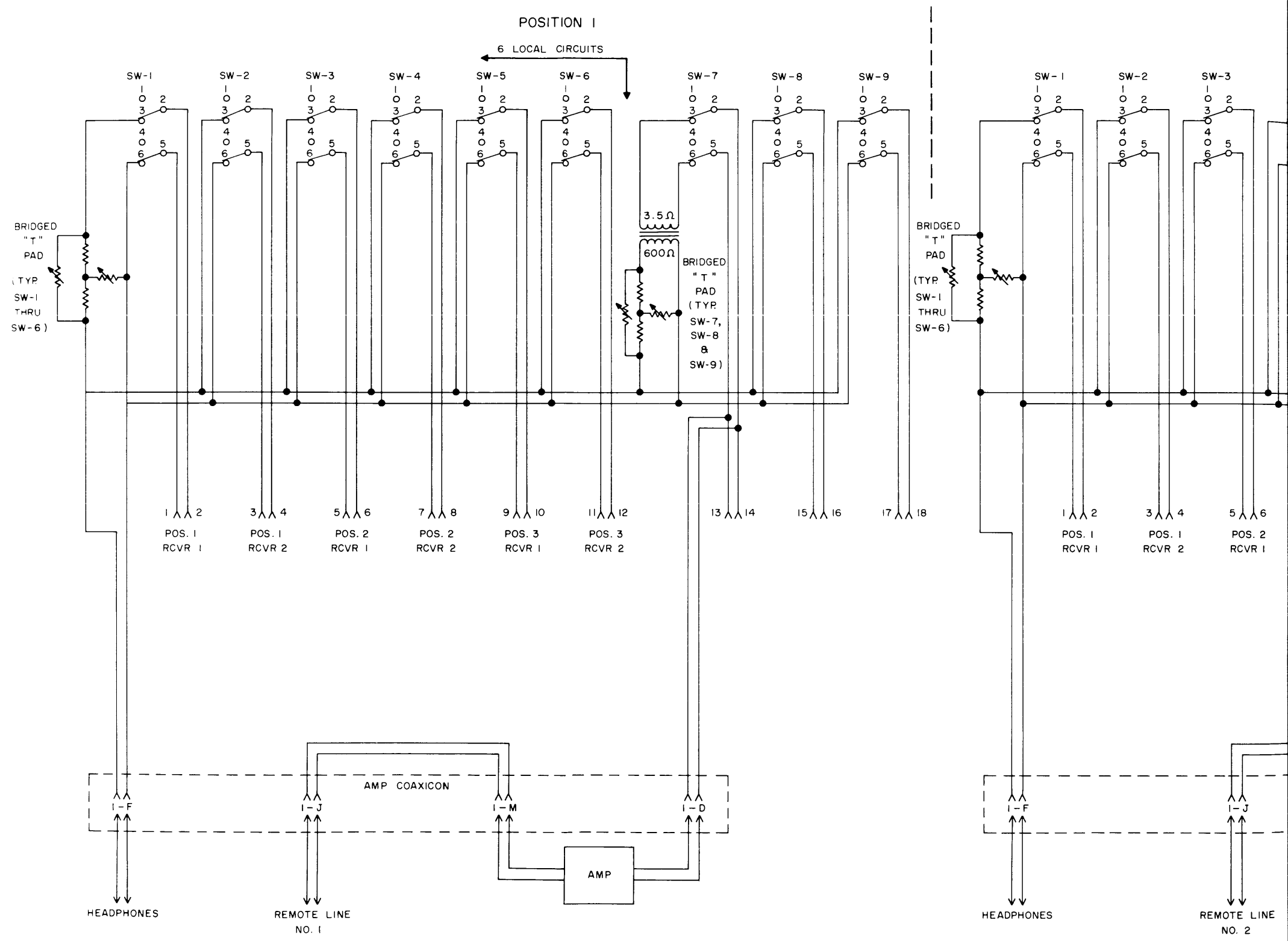


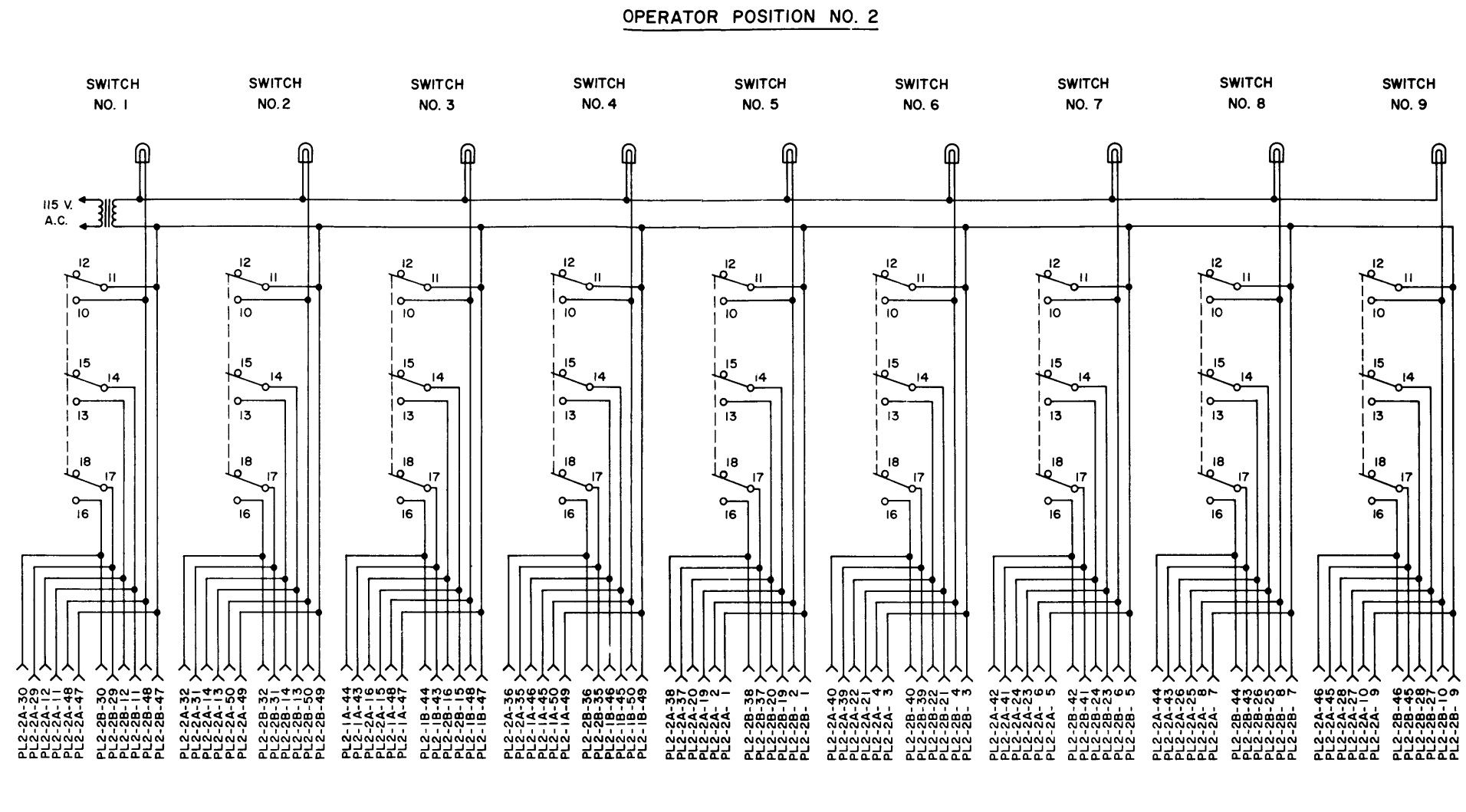


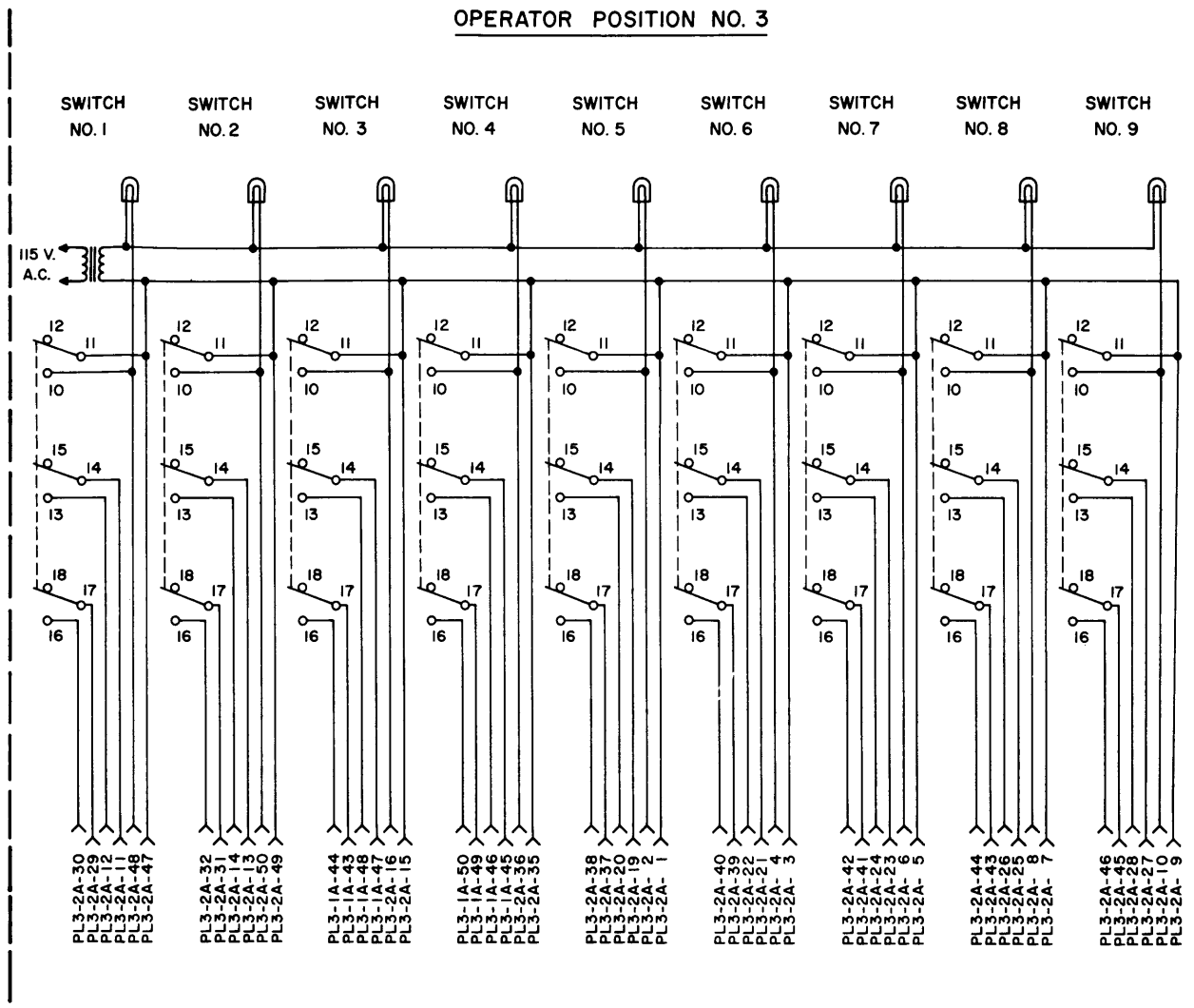
NOTES:

1. ALL SWITCHES SHOWN IN DOWN POSITION.

Figure 4-97. RF3 Receiver Control Panel, Schematic Diagram (Headphone Circuits)


POSITION 1
6 LOCAL CIRCUITS
SW-1
SW-2
SW-3
SW-4
SW-5
SW-6
SW-7
SW-8
SW-9
BRIDGED "T" PAD (TYP. SW-1 THRU SW-6)
3.5Ω
600Ω
BRIDGED "T" PAD (TYP. SW-7, SW-8 & SW-9)
1 2 POS. 1 RCVR 1
3 4 POS. 1 RCVR 2
5 6 POS. 2 RCVR 1
7 8 POS. 2 RCVR 2
9 10 POS. 3 RCVR 1
11 12 POS. 3 RCVR 2
13 14
15 16
17 18
AMP COAXICON
I-F
I-J
I-M
I-D
AMP
HEADPHONES
REMOTE LINE NO. 1
BRIDGED "T" PAD (TYP. SW-1 THRU SW-6)
1 2 POS. 1 RCVR 1
3 4 POS. 1 RCVR 2
5 6 POS. 2 RCVR 1
I-F
I-J
HEADPHONES
REMOTE LINE NO. 2





CONNECTOR DESIGNATIONS

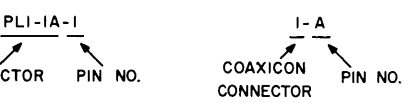
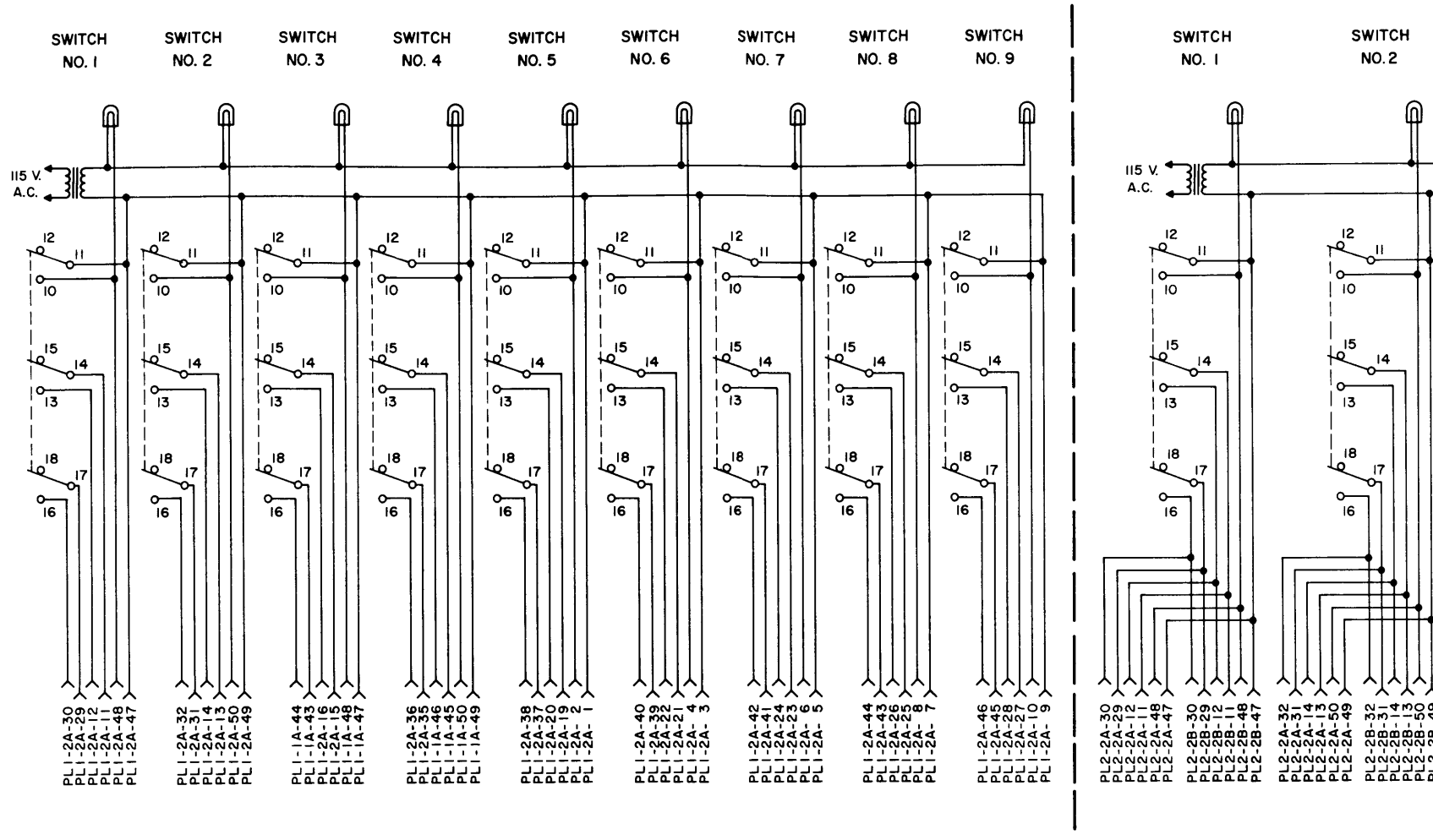
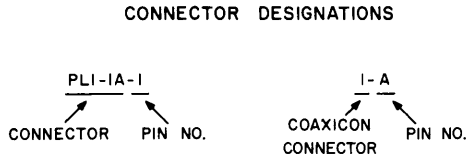


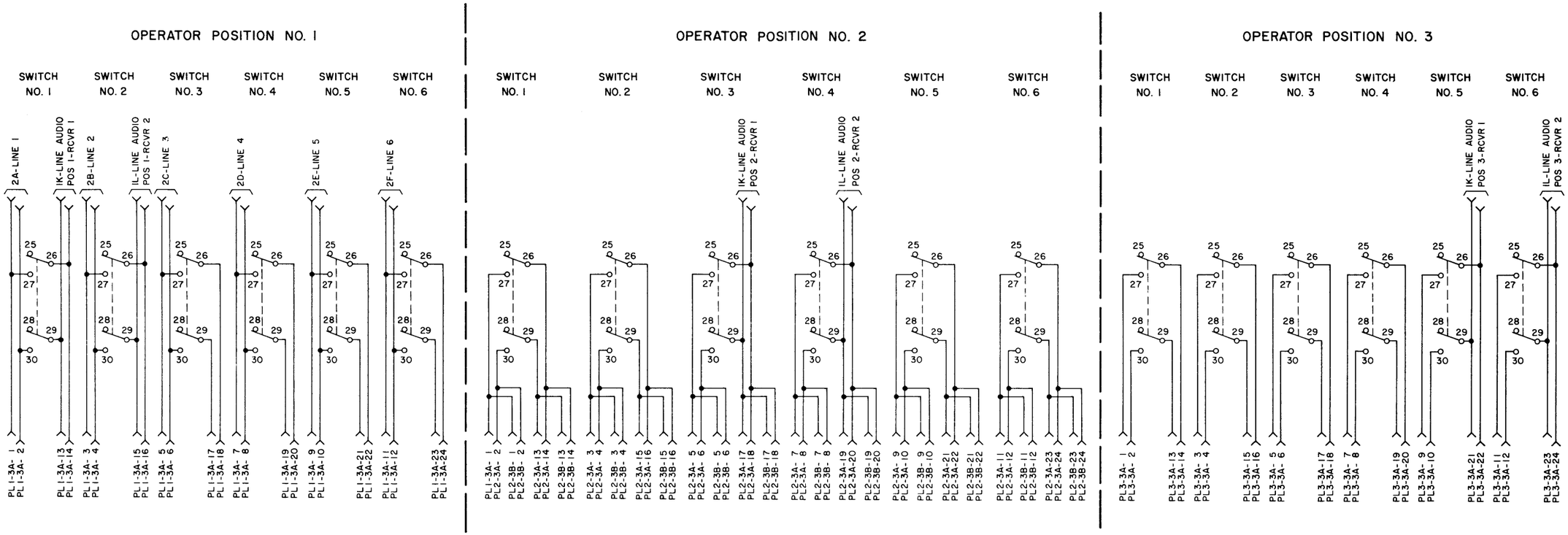
Figure 4-98. RF3 Receiver Control Panel, Schematic Diagram (Headphone Indicator Circuits)

OPERATOR POSITION NO. 1



CONNECTOR DESIGNATIONS





NOTES:

1. REF. TRANSMITTER CONTROL INTER-CONNECTING CABLE DIAGRAM, RF3 OPERATOR POSITIONS.
2. REF. MOSSMAN TYPE C (8-8) SWITCH, SCHEMATIC DIAGRAM.
3. ALL SWITCHES ARE SHOWN IN CENTER POSITION.

CONNECTOR DESIGNATIONS

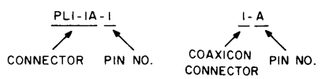


Figure 4-99. RF3 Receiver Control Panel, Schematic Diagram (Remote Output Circuits)

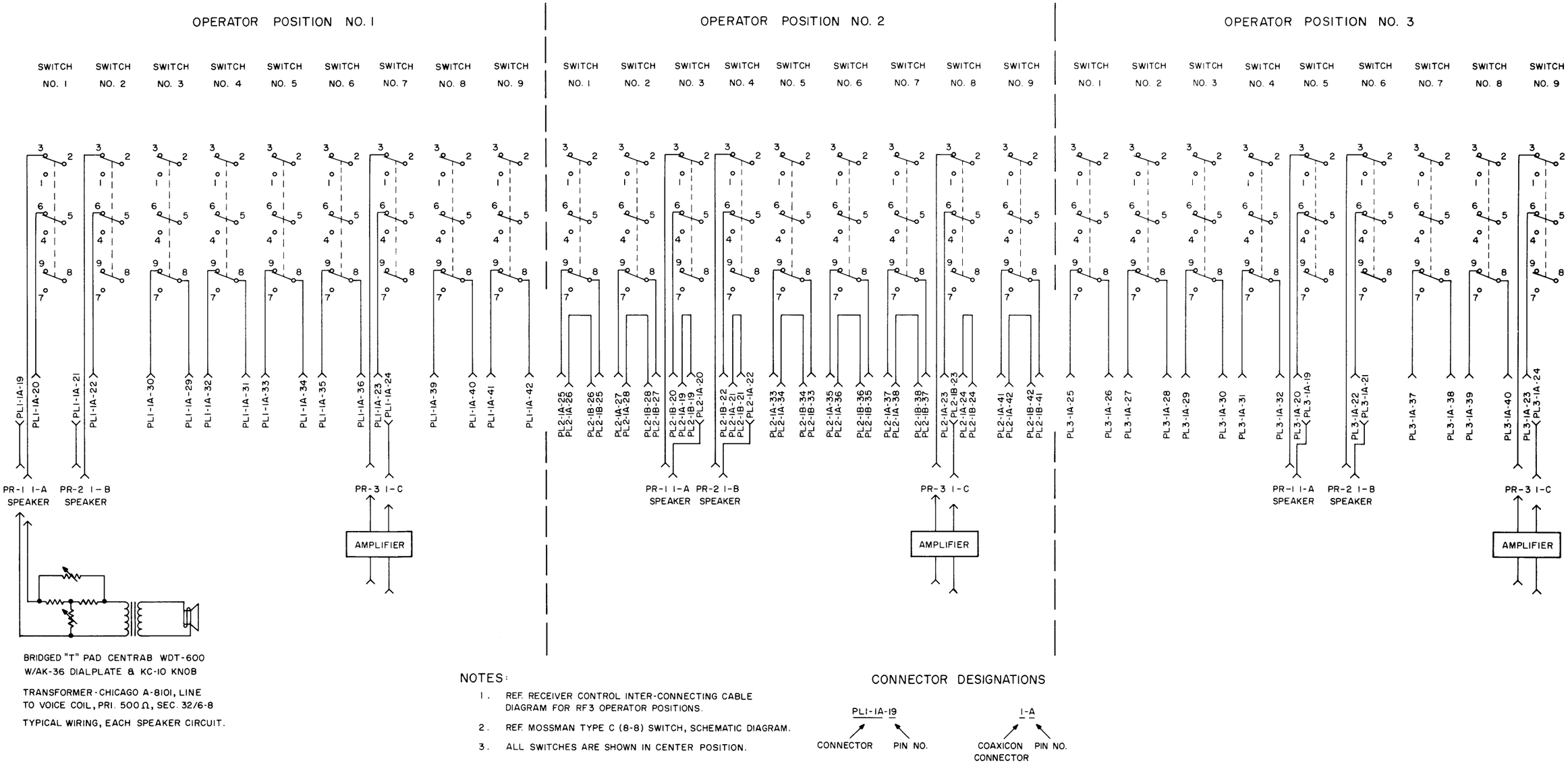


Figure 4-100. RF3 Receiver Control Panel, Schematic Diagram (Speaker Muting Circuits)

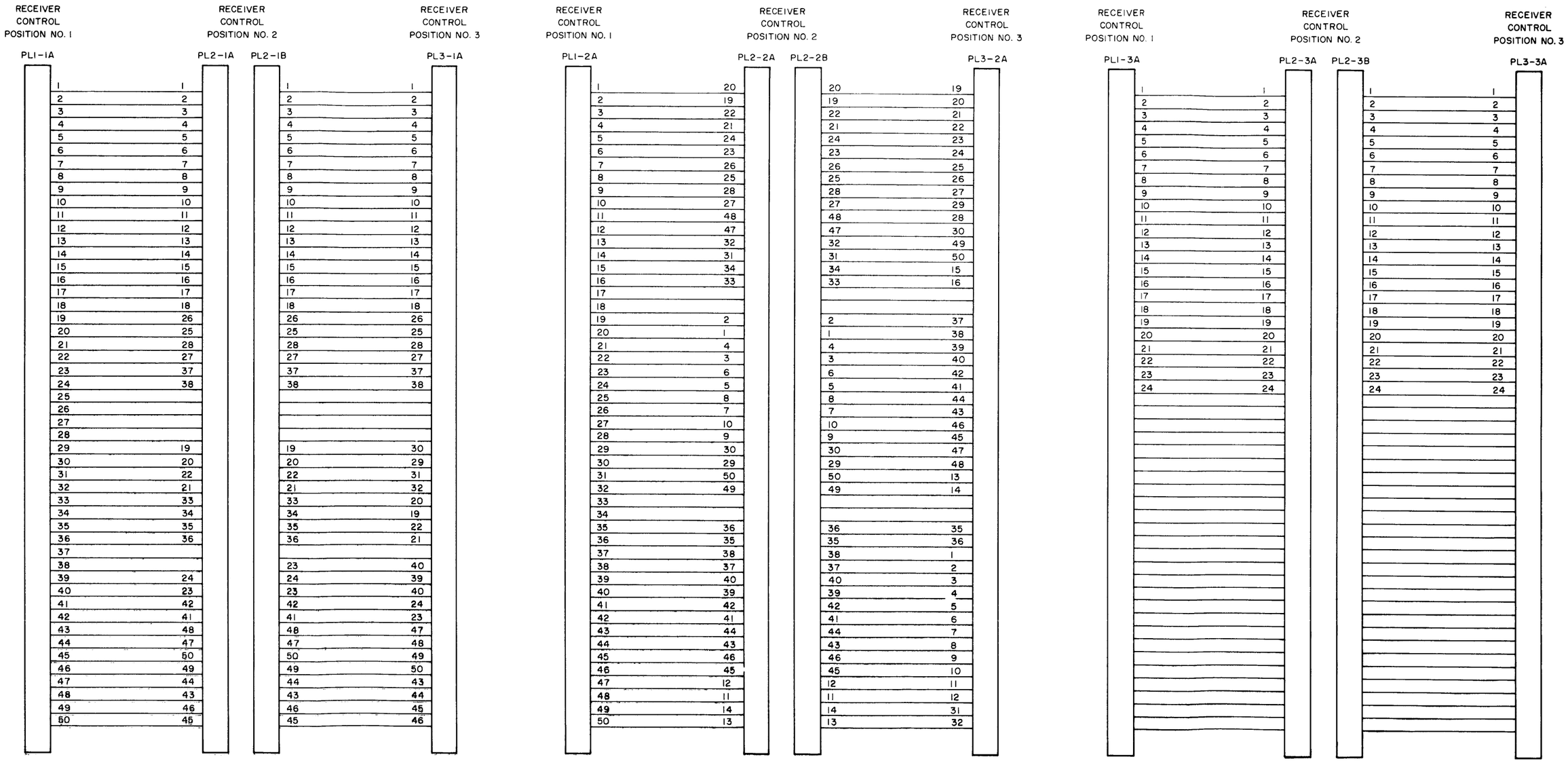


Figure 4-101. RF2 Receiver Control Panels, Interconnecting Diagram

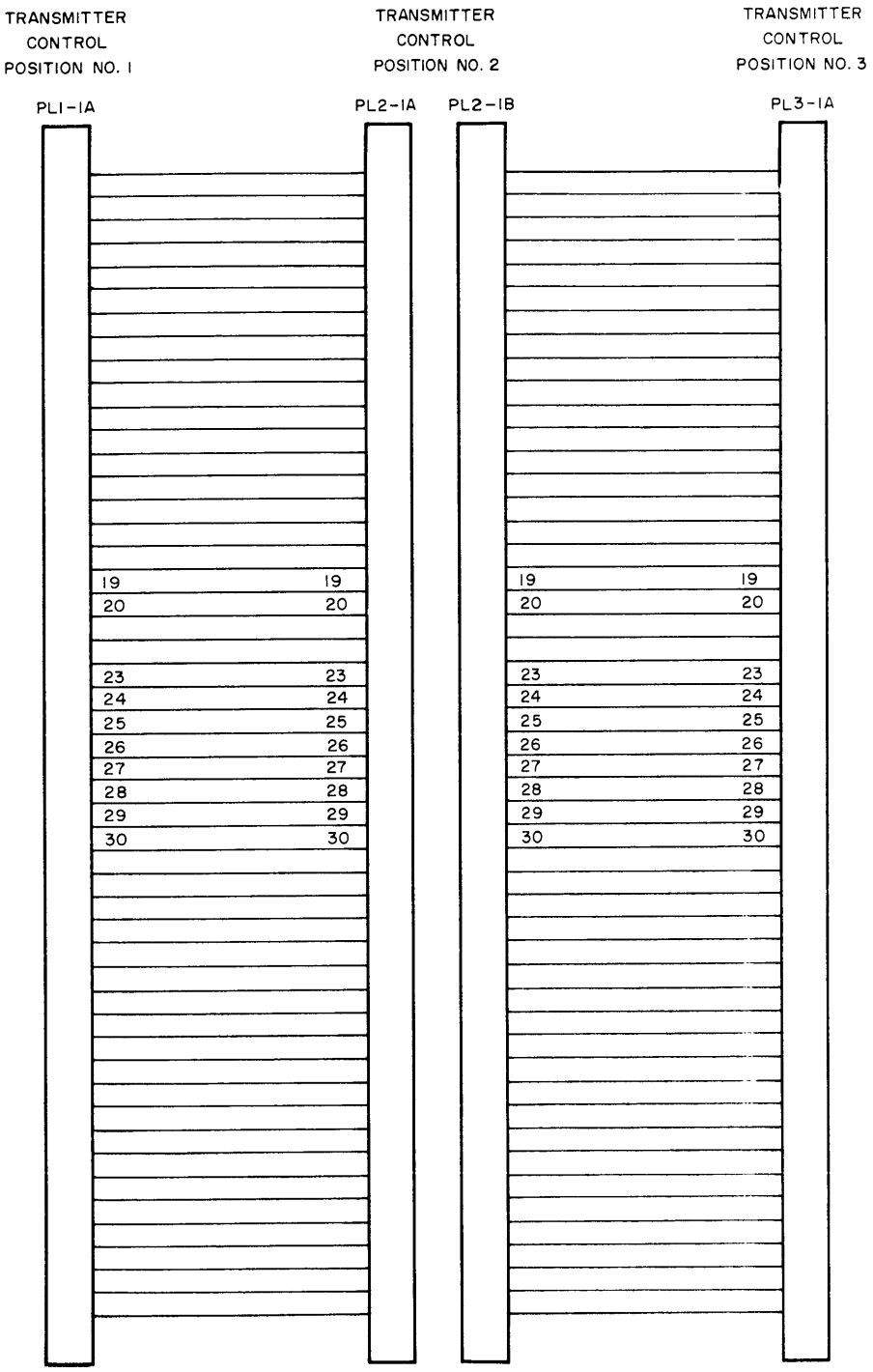


Figure 4-102. RF2 Transmitter Control Panels, Interconnecting Diagram

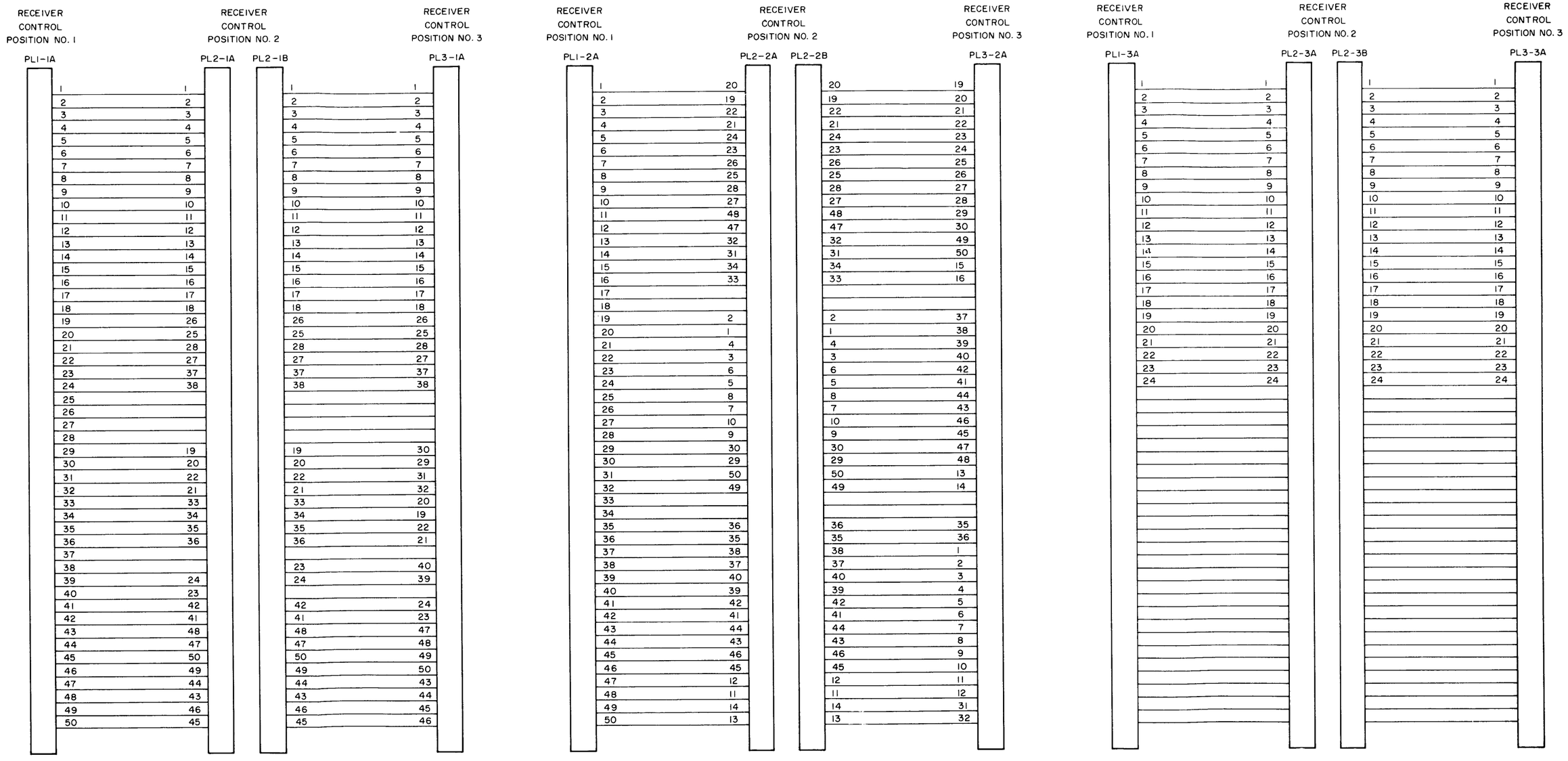


Figure 4-103. RF3 Receiver Control Panels, Interconnecting Diagram

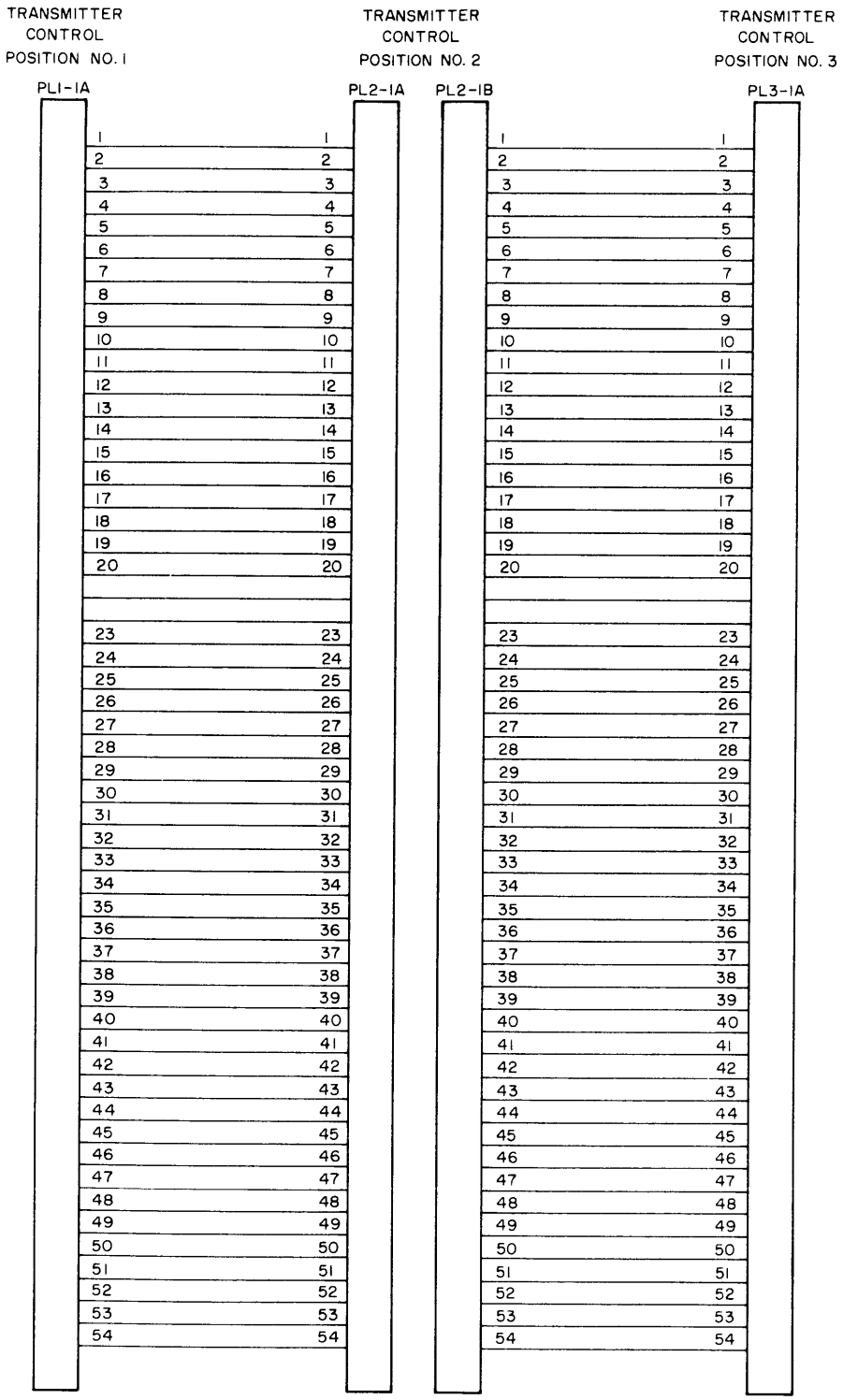


Figure 4-104. RF3 Transmitter Control Panels, Interconnecting Diagram

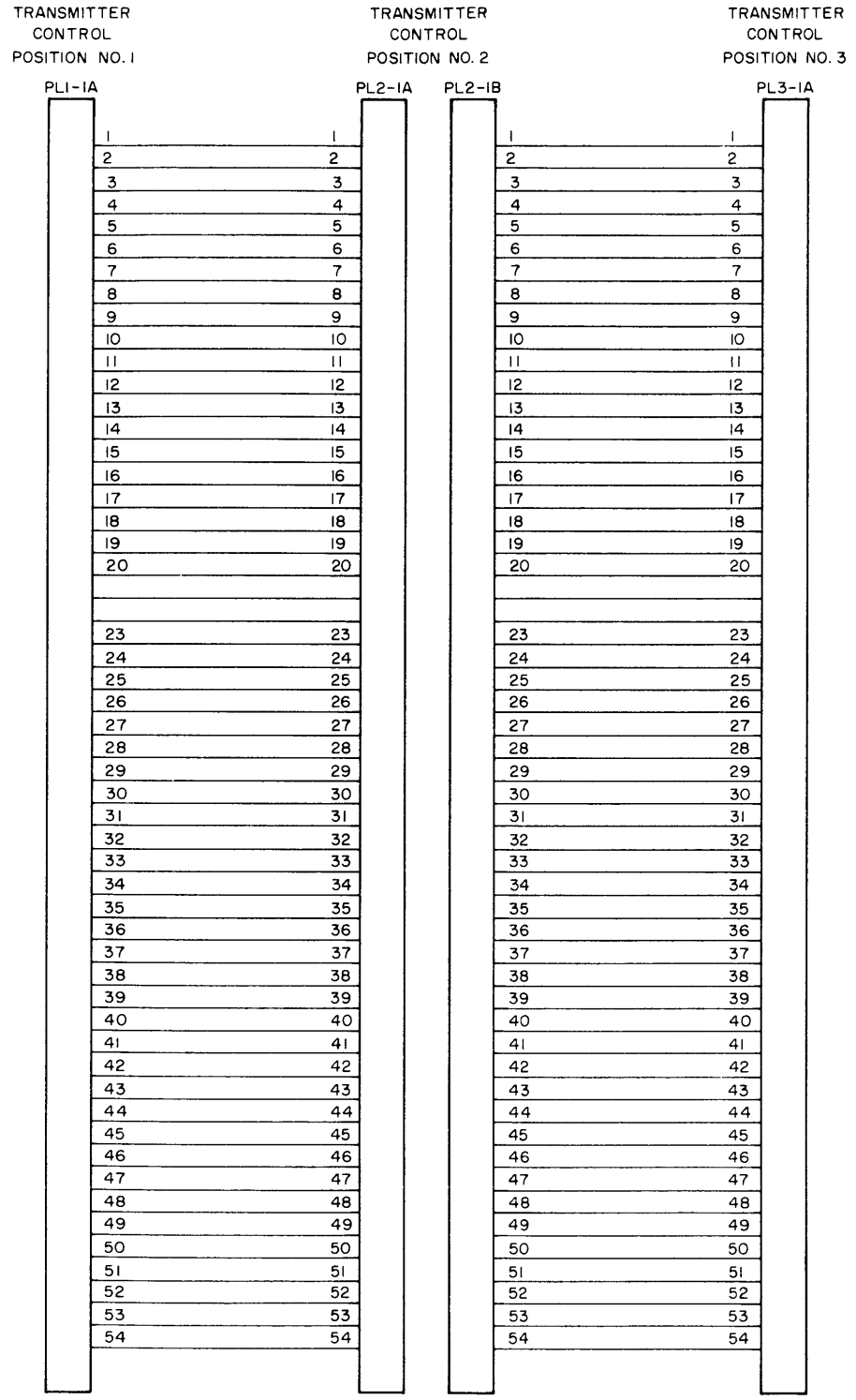


Figure 4-104. RF3 Transmitter Control Panels, Interconnecting Diagram

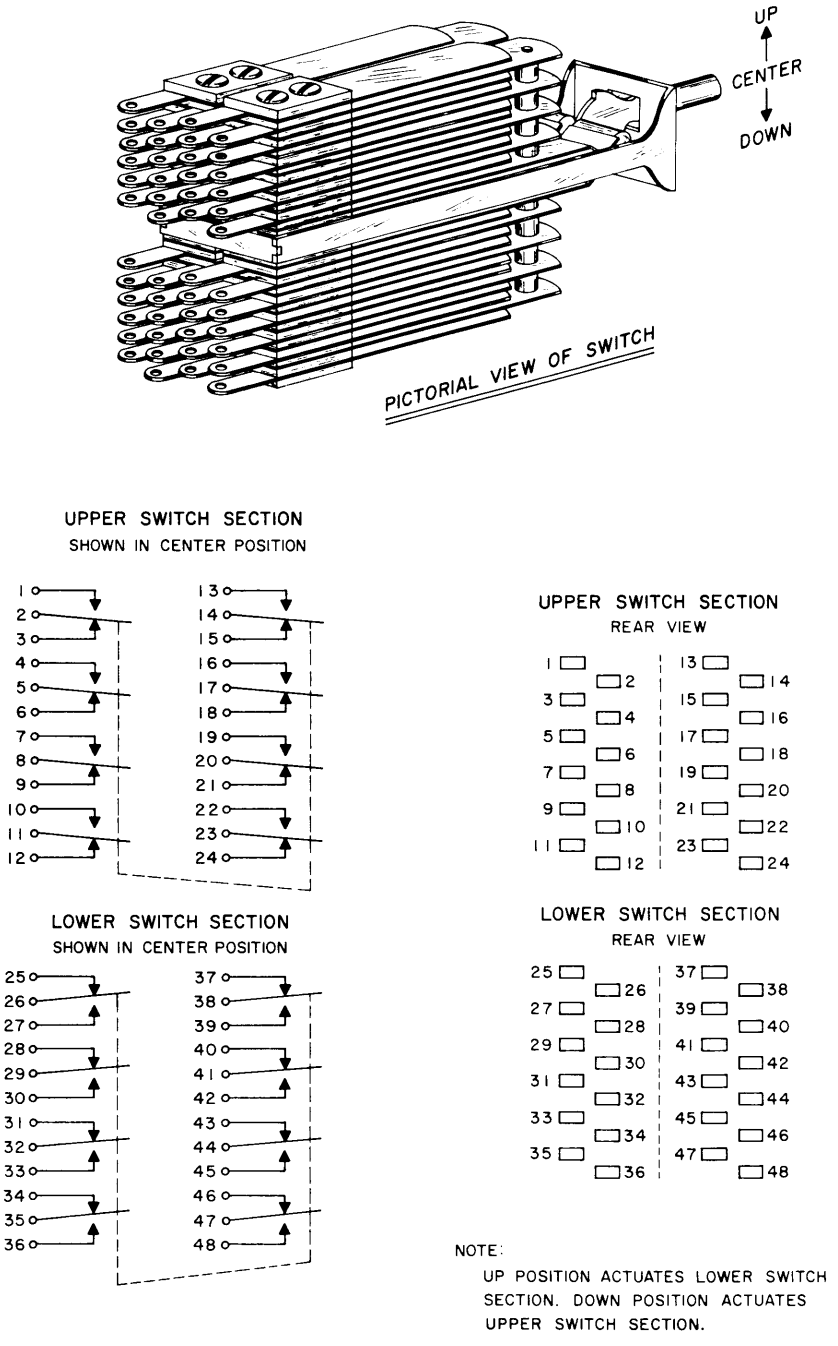


Figure 4-105. Control Panel Switch Contact Configuration

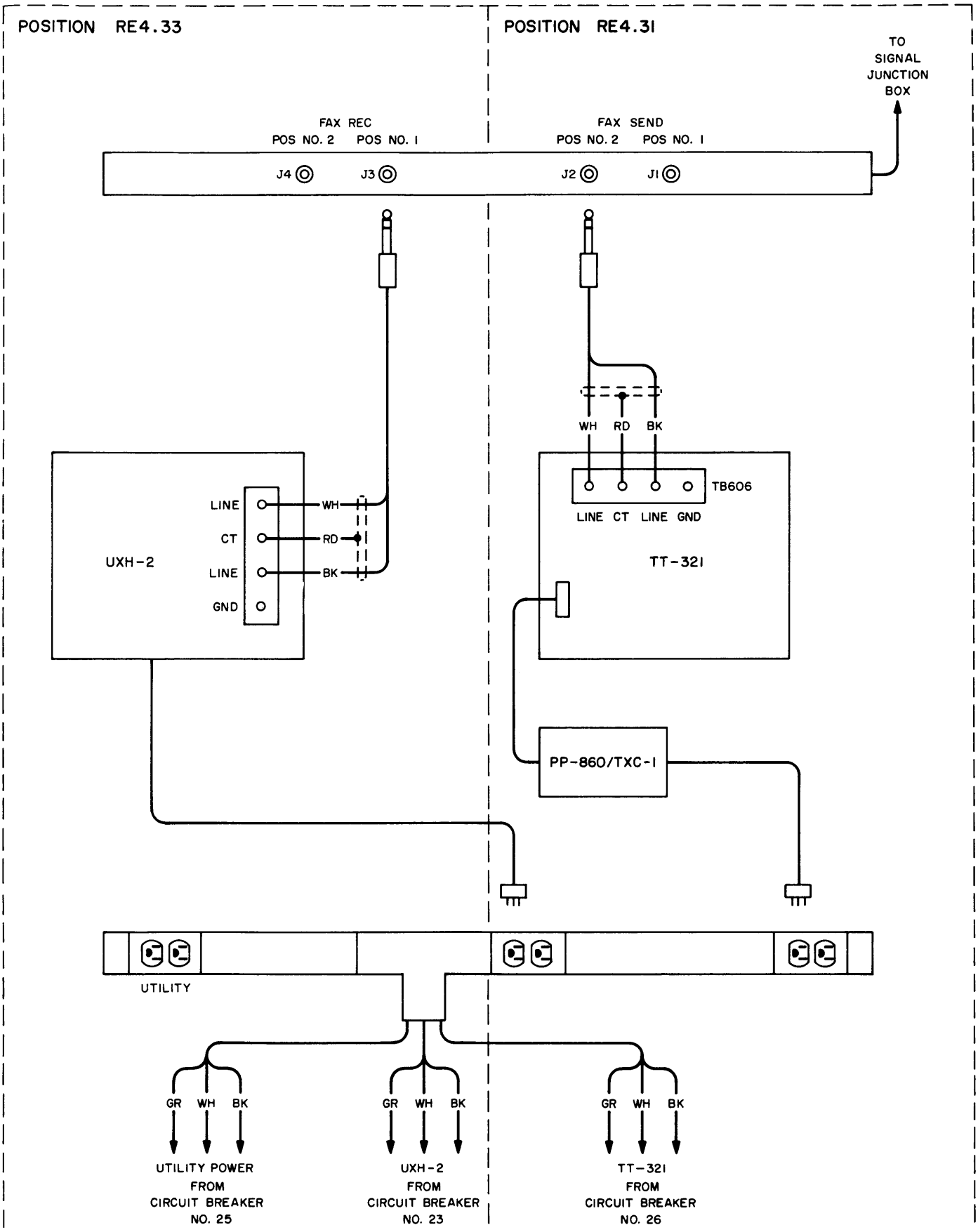


Figure 4-106. FAX Position RE4.31 and 4.33, Wiring Diagram

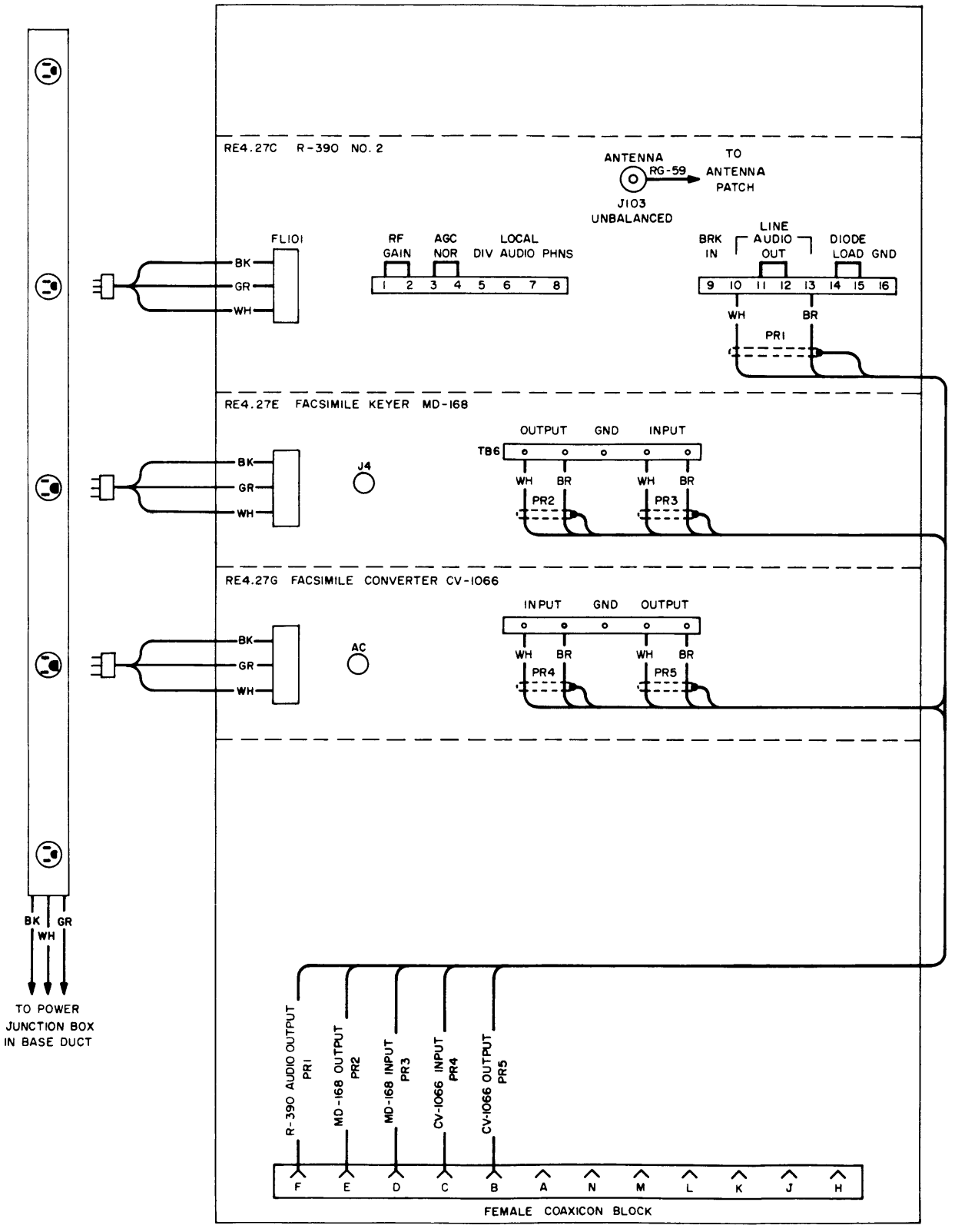
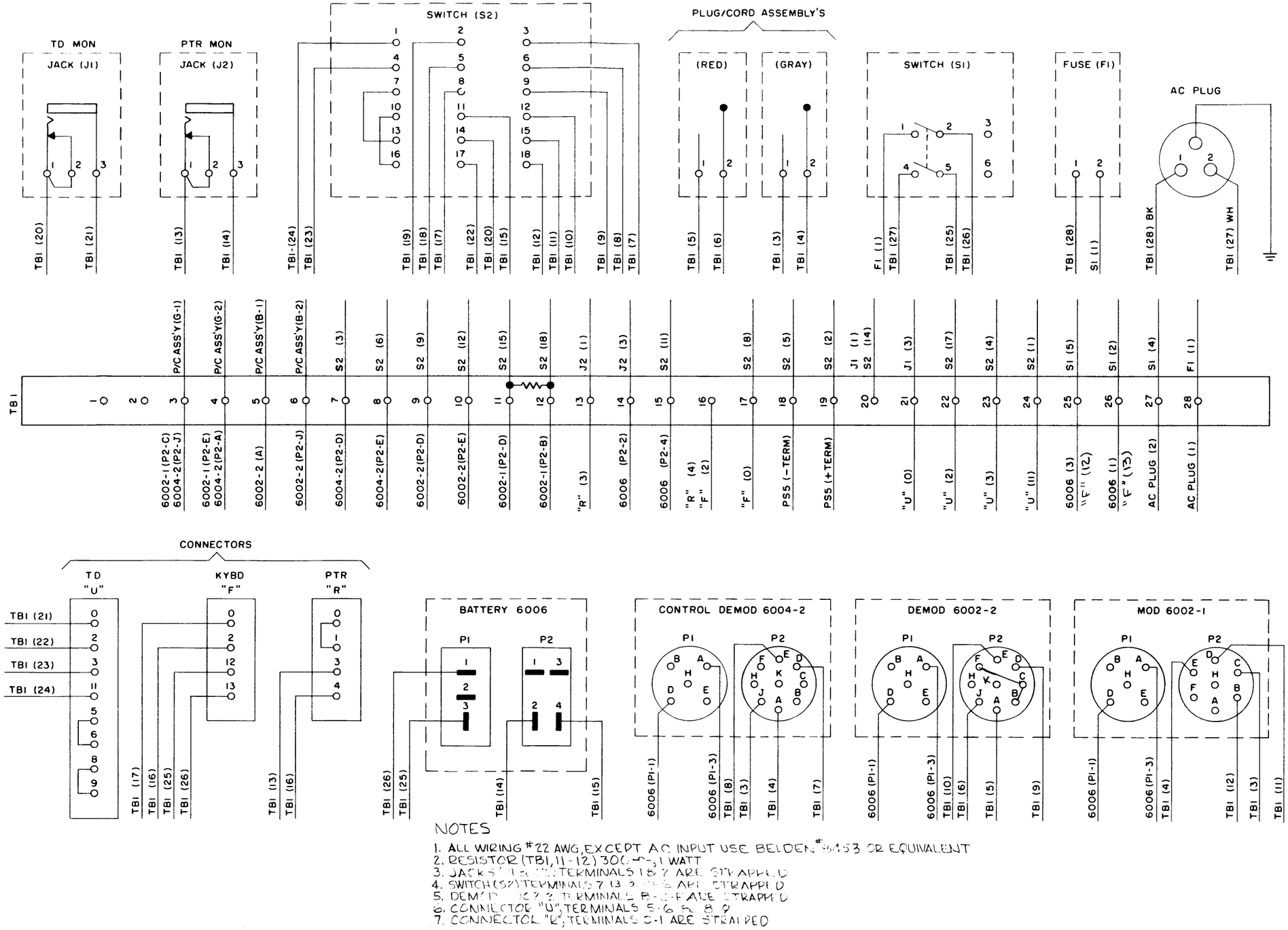


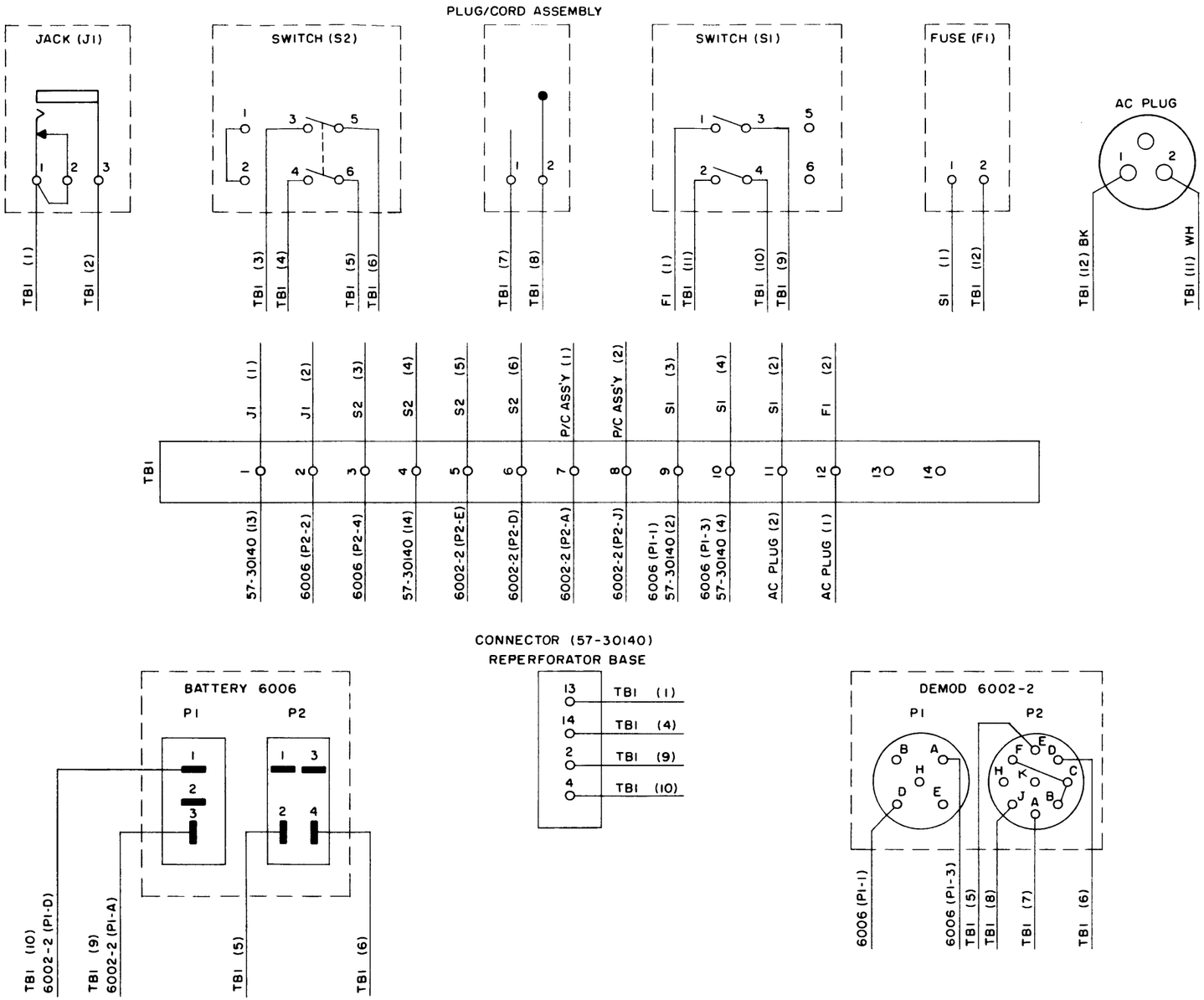
Figure 4-107. FAX Equipment Rack RE4.27, Wiring Diagram



NOTES

1. ALL WIRING #22 AWG, EXCEPT AC INPUT USE BELDEN* 8453 OR EQUIVALENT
2. RESISTOR (TB1, 11-12) 300Ω, 1 WATT
3. JACKS J1 & J2 TERMINALS 1 & 2 ARE STRAPPED
4. SWITCH (S2) TERMINALS 7, 13, 2, 16 ARE STRAPPED
5. DEMOD 6002-2 TERMINALS B-C-F ARE STRAPPED
6. CONNECTOR "U", TERMINALS 5-6, 5, 8, 9
7. CONNECTOR "R", TERMINALS 0-1 ARE STRAPPED

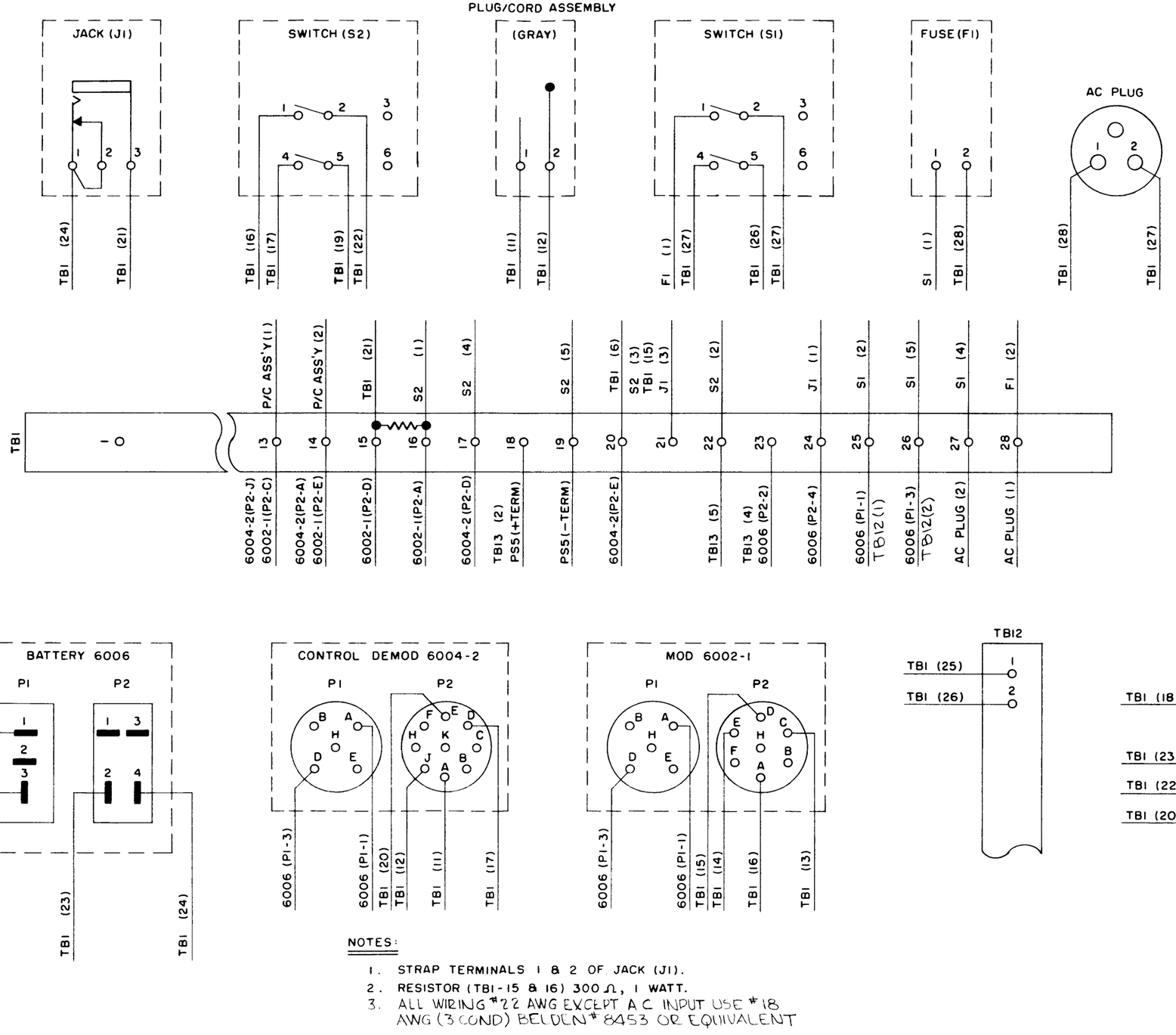
Figure 4-108. Printer Test Bench RH1.1, Wiring Diagram



NOTES:

1. JACK (J1), TERMINALS 1 & 2 ARE STRAPPED.
2. SWITCH (S2), TERMINALS 1 & 2 ARE STRAPPED.
3. DEMOD 6002-2, TERMINALS B-C-F ARE STRAPPED.
4. ALL WIRING #22 AWG. EXCEPT A C INPUT, USE #18 AWG (3 COND.) BELDEN # 2453 OR EQUIVALENT.

Figure 4-109. Reperforator Test Bench RH1.3, Wiring Diagram



NOTES:

1. STRAP TERMINALS 1 & 2 OF JACK (J1).
2. RESISTOR (TBI-15 & 16) 300 Ω, 1 WATT.
3. ALL WIRING #22 AWG EXCEPT A C INPUT USE #18 AWG (3 COND) BELDEN # 8453 OR EQUIVALENT

Figure 4-110. Transmitter Distributor Test Bench RH1.5, Wiring Diagram

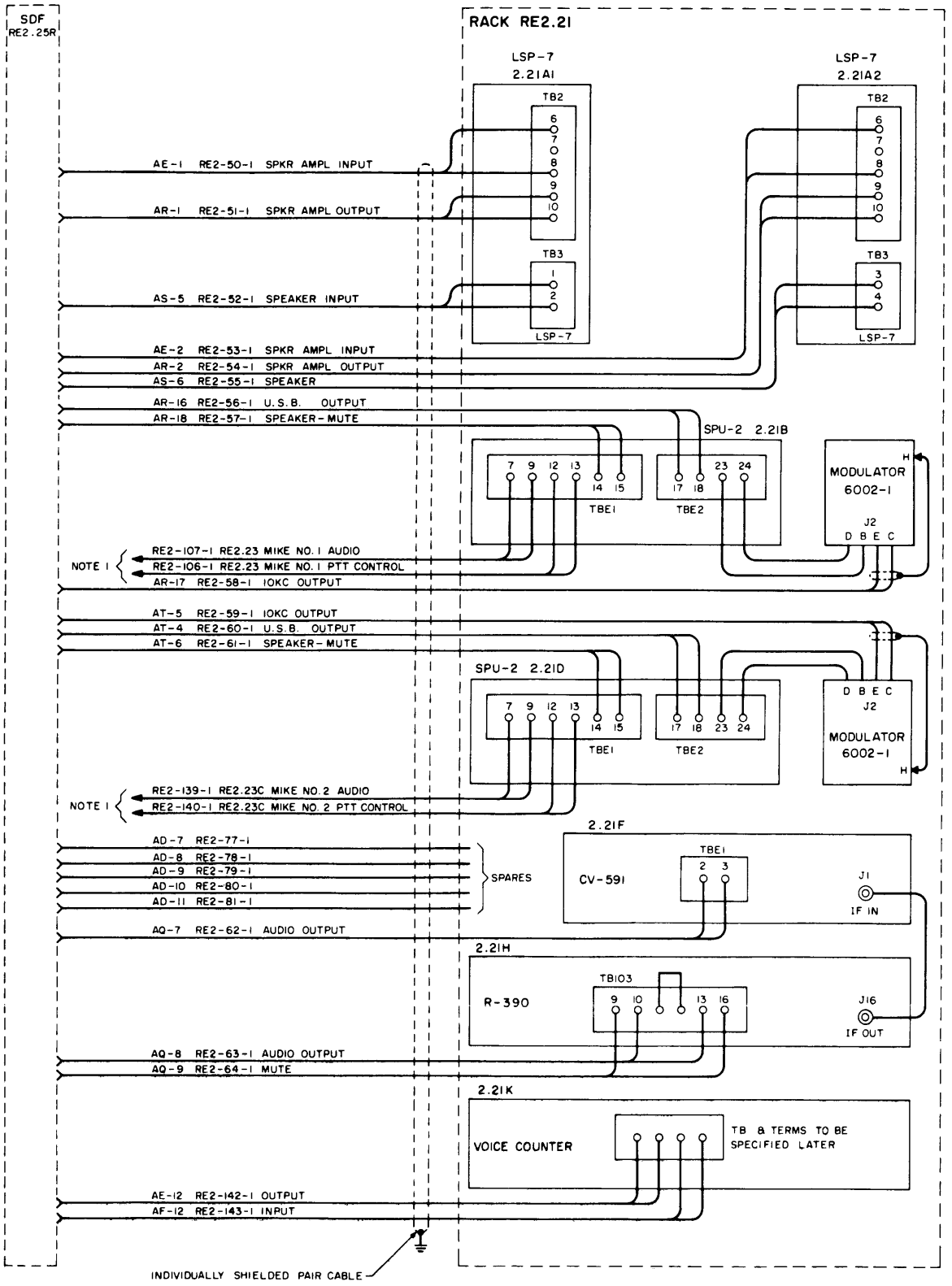


Figure 4-111. Voice Equipment Rack RE2.21, Wiring Diagram

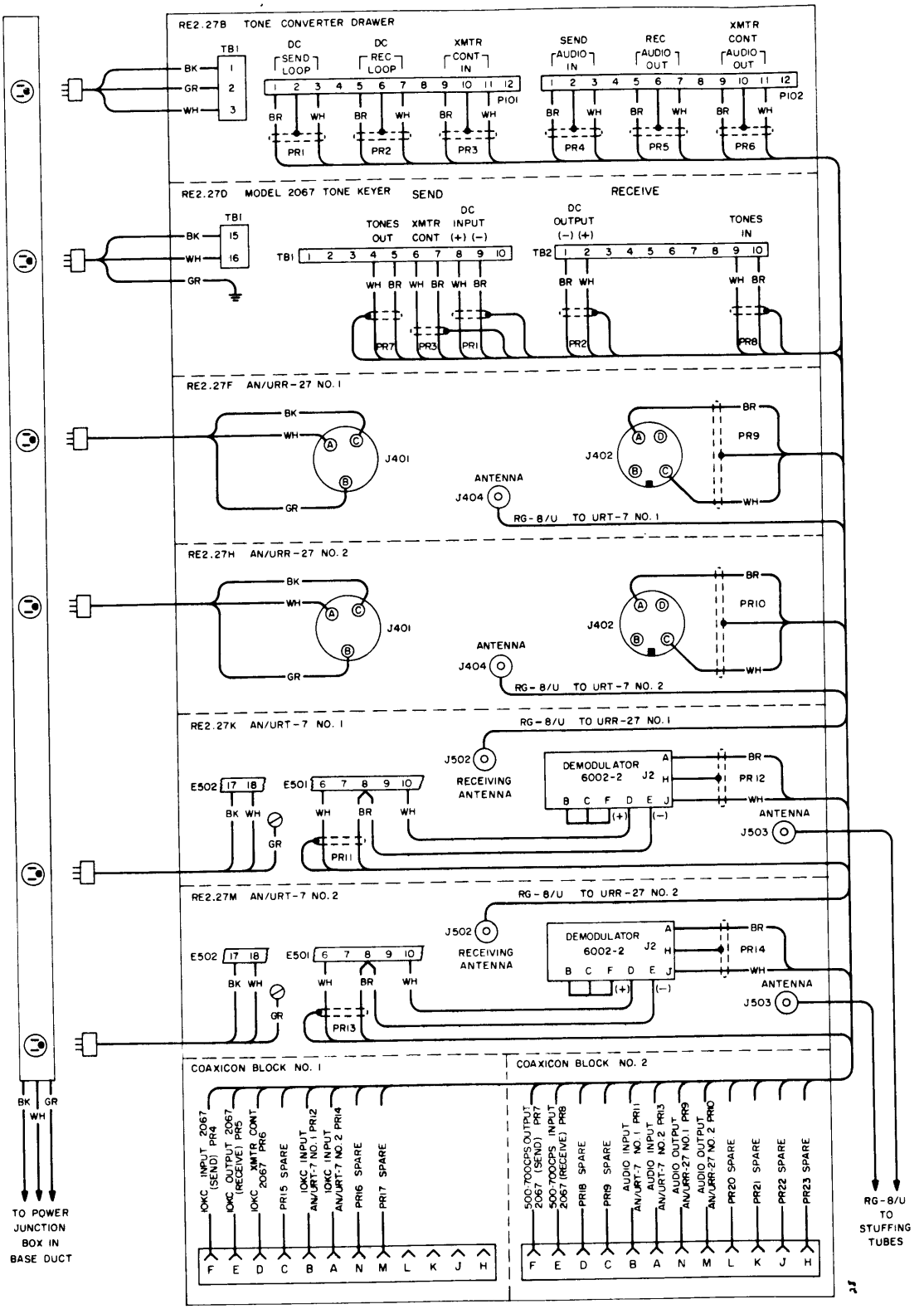


Figure 4-112. VHF Equipment Rack RE2.27, Wiring Diagram

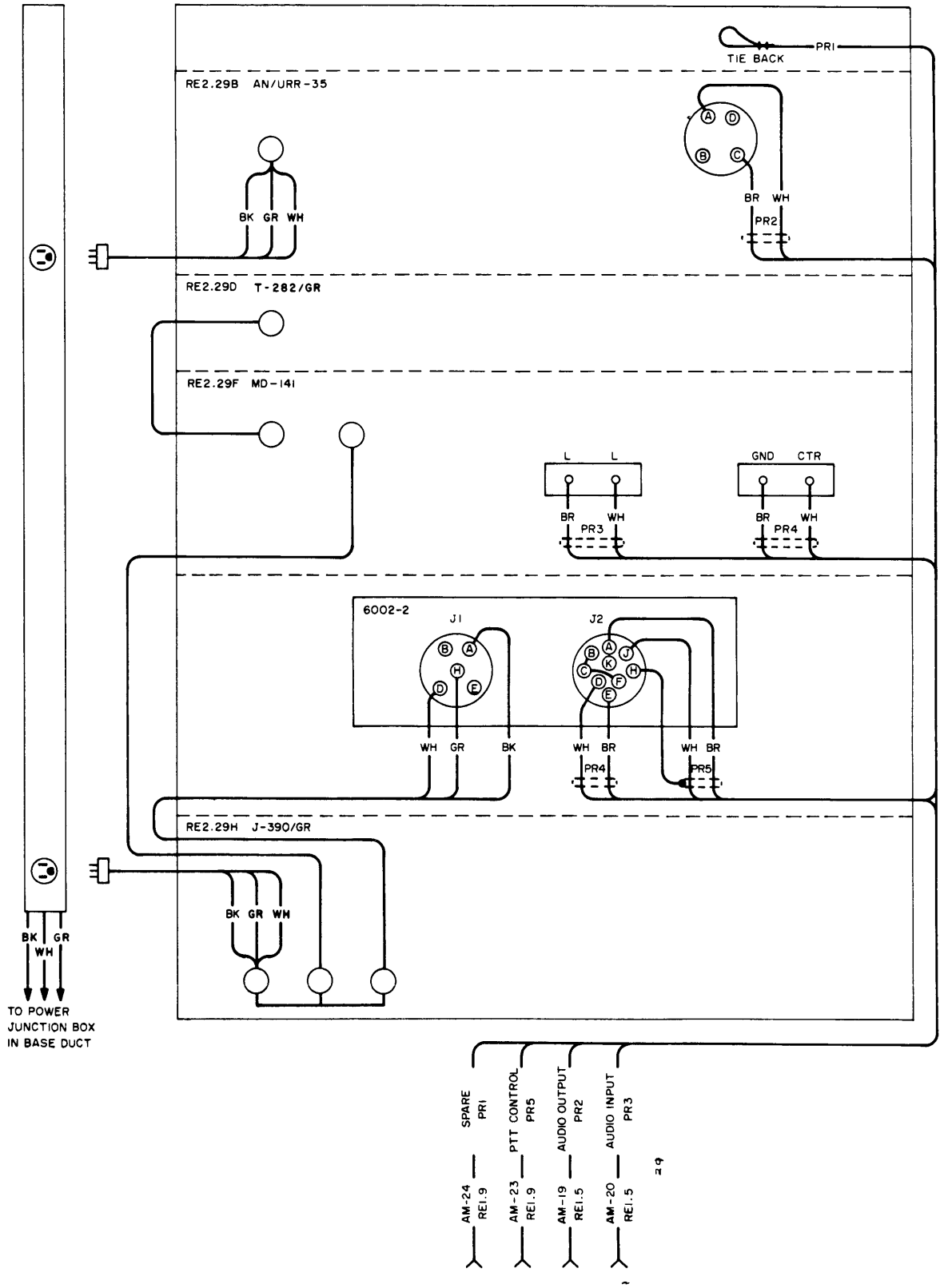


Figure 4-113. UHF Equipment Rack RE2.29, Wiring Diagram

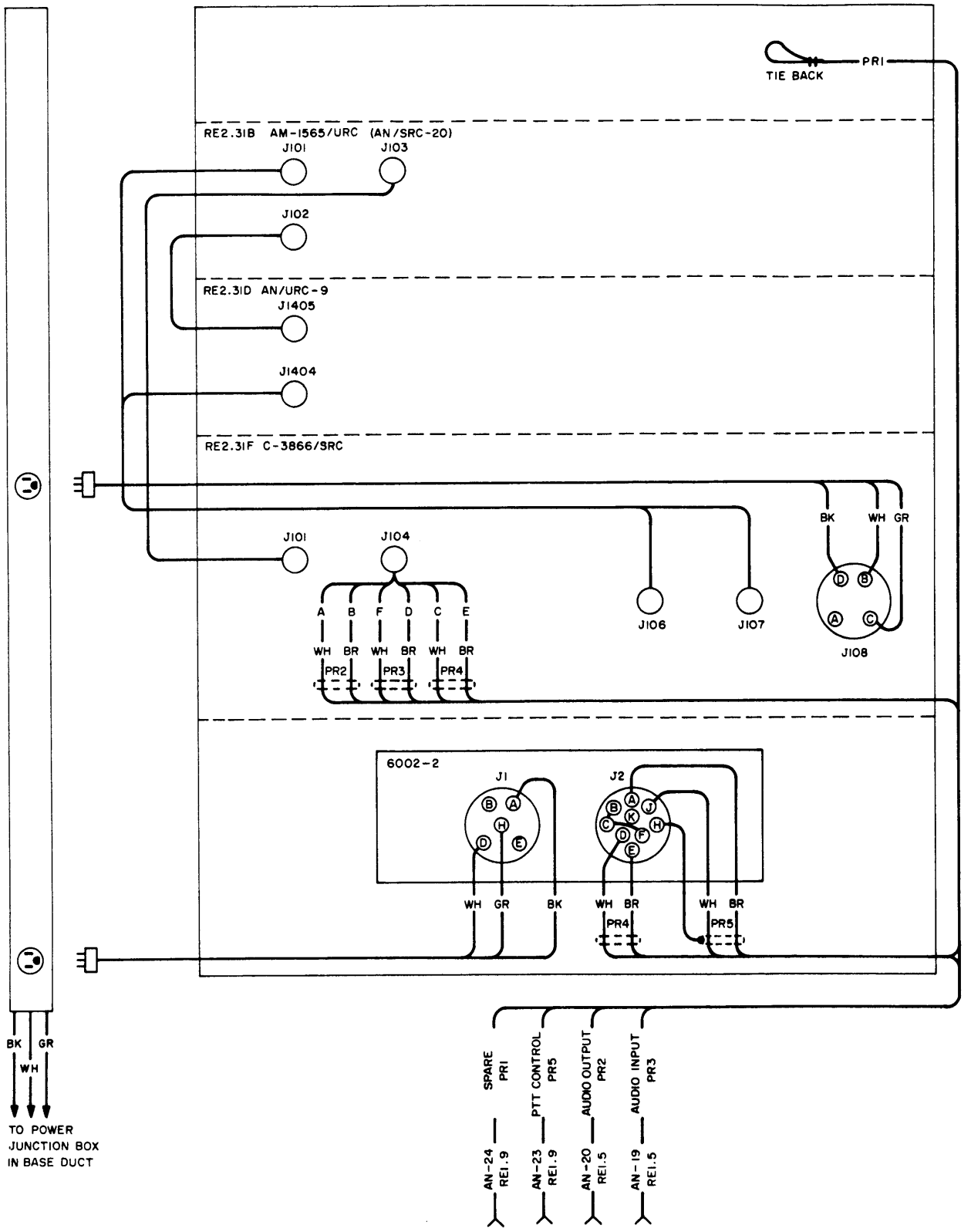


Figure 4-114. AN/SRC-20 Rack RE2.31, Wiring Diagram

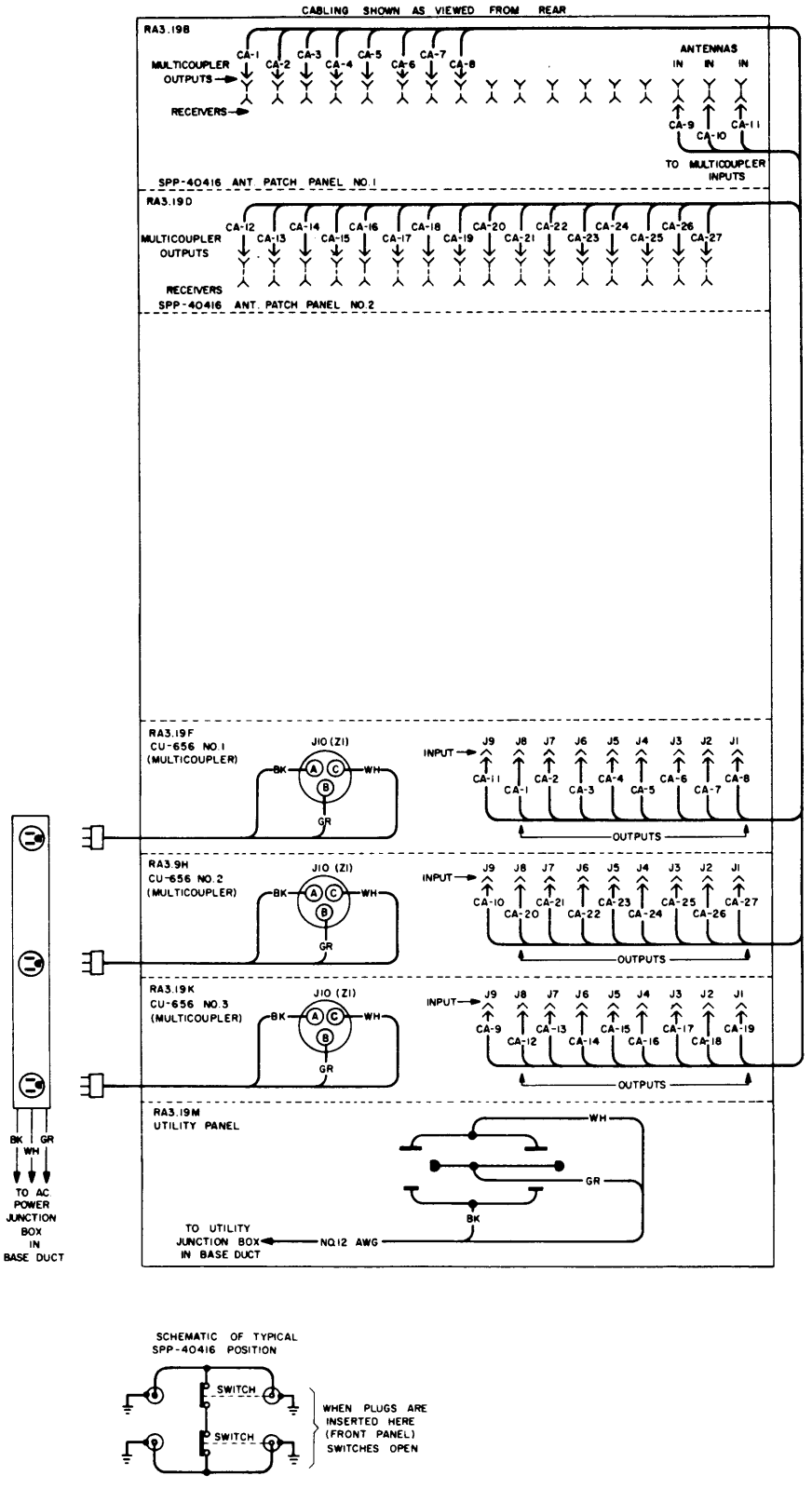


Figure 4-115. Antenna Patch & Multicoupler Rack RA3.19, Rack Wiring

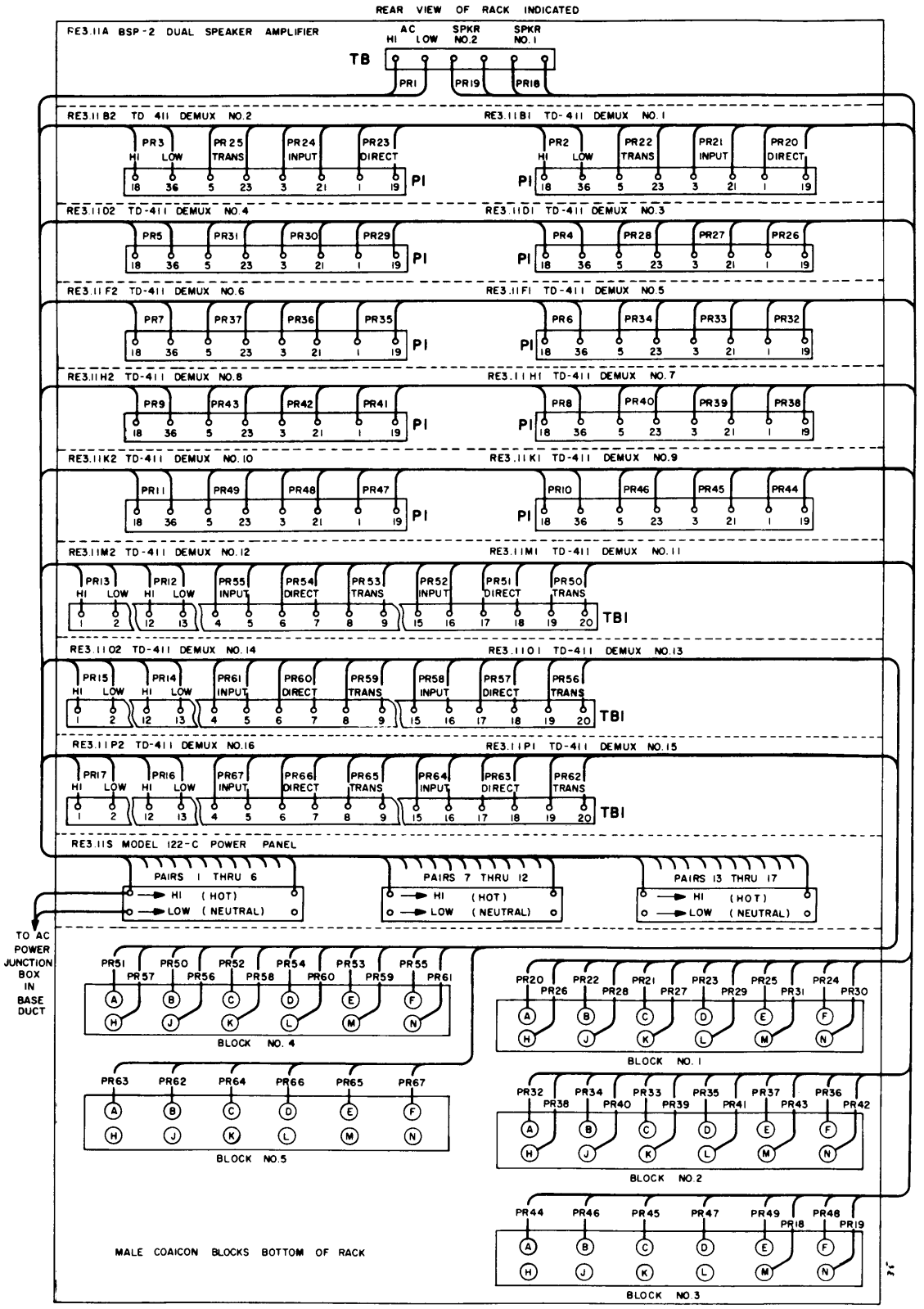


Figure 4-116. TD-411/UGC Demultiplexer Rack RE3.11 (2030 System), Wiring Diagram

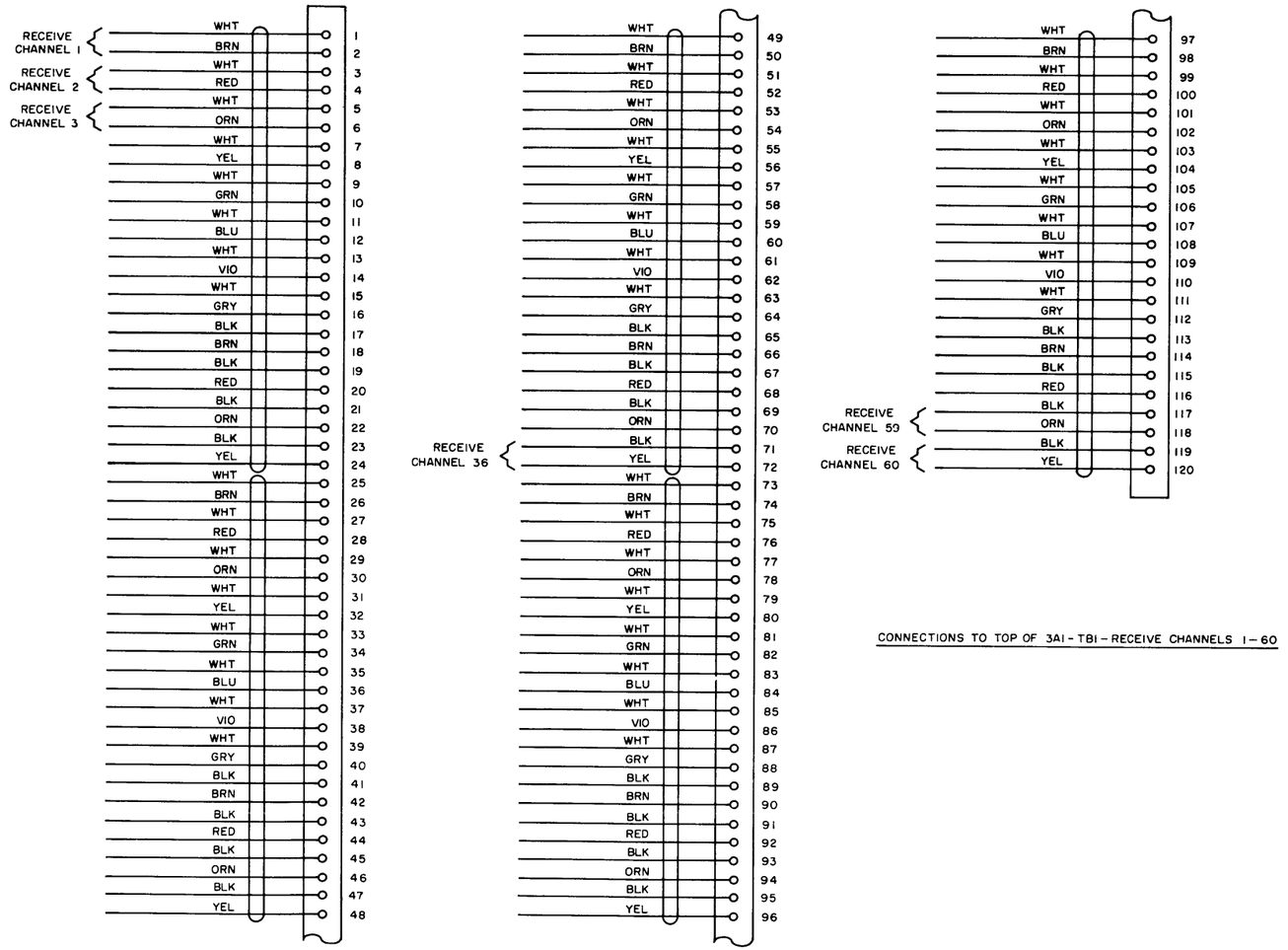


Figure 4-117. AN/FCC-17 Multiplexer VF Cabling Connections to Demultiplexer Equipment Rack 3, Typical of RE2 and TC1

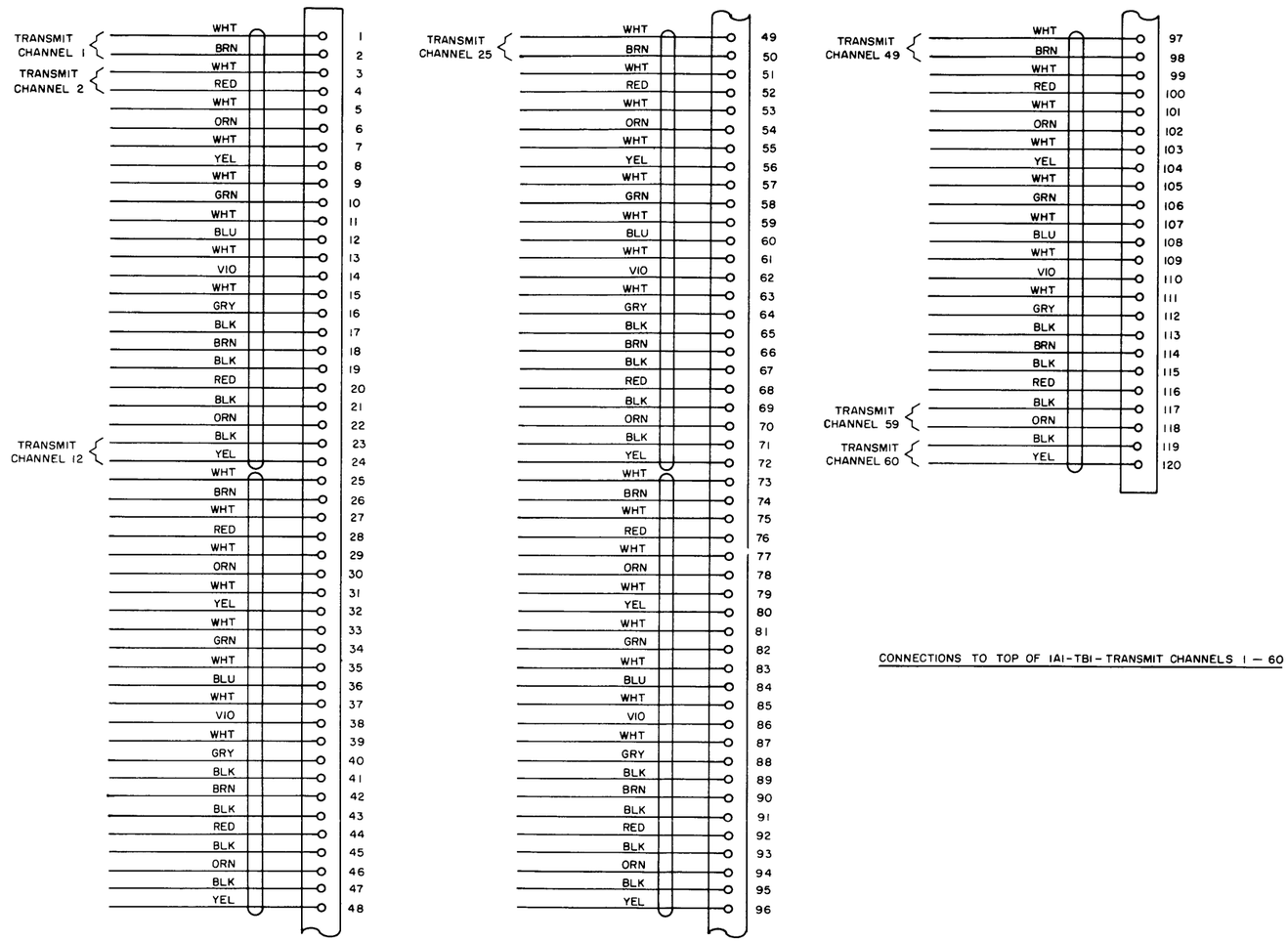


Figure 4-118. AN/FCC-17 Multiplexer VF Cabling Connection to Multiplexer Equipment Rack 1, Typical of RE2 and TC1