TECHNICAL MANUAL

for

DECODER-RECEIVER

MODEL RTTD-1

(KY-546/FRR-72)

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. **OTTAWA, CANADA**

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NOTICE

THE TECHNICAL MATERIEL CORPORATION
COMMUNICATIONS ENGINEERS
700 FENIMORE ROAD MAMARONECK, N. Y.

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes*furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

PROCEDURE FOR ORDERING REPLACEMENT PARTS

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION
Engineering Services Department
700 Fenimore Road
Mamaroneck, New York

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

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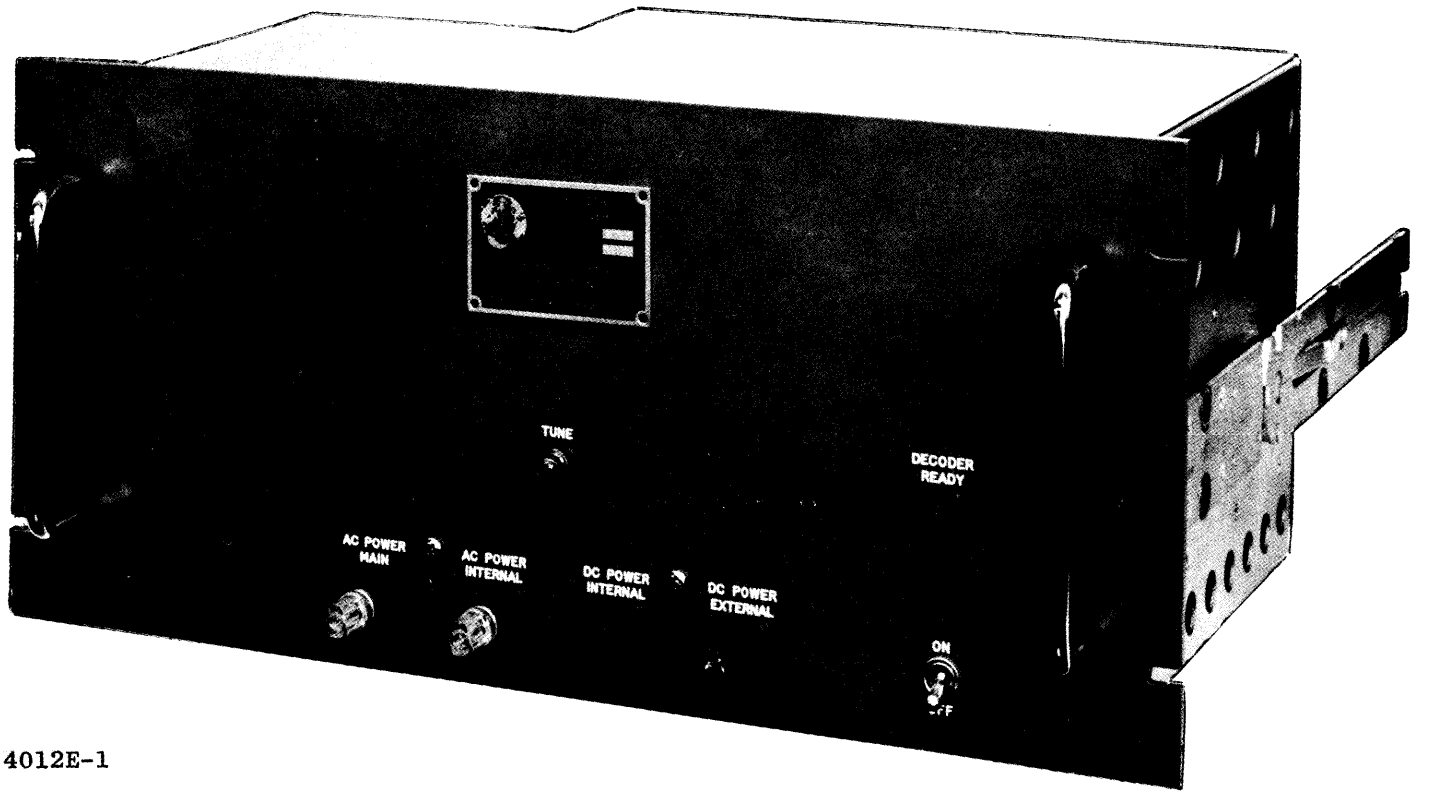

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Figure 1-1. Decoder-Receiver, Model RTTD-1

SECTION 1
GENERAL DESCRIPTION

1-1. FUNCTIONAL DESCRIPTION

DECODER-RECEIVER, Model RTTD-1 (figure 1-1) is a remote tuning, timing and decoder device used in TMC TechniMatiC* remote controlled receiver systems.

The DECODER-RECEIVER, Model RTTD-1 (hereafter referred to as the RTTD) is activated by a command signal, in five-bit parallel form, from a remote controlled memory unit, control panel or any other programming device, thereby controlling the various units comprising the remote controlled system.

The input commands to the RTTD are decoded and routed to the various modular unit tuning mechanisms in the proper programmed sequence. The RTTD is automatically deenergized at the end of each tuning cycle. If a fault occurs and the RTTD does not deenergize, a 30 second solid-state shut-off relay will cause it to deenergize.

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*Trademark applied for.

1-2. PHYSICAL DESCRIPTION

The RTTD is equipped with a 19 inch wide front panel, suitable for mounting into any standard width equipment rack. The front panel measures 8-3/4 inches high supporting a chassis measuring 11-1/4 inches deep. The unit is designed to be screw-fastened to a rack frame and comes equipped with chassis-tilt slides when used in system applications. The front panel displays two indicator lamps, a toggle switch and four fuses. All interconnecting cables are mated at the rear of the chassis.

1-3. TECHNICAL SPECIFICATIONS

INPUT POWER REQUIREMENTS:	105, 115 or 125 vac, 210, 230 or 250 vac, 50/60 cps, single phase
INPUT:	5-Bit parallel
SAFETY FEATURES:	30 second solid-state shut-off relay
PHYSICAL DIMENSIONS:	19 inches wide by 8-3/4 inches high by 11-1/4 inches deep
COMPONENT AND CONSTRUCTION:	Equipment manufactured in accordance with JAN/MIL specifications wherever practicable
POWER CONSUMPTION:	500 watts total power consumption.
	300 watts consumption for five seconds for solenoid and torque motor of HFRR-2 during full cycle.
	200 watts consumption continuously.

SECTION 2
INSTALLATION

2-1. INITIAL INSPECTION

Each RTTD has been thoroughly checked and tested at the factory before shipment. Upon arrival at the operating site, inspect the packing case and its contents immediately for possible damage. Unpack the equipment carefully. Inspect all packing material for parts which may have been shipped as loose items.

With respect to damage to the equipment for which the carrier is liable, The Technical Materièl Corporation will assist in describing methods of repair and the furnishing of replacement parts.

2-2. MECHANICAL INSTALLATION

The RTTD is equipped with a 19-inch wide rack panel, designed to be mounted into any standard width equipment rack. The panel is to be screw fastened to the rack frame. Chassis tilt-slides are provided for ease of maintenance and inspection. See figure 2-1.

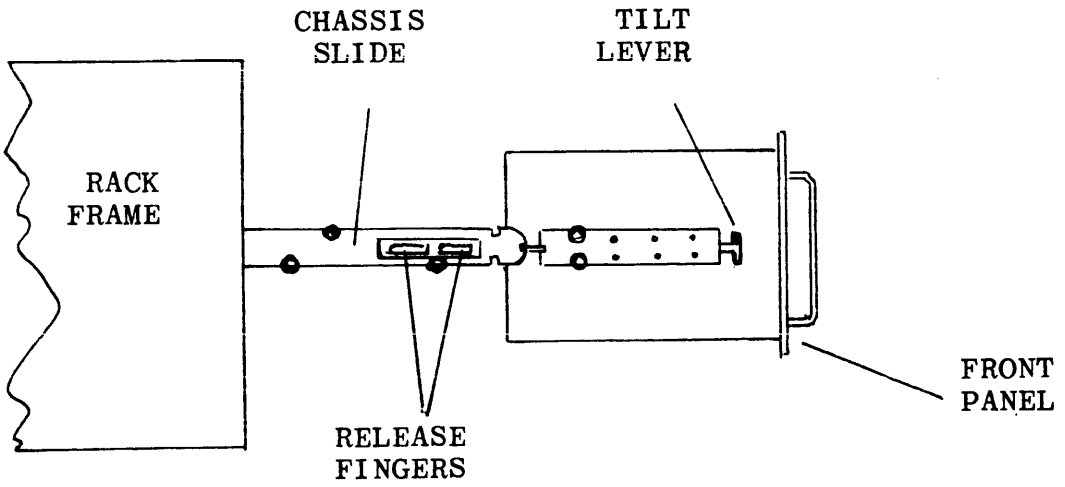


Figure 2-1. Slide Mounting Details

2-3. ELECTRICAL INSTALLATION

The RTTD is factory wired to receive an input line voltage of 115 volts ac. The input power transformer, however, incorporates voltage taps making it possible to receive an input line voltage of 105 volts ac, 125 volts ac, and by simple wiring changes (shown in figure 2-2), operation from an input line voltage of 230 volts ac.

Connectors J4001, J4002, and J4003 are to be connected to the various modular units to be controlled.

Connector J4004 is to be connected to the external memory unit or programming device for input power control and input command pulses.

Connector J4009 to be connected to an external synthesizer for dc correction voltage.

Connector J4010 to be connected to an external synthesizer for audio sync tones. See figure 2-3.

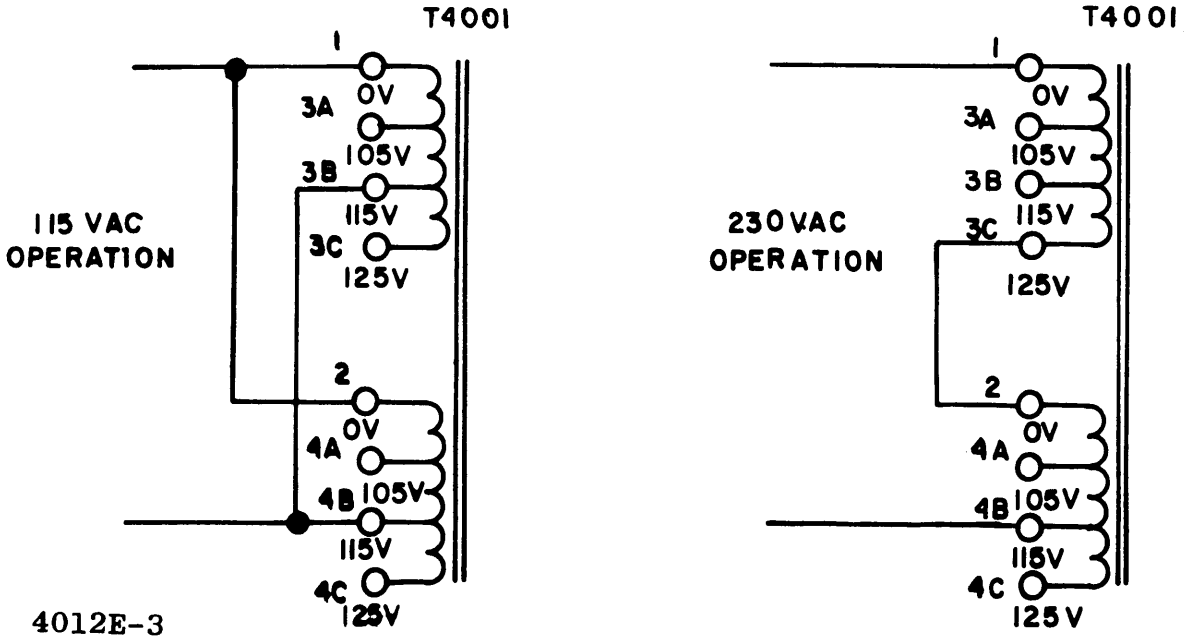


Figure 2-2. Power Supply Changeover Connections

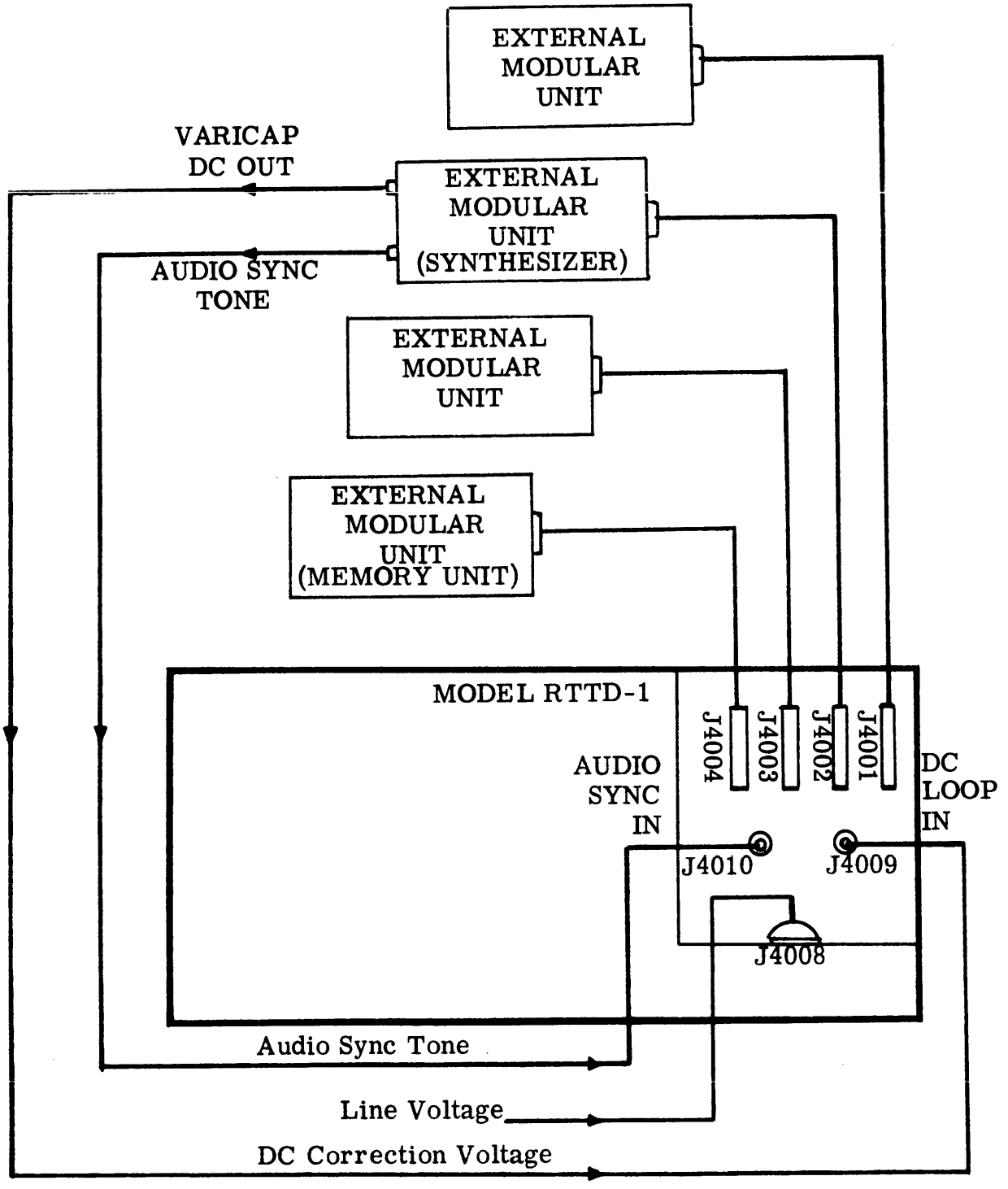


Figure 2-3. Interconnection Diagram.

SECTION 3
OPERATOR'S SECTION

3-1. GENERAL

The RTTD has been designed to operate automatically by commands from an external programming device. The input command signals are supplied to the RTTD, via connector J4004, in a five-bit parallel form.

3-2. OPERATOR'S INSTRUCTIONS

Since the RTTD is operated automatically by an external programming device, the operator is required to perform no adjustments other than initially setting the a-c power toggle switch to on. When a-c is applied to the RTTD, a front panel a-c indicator lamp will light signifying application of a-c input voltage. The d-c voltage indicator lamp will light during a tuning cycle. Four fuses are also front panel mounted, used to protect their indicated circuits.

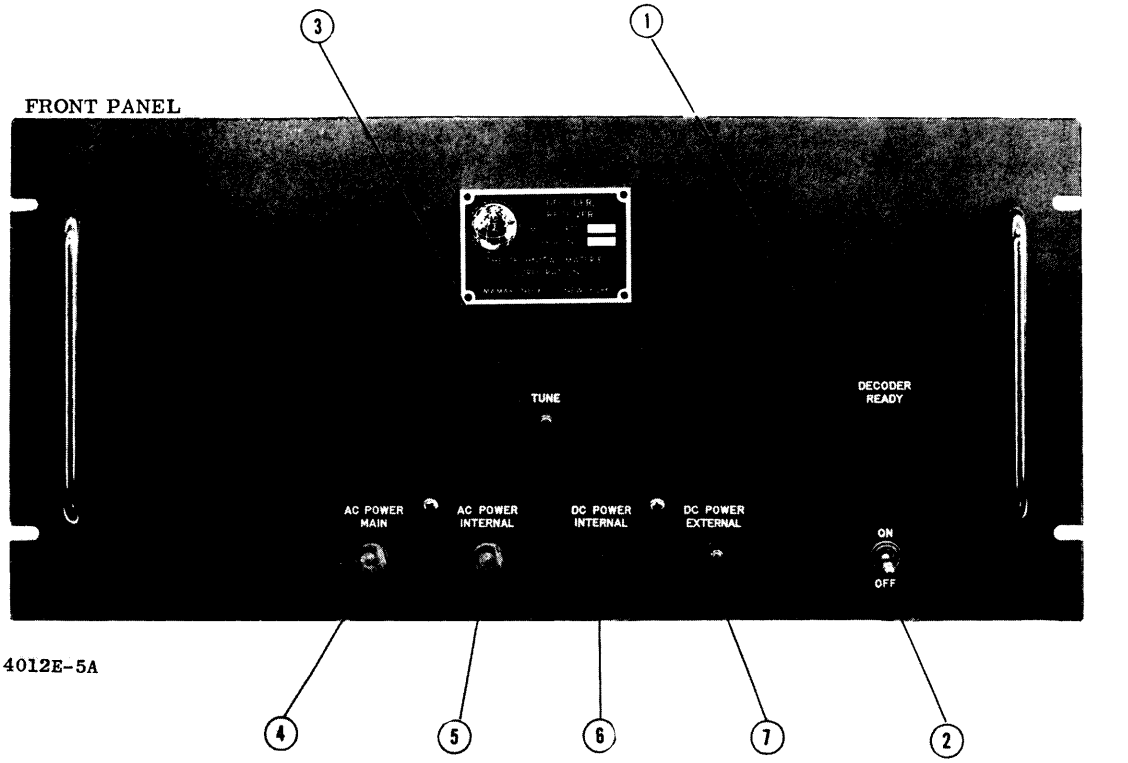
3-3. OPERATOR'S MAINTENANCE

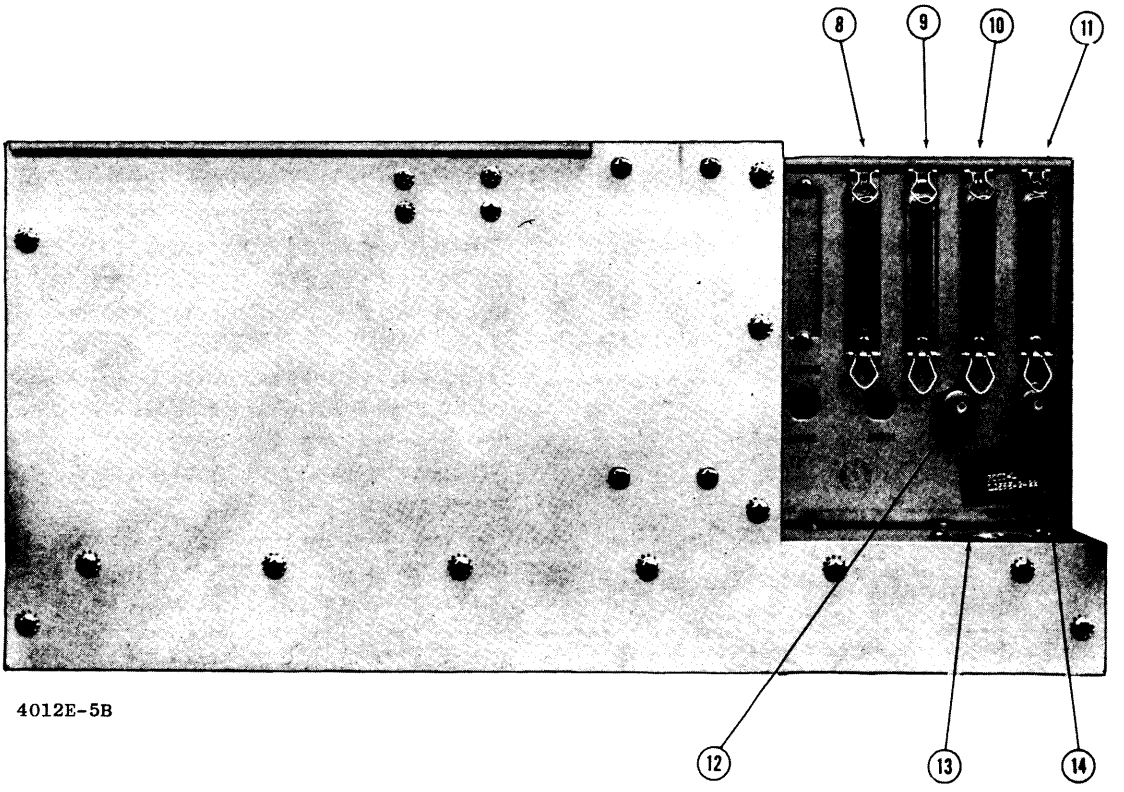
The operator may, at certain times, be required to perform various aspects of operator's maintenance. This type of maintenance may consist of simply keeping the unit clean and observing for secure interconnections.

However, should normal operating procedures produce unsatisfactory results, a check of the interconnections and associated equipment levels to the RTTD may clear the fault. A check of the four protective fuses may also be necessary.

TABLE 3-1. FRONT PANEL AND REAR CHASSIS COMPONENTS

SERIAL DESIGNATION (Figure 3-1)	PANEL DESIGNATION (Figure 3-1)	FUNCTION
	FRONT PANEL	
1	DECODER READY indicator lamp, DS4002	When AC POWER toggle switch is ON, lights to indicate a-c power is applied to RTTD.
2	AC POWER ON/OFF, toggle switch, S4002	In ON position, applies a-c power to RTTD.
3	TUNE , indicator lamp, DS4001	Indicates tuning signal applied to RTTD.
4	115 VAC/6A fuse, F4001	Solenoid operating voltage protective fuse.
5	115 VAC/15A fuse, F4002	Input line voltage protective fuse.
6	+28 VDC/3A fuse, F4003	+28 vdc power supply protective fuse.
7	+28 VDC/.5A SERVO fuse, F4004	+28 vdc servo voltage protective fuse.
	REAR CHASSIS	
8	J4004	Input operating and control voltages from external programmer.
9	J4003	Output control voltages to external modular unit.
10	J4002	Output control voltages to external modular unit.
11	J4001	Output control voltages to external modular unit.
12	J4010	Audio sync tone from external synthesizer.
13	J4008	AC line voltage input
14	J4009	DC correction voltage from external synthesizer.





662.1-3

662.1-5

Figure 3-1. Front Panel and Rear Chassis Components

SECTION 4
PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

The RTTD receives the initial start and control function code signals from an associated programmer or memory unit. These control function codes, in 5-bit parallel form, are decoded to position the remote modular unit slave stepping switches to the programmed functional position or setting. At the completion of the tuning cycle, the RTTD automatically deactivates or shuts off, starting again on command from the associated memory unit. However, if the RTTD develops a fault, an internal solid-state shut-off relay will automatically deactivate the RTTD after 30 seconds' operating time.

Due to the various unique circuitry designs within the RTTD, the following circuit description will be analyzed in a block or section breakdown. See figure 4-1 for a simplified block diagram layout.

4-2. CIRCUIT DESCRIPTION.

The RTTD may be divided into six functional sections and will therefore be discussed as follows.

a. Activation Circuitry

b. Input Code Circuitry

c. Timer and Clock Circuitry

d. Control Selection and Positioning

e. Servo Amplifier Control Circuitry

f. Deactivation Circuitry

a. ACTIVATION CIRCUITRY. - When the ON/OFF power toggle switch is set at ON, the DECODER READY indicator lamp will light. This condition indicates that 115 volts a-c is connected to the RTTD, although the circuit is not yet completed through its power supply transformer T4001. This circuit is not completed until the RTTD receives its initial starting pulse from the associated memory unit.

The initial starting pulse is received at pins 8 and 27 of J4004, causing power relay K4030 to momentarily energize. Pin 27 of J4004 has a constant 18 volts d-c applied, with pin 8 providing the momentary ground return. Closed contacts 5 and 6 of relay K4030 completes the 115 volts a-c circuit, causing activation of the RTTD power supply (momentarily). This condition causes the TUNE indicator lamp to light.

Relay K4030 then connects 28 volts d-c to the solenoid of start relay K4013 (momentarily) via contacts 3 and 4. Relay K4013 in turn momentarily connects 28 volts d-c to the solenoid of relay K4006 via contacts 9 and 10. Relay K4006 thus energizes, locking itself in the energized position by a holding circuit via normally closed contacts 5 and 6 of deenergized relay K4014 and its own closed contacts 6 and 7. With relay K4006 energized, 28 volts d-c is applied to the solenoid of power supply lock-up relay K4027 via contacts 9 and 10 of relay K4006 and normally closed contacts 4 and 5 of deenergized relay K4026. With relay K4027 energized, the 115 volts

a-c circuit is completed through closed contacts 6 and 7 of relay K4027. The 115 volts a-c is then applied to input power transformer T4001.

Input power transformer T4001 contains three secondary windings.

Secondary winding terminals 5 and 6 provide +28 volts d-c, via a full wave bridge rectifier network, for activation of the various RTTD relay solenoids.

Secondary winding terminals 7 and 8 provide 26 volts a-c to connector J4001 pins 7 and 8 (fixed phase for servo generator).

Secondary winding terminals 9, 10 and 11 are used to supply 6.3 volts a-c to connector J4006 pins 9, 10 and 11. This voltage is used to supply a direction of servo search signal to the servo amplifier AZ103.

With power supply lock-up relay K4027 now energized, an "in tune process" signal is routed back to the external memory unit. This is accomplished by providing a ground return to the memory unit's "in tune process" relay via pin 12 of J4004, through contacts 9 and 11 of K4027. Energizing the memory unit's "in tune process" relay causes it to deenergize its "ready" relay. These two relays in the remote memory unit make connections to the memory unit readback circuits, causing the remote operator's indicator lamps to go from "ready" to "in tune process".

The energized relay K4027 also sends a "decoder energized" signal back to the external memory unit. This is accomplished by closed contacts 1 and 3 of K4027, routing +12 volts d-c at pin 35 of J4004 back into the memory unit via pin 6 of J4004. This +12 volts d-c closes the input gate of the memory unit to any further messages.

b. INPUT CODE CIRCUITRY. - The code input relays K4001 through K4005 receive +28 volts d-c at solenoid terminal 4 before the charges from the memory unit arrive at terminal 1. A negative memory unit charge ("1") causes current to flow through the solenoid, causing the relay to energize. A positive memory unit charge ("0") leaves the relay deenergized. Each code input relay (K4001 through K4005), when energized, connects a ground return to a corresponding bit relay (K4021 through K4025), energizing that relay.

The nature of the input 5-bit codes are such that those codes intended to select a receiver control (addressal functions) begin with a "1" as bit #1. The next code that follows it is a code to position that control (action function) and begins with a "0" as bit #1. If the code is a control selector, the "1" bit in bit #1 energizes relay K4001. The ground return through relay K4001 closed contacts causes relay K4019 to energize. The code appearing at the swinger contacts 21, 18, 15, 12 and 9 of K4019 is then connected to contacts 22, 19, 16, 13 and 10, respectively. This routes the 5-bit code to wafer #1 of the RTTD 18-position master control stepping switch. Wafer #1 is the drive wafer of the master control stepping switch; the code drives the switch to a specific position as shown in table 4-1.

TABLE 4-1. CODES VS. MASTER CONTROL STEPPING SWITCH

CODE BITS 1 2 3 4 5	SWITCH POSITION	CONTROL FUNCTION
1 1 0 0 1	1	2-16 mc switch on remote synthesizer
1 0 0 0 1	2	17-32 mc switch on remote synthesizer
1 0 0 1 1	3	100 kc switch on remote synthesizer
1 0 0 1 0	4	10 kc switch on remote synthesizer
1 0 1 1 1	5	1 kc switch on remote synthesizer
1 0 1 0 1	6	.1 kc switch on remote synthesizer
1 1 1 1 1	7	FUNCTION #1
1 1 0 1 1	8	FUNCTION #2
	9	NO CONNECTION
1 0 1 1 0	10	FUNCTION #3
1 1 1 1 0	11	FUNCTION #4
1 1 1 0 0	12	FUNCTION #5
1 1 1 0 1	13	FUNCTION #6
1 1 0 0 0	14	FUNCTION #7
1 1 0 1 0	15	FUNCTION #8
1 0 0 0 0	16	DECODER STOP
1 0 1 0 0	17	FUNCTION #9

The code drives the master control stepping switch to a specific position as follows.

When relay K4019 is energized (by bit #1 = 1), it causes relay K4020 to energize via K4019 contacts 6 and 7. The 5-bit code, with bit #1 always a "1", has only 4 significant bits left, leaving bits 2, 3, 4 and 5 to drive the wafer.

The bit information is in the form of the "1" bits connected to +28 volts d-c (from energized relay K4015 via R4010) and the "0" bits disconnected from the +28 volts d-c. In addition, bit #2 is repeated again in reverse polarity, in order to drive the stepping switch into 16 possible

positions from only a 4-bit code. Current from the +28 volts d-c line continues to move through the stepping switch solenoid until the proper position is reached.

When the current ceases, relay K4012 denergizes. This causes relay K4008 to energize, removing the +28 volts d-c from the code input relay solenoids. The code input relays are now cleared and ready to receive the next code. This is the end of the +12 volts d-c "pulse" from the clock circuit (described in paragraph 4-2c).

The next +12 volts "advance" pulse pulls the next code to the code input relay K4001 through K4005 solenoids. This code, (an action function), contains a "0" for bit #1. Relay K4001 deenergizes, causing relays K4021, K4019 and K4020 to deenergize. The code appearing at relay K4019 swinger contacts 18, 15, 12 and 9 (representing the significant 4-bits (2 through 5) of the action code) is then connected to the wipers of stepping switch wafers #2 through #5, respectively. When the master control stepping switch is in position 1 or 2, bit #2 is connected (with reversed polarity) to the wipers on wafer #6. The reason for this is that in positions 1 and 2, the 4-bit code must drive a 16-position switch in the external modular synthesizer unit (MC switch). In positions 3 through 17, however, the 4-bit code drives a 12-position switch in the various receiver controls and the reversed bit #2 is not required.

The opened and closed bit connections, to the +28 volts d-c for the function code, are primarily the same as for the addressal function code but without the bit #2 reversal.

When the "E" code (10000) comes through, as an addressal function, closed contacts 21 and 22 of relay K4019 are used to transmit bit #1 (1) to the master control stepping switch instead of the reversed bit #2. With this code, all bits of 2 through 5 make "0" connections and the only "1" connection (to +28 vdc) is made via relay K4020 contacts 8 and 10, relay K4022 contacts 14 and 15, relay K4021 contacts 21 and 22 and relay K4019 contacts 21 and 22.

When the Function #5 addressal code arrives, the master control stepping switch moves to position 12. The subsequent function #5 action code is always a 4-bit code with only 2 significant bits, 2 and 4. Bits 3 and 5 are always "0" and relay K4010 is always deenergized by the absence of +28 volts d-c. The +28 volts d-c is available on either line from master control stepping switch wafer #3 or #5. Bit #2 (1 or 0) information then travels via wafer #2, relay K4010 contacts 9 and 8 to the Function #5 output. Bit #4 arrives via pins 6 and 5. If the code is incorrect (i.e., if bits 3 or 5 contain +28 volts d-c representing a "1"), relay K4010 energizes, cutting off the code.

c. TIMER AND CLOCK CIRCUITRY. - The clock circuit supplies +12 volts d-c "advance" pulses to the external memory unit. This is accomplished by connecting the +12 volts d-c, available from the memory unit at contact 3 of relay K4027, through closed contacts 18 and 19 of relay K4006 to contact 18 of relay K4008. This +12 volts d-c reference voltage is used to form the +12 volts "advance" pulses. Relay K4006 contacts 9 and 10 also supplies +28 volts d-c to the clock circuit at resistor R4018.

The clock circuit, (Q4001, Q4002, Q4003, K4008 and K4012), is activated and controlled by the remote receiver system slave stepping switches. When the remote slave stepping switches are moving, current is drawn and relay K4012 is energized through Q4003. With relay K4012 energized, its contacts 5 and 6 open, preventing Q4001 and Q4002 from conducting current through the solenoid of relay K4008. Deenergized relay K4008 supplies +28 volts d-c to the code input relays, holding them in their code positions while the slave stepping switches are moving.

When the slave stepping switches stop moving, there is no current flow through relay solenoid K4012, thereby closing its contacts 5 and 6.

This condition causes relay K4008 to energize and the +28 volts to the code input relay solenoids is removed. This causes the code input relays to be cleared for the next input code.

Relay K4008 sends +12 volts d-c pulses* to the memory unit via contact 18 and alternate contacts 17 and 19. The alternate pulses travel through pins 7 and 16 of connector J4004. Each pulse enters the memory unit; the memory unit issues a responding pulse that ultimately results in negative or positive pulses. These pulses appear at connector J4004 pins 19, 37, 18, 56 and 17 for bits 1, 2, 3, 4 and 5 of the first code.

A negative pulse represents a "1"; a positive pulse represents a "0".

Relay K4008 also sends +28 volts d-c pulses, via contacts 11 and 12 and relay K4006 contacts 21 and 22, to the solenoids of code input relays K4001 through K4005. Contacts 11 and 12 of relay K4008 also supply

*Since relay K4008 and the slave stepping switches operate in a reciprocative action, the "pulses" issued from relay K4008 and the memory unit vary in duration. This duration depends on the interval required for the slave stepping switch to "home".

+28 volt pulses directly to the solenoid of bit 1 relay K4021. Contacts 20 and 21 of relay K4008 supply +28 volts d-c pulses to the solenoids of bit 2, 3, 4, and 5 relays K4022 through K4025, respectively. Contacts 5 and 6 of relay K4008 supply +28 volts d-c pulses to the solenoid of relay K4019.

d. CONTROL SELECTION AND POSITIONING. - Each "advance" pulse from the clock circuit continues to "pull" out the next code from the memory unit's memory core. The remote operator has pre-programmed these codes in the order shown in table 4-1, alternating them with control position codes. Referring to table 4-1, the first six codes select controls on the remote modular synthesizer unit. The rest of the codes may select other controls in the receiver, depending on the cable connections to connectors J4002 and J4003. These connections may vary in accordance with the TechniMatiC receiver system in use.

Sequential relays and a servo control amplifier (AZ103), arranged in the RTTD, allow the MC, 100KC, 10KC, 1KC and .1KC codes to position these controls in the remote synthesizer unit first. Synthesizer switch connections then tune the associated r-f tuner to the synthesizer setting. The code 11111 (refer to table 4-1), besides selecting the function #1 position, also starts the r-f tuner modular unit's band switch action and servo control action (used to fine-tune the r-f tuner).

When the "E" code enters the unit, it results in a shut-down of all power in the RTTD, sending a "tune complete" signal back to the remote operator. This is accomplished as follows.

When the MC code (refer to table 4-1) has entered the RTTD, it has moved the master control stepping switch to either position #1 or position #2. This depends on whether it is the 2-16 code or 17-32 code. In order for the 32-position switch in the modular r-f tuner to be positioned by a series of 4-bit codes, it is necessary to repeat bit #2 in reverse polarity as previously discussed, and to repeat the same control position 4-bit code for each half of the range. Each range half is driven through a 2:1 gear network by a 16-position stepping switch.

When in position #2, the master control stepping switch wafer #8 connects +28 volts d-c to the 17-31 mc wafer switch solenoid in the modular synthesizer unit, thus driving it out of the 17-32 mc range. This is in preparation for receiving the 2-16 code. This action works in reverse for position #2; +28 volts d-c is connected to the 2-16 mc wafer switch solenoid in the modular synthesizer unit, driving the 32-position switch into the 17-32 mc half.

The +28 volts at pin 8 wiper of master control stepping switch wafer #8 is an "advance" pulse. This is received via relay K4008 contacts 14 and 15, bit-1 relay K4021 contacts 17 and 18 in its "0" position, through resistor R4010 of the clock circuit and energized relay K4015 contacts 6 and 7. Relay K4015 becomes deenergized between codes.

When the modular synthesizer unit MC switch has been driven into the correct half of the range, the MC code set up on the RTTD connector J4001 proceeds to work on the stepping switch to bring it to the correct MC position. Master control stepping switch wafer #7, at position 1 or 2, also

makes connections that disable the modular r-f tuner tune servo control in the RTTD. This is accomplished by connecting +28 volts d-c via wiper pin 18 to the solenoid of relay K4032. The energized relay K4032 contacts 5 and 6 open, disconnecting +28 volts d-c from the solenoid of relay K4007 (which it had obtained from its own closed contacts 6 and 7). (This is in the event that relay K4007 is still energized from a previous tuning sequence.) The deenergized relay K4007 disconnects the +28 volts d-c regulated supply from the modular r-f tuner unit via J4001 pin 15, through deenergized relay K4017 contacts 20 and 21, energized relay K4009 contacts 9 and 10 to the servo control amplifier AZ103, J4006 pin 17.

Relay K4009 is energized as long as there is no audio sync tone issuing from the modular synthesizer unit's phase detector. The ground return for the +28 volts d-c at relay K4009 solenoid pin 4 is supplied by the sync tone relay in the modular synthesizer unit when in the "no tone" position. This is accomplished via connector J4002, pins 4 and 22.

e. SERVO AMPLIFIER CONTROL CIRCUITRY. - The MC switches in the modular synthesizer unit, having moved to the correct position for the MC code, make connections via a wafer switch to bring the modular r-f tuner band switch to the proper MC position. This is accomplished as follows.

As the 100KC control code moves through the RTTD, the stepping switch is brought to position 3. This furnishes +28 volts d-c from the wiper at wafer #7, through deenergized relay K4017 contacts 8 and 9, connector J4001 pin 36, through the modular synthesizer switches, the band contact in the modular r-f tuner unit switch, to RTTD connector J4001 pin 16,

relay K4028 solenoid to ground. With relay K4028 energized, contacts 1 and 3 close and contacts 6 and 7 close, connecting a-c power across the modular r-f tuner unit's gear detent solenoid on its band switch drive motor. Current through the r-f tuner's detent solenoid draws the detent out of the gear, causing the actuator to push a limit switch (in the r-f tuner) to close it. The closed limit switch connects +28 volts d-c from relay K4028 closed contacts 1 and 3 to the solenoid of relay K4017. Energized relay K4017 connects a-c power to the modular r-f tuner motor, through closed relay K4028 contacts 6 and 7 and disconnects the regulated +28 volts d-c intended for the modular r-f tuner unit's tune servo control by opening contacts 20 and 21.

This relay sequence prevents the r-f tuner motor from moving until the detent has been removed and disables the tune servo while the band switch is moving. When the motor has moved its wafer switch to the correct band position, the +28 volts d-c to relay K4028 solenoid is removed, causing it to deenergize. With relay K4028 deenergized, its contacts 1 and 3 open, deenergizing relay K4017 and contacts 6 and 7 open, removing current from the modular r-f tuner unit's detent solenoid. The r-f tuner detent returns to its former position and a cam drops into the gear switch cam follower. The cam rides on top of the cam follower until it comes to the notched detent. This action causes the limit switch (in the r-f tuner) to re-open. Deenergized relay K4017 disconnects the a-c power from the modular r-f tuner unit's band motor by opening contacts 6 and 7 and reconnects contacts 20 and 21 to supply the regulated +28 volts d-c for servo tuning

at swinger contact 9 of deenergized relay K4007.

The RTTD continues to draw the 100KC, 10KC, 1KC and .1KC codes out of the memory unit with the RTTD master control stepping switch moving through positions 3, 4, 5, and 6, respectively. The modular synthesizer unit's 100KC, 10KC, 1KC and .1KC slave stepping switches move to their proper 0 to 9 positions in response.

When function #1 code (11111) comes through, the RTTD master control stepping switch moves to position 7. While in position 7 or 8, switch wafer #7 connects +28 volts d-c to the solenoid of relay K4007. Energized relay K4007 then locks itself by drawing +28 volts d-c from the constant supply through closed contacts 5 and 6 of deenergized relay K4032 and its own closed contacts 6 and 7. Closed relay K4007 contacts 9 and 10 now apply the regulated +28 volts d-c for the servo over to contact 10 of deenergized relay K4009. When the sync tone relay in the modular synthesizer unit is in the "no tune" position, it indicates that the modular r-f tuner unit is out of sync with the synthesizer. The closed sync tone relay contacts in the modular synthesizer, in the "no tune" position, provide a ground return for energization of relay K4009 via connector J4002 pins 4 and 22. With relay K4009 energized, +28 volts d-c is applied to the servo control amplifier AZ103 via relay K4009 contacts 9 and 10, through connector J4006 pin 17.

The modular synthesizer unit 100KC, 10KC, 1KC and .1KC control switches now at their prescribed settings, may or may not provide a ground return to the RTTD, depending on their particular switch positions.

This ground return is used by the RTTD as the "direction of search" signal via connector J4002 pin 3. This "direction of search" signal from the modular synthesizer unit back to the RTTD indicates the relative position of the frequency in the synthesizer selected band dial. If the frequency is in the left half of the dial, continuity to ground is made. If the frequency is in the right half of the dial, continuity to ground is not made. When continuity to ground is made, a ground return is provided at relay K4018 solenoid, causing it to energize. The closed relay K4018 contacts 12 and 13 then routes 6.3 volts a-c, from transformer T4001 taps 10 and 11, to the servo control amplifier AZ103. This voltage is routed via closed contacts 5 and 6 of deenergized relay K4011 through connector J4006 pins 9 and 10. This a-c voltage causes the servo control amplifier AZ103 to drive the modular r-f tuner unit's tune motor towards the low frequency end (or left side) of the band dial.

However, if a ground return is not provided to RTTD relay K4018 solenoid, relay K4018 remains deenergized. This condition causes 6.3 volts a-c, from transformer T4001 taps 10 and 9, to be routed to the servo control amplifier via normally closed relay K4018 contacts 11 and 12 and closed relay K4011 contacts 5 and 6.

The two 6.3 volt a-c sources at T4001 are of 180° phase difference; taps 9 and 10, and taps 10 and 11, with tap 10 common. The selected phase of 6.3 volts a-c causes the servo control amplifier AZ103 to drive the modular r-f tuner unit's tune motor to the high or low frequency end of the dial.

As the modular r-f tuner unit's tune motor continues to move, before it comes to the end of the dial, it will either encounter the desired frequency setting or will not. This depends on its previous starting position.

If it does not encounter the desired frequency setting, it will continue to move to its end of dial limit. At the end of the dial limit, a limit switch is actuated. When the motor has moved the cursor to the low end of the dial, the limit switch closes, supplying +28 volts d-c, energizing relay K4011 via energized relay K4018 contacts 21 and 22, through connector J4001 pins 9 and 13. With relay K4011 energized, closed relay K4018 contacts 9 and 10 routes the 6.3 volts a-c voltage from T4001 tap 9 to servo control amplifier AZ103 via relay K4011 closed contacts 7 and 6 to the servo control amplifier AZ103 through connector J4006 pin 10. This reversed phase voltage causes the servo control amplifier AZ103 to drive the modular r-f tuner unit's tune motor in the opposite direction.

As the r-f tuner motor moves, the cursor releases the limit switch, causing the opposite or high end limit switch to act as a holding circuit. This holding circuit, through connector J4001, pin 11, closed contacts of relay K4018 contacts 18 and 19 and relay K4011 closed contacts 9 and 10, keeps the r-f tuner unit's motor moving in the opposite or right end of the frequency dial.

When the tune motor has moved to the right or high end of the dial, the motor cursor actuates the high end limit switch. This causes the relay K4011 holding voltage to be removed, causing a reversed phase a-c voltage to be applied to the servo control amplifier AZ103. Therefore,

when the r-f tuner unit's motor reaches either end of the frequency dial, the direction of search is automatically reversed by the limit switches. Normally, if the r-f tuner unit does not find its desired frequency setting in the first sweep, it will find it on the reversed or second sweep.

As the r-f tuner unit's tune capacitor nears the correct frequency point, the associated synthesizer unit's phase detector circuit, comprising the r-f tuner unit's hfo output with that of the synthesizer's stabilized frequency, issues a difference frequency. This difference frequency decreases as the r-f tuner unit's tune capacitor nears the correct point. As this frequency difference moves into the audio range, it becomes the RTTD input "audio sync tone". The audio sync tone connected to the RTTD via connector J4010 is routed to the servo control amplifier AZ103 via connector J4006 pins 3 and 4 across resistor R4027. The audio sync tone works directly on the servo control circuitry to effect, first, a reversal in the modular r-f tuner unit's tune motor direction, and second, to decrease the motor speed.

When the r-f tuner unit's hfo frequency has become synchronized with that of the associated synthesizer unit, the synthesizer unit's phase detector causes the synthesizer sync tone relay to deenergize. This action disconnects the previous connection across RTTD connector J4002, pins 4 and 22, thereby deenergizing relay K4009 by removing the ground return path.

f. DEACTIVATION CIRCUITRY. - When the "E" (10000) code enters the RTTD code bit relays, the master control stepping switch moves to position 16. Wafer #7 connects +28 volts d-c to the solenoid of relay K4014

via deenergized relay K4013 contacts 5 and 6 and energized relay K4006 contacts 12 and 13. Relay K4014 thus energized, causes relay K4006 to deenergize by breaking the +28 volts d-c path to the K4006 solenoid via relay K4006 contacts 6 and 7 and relay K4014 contacts 5 and 6.

If the modular synthesizer unit's sync relay has meanwhile become deenergized, by synchronization with the associated r-f tuner unit, relay K4009 deenergizes. With relay K4009 deenergized, the +28 volts d-c energizing path is removed from the solenoid of relay K4027, via relay K4009 contacts 6 and 7 and deenergized relay K4006 removes the remaining +28 volts d-c path from the solenoid of relay K4027. This is accomplished via relay K4006 contacts 9 and 10 and deenergized relay K4026 contacts 5 and 6. The deenergized relay K4027 open contacts 9 and 11 removes the ground return path to the associated memory unit's "in tune process" relay via connector J4004 pin 12. The memory unit "in tune process" relay in turn energizes the memory unit "ready" relay causing a "ready" code to be transmitted back to the remote operator. This indicates that the receiver is ready to receive the next tuning code.

It can be seen that, in order for a "ready" condition to exist at the remote operator's panel, two conditions must be completed at the RTTD. They are: the modular r-f tuner unit's hfo must be locked into sync with the associated synthesizer unit and, the RTTD must have received the "E" code.

Depending upon the previous position of the modular r-f tuner unit's hfo control and the number of codes in the message, the "E" code may occur before sync or vice versa.

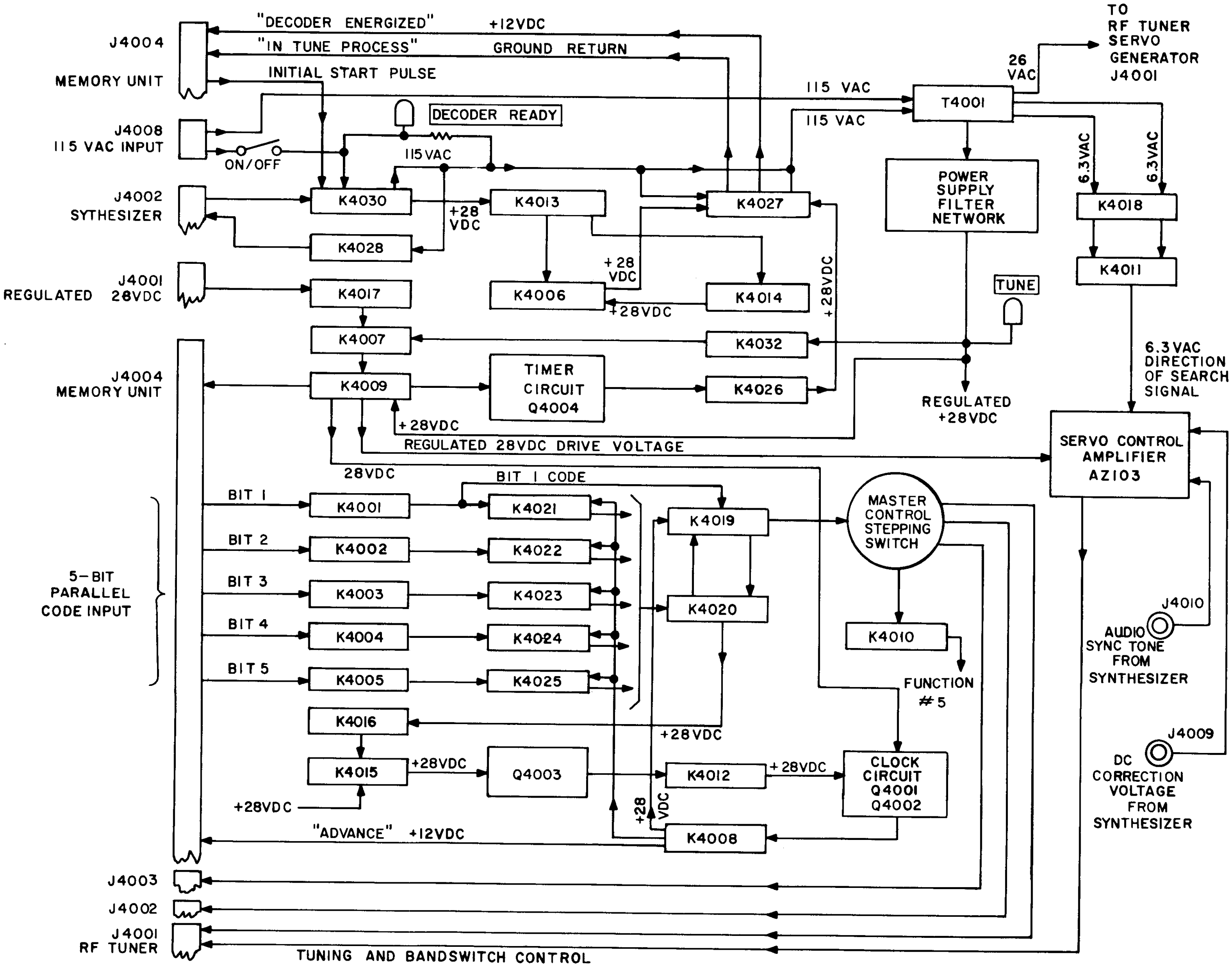


Figure 4-1. Simplified Block Diagram.

SECTION 5
MAINTENANCE

5-1. PREVENTIVE MAINTENANCE

a. In order to prevent equipment failure due to dust, dirt and other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to.

b. At periodic intervals, the equipment should be removed from its mounting for cleaning and inspection. All accessible covers should be removed and the wiring and all components inspected for dirt, corrosion, charring, discoloring or grease. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease from other parts with any suitable cleaning solvent. Use of carbon tetrachloride should be avoided due to its highly toxic effects. Trichlorethylene or methylchloroform may be used, providing the necessary precautions are observed.

WARNING

When using toxic solvents, make certain that adequate ventilation exists. Avoid prolonged or repeated breathing of the vapor. Avoid prolonged or repeated contact with skin. Flammable solvents shall not be used on energized equipment or near any equipment from which a spark may be received. Smoking, "hot work," etc. is prohibited in the immediate area.

CAUTION

When using trichlorethylene, avoid contact with painted surfaces, due to its paint removing effects.

5-2. TROUBLESHOOTING.

The following troubleshooting aids are provided.

a. Relay operational flow-diagram (figure 5-1).

b. Component layout diagrams (figures 5-2 and 5-3).

c. Simplified block diagram (figure 4-1).

d. Schematic diagram (figure 7-1).

When a piece of equipment has been operating satisfactorily and suddenly fails, the cause of failure may be due to circumstances occurring at the time of failure or due to symptoms of past failures. Therefore, the first check is to ascertain that proper equipment voltages are present and that all fuses and interconnecting cables are in proper functional condition.

If the above mentioned checks fail to locate the fault, the unit should be removed from the equipment rack, dust covers removed, and visually checked for burned elements, charring, corrosion, arcing, excessive heat, dirt, dampness or any other harmful condition.

If the fault is still not located, the technician should then proceed with continuity and voltage checks.

Figure 5-1 illustrates the relay energizing paths, useful in trouble-shooting and signal tracing.

Use of figure 5-1 (sheets 1 and 2) will enable the technician to locate the necessary d-c energizing voltage paths for the various relay solenoids. When using figure 5-1, the schematic diagrams in section 7 may be used to enhance and furnish associated components and tie-points not shown.

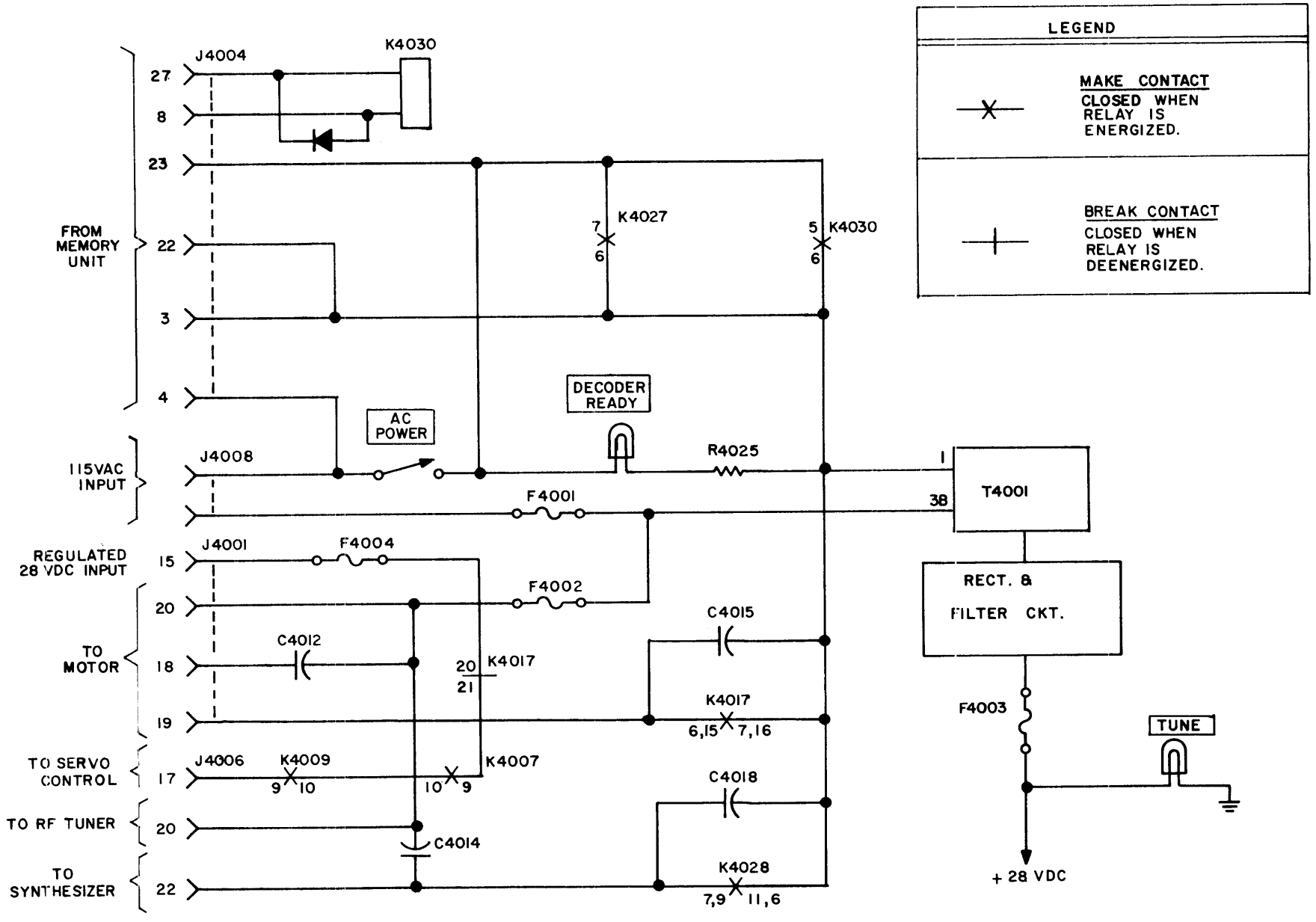


Figure 5-1. Relay Energizing Flow-Diagram (sheet 1 of 2)

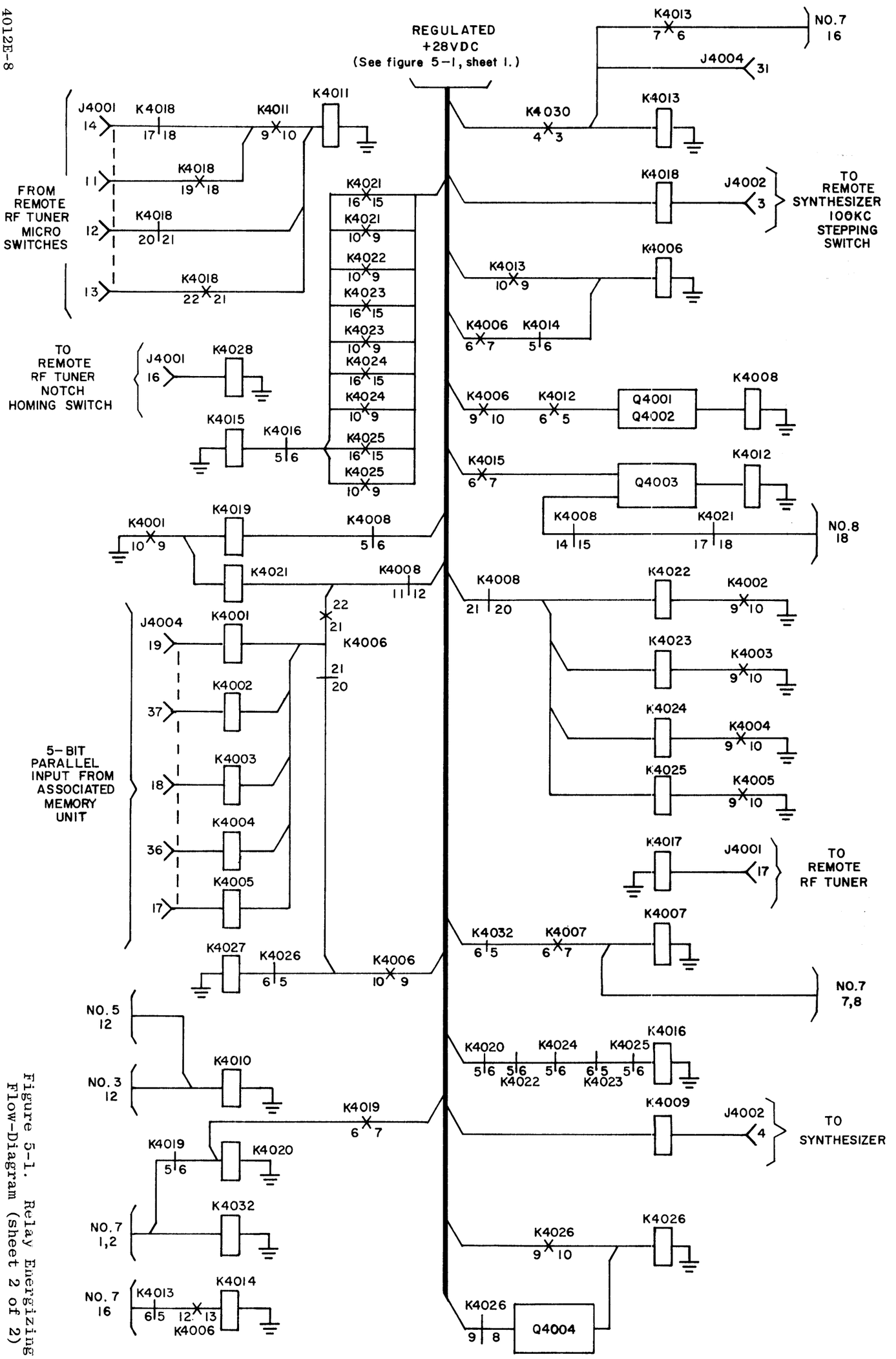
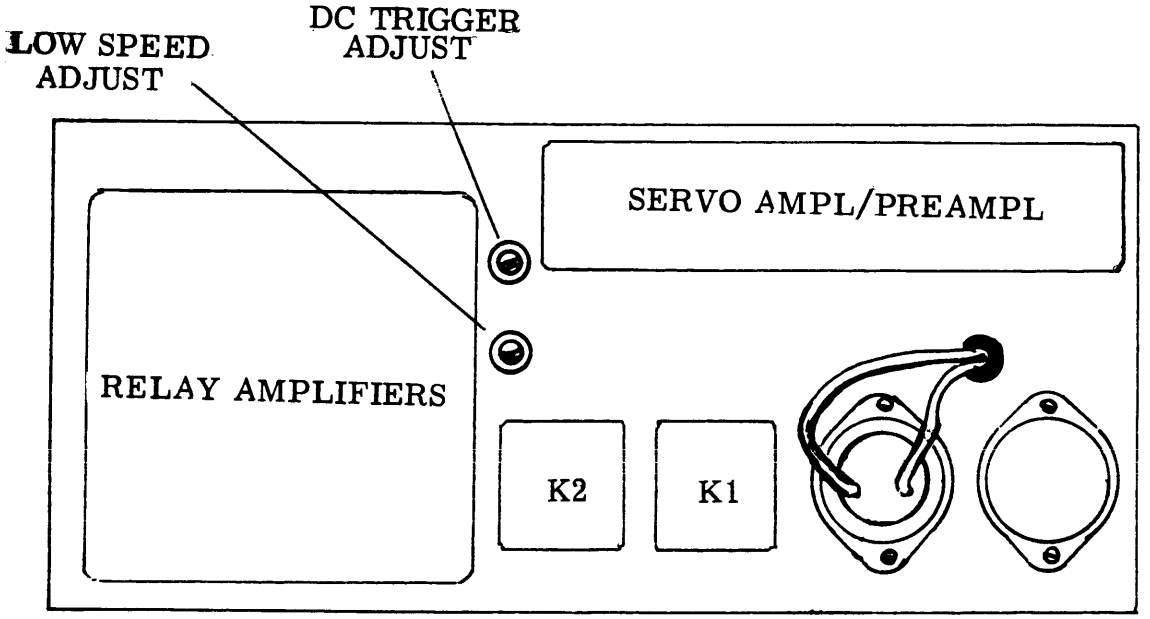


Figure 5-1. Relay Energizing Flow-Diagram (sheet 2 of 2)

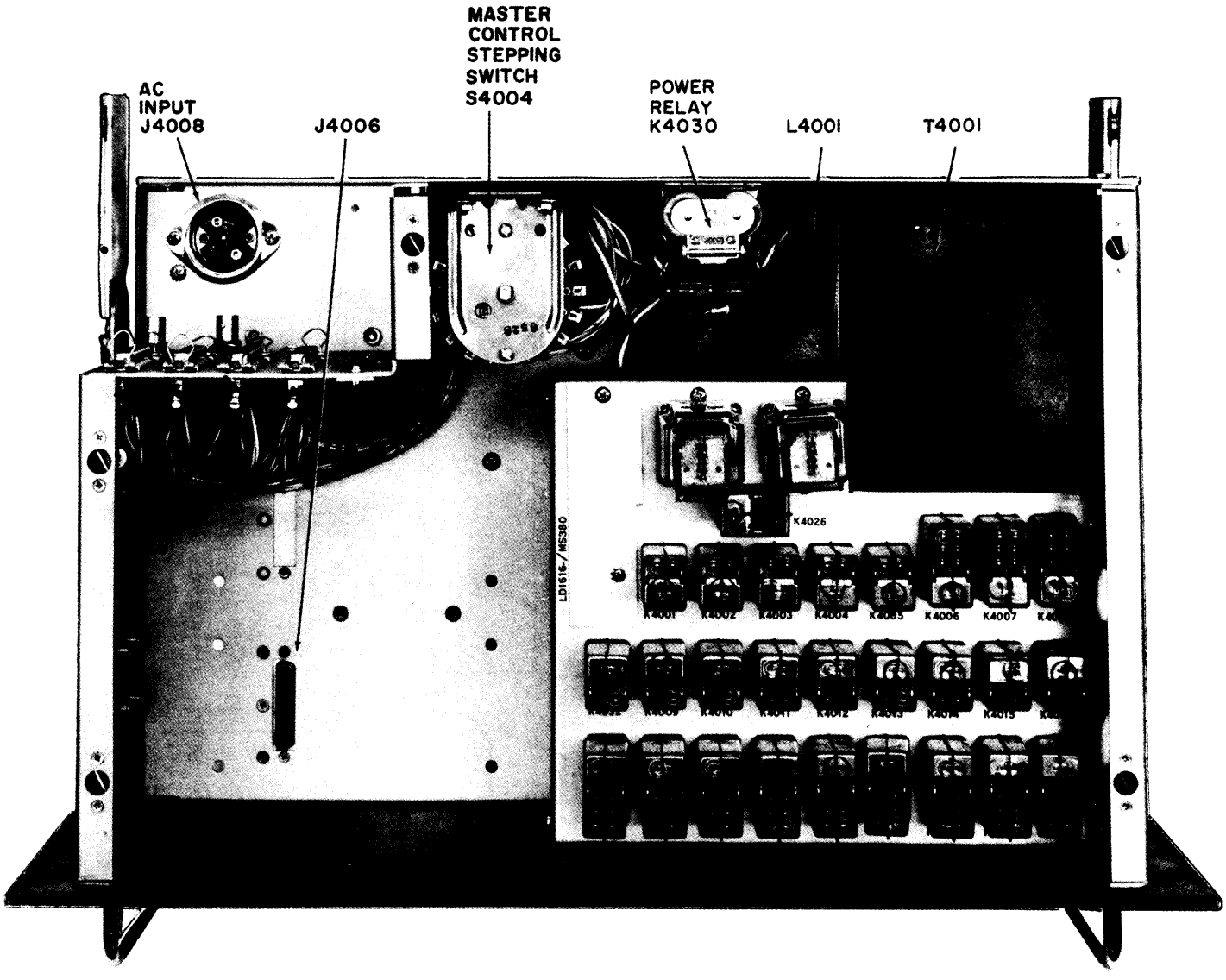
5-3. REPAIR AND REPLACEMENT

Maintenance of the **RTTD** will consist mainly of component replacement. It should be noted that when replacing components having many wires connected, such as switches, relays, etc. the wires should be tagged and marked for accurate identification when replacing. When replacing components, refer to the parts list in section 6 for exact or equivalent replacements. Use of the schematic diagram in section 7 is advisable when replacing or disconnecting components.



4012E-9

Figure 5-2. Servo Amplifier, AZ103.



4012E-10

Figure 5-3. Top Chassis Component Layout

662.1-6.

SECTION 6

PARTS LIST

6-1. INTRODUCTION

The parts list presented in this section is a cross-reference list of parts identified by a reference designation and TMC part number. In most cases, parts appearing on schematic diagrams are assigned reference designations in accordance with MIL-STD-16. Wherever practicable, the reference designation is marked on the equipment, close to the part it identifies. In most cases, mechanical and electro-mechanical parts have TMC part numbers stamped on them.

To expedite delivery when ordering any part, specify the following:

a. Generic name.

b. Reference designation.

c. TMC part number.

d. Model and serial numbers of the equipment containing the part being replaced; this can be obtained from the equipment nameplate.

For replacement parts not covered by warranty (refer to warranty sheet in front of manual), address all purchase orders to:

The Technical Materiel Corporation
Attention: Sales Department
700 Fenimore Road
Mamaroneck, New York

PARTS LIST

for

DECODER RECEIVER, RTTD-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C4001	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-50-50
C4002	Same as C4001.	
C4003	Same as C4001.	
C4004	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-10-50
C4005	CAPACITOR, FIXED, ELECTROLYTIC: 15 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-15-50
C4006	CAPACITOR, FIXED, ELECTROLYTIC: 25 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-25-50
C4007	Same as C4005.	
C4008	CAPACITOR, FIXED, ELECTROLYTIC: 75 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-75-50
C4009	CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC: 1 uf, +20%; 400 WVDC; hermetically sealed tubular metal case.	CP106A105-4
C4010	CAPACITOR, FIXED, ELECTROLYTIC: 2,600 uf, -10% +100%; 50 WVDC; 65 VDC surge; insulated aluminum case, clear rigid plastic tube.	CE112-6
C4011	Same as C4010.	
C4012	CAPACITOR, FIXED, PAPER DIELECTRIC: 5 uf, +10% at 60 cps at 25°C, +5°C; 370 WVAC at 60 cps; hermetically sealed seemless drawn steel oval case.	CP113-2
C4013	Same as C4012.	
C4014	CAPACITOR, FIXED, PAPER DIELECTRIC: 4 uf, +10% at 60 cps at 25°C, +5°C; 370 WVAC at 60 cps; hermetically sealed seemless drawn steel oval case.	CP113-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C4015	CAPACITOR, FIXED, METALIZED PLASTIC: 0.15 uf, +5%; 400 WVDC; non-inductive winding, epoxy encapsulated.	CN114R15-4J
C4016	NOT USED	
C4017	CAPACITOR, FIXED, ELECTROLYTIC: 75 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-75-25
C4018	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-20-50
C4019	CAPACITOR, FIXED, METALIZED PLASTIC: 0.10 uf, +5%; 400 WVDC; non-inductive winding, epoxy encapsulated.	CN114R10-4J
CR4001	SEMICONDUCTOR DEVICE, DIODE	1N270
CR4002 thru CR4005	Same as CR4001.	
CR4006	SEMICONDUCTOR DEVICE, DIODE: silicon; max. peak reverse voltage 100 volts; average forward current 12 amps at 150°C; operating and storage temperature range -65°C to +200°C; hermetically sealed case.	1N1200A
CR4007 thru CR4009	Same as CR4006.	
CR4010	ABSORBER, OVERVOLTAGE: operating voltage range 28 to 33 volts; max. reverse voltage 10 VDC; 750 ma, 200 PIV diode, 6.8 V, 1 watt Zener; tantalum capacitor, 1 uf, 35 WVDC; green case.	DD111-1
CR4011	SEMICONDUCTOR DEVICE, DIODE: silicon; peak reverse voltage 200 V; RMS supply voltage 140 V; DC blocking voltage 200 V; max. forward voltage drop 1.1 V; max. reverse current 0.3 ma; hermetically sealed.	1N538
CR4012	SEMICONDUCTOR DEVICE, DIODE: diffused silicon; peak inverse voltage 400 V; RMS voltage 280 V; average forward rectified cur-	1N2070

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CR4012 (cont)	rent 750 ma at 25°C; average forward rectified current 500 ma at 100°C; recurrent peak current 6 amps at 25°C; ambient operating temperature -65°C to +100°C; epoxy encapsulated body.	
CR4013 thru CR4015	Same as CR4012.	
DS4001	LAMP, INCANDESCENT: 28 volts AC/DC, 0.04 amp; single contact, T-1-3/4 bulb.	BI110-7
DS4002	Same as DS4001.	
F4001	FUSE, CARTRIDGE: 3 amps; quick acting; 1-1/4" long x 1/4" dia.	FU100-3
F4002	Same as F4001.	
F4003	Same as F4001.	
F4004	FUSE, CARTRIDGE: 1/2 amp; quick acting; 1-1/4" long x 1/4" dia.	FU100-.500
J4001	CONNECTOR, RECEPTACLE, ELECTRICAL: 37 female contacts, removeable crimp pin style, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ310-3
J4002 thru J4004	Same as J4001.	
J4005	NOT USED	
J4006	CONNECTOR, RECEPTACLE, ELECTRICAL: 25 female contacts, removeable crimp pin style, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ310-2
J4007	NOT USED	
J4008	CONNECTOR, RECEPTACLE, ELECTRICAL: AC power; 2 male contacts rated for 10 amps, 250 V or 15 amps, 125 V; polarized; twist lock type; black bakelite.	JJ175

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J4009	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 round female contact, straight type, series BNC to BNC.	JJ172
J4010	Same as J4009.	
K4001	RELAY, ARMATURE: DPDT; 5,000 ohms, +10% DC resistance; operating voltage 20.5 VDC; current rating 4.1 ma, 85 mu at 25°C; 8 contacts rated for 1 amp at 29 VDC; clear high impact styrene dust cover case.	RL156-4
K4002 thru K4005	Same as K4001.	
K4006	RELAY, ARMATURE: 6 PDT; 430 ohms, +10% DC resistance; operating voltage 24 VDC; current rating 56 ma, 1,500 mu at 25°C; 20 contacts rated for 5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-5
K4007	Same as K4006.	
K4008	Same as K4006.	
K4009	Same as K4001.	
K4010	RELAY, ARMATURE: DPDT; 700 ohms, +10% DC resistance; operating voltage 24 VDC; current rating 35 ma, 700 mu at 25°C; 8 contacts rated for 5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-1
K4011 thru K4016	Same as K4010.	
K4017 thru K4025	Same as K4006.	
K4026	RELAY, ARMATURE: 4 PDT; 185 ohms, +10% DC resistance; operating voltage 12 VDC; current rating 60 ma, 700 mu at 25°C; 14 contacts rated for 2 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-2

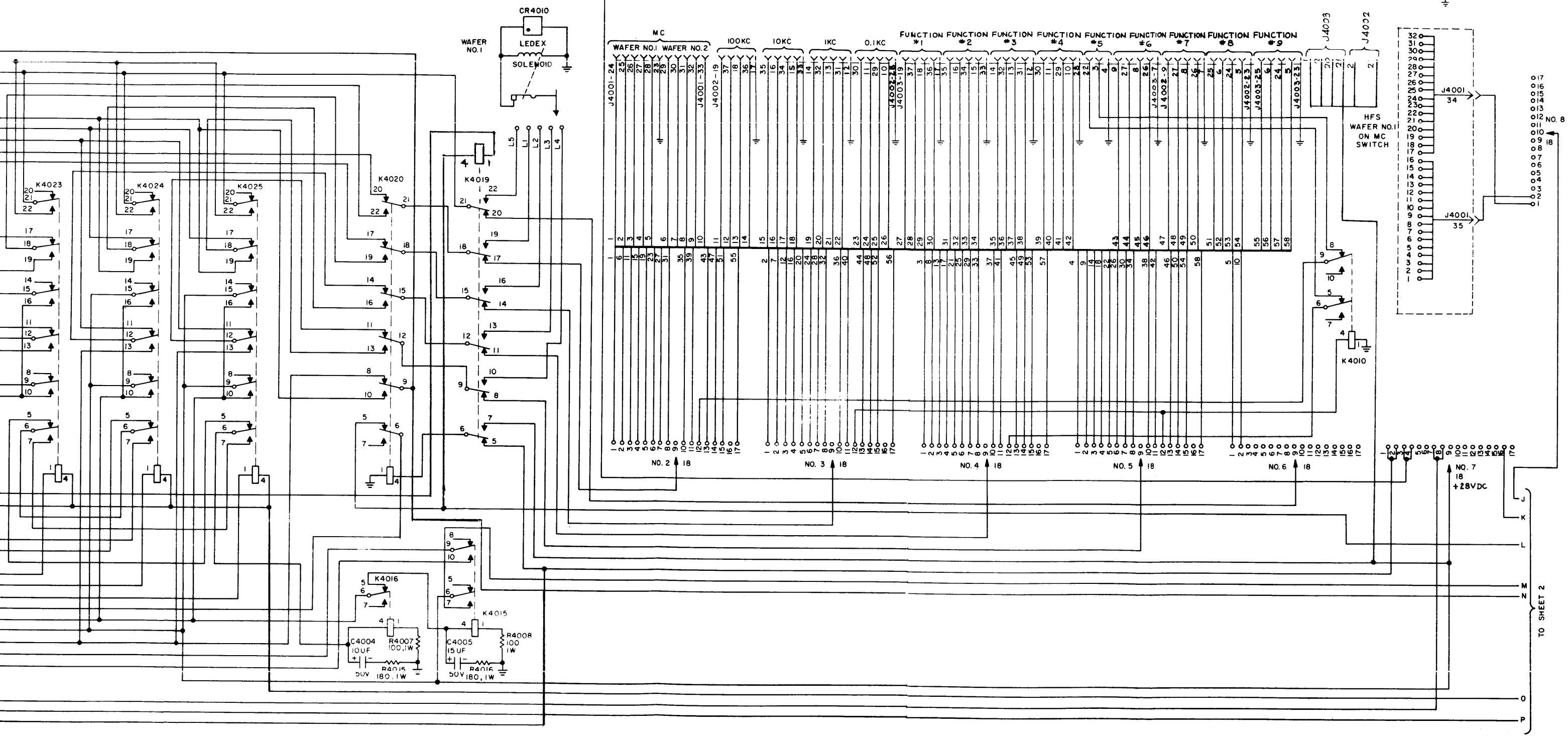
REF SYMBOL	DESCRIPTION	TMC PART NUMBER
K4027	RELAY, ARMATURE: 3 PDT; 475 ohms DC resistance; operating voltage 24 VDC; 11 contacts rated for 10 amps.	RL162-1
K4028	Same as K4027.	
K4029	NOT USED	
K4030	RELAY, GENERAL PURPOSE: 258 ohms resistance, current rating 0.051 amps DC; coil rated for 13 VDC; contacts rated for 110 VAC, 60-400 cps at 10 amps or 26.5 VDC at 10 amps; operating temperature range -55°C to +80°C.	RL161-2C13
K4031	NOT USED	
K4032	Same as K4010.	
L4001	CHOKE, FILTER: single phase, 50/60 cps; 35 mh at 1 amp, 3 mh at 6 amps; hermetically sealed.	TF5020
Q4001	TRANSISTOR: germanium, hi current; collector to base voltage 40 V; collector to emitter and emitter to base voltage 20 V; collector current 7 amps; base current 3 amps; power dissipation 85 watts at 25°C; operating-storage and junction temperature range -65°C to +110°C; JEDEC type TO-3 case.	2N456A
Q4002	Same as Q4001.	
Q4003	Same as Q4001.	
Q4004	TRANSISTOR: silicon, unijunction; emitter to base reverse voltage 60 V; RMS emitter current 70 ma; peak emitter current 2 amps; total power dissipation, free air 450 mw at 25°C; operating temperature range -65°C to +140°C; storage temperature range -65°C to +175°C; hermetically sealed glass to metal case.	2N492
R4001	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 1/2 watt.	RC20GF102J
R4002 thru R4005	Same as R4001.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R4006	RESISTOR, FIXED, COMPOSITION: 330 ohms, ±5%; 1 watt.	RC32GF331J
R4007	RESISTOR, FIXED, COMPOSITION: 100 ohms, ±5%; 1 watt.	RC32GF101J
R4008	Same as R4007.	
R4009	RESISTOR, FIXED, COMPOSITION: 33 ohms, ±5%; 1/2 watt.	RC20GF330J
R4010	RESISTOR, FIXED, WIREWOUND: 0.5 ohms, 5 watts.	RW107-54
R4011	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, ±5%; 2 watts.	RC42GF682J
R4012	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±5%; 2 watts.	RC42GF471J
R4013	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, ±5%; 2 watts.	RC42GF332J
R4014	RESISTOR, FIXED, COMPOSITION: 270 ohms, ±5%; 1 watt.	RC32GF271J
R4015	RESISTOR, FIXED, COMPOSITION: 180 ohms, ±5%; 1 watt.	RC32GF181J
R4016	Same as R4015.	
R4017	RESISTOR, FIXED, COMPOSITION: 33 ohms, ±5%; 1 watt.	RC32GF330J
R4018	RESISTOR, FIXED, COMPOSITION: 56 ohms, ±5%; 1 watt.	RC32GF560J
R4019	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±5%; 1 watt.	RC32GF471J
R4020	RESISTOR, FIXED, WIREWOUND: 33 ohms; current rating 1,231 ma; 50 watts.	RW105-49
R4021	NOT USED	
R4022	RESISTOR, FIXED, COMPOSITION: 220 ohms, ±5%; 1 watt.	RC32GF221J
R4023	Same as R4022.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R4024	RESISTOR, VARIABLE, COMPOSITION: 250,000 ohms, ±20%; 1/2 watt; linear taper.	RV106UX8B254B
R4025	RESISTOR, FIXED, WIREWOUND: 3,000 ohms; current rating 58 ma; 10 watts.	RW109-30
R4026	RESISTOR, FIXED, COMPOSITION: 100 ohms, ±5%; 1/2 watt.	RC20GF101J
R4027	Same as R4026.	
S4001	SWITCH, TOGGLE: SPST; rated for 3 amps, 250 volts or 6 amps at 125 volts AC/DC; 4 solder lug type terminals.	ST103-2-62
S4002	NOT USED	
S4003	NOT USED	
S4004	SWITCH, ROTARY, SOLENOID: 8 sections, 18 positions, 20° angle of throw; coil resistance 11.1 ohms, ±5% at 20°C; voltage rating 28 VDC, ±10%.	SW355
T4001	TRANSFORMER, POWER, STEP-DOWN: primary- 105, 115, 125 V, 50/60 cps, single phase; secondary- 34.8 V at 5 amps DC; 27 V, 18.1 V at 400 ma DC, center tapped; 15 solder lug type terminals; fully enclosed hermetically sealed case.	TF295
XDS4001	LIGHT, INDICATOR: amber transparent lens; sub-miniature type.	TS153-3
XDS4002	LIGHT, INDICATOR: red transparent lens; sub-miniature type.	TS153-1
XF4001	FUSEHOLDER: lamp indicating; accommodates cartridge fuse 1-1/4" long x 1/4" dia.; 90 to 300 volts, 20 amps; neon lamp type with 220K ohm lamp resistor; clear transparent flat sided knob; black body.	FH104-3
XF4002	Same as XF4001.	
XF4003	FUSEHOLDER: lamp indicating; accommodates cartridge fuse 1-1/4" long x 1/4" dia.; 22 to 33 volts, 20 amps; incandescent lamp type with 330 ohm lamp resistor; transparent amber flat sided knob; black body.	FH104-7

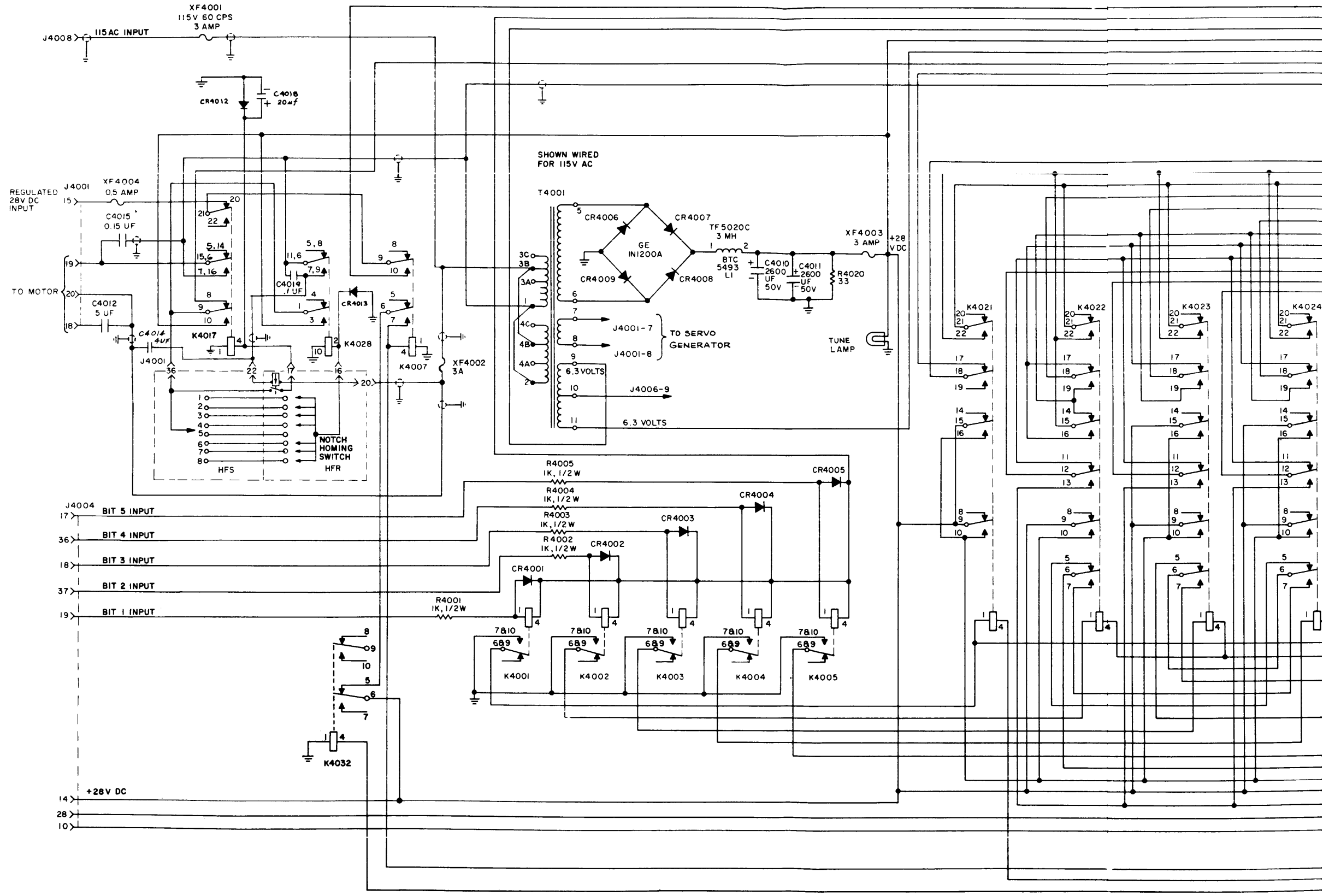
REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XF4004	Same as XF4003.	
XK4001	SOCKET, RELAY: with retainer; 6 beryllium copper gold plated contacts; black phenolic socket.	TS171-1
XK4002 thru XK4005	Same as XK4001.	
XK4006	SOCKET, RELAY: with retainer; 18 beryllium copper gold plated contacts; black phenolic socket.	TS171-2
XK4007	Same as XK4006.	
XK4008	Same as XK4006.	
XK4009 thru XK4016	Same as XK4001.	
XK4017 thru XK4025	Same as XK4006.	
XK4026	SOCKET, RELAY: with retainer; 12 beryllium copper gold plated contacts; black phenolic socket.	TS171-3
XK4027	SOCKET, ELECTRON TUBE: 11 cadmium plated contacts rated for 500 volts, 3 amps; phenolic solid black body.	TS100-5
XK4028	Same as XK4027.	
XQ4001	SOCKET, TRANSISTOR: 7 pin contact accommodation; 0.040 or 0.050 dia.; polarized; 1 terminal lug grounding strap; o/a dim. 1-37/64" x 1" max.	TS166-1
XQ4002	Same as XQ4001.	
XQ4003	Same as XQ4001.	
XQ4004	SOCKET, TRANSISTOR: 4 silver plated beryllium copper contacts with gold flash; mica filled molded phenolic socket.	TS147

SECTION 7
SCHEMATIC DIAGRAMS



MODEL NO.	DECODER FUNCTIONS								
	1	2	3	4	5	6	7	8	9
DDR-5B	CH.A IF BW	CH.A DET	CH.B IF BW	CH.B DET	AFC ON-OFF	RF GAIN	SPARE	SPARE	SPARE
DDR-5BR	IF BW	DET	AUDIO FIL HI PASS	AUDIO FIL LO PASS	SPARE	SPARE	SPARE	SPARE	SPARE

Figure 7-1. Schematic Diagram, Model RTTD-1 (Sheet 1 of 2)



MODEL NO.	1	2
DDR-5B	CH.A IF BW	CH.A DET
DDR-5BR	IF BW	DET

CK-805E

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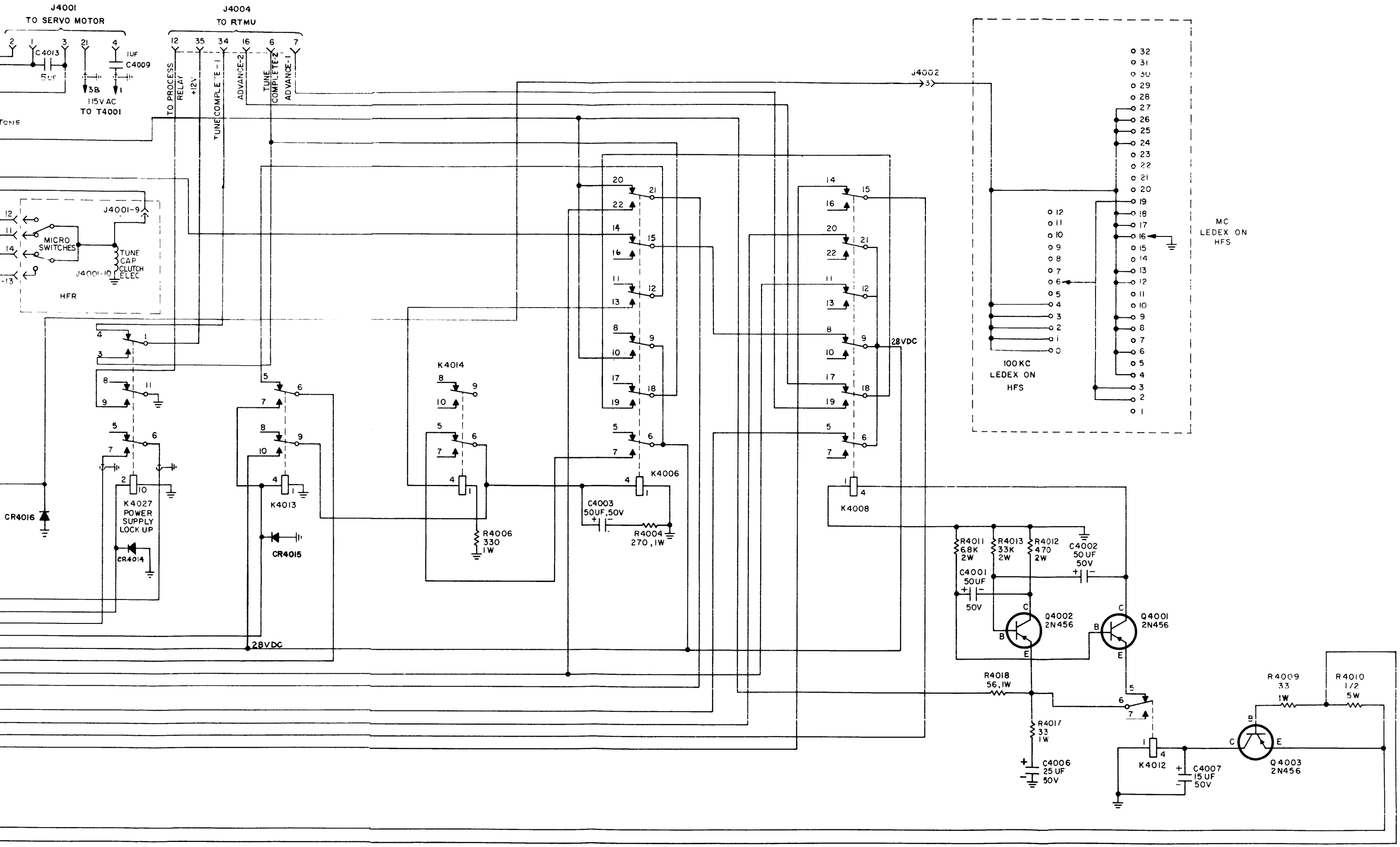
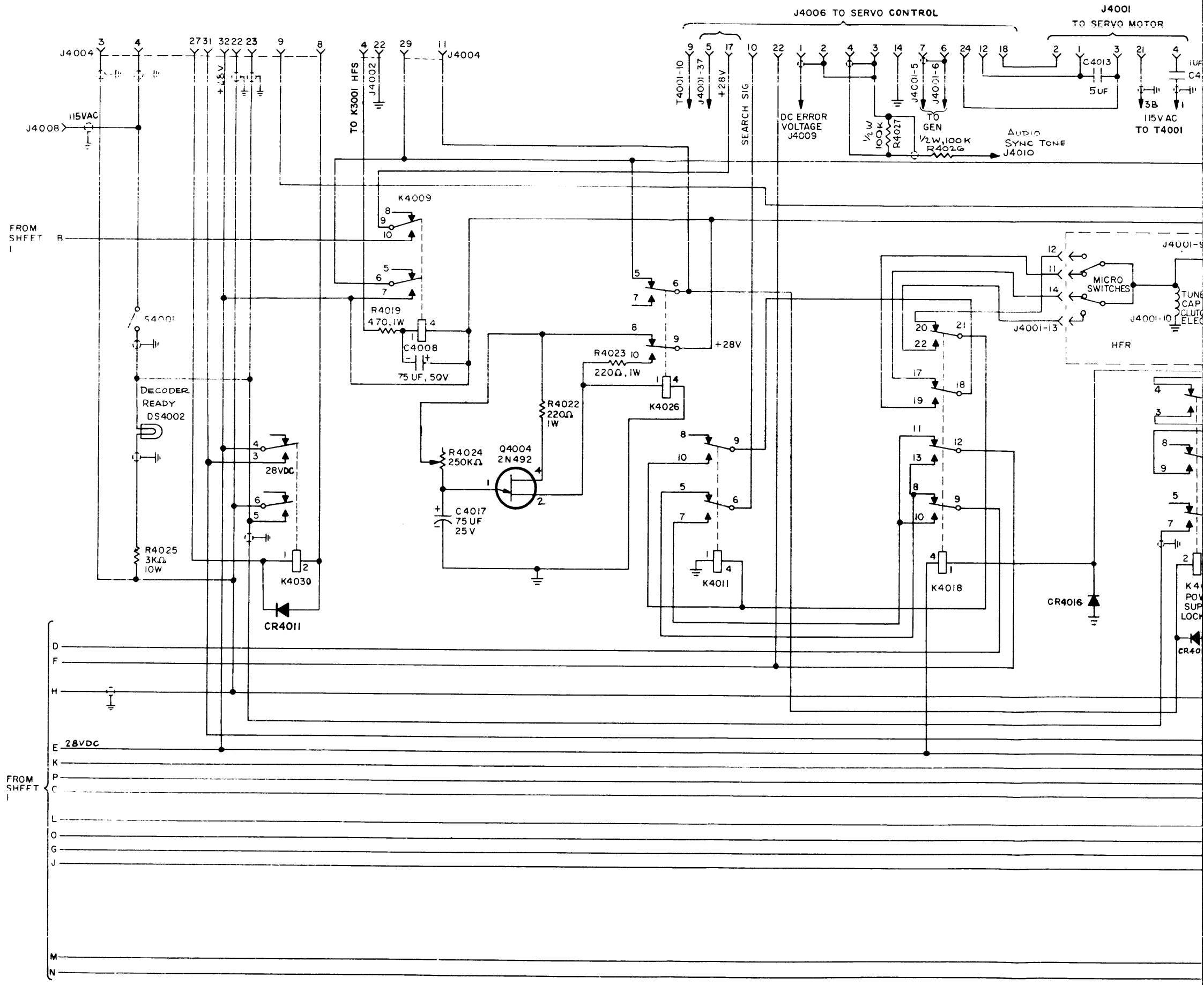


Figure 7-1. Schematic Diagram, Model RTTD-1 (Sheet 2 of 2)



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