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TECHNICAL MANUAL
for
CONTROL TERMINATOR
MODEL LRCB-1



THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N. Y. **OTTAWA, CANADA**

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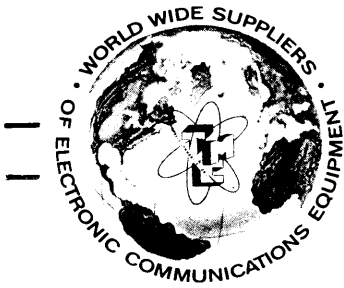


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THE TECHNICAL MATERIEL CORPORATION

C O M M U N I C A T I O N S E N G I N E E R S

700 FENIMORE ROAD

MAMARONECK, N. Y.

W a r r a n t y

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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.

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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.

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

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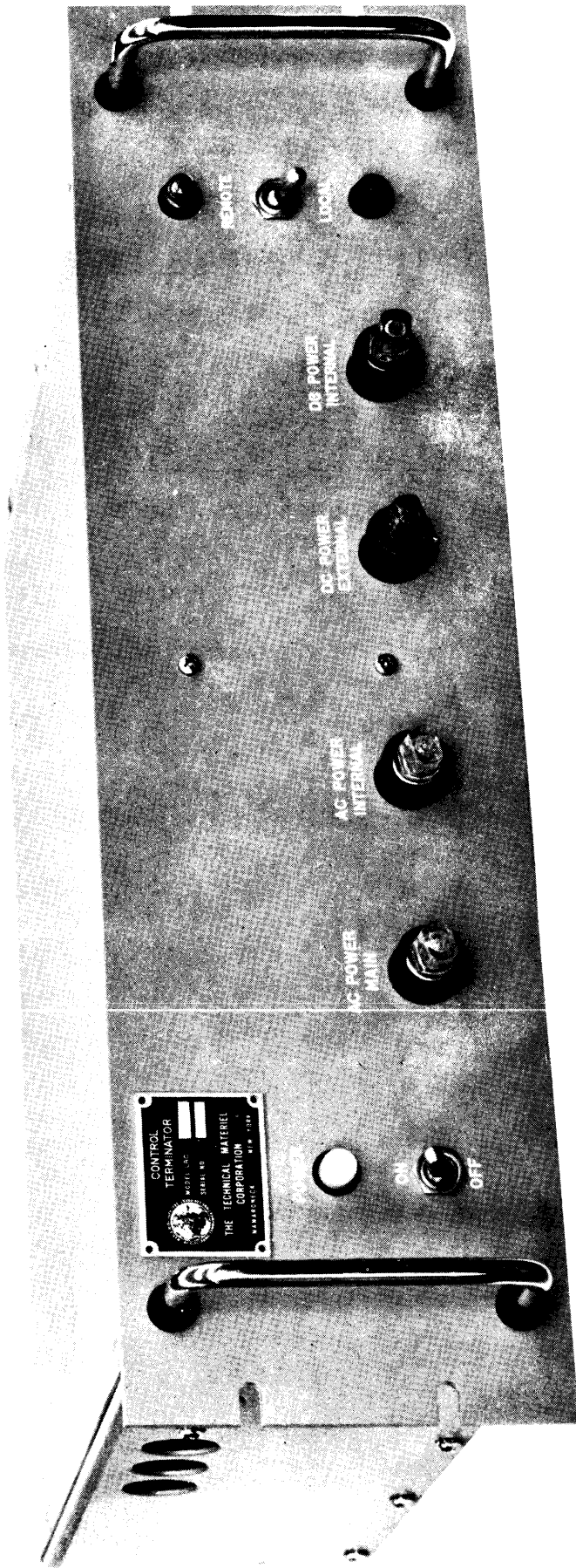
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5005A-1

Figure 1-1. Control Terminator, Model LRCB-1

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

Control Terminator, Model LRCB-1 (figure 1-1), is a remote tuning and band switching control used with associated units of a receiver system. (Refer to the functional block diagram, figure 1-2.) The LRCB provides the required voltages through its sequential relays and time-delay circuits, including a servo amplifier, for the tuning and band switching operations. Travel control circuitry, contained in the LRCB, prevents overtravel of the TUNING/KCS motor in the associated AFC unit.

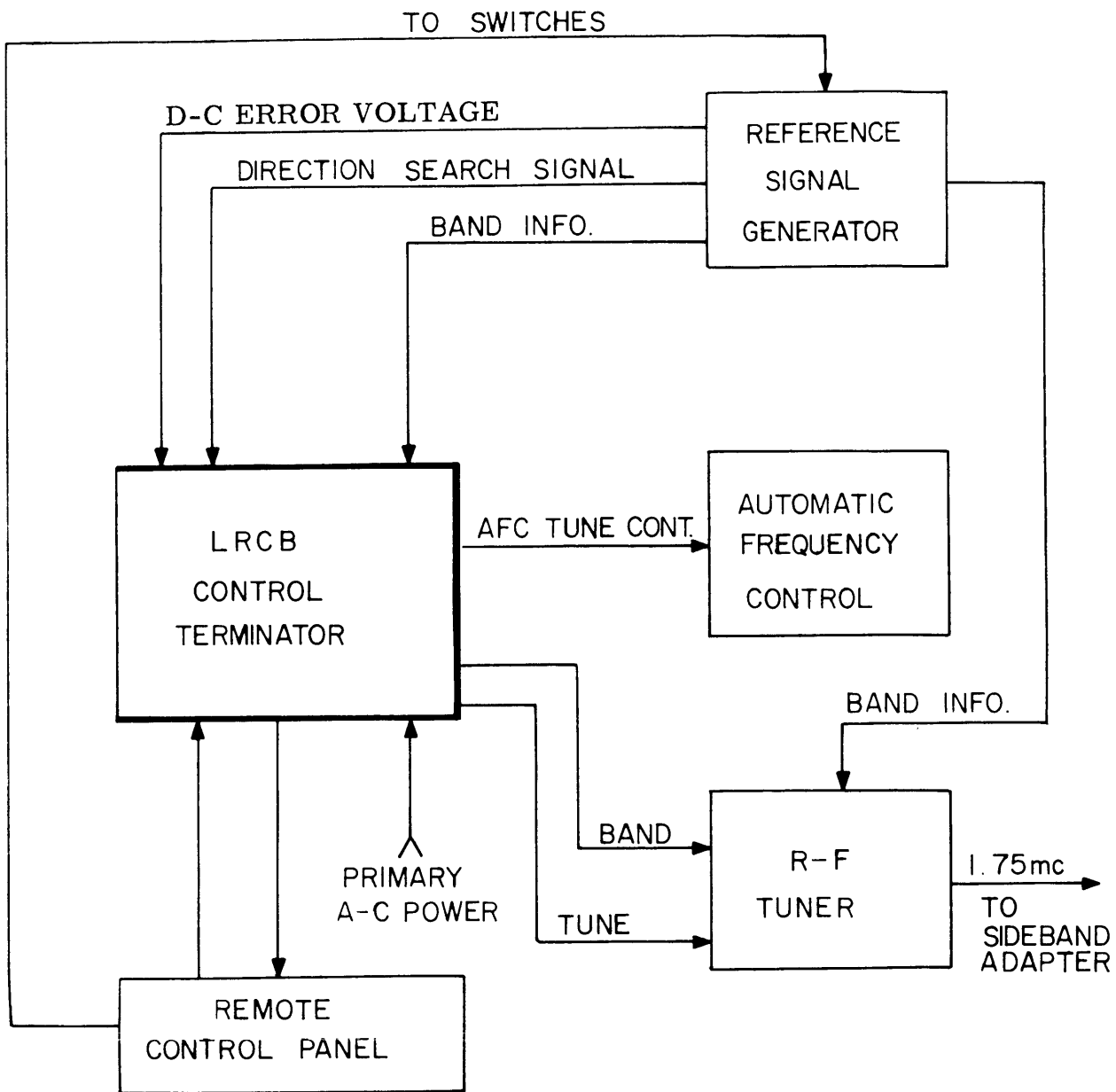
A REMOTE/LOCAL switch, located on the front panel of the LRCB, provides power cut-off (when set at LOCAL) for local tuning of the associated tuner and reference signal generator.

1-2. PHYSICAL DESCRIPTION.

a. EXTERNAL. - The LRCB is provided with a non-tilt slide mechanism for installation in a standard 19-inch wide rack. The switches and indicators (lamps) necessary for the operation of the LRCB are located on the front panel; the rear panel contains the power input and related connectors (refer to figure 2-2). The removable top cover of the LRCB facilitates maintenance, repair, and troubleshooting. The LRCB is 19 inches wide, 5-1/8 inches high, and 17-1/2 inches deep; the unit weighs 37 pounds.

b. INTERNAL. - The larger components in the LRCB are chassis-mounted and identified; the smaller components, such as capacitors, resistors, and diodes, are identified at their mounted locations on the terminal board.

Table 1-1 lists the semiconductor complement of the LRCB.



5005A-2

Figure 1-2. Functional Block Diagram, LRCB

1-3. EQUIPMENT SUPPLIED.

Table 1-2 lists the equipment supplied with the LRCB.

1-4. TECHNICAL SPECIFICATIONS.

INPUTS: D-c error voltage;
 dry contact switch position information.

OUTPUTS: Tuning and band switch motor power:
 28 volts for relay and rotary solenoid
 operation.

POWER REQUIREMENTS: 115 VAC, single phase, 50/60 cps.

TABLE 1-1. SEMICONDUCTOR COMPLEMENT, LRCB

SYMBOL	TYPE	FUNCTION
CR4001 thru CR4004	1N200A	28 vdc rectifier
CR4005 CR4006	1N2070	Relay coil damper
CR4007 thru CR4010	1N270	Relay coil damper
CR4011	1N2070	Relay coil damper
CR4012 thru CR4016	1N270	Relay coil damper
CR4017	1N2484	*
CR4018	1N3324B	28 vdc regulator
CR4019	1N2070	*
Q4001	2N456A	Relay driver
Q4002	2N492	Time delay

TABLE 1-2. EQUIPMENT SUPPLIED

NAME	DESIGNATION	QUANTITY
AC Power Cable Assembly	CA-555-4	1
Type BNC RF Connector	PL-244-1	2
Connector	JJ 313-2H	1
Connector	JJ 313-3H	1
Rubber Bushing	MS 3420-12A	2

SECTION 2
INSTALLATION

2-1. GENERAL.

The LRCB is tested at the factory and is carefully packaged to prevent damage during shipment. When it is delivered at the operating site, inspect the packing case and its content for damage that might have occurred during transit. Unpack the equipment carefully, and inspect all packaging material for parts that may have been shipped as loose items. With respect to damage to the equipment for which the carrier is liable, The Technical Materiel Corporation will assist in describing methods of repair and furnishing of replacement parts.

2-2. MECHANICAL INSTALLATION.

The LRCB is equipped with a standard 19-inch wide front panel; install the LRCB in the equipment rack as follows (refer to figure 2-1):

- a. Pull out the center sections of tracks, located in the equipment rack, until they lock in extended position.
- b. Position slide mechanisms of LRCB in tracks, and ease the unit into the rack until release fingers engage holes in the tracks.
- c. Depress release fingers and slide the LRCB completely into the rack; secure front panel of LRCB to the rack with screws and washers.
- d. Make the necessary electrical connections, as described in paragraph 2-3.

NOTE

To prevent LRCB cables from snagging, attach reel-mounted springs (NEGATOR B motors) located inside the rack to the cables.

2-3. ELECTRICAL INSTALLATION.

a. INTERCONNECTIONS. - Refer to the system wiring diagram provided in the system manual and make the cabling connections between the LRCB and related units, as indicated. The rear panel of the LRCB is shown in figure 2-2; refer to table 2-1.

b. POWER SUPPLY. - The LRCB is designed for 115-volt, 50- or 60-cycle, single phase power operation.

c. INITIAL ADJUSTMENTS. - The LRCB is checked at the factory in accordance with the manufacturer's specifications and therefore no initial adjustments are required before installation and operation.

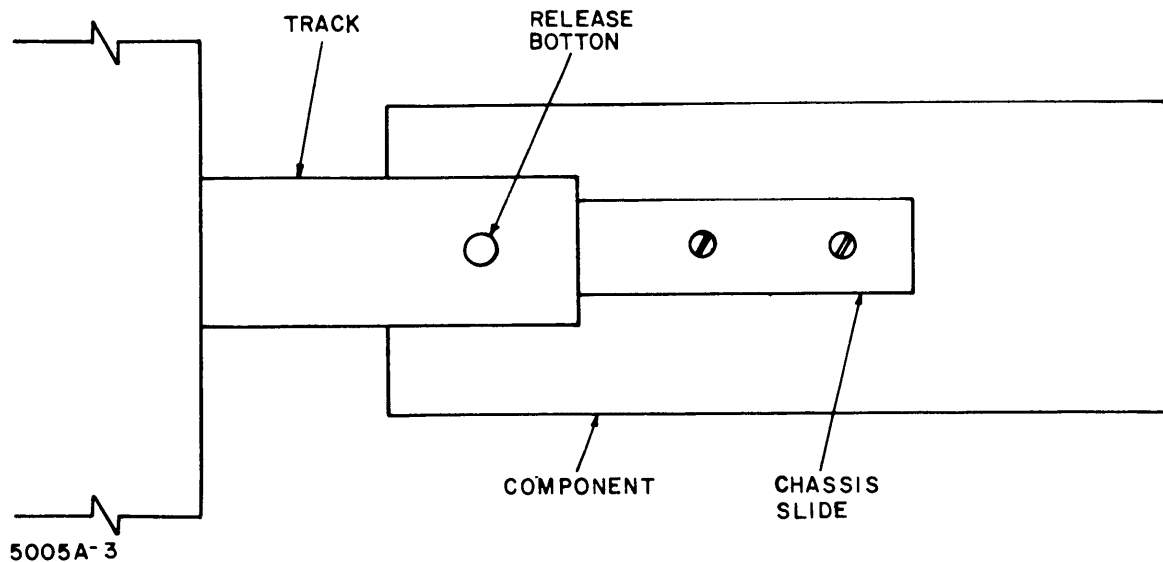


Figure 2-1. Non-Tilt Slide Mechanism

TABLE 2-1. REAR PANEL CONNECTORS, LRCB

CONNECTOR	TO
J4001	A-C Main power supply.
J4002	Reference signal generator, and automatic frequency control.
J4003	Remote control panel.
J4005	Servo control (d-c error voltage).
J4006	Servo control (sync tone).

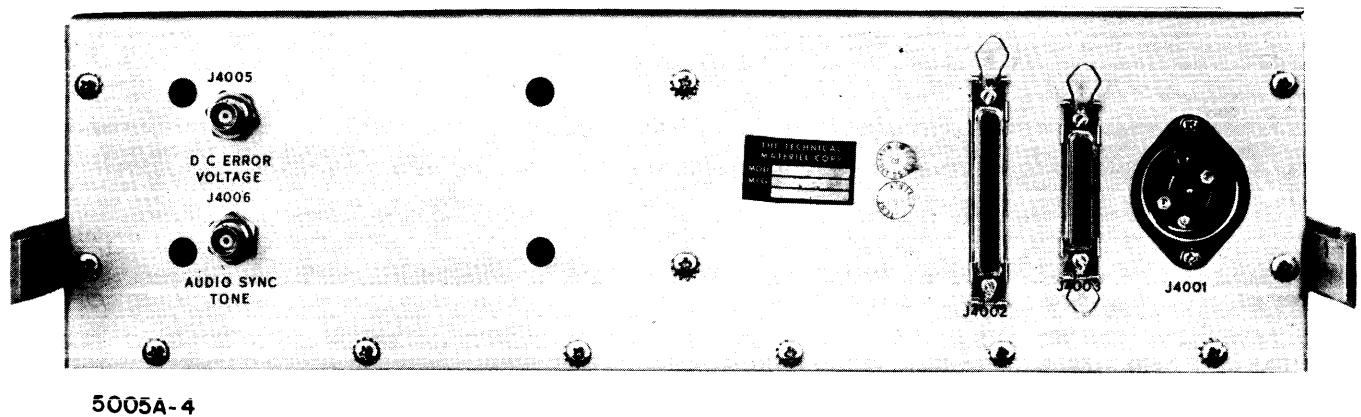


Figure 2-2. Rear Panel, LRCB

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SECTION 3
OPERATOR'S SECTION

3-1. INDICATOR AND SWITCH FUNCTIONS.

The functions of the indicators (lamps) and switches of the LRCB are explained in table 3-1. All indicators, switches, and fuses are identified by front-panel markings, as shown in figure 3-1.

3-2. OPERATING PROCEDURE.

The LRCB functions as part of a receiver system; refer to the system manual for operating procedures.

3-3. OPERATOR'S MAINTENANCE.

Check condition of switches, lamps, and fuses. Lit fuse cap indicates that the fuse has blown.

WARNING

Never replace a fuse with one of higher current rating. If a fuse blows immediately after replacement, do not replace it a second time until the cause of trouble has been corrected.

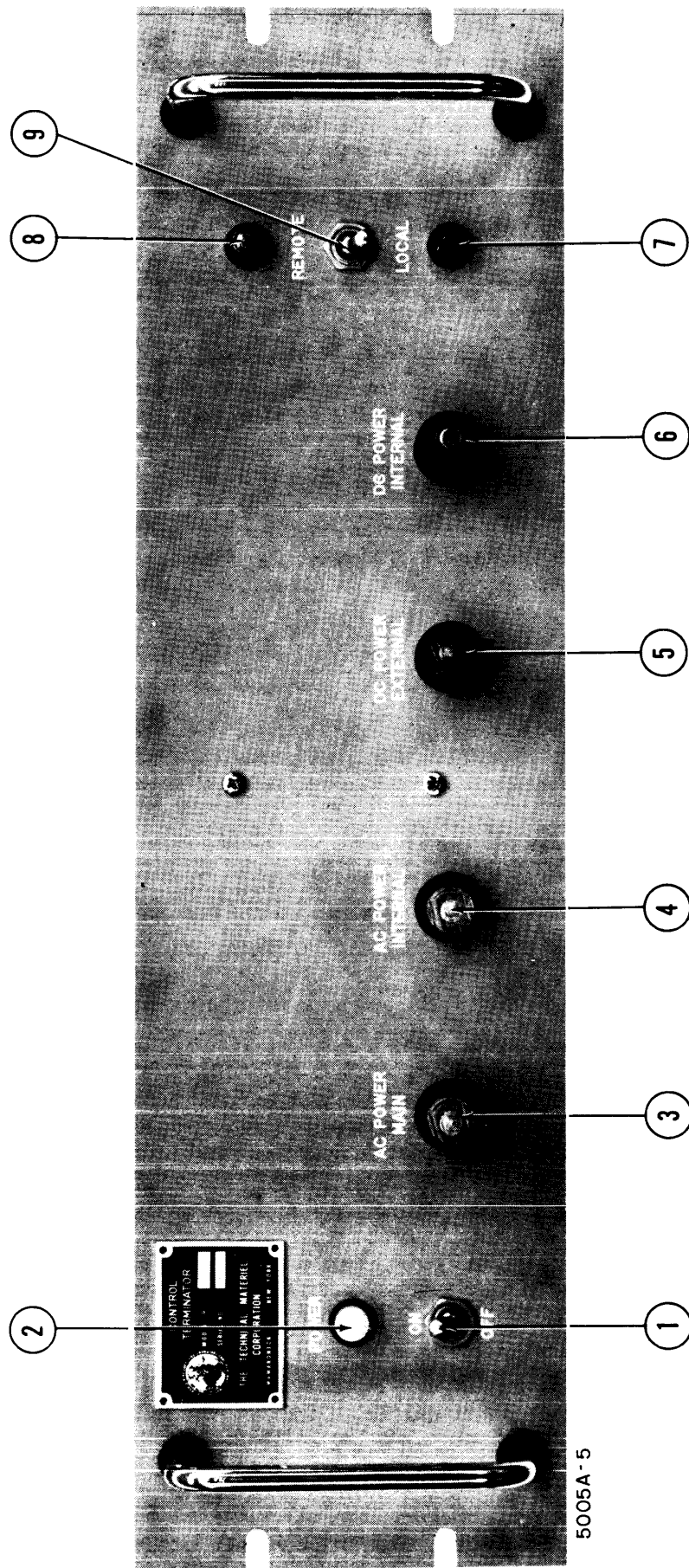


Figure 3-1. Indicators and Switches, LRCB

TABLE 3-1. OPERATING CONTROLS AND INDICATORS, LRCB

ITEM (See fig. 3-1)	Control or Indicator	Function
1	ON/OFF switch	Turns on AC power for unit and servo control amplifier.
2	POWER lamp	Lights when AC power is on.
3	AC POWER MAIN fuse	Protects main power trans- former primary circuit; when lit, fuse has blown.
4	AC POWER INTERNAL fuse	Protects band switching motor and AC solenoid.
5	DC POWER EXTERNAL fuse	Protects 30-volt power supply (servo amplifier).
6	DC POWER INTERNAL fuse	Protects +28 VDC power supply.
7	LOCAL lamp	Lights when REMOTE/LOCAL switch (item 9) is set at LOCAL operating position.
8	REMOTE lamp	Lights when REMOTE/LOCAL switch (item 9) is set at REMOTE operating position.
9	REMOTE/LOCAL switch	When set at LOCAL, permits local tuning of associated tuner and reference signal generator; when set at REMOTE, permits tuning and band select- ion from associated remote control panel.

SECTION 4

PRINCIPLES OF OPERATION

4-1. GENERAL

The LRCB functions with associated units of a receiver system as a remote tuning and band switching control; the unit contains a +28 vdc power supply, and is operated through a remote control panel. A master switch on the remote control panel activates its corresponding slave stepping switch of the reference signal generator and moves it to the same position, thus tuning the reference signal generator for the carrier frequency that has been set up at the remote control panel. Additional wafers on the slave switches of the reference signal generator now send control voltages to the LRCB, which in turn tunes the associated receiver to the required carrier frequency.

4-2. FUNCTIONAL ANALYSIS.

The LRCB, in conjunction with associated equipment, operates in the following manner (refer to figure 1-2):

When the reference signal generator MC slave switch has moved to its correct position for the mc component in the carrier frequency, an extra wafer on the switch makes a connection with the sequential relays in the LRCB. The LRCB sends a controlling voltage to the r-f tuner BAND switch motor moving the BAND switch control in search for the proper band to correspond with the mc figure. Another wafer on the reference signal generator MC switch acts as a master stepping switch to a slave homing switch in the r-f tuner to stop the motor at the proper band by cutting off its power supply voltage.

When the reference signal generator 100KC slave switch has moved to its position for the 100-ke component in the carrier, an extra wafer on the switch presents a "direction of search" signal to the tuner TUNE drive motor, via sequential relays and a servo amplifier in the LRCB. The servo amplifier sends controlling a-c voltage to the tuner TUNE motor. The voltage contains one of two types of phases: one phase starts the motor in a clockwise direction, and the other phase sends it counterclockwise.

When the reference signal generator MC and 100KC slave switches have moved to their proper positions, wafers on both switches (depending on whether the frequency is on the left or right side of the band dial) either do or do not make a contact to ground through an LRCB relay coil, either energizing or not energizing the relay. If the frequency is on the left half of the dial, the relay is energized and works through an LRCB transformer and the servo amplifier to change the phase on the fixed phase input of the tuner TUNE motor, causing the TUNE capacitor to "search" towards the left on the band dial for the frequency. If the wafers do not connect the relay coil to ground, the relay remains de-energized and the tuner TUNE motor proceeds to search to the right. This arrangement minimizes the searching time.

As the TUNE control nears the proper point, the reference signal generator phase detector produces a d-c correction voltage. This d-c correction voltage causes the servo amplifier to center on the signal, thus making the error voltage zero volts. When the d-c voltage has reduced to

a small enough value, the SYNC lamp on the associated remote control panel lights.

If, after approximately 30 seconds from the time that the master switches on the remote control panel were activated, there has been no d-c correction voltage appearing at the LRCB servo amplifier, the LRCB sends a signal back to the remote control panel and lights the FAULT lamp. In this case, the remote control panel RESET button may be depressed, supplying the energizing voltage necessary to re-start the sequential relay action in the LRCB.

Power for the reference signal generator slave stepping switches and the sequential relays in the LRCB originates in the LRCB, but is first routed through the REMOTE/LOCAL switch of the LRCB and the contacts of relay K4001. With the REMOTE/LOCAL switch in the LOCAL position this power is cut off and local tuning of the reference signal generator and the r-f tuner is possible without interference from the remote control panel.

With the REMOTE/LOCAL switch in the REMOTE position and the TUNE OVERRIDE switch on the remote control panel in the OFF position, the power is again cut off until the TUNE button on the remote control panel is depressed.

This arrangement allows the remote operator to first set up the carrier frequency (MC, 100 KC, 10 KC, 1 KC, and .1 KC switches on the remote control panel) and then press the TUNE button on the remote control panel; as the TUNE button is pressed, the TechniMatic* tuning action starts. (If the TUNE

* Trademark applied for.

OVERRIDE switch on the rear of the remote control panel is ON, action will start as soon as any frequency control on the remote control panel is moved.)

4-3. CIRCUIT ANALYSIS.

The LRCB, as part of a receiver system, controls the associated external circuits that are used for automatic frequency control (AFC) tuning, rotary stepping solenoid activation, band selection, and frequency tuning. Refer to the schematic diagram, figure 7-1.

Relays K4006, K4011, and K4012 tune the associated AFC, as follows:

When a two-position switch (AFC SCAN) at the remote control panel is held in one position, relay K4011 in the LRCB is activated and will drive the knob of the associated AFC unit clockwise; when the switch is held in the other position, K4012 is activated and will drive the AFC unit knob counter-clockwise. When either K4011 or K4012 is energized, K4006 is also energized; however, when either direction-control relay is de-energized, K4006 (through resistors R4004 and R4005, and diode CR4017) remains energized for several seconds, furnishing a braking action to the tuning motor in the AFC and also keeps the RESET button closed while the braking action takes place. Contacts 6 and 7 on K4006 control the RESET switch located on the AFC unit (this switch is energized for several seconds after the motor has stopped).

The rotary stepping solenoid in the associated receiver is operated by the LRCB, as follows:

When the TUNE SYNC button on the remote control panel is depressed, relay K4001 of LRCB is energized and a potential of 28 volts is fed to the contacts of K4001, through resistors R4006 and R4014 and then to the remote control panel through contacts 21, 22, 23, 24, and 25 of connector J4003. The 28 volts is fed through several master wafers of the remote control panel. The continuity through each remote control panel master switch, through the solenoid of a slave wafer in the reference signal generator, to ground will cause the solenoid to draw current until the wafer has slaved itself to the master switch. Transistor Q4001 will turn on and will energize K4010; since operation of K4010 removes power through the servo control in the LRCB (which operates the servo system), the band switch motor cannot rotate and the servo cannot begin to search.

If relay K4010 is de-energized and the band switch motor is rotating, the motor will remain locked-up and continue to rotate when K4010 is energized. When K4010 is energized, relay K4001 locks and 28 volts continue to operate the rotary stepping solenoid after the TUNE button on the remote control panel is released. If the TUNE OVERRIDE switch on the remote control panel is closed, relay K4001 will always remain energized (28 volts will be applied continually to the master wafers on the remote control panel), so that whenever the TUNE OVERRIDE switch on the remote control panel is closed

and a master control knob is rotated, the rotary stepping solenoid on the receiver will follow, without the TUNE button having to be pushed in.

Relays K4002 and K4008 in the LRCB operate the band switch motor in the associated r-f tuner. When 28 volts is applied through contacts 14 and 15 at relay K4010 to contact 8 of K4008, from where contact 9 feeds to a switch of the associated reference signal generator (this switch is part of the rotary stepping solenoid), this signal then selects the band, as follows:

The different megacycles that make up the band are shorted out. Eight (8) leads are routed off this switch wafer and fed to the notch homing switch in the associated r-f tuner. If there is continuity from contact 9 at K4008 through the switch of the associated reference signal generator, through the notch homing switch of the associated r-f tuner, and back to contact 2 at K4002 (which is the relay coil), a-c is applied to the solenoid in the r-f tuner and actuates the detent on the band switch gear assembly. When this solenoid is actuated, a micro switch operates and furnishes power to the coil of relay K4008 which now (through contacts 9 and 10) locks up K4002. K4008 now furnishes a-c power to the motor of the band switch gear assembly in the r-f tuner. Also, when K4008 is energized, the 28 volt supply to the servo control in the LRCB is broken at contacts 20 and 21, preventing the servo control from searching while the band switch motor is rotating.

When the notch homing switch in the r-f tuner reaches its proper position, relay K4002 is de-energized (voltage continuity

has kept K4002 energized) and the solenoid in the band switch in the gear assembly will de-energize, and the cam will contact the cam follower in the gear switch. When the cam follower reaches the detent it will open the micro switch and de-energize K4008. When K4008 is de-energized, the band switch motor stops and the band switch gear assembly comes to rest on the pre-selected band, and 28 volts is again applied to the servo control.

Frequency changes are accomplished by rotary stepping solenoids in the associated reference signal generator. This action de-energizes a synchronization relay in the reference signal generator; the reference signal generator and the r-f tuner will then be out of synchronization and relay K4004 in the LRCB will energize. When K4004 energizes, and the band switch stops rotating, 28 volts will be applied to contacts 9 and 10 of K4004, thus reaching contact 17 on connector J4004, and will activate the servo control into a search cycle.

The direction of the search cycle depends on whether relay K4009 is energized or de-energized. Whenever there is continuity from ground to the 100KC switch wafer and the MC switch wafer of the associated reference signal generator to relay K4009 of the LRCB, K4009 will be energized and will cause the cursor on the r-f tuner to search (driven by the servo) to the left; whenever K4009 is de-energized, the cursor will search to the right.

When the servo has driven the cursor to one end of the band a micro switch in the r-f tuner will be activated and, no matter in which direction the servo started searching and no matter which micro switch is activated, relay K4005 will energize

and lock itself, and will thus reverse the direction of the servo. The search signal is applied from contacts 9, 10, and 11 of the center tap winding of transformer T4001.

Whenever the servo reverses and starts searching in the other direction and fails to locate the signal, the servo will continue to the other end of the band and the micro switch at this end will be activated, relay K4005 will de-energize and cause the servo to search in the opposite direction. As the cursor (driven by the servo) nearly reaches the frequency it is seeking, a d-c error voltage, produced by the reference signal generator, is applied to the servo control. This is accomplished by the sync relay of the reference signal generator energizing at the beginning of the capture range and opening the ground path to relay K4004 and to the servo amplifier. Due to a time constant developed by capacitor C4003, relay K4004 remains energized for approximately three seconds. During this time the d-c error voltage from J4005 is applied to the servo amplifier (pin 1, J4004). The d-c error voltage now operates the servo amplifier; when the servo amplifier centers on the d-c error voltage (zero volts), the search cycle stops, thus breaking the voltage to the servo motor.

Voltage is supplied to the fixed phase of the servo motor and servo generator by relay K4003, which is energized from contacts on relay K4004. When relay K4003 is de-energized, the fixed phase voltage is removed (whenever the receiver is in tune).

A 30-second time-delay circuit is formed by relay K4007, transistor Q4002, resistor R4011, and capacitor C4005; this time-delay circuit is inserted to energize K4007, stop the servo control from searching, and light a FAULT lamp on the remote control panel if the receiver fails to tune in within the specified length of time (the tune cycle may be started again by pushing in the RESET button on the remote control panel).

When the REMOTE/LOCAL switch on the LRCB is set at LOCAL, the LOCAL lamp will light to indicate that all power is removed from the unit, and this enables local manual tuning of the associated r-f tuner and reference signal generator; when the switch is set at REMOTE, 28 volts is furnished to the unit, and this condition is indicated by the REMOTE lamp.

SECTION 5
MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

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

At periodic intervals, the equipment should be removed from its mounting for cleaning and inspection. The wiring and all components should be inspected for dirt, dust, corrosion, grease or other harmful conditions. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease with any suitable cleaning solvent. Use of carbon tetrachloride should be avoided due to its highly toxic effects. Trichlorethylene or methyl chloroform 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 trichloroethylene, avoid contact with painted surfaces as the fluid may act as a paint remover.

5-2. TROUBLESHOOTING.

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 interconnecting wires are secure.

If these checks fail to locate the fault, the unit should be removed from the cabinet and visually checked for corrosion, dirt, or any other harmful conditions.

When troubleshooting, refer to the schematic diagram, figure 7-1.

5-3. REPAIR AND REPLACEMENT.

Maintenance of the LRCB 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 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.

SECTION 6
PARTS LIST

6-1. GENERAL.

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

ELECTRICAL PARTS LIST, LRCB-1 CONTROL TERMINATOR

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
AR4001	AMPLIFIER, SERVO CONTROL	AZ103
C4001	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-50-50
C4002	CAPACITOR, FIXED, ELECTROLYTIC: 40 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-40-50
C4003	CAPACITOR, FIXED, ELECTROLYTIC: 75 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-75-50
C4004	NOT USED	
C4005	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-100-25
C4006	CAPACITOR, FIXED, ELECTROLYTIC: 2,600 uf, -10% +100%; 65 volts DC surge; 50 WVDC; aluminum case.	CE112-6
C4007	Same as C4006.	
C4008	CAPACITOR, FIXED, METALIZED PLASTIC: 0.15 uf, +5%; 400 WVDC, non-inductive winding; epoxy encapsulated case.	CN114R54J
C4009	CAPACITOR, FIXED, PAPER DIELECTRIC: 5 uf, +10% at 60 cps, 25°C, +5°C; 370 WVAC at 60 cps; hermetically sealed seamless drawn steel oval case.	CP113-2
C4010	CAPACITOR, FIXED, PAPER DIELECTRIC: 4 uf, +10% at 60 cps, 25°C, +5°C; 370 WVAC at 60 cps; hermetically sealed seamless drawn steel oval case.	CP113-1
C4011	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-20-50
C4012	Same as C4009.	
C4013	CAPACITOR, HIGH TEMPERATURE, METALIZED PAPER: 1,000,000 uuf, +20%; full voltage rating to 100°C, 75% at 125°C; 400 WVDC; hermetically sealed tubular metal case.	CP106A105-4

ELECTRICAL PARTS LIST, LRCB-1 CONTROL TERMINATOR (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C4014	Same as C4006.	
C4015	CAPACITOR, FIXED, METALLIZED PLASTIC: 0.10 uf, +5%; 400 WVDC, non-inductive winding; epoxy encapsulated case.	CN114R104J
CR4001	SEMICONDUCTOR DEVICE, DIODE	1N1200A
CR4002 thru CR4004	Same as CR4001.	
CR4005	SEMICONDUCTOR DEVICE, DIODE	1N2070
CR4006	Same as CR4005	
CR4007	SEMICONDUCTOR DEVICE, DIODE	1N270
CR4008 thru CR4010	Same as CR4007.	
CR4011	Same as CR4005.	
CR4012 thru CR4016	Same as CR4007.	
CR4017	SEMICONDUCTOR DEVICE, DIODE: silicon, 600 volts; mas. continuous DC current .50 amps at 100 C; surge current peak 75 amps; max. operating temp. 150°C; max. forward voltage drop 1.0 V; max. reverse current 1000 ua.	1N2484
CR4018	SEMICONDUCTOR DEVICE, DIODE	1N3324B
CR4019	Same as CR4005.	
DS4001	LAMP, INCANDESCENT: 28.0 VAC/VDC; 0.04 amps; single contact: miniature T-1-3/4 bulb.	BI110-7
DS4002	Same as DS4001.	
DS4003	Same as DS4001.	
DS4004	Non-replaceable item. Part of XF4003.	
DS4005	Non-replaceable item. Part of XF4004.	

ELECTRICAL PARTS LIST, LRCB-1 CONTROL TERMINATOR (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
DS4006	Non-replaceable item. Part of XF4001.	
DS4007	Non-replaceable item. Part of XF4002.	
F4001	FUSE, CARTRIDGE: 3 amps; time lag; 1-1/4" long x 1/4" dia.; slow blow.	FU102-3.00
F4002	Same as F4001.	
F4003	FUSE, CARTRIDGE: 1/2 amp; quick acting; 1-1/4" lg. x 1/4" dia.; rated for 250 volts or less.	FU100-.5
F4004	FUSE, CARTRIDGE: 10 amps; time lag; 1-1/4" long x 1/4" dia.; slow blow.	FU102-10.00
J4001	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
J4002	CONNECTOR, RECEPTACLE, ELECTRICAL: 37 female contacts, removeable crimp pin style, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ310-3
J4003	CONNECTOR, RECEPTACLE, ELECTRICAL: 25 female contacts, removeable crimp pin style, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ310-2
J4004	Same as J4003.	
J4005	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 round female contact; straight; straight type; series BNC to BNC.	JJ172
J4006	Same as J4005.	
K4001	RELAY, POWER: 3PDT; 10 amps inductive contact current; coil rated for 24 VDC, 475 ohms, 1.2 watts; 11 pin plug type terminals; transparent plastic construction.	RL162-1
K4002	Same as K4001.	
K4003	RELAY ARMATURE: DPDT; 700 ohms, $\pm 10\%$ DC resistant; operating voltage 24 VDC; current rating 35 ma, 700 mw at 25°C; contacts	RL156-1

ELECTRICAL PARTS LIST, LRCB-1 CONTROL TERMINATOR (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
K4003 (cont)	rated for 5 amps at 29 VDC; clear high impact styrene dust cover case.	
K4004	RELAY, ARMATURE: DPDT; 5,000 ohms, +10% DC resistance; operating voltage 20.5 VDC; current rating 4.1 ma; 85 mw at 25°C; contacts rated for 1 amp at 29 VDC; clear high impact styrene dust cover case.	RL156-4
K4005	Same as K4003.	
K4006	Same as K4004.	
K4007	RELAY, ARMATURE: 4PDT; 85 ohms, +10% DC resistance; operating voltage 12 VDC; current rating 60 ma; 700 mw at 25°C; contacts rated for 2 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-2
K4008	RELAY, ARMATURE: 6PDT; 45 ohms, +10% DC resistance; operating voltage 24 VDC; current rating 56 ma; 1,500 mw at 25°C; contacts rated for 5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-5
K4009 thru K4012	Same as K4008.	
L4001	CHOKE, FILTER: 2 terminals; 0.12 ohms DC resistance; 0.03 hy min. with 10 VAC, 60 cps, 1.0 amp DC terminals 1 and 2; 0.004 hy min. with 10 VAC, 60 cps, 6 amps DC on terminals 1 and 2; hermetically sealed.	TF5026
Q4001	TRANSISTOR	2N456A
Q4002	TRANSISTOR	2N492
R4001	RESISTOR, FIXED, COMPOSITION: 220 ohms, +10%; 1 watt.	RC32GF221K
R4002	Same as R4001.	
R4003	RESISTOR, FIXED, COMPOSITION: 33 ohms, +10%; 1/2 watt.	RC20GF330K
R4004	RESISTOR, FIXED, WIREWOUND: 2,000 ohms, current rating 50 ma; 5 watts.	RW107-40

ELECTRICAL PARTS LIST, LRCB-1 CONTROL TERMINATOR (CONT.)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R4005	Same as R4004.	
R4006	RESISTOR, FIXED, WIREWOUND: 0.5 ohms, current rating 6,300 ma; 20 watts.	RW110-47
R4007	RESISTOR, FIXED, WIREWOUND: 75 ohms, current rating 815 ma; 50 watts.	RW105-50
R4008	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, <u>+5%</u> ; 1/2 watt.	RC20GF104J
R4009	Same as R4008.	
R4010	RESISTOR, FIXED, COMPOSITION: 470 ohms, <u>+10%</u> ; 1 watt.	RC32GF471K
R4011	RESISTOR, VARIABLE, COMPOSITION: 500,000 ohms, <u>+20%</u> ; 0.5 watt at 70°C; linear taper.	RV106UX8B-504B
R4012	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, <u>+10%</u> ; 2 watts.	RC42GF102K
R4013	RESISTOR, FIXED, WIREWOUND: 15 ohms, current rating 1,150 ma; 20 watts.	RW110-5
R4014	Same as R4006.	
R4015	RESISTOR, FIXED, COMPOSITION: 150 ohms, <u>+5%</u> ; 1 watt.	RC32GF151J
R4016	Same as R4015.	
R4017	Non-replaceable item. Part of XF4004.	
R4018	Non-replaceable item. Part of XF4003.	
R4019	Non-replaceable item. Part of XF4001.	
R4020	Non-replaceable item. Part of XF4002.	
S4001	SWITCH, TOGGLE: SPST; 6 amps, 125 VAC; 28° angle of throw; solder lug terminals.	ST12A
S4002	SWITCH, TOGGLE: SPDT; 6 amps, 125 VAC; 28° angle of throw; solder lug terminals.	ST12D

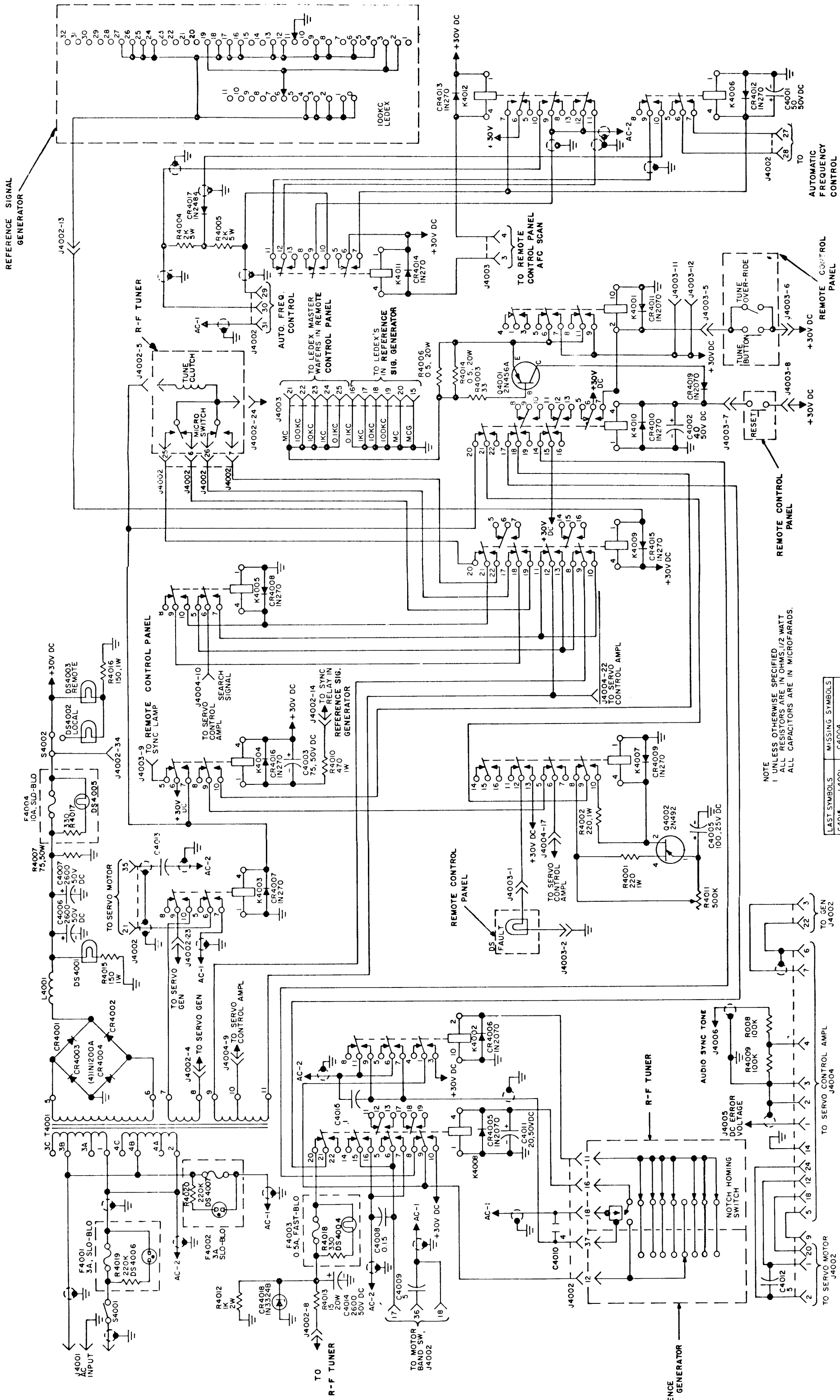
ELECTRICAL PARTS LIST, LCRB-1 CONTROL TERMINATOR (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
T4001	TRANSFORMER, POWER: primary - 105, 115, 12.5V, 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 steel case.	TF295
TB4001	TERMINAL BOARD, BARRIER: 2 double right angle solder lug type terminals; bakelite board.	TM127-2
TB4002	Same as TB4001.	
XDS4001	LIGHT, INDICATOR: white translucent lens, sub-miniature type.	TS153-5
XDS4002	LIGHT, INDICATOR: green lens, sub-miniature type.	TS153-2
XDS4003	LIGHT, INDICATOR: amber lens, sub-miniature type.	TS153-3
XF4001	FUSEHOLDER: lamp indicating; accommodates cartridge fuse 1-1/4" lg.x 1/4" dia.; 90 to 300 volts, 20 amps; neon lamp type with a 220K ohm lamp resistor; clear transparent flat sided knob; black body; consists of DS4006, R4019.	FH104-3
XF4002	Same as XF4001. Consists of DS4007, R4020.	
XF4003	FUSEHOLDER: lamp indicating; accommodates cartridge fuse 1-1/4" lg. x 1/4" dia.; 22 to 33 volts, 20 amps; incandescent lamp type with a 330 ohm lamp resistor; amber transparent flat sided knob; brown body; consists of DS4004, R4018.	FH104-11
XF4004	Same as XF4003. Consists of DS4005, R4017.	
XK4001	SOCKET, ELECTRON TUBE: 11 cadmium plated contacts rated for 500 volts, 3 amps; phenolic solid black body.	TS100-5
XK4002	Same as XK4001.	
XK4003	SOCKET, RELAY: with retainer; 6 beryllium copper gold plated contacts; black phenolic socket.	TS171-1

ELECTRICAL PARTS LIST, LRCB-1 CONTROL TERMINATOR (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XK4004 thru XK4006	Same as XK4003.	
XK4007	SOCKET, RELAY: with reatiner; 12 beryllium copper gold plated contacts; black pheriolic socket.	TS171-3
XK4008	SOCKET, RELAY: with retainer; 18 beryllium copper gold plated contacts; black pheriolic socket.	TS171-2
XK4009 thru XK4012	Same as XK4008.	
XQ4001	SOCKET, TRANSISTOR: 7 pin contact accom- modation; 0.040 or 0.050 dia.; polarized; 1 terminal lug grounding strap; o/a dim. 1-37/64" x 1" max.	TS166-S1
XQ4002	SOCKET, TRANSISTOR: 4 silver plated bery- llium copper contacts with gold flash; mica filled molded phenolic socket.	TS147

SECTION 7
SCHEMATIC DIAGRAMS

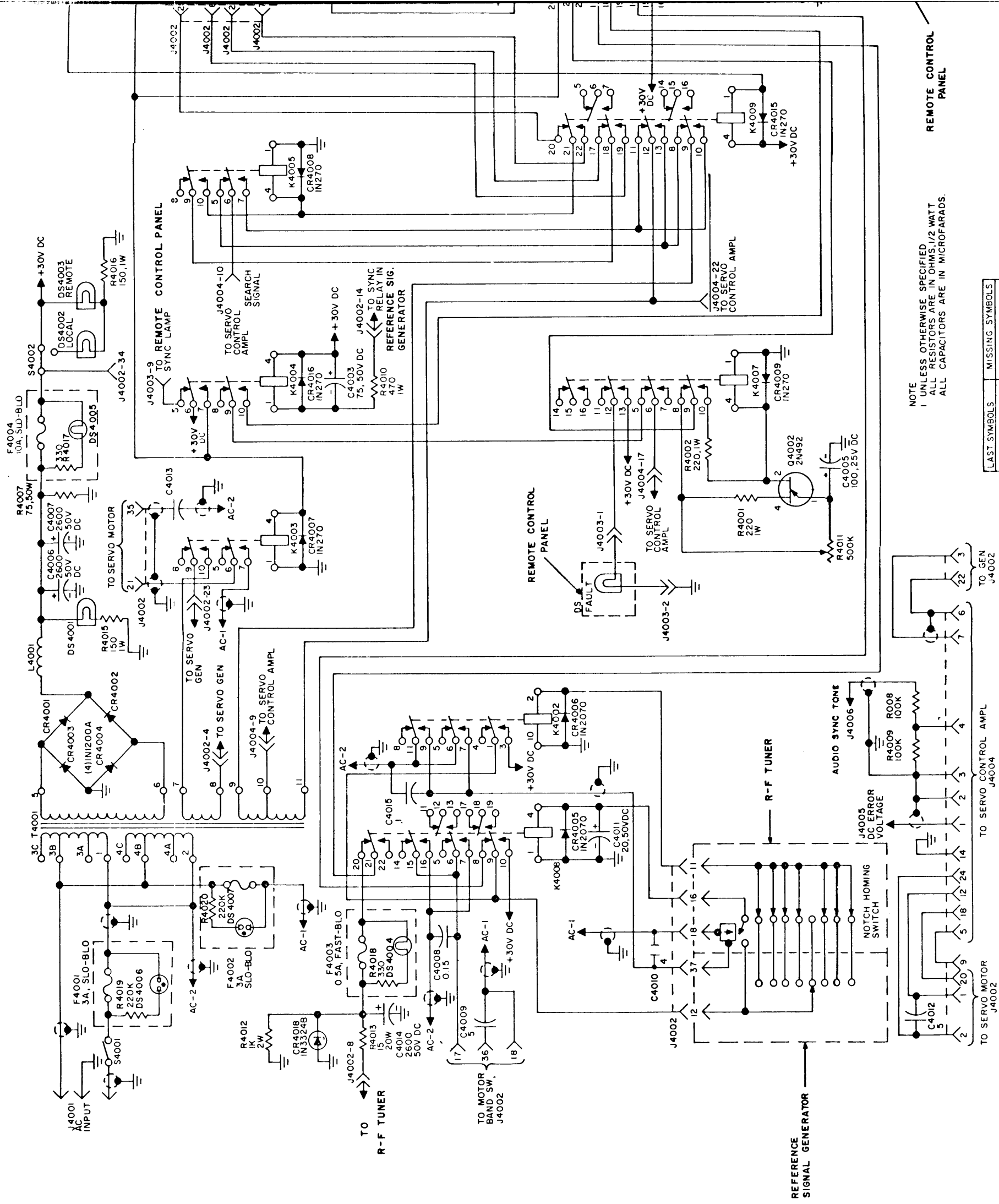


NOTE
 1 UNLESS OTHERWISE SPECIFIED
 ALL RESISTORS ARE IN OHMS/1/2 WATT
 ALL CAPACITORS ARE IN MICROFARADS.

LAST SYMBOLS	MISSING SYMBOLS
C4015	L4001
CR4019	Q4002
DS4003	R4016
F4004	S4002
K4012	T4001
J4006	

5005A-6 (CK-9776)

Figure 7-1. Schematic Diagram, LRCB-1



NOTE
 1 UNLESS OTHERWISE SPECIFIED
 ALL RESISTORS ARE IN OHMS /2 WATT
 ALL CAPACITORS ARE IN MICROFARADS.

LAST SYMBOLS	MISSING SYMBOLS
C4015	L4001
CR4019	O4002
DS4003	R4016
F4004	S4002
K4012	T4001
J4006	

5005A-6 (CK-977φ)