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UNCLASSIFIED

TECHNICAL MANUAL

for

REMOTE CONTROL UNIT

MODEL LSCA-1



THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y.

OTTAWA, ONTARIO

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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

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MAMARONECK, N. Y.

W a r r a n t y

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

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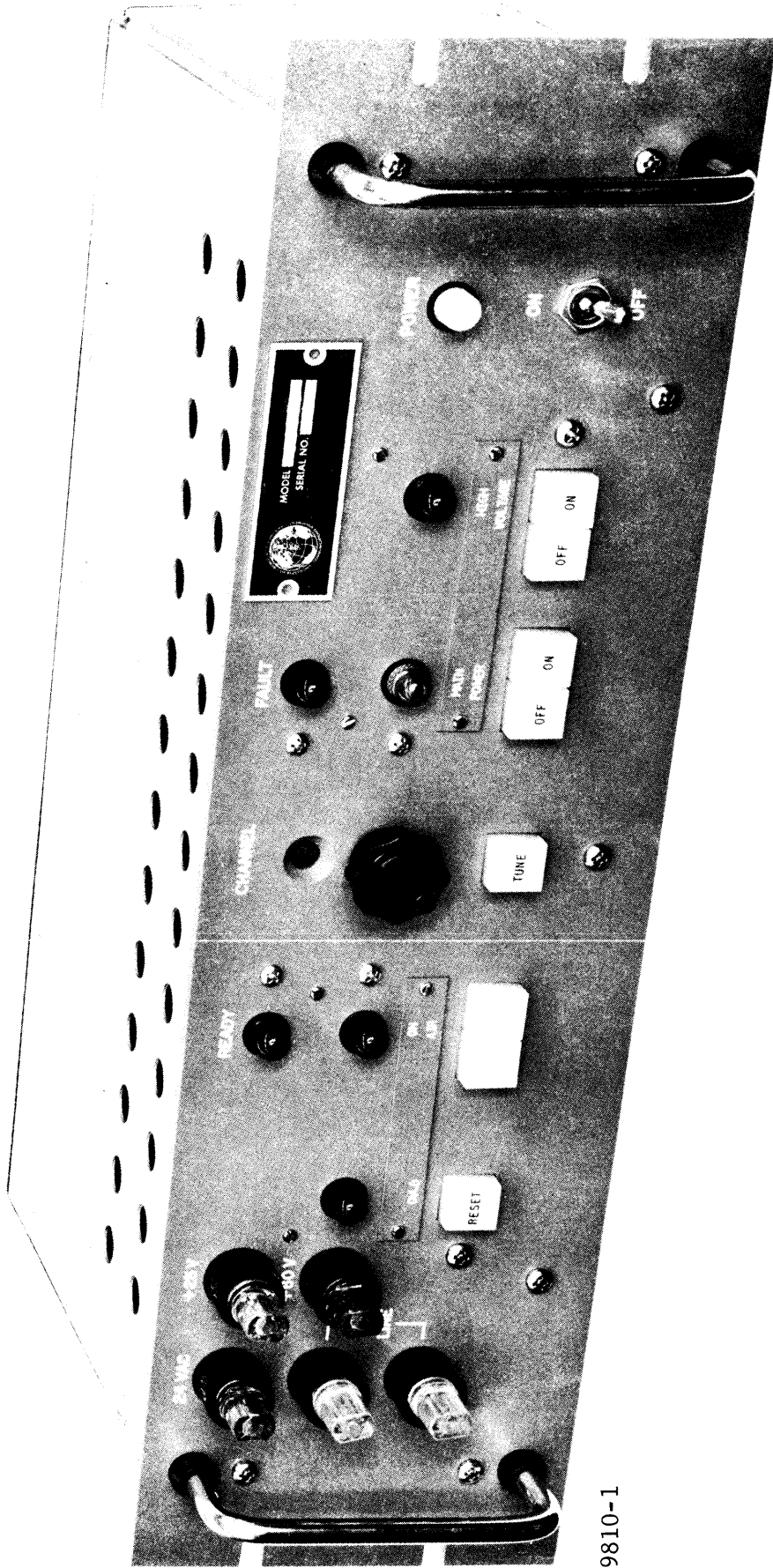


Figure 1-1. Remote Control Unit, Model LS-CA-1

668.30-9

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

Remote Control Unit, Model LSCA-1 (figure 1-1) is a remote control unit, enabling an operator to monitor, select and control various functions of a remotely located transmitter system.

The LSCA front panel controls and indicators are functionally an extension of the remote transmitter system's unit controls and indicators. This design effectively permits accurate fingertip control and monitoring of the remotely located transmitter system from a master control center or console.

All control and indicator readback signals are interconnected and routed by means of one interconnect cable.

1-2. PHYSICAL DESCRIPTION.

The LSCA is equipped with a 19-inch wide front panel, suitable for mounting into any standard width equipment rack or console. The front panel measures 5-1/4 inches high, supporting an 8-inch deep chassis. All fuses, controls, and indicators are front panel mounted. Primary power and interconnecting signal cables are mated at the rear of the unit.

1-3. TECHNICAL SPECIFICATIONS.

REMOTE CONTROLLING FUNCTIONS:

1. CHANNEL selection, any one of eight transmitting channels.
2. Overload RESET.
3. MAIN POWER ON/OFF.
4. HIGH VOLTAGE ON/OFF.

REMOTE READBACK INDICATIONS:

1. OVLD (overload)
2. ON AIR
3. MAIN POWER
4. HIGH VOLTAGE
5. READY
6. FAULT

POWER REQUIREMENTS:

Factory wired to receive an input of 115 volts a-c, 50/60 cps, single phase power. Changeover possible for 230 volts a-c input.

PHYSICAL DIMENSIONS:

19-inch wide x 5-1/4 inches high x 8 inches deep.

SECTION 2 INSTALLATION

2-1. INITIAL INSPECTION.

Each LSCA has been thoroughly checked and tested at the factory before shipment. Upon receipt of the equipment, unpack it carefully and inspect for damage that may have occurred in transit. 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 Materiel Corporation will assist in describing methods of repair and the furnishing of replacement parts.

2-2. MECHANICAL INSTALLATION.

The LSCA is equipped with a 19-inch wide front panel, suitable for mounting into any standard width equipment rack or console. The unit may be panel mounted to an equipment frame by means of the supplied mounting screws.

2-3. ELECTRICAL INSTALLATION.

Electrical installation of the LSCA consists of connection to 115 volts primary a-c power and connection to an associated remote transmitter system.

A-c primary input power is applied to the unit via rear chassis connector J101.

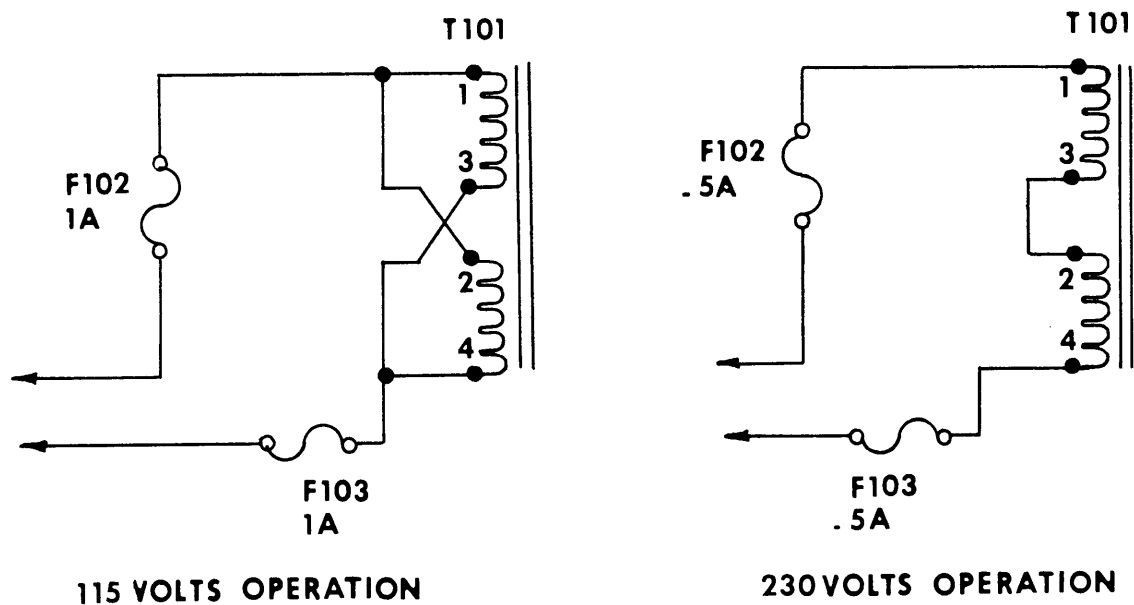
NOTE

The LSCA is factory wired to receive 115 volts a-c, 50/60 cps, single phase power. For 230 volts a-c operation, rewire the input transformer primary winding as shown in figure 2-1.

Remote equipment selection connections are mated at rear chassis connector J102, when an equipment-select unit is used.

Remote transmitter control and readback signal connections are mated at rear chassis connector J103, from the control-terminator unit of the associated transmitter system.

See figure 2-2 for interconnection details.



9810-2

Figure 2-1. Input Voltage Changeover Connections.

REAR PANEL VIEW

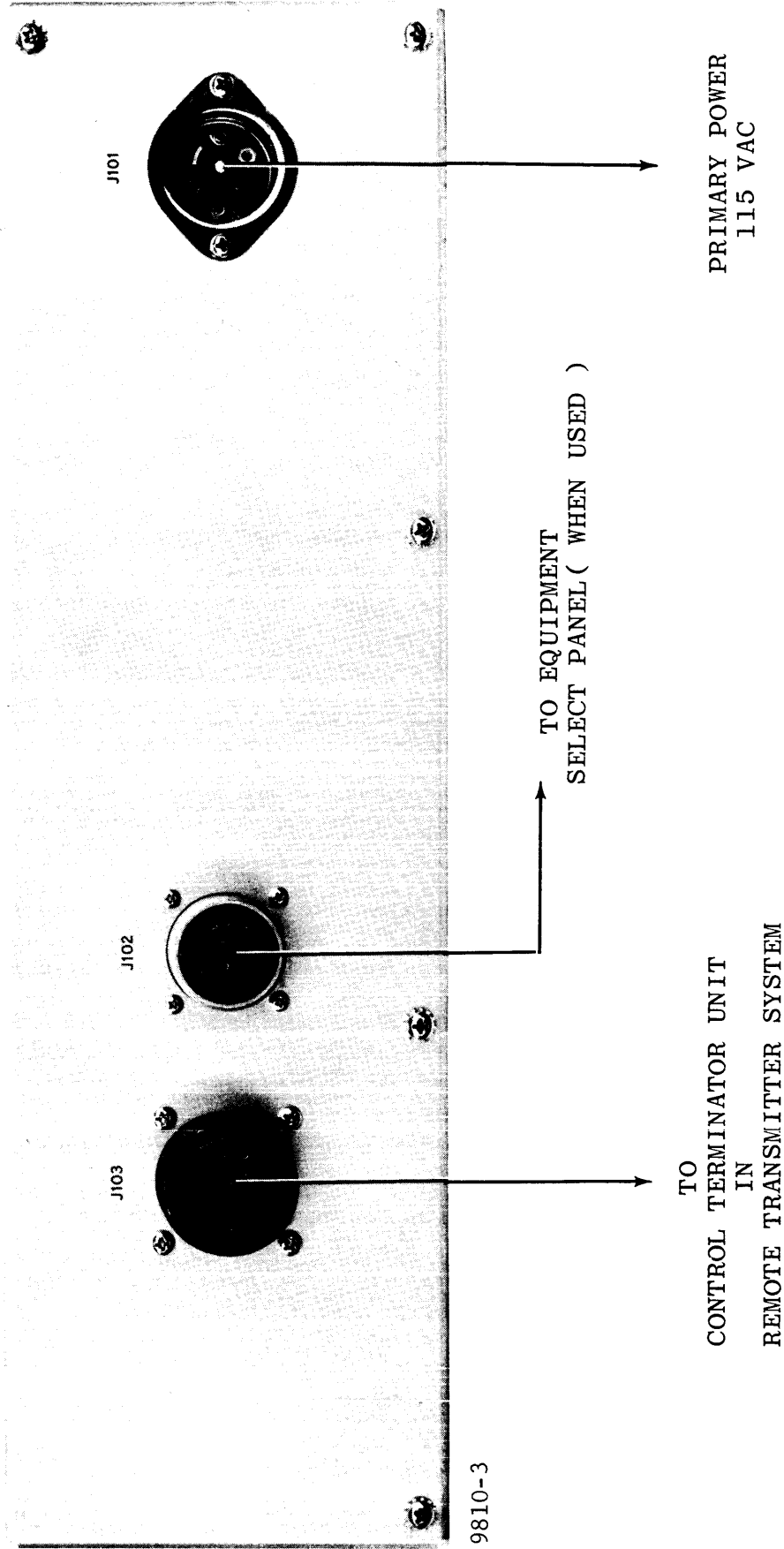


Figure 2-2. Electrical Interconnections.

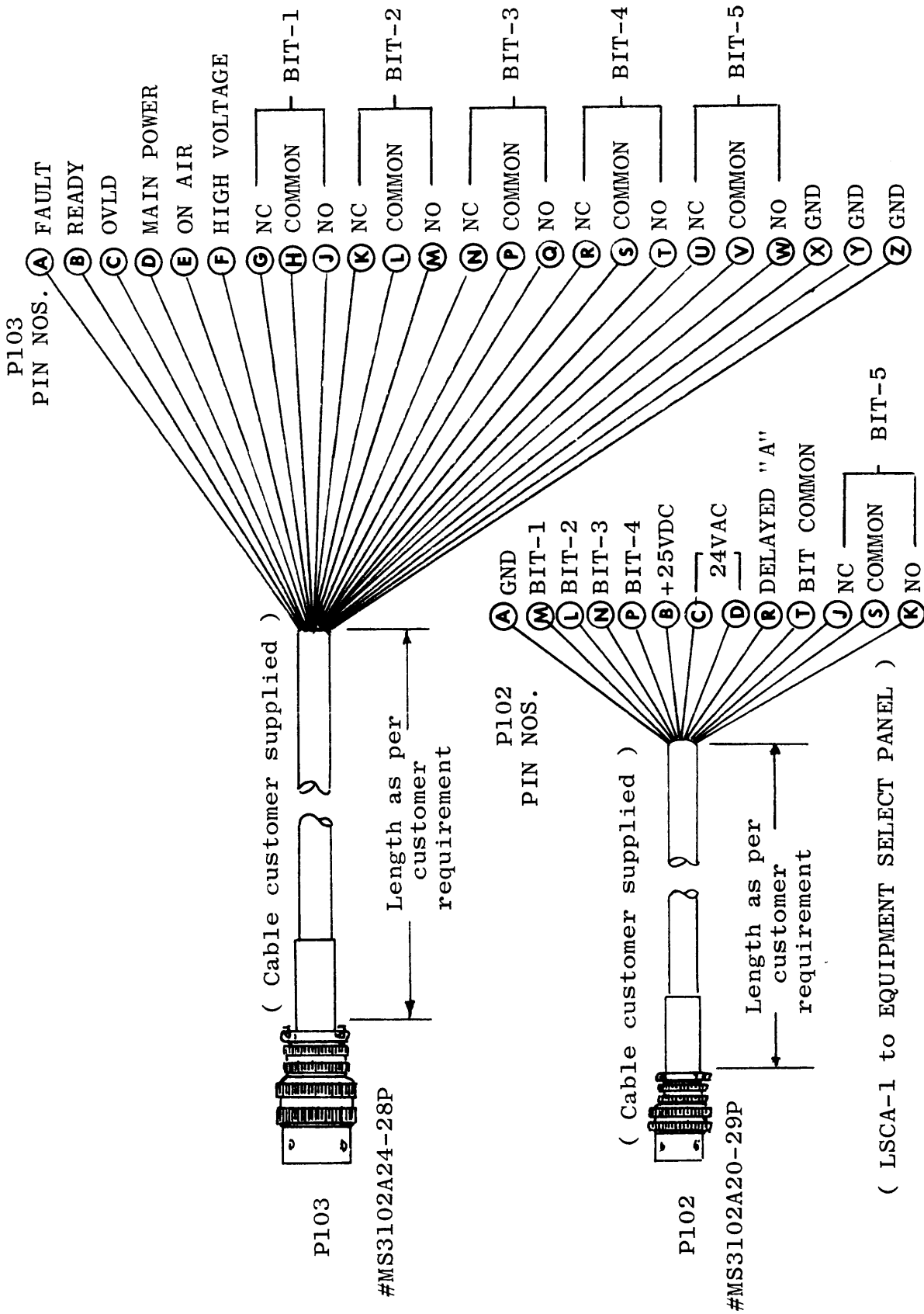


Figure 2-3. Cable Construction Daigram

SECTION 3

OPERATOR'S SECTION

3-1. GENERAL.

The LSCA is a remote control unit providing control and indications of some of the corresponding controls and indicators of the remote transmitter. Activation of the LSCA is accomplished by setting the power toggle switch at ON, causing the POWER indicator lamp to light. Indicator lamps, activated by readback signals from the remote transmitter, provide visual indications of various transmitter conditions. Corresponding pushbuttons enable remote control or reset of these various transmitter conditions. Channel selection, any one of up to eight transmitter channels, is accomplished by setting the eight-position channel selector switch to the desired operating channel, viewed in the CHANNEL selector illuminated window. Front panel fuses, indicator types, provide protection to the indicated voltage line circuits. See figure 3-1, used in conjunction with table 3-1, for unit control and indicator functions.

3-2. OPERATOR'S INSTRUCTIONS.

With interconnecting cables properly terminated and power applied to the LSCA, the operator may control the remote transmitter system as follows.

To select a desired transmitter operating channel (channels 1 through 8), set the CHANNEL selector switch to the desired channel number, viewed in the associated CHANNEL window. To initiate the selected channel command to the remote transmitter, depress the TUNE pushbutton.

The OVLD indicator lamp, when lit, signifies that an overload condition exists in the remote transmitter system. Depressing the RESET pushbutton causes

the reset circuitry in the remote transmitter system to correct the overload condition; the OVLD indicator lamp should extinguish denoting that the overload condition is corrected.

The MAIN POWER indicator lamp, when lit, signifies that main power is applied and present at the remote transmitter system. This condition should exist when the MAIN POWER ON pushbutton is depressed. Depressing the associated OFF pushbutton removes main power, extinguishing the MAIN POWER indicator lamp.

The HIGH VOLTAGE indicator lamp, when lit, signifies that high voltage is applied and present at the remote transmitter system. This condition should exist when the HIGH VOLTAGE ON pushbutton is depressed. Depressing the associated OFF pushbutton removes high voltage, extinguishing the HIGH VOLTAGE indicator lamp.

The READY indicator lamp and ON AIR indicator lamp will light when the remote transmitter system is in a ready and on the air condition. These indicator lamps are activated by the power output relay in the remote transmitter system, via the associated control-terminator unit.

The FAULT indicator lamp, when lit, signifies a fault in the remote transmitter system. This indication is controlled or initiated by the power output relay in the remote transmitter system, via a time-delay circuit in the associated control-terminator unit.

TABLE 3-1. CONTROLS, INDICATORS AND CONNECTORS

SYMBOL DESIGNATION (figure 3-1)	PANEL DESIGNATION	FUNCTION
FRONT PANEL		
①	AC LINE, fuses; indicator type, 1.0A	Input a-c line voltage protective fuses.
②	24VAC, fuse; indicator type, 0.5A	Protective fuse for 24 volts a-c circuit.
③	+25V, fuse; indicator type, 1.0A	Protective fuse for +25 volts d-c circuit.
④	+60V, fuse; indicator type, 0.25A	Protective fuse for +60 volts d-c circuit.
⑤	READY, indicator lamp; Green.	When lit, indicates remote transmitter is ready for tuning.
⑥	Channel selector knob, 8-position.	Used to select operation of any one of eight channels.
⑦	Channel selector window, illuminated.	Displays channel number selected by channel selector knob.
⑧	FAULT, indicator lamp; Red.	When lit, indicates a fault in the remote transmitter.
⑨	ON/OFF, power toggle switch.	When set at ON, applies operating voltage to unit.
⑩	POWER, indicator lamp; White.	When lit, indicates operating voltage is applied to unit, when power toggle switch is set at ON.
⑪	OVLD, indicator lamp. Red.	When lit, indicates an overload condition at the remote transmitter.

TABLE 3-1. CONTROLS, INDICATORS (CONT.)

SYMBOL DESIGNATION	PANEL DESIGNATION	FUNCTION
FRONT PANEL		
(12)	RESET, pushbutton switch.	When pressed, routes a reset signal to the remote transmitter; used to clear the overload condition.
(13)	ON AIR, indicator lamp. Red.	When lit, indicates remote transmitter is operational or "on the air".
(14)		NOT USED
(15)	TUNE, pushbutton switch.	When pressed, routes a tune signal to the remote transmitter; used to initiate the tune cycle.
(16)	MAIN POWER OFF/ON, pushbutton switches.	Remote transmitter Main Power control switches.
(17)	MAIN POWER, indicator lamp. Amber.	When lit, indicates remote transmitter Main Power is applied.
(18)	HIGH VOLTAGE OFF/ON, pushbutton	Remote transmitter High Voltage control switches.
(19)	HIGH VOLTAGE, indicator lamp. Red.	When lit, indicates remote transmitter High Voltage is applied.

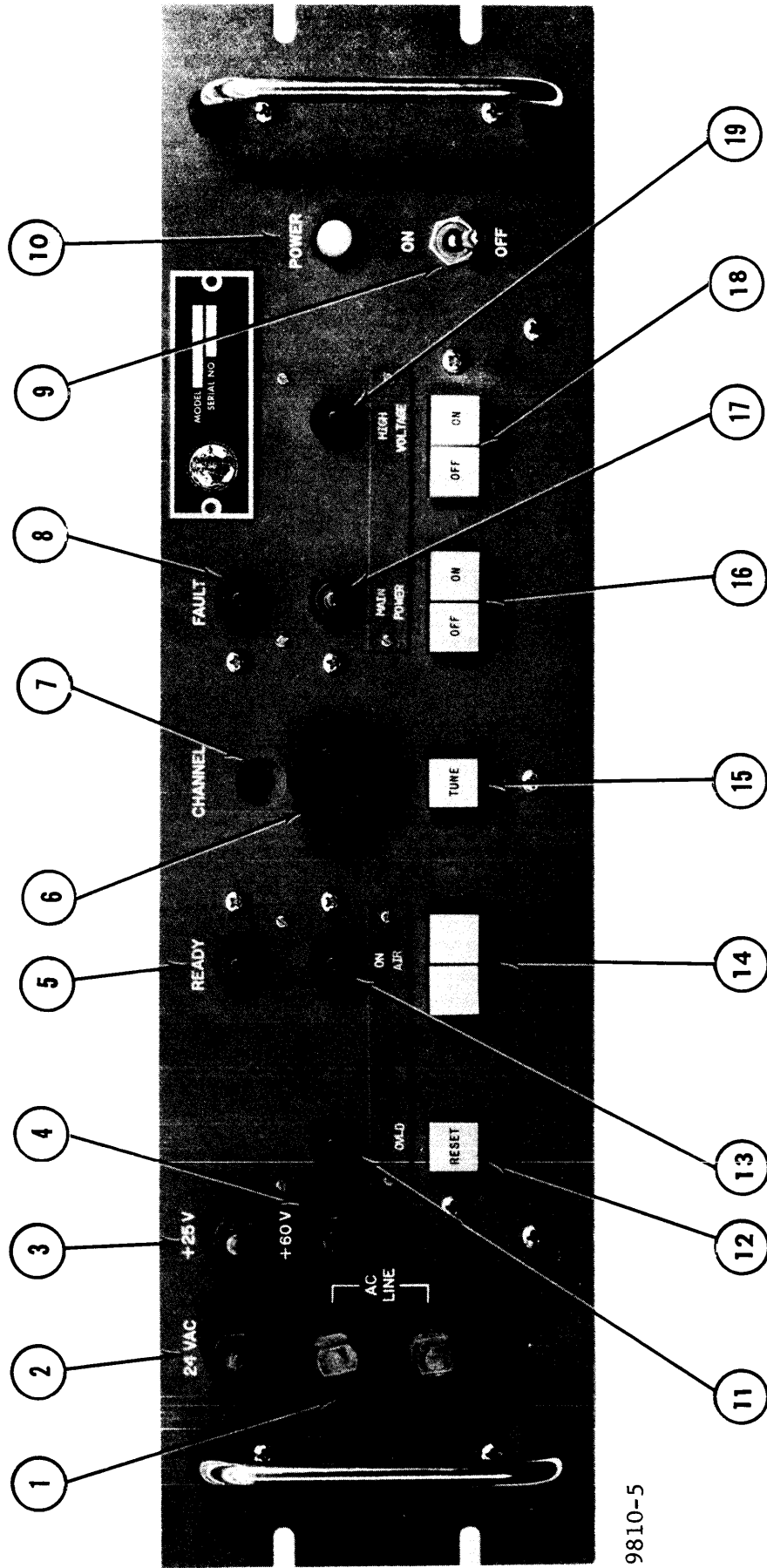


Figure 3-1. Controls and Indicators.

SECTION 4

PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

The LSCA is basically an extension of some of the various controls and indicators of the remote transmitter system. A CHANNEL selector switch provides remote selection of any one of up to eight transmitter channels, viewed in the illuminated CHANNEL selector window. FAULT and READY indicator lamps, activated by remote readback signals, signify the operational condition of the remote transmitter. An OVLD (overload) indicator lamp, also activated by a remote readback signal, indicates an overload condition in the remote transmitter. A corresponding RESET pushbutton switch enables remote resetting of the transmitter's overload reset relay. Other indicator lamps, with corresponding pushbutton switches, indicate and control other various functions of the remote transmitter. See figure 4-1 for a functional block diagram.

4-2. CIRCUIT DESCRIPTION.

The LSCA circuitry may be divided into three categories; rotary switch channel selections, pushbutton switch function selections and readback indicator functions. The following text will therefore be divided into three categories, each with an associated supporting circuit diagram.

Refer to table 4-1 for LSCA control functions versus their corresponding code bits.

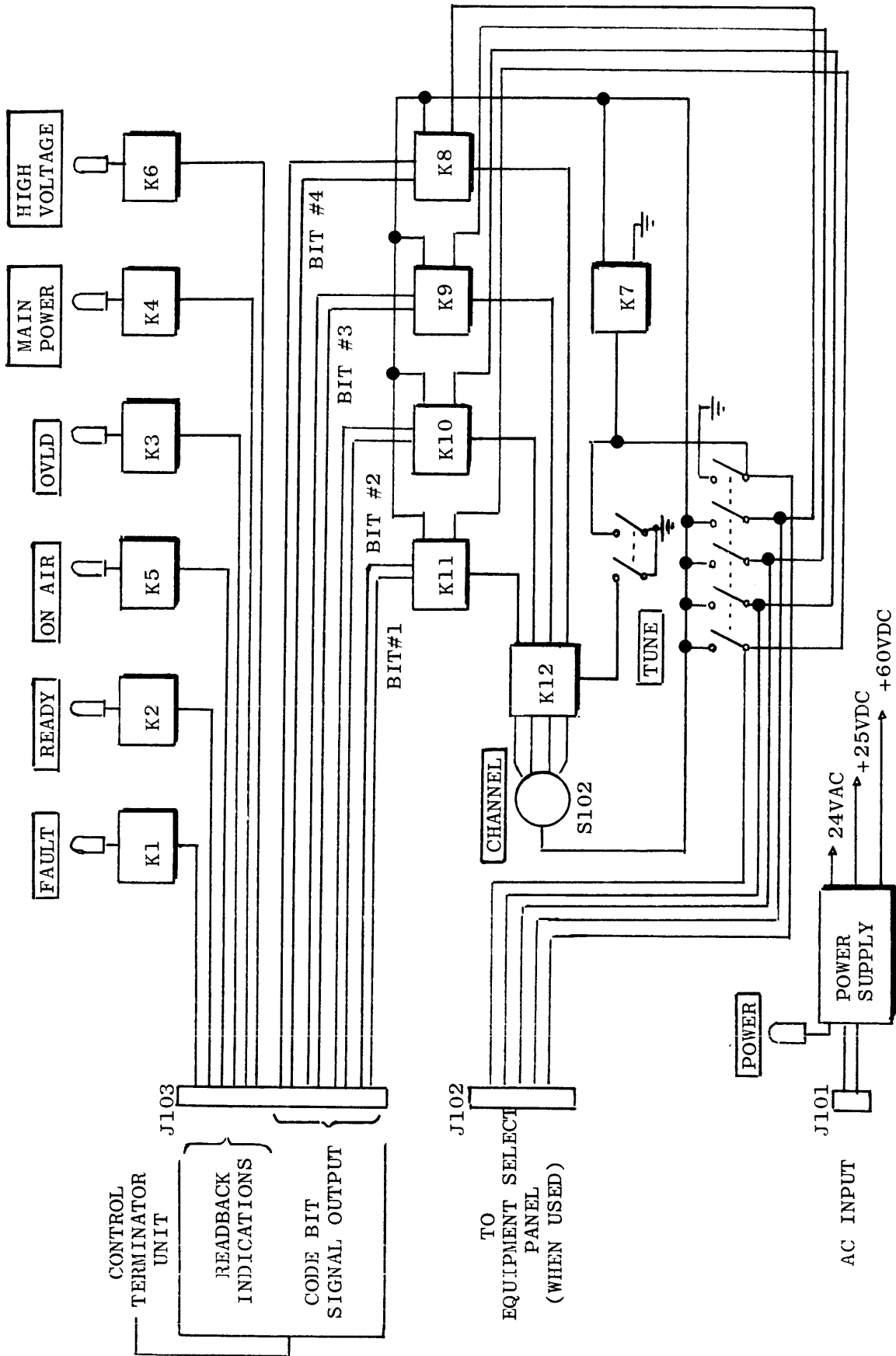


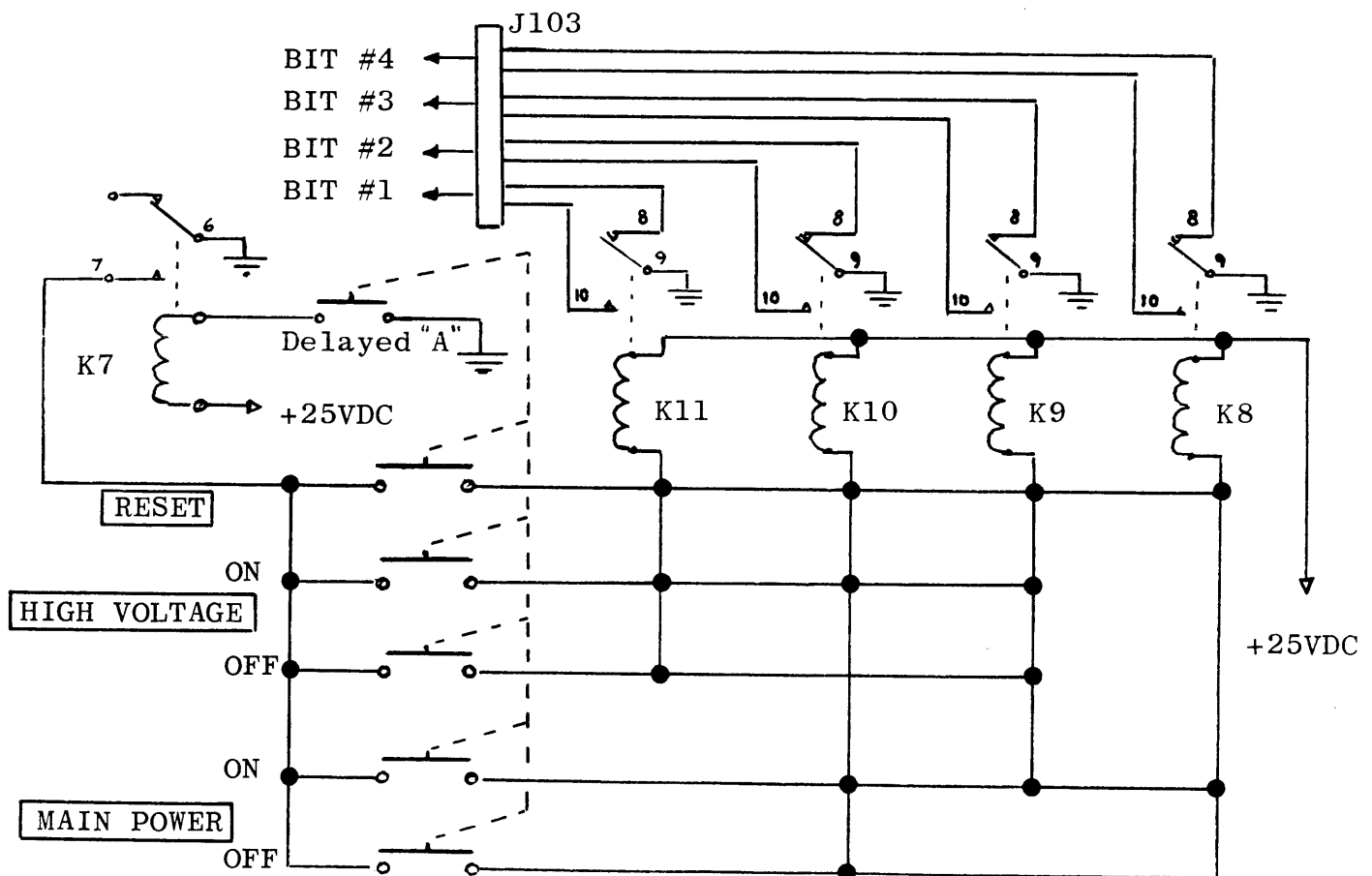
Figure 4-1. Functional Block Diagram

a. CHANNEL SELECTION

Remote transmitter channel selection is accomplished by use of an 8-position rotary selector switch S102. With the CHANNEL selector switch S102 set at the desired channel position, the operator must depress the TUNE pushbutton to initiate that selected channel to the remote transmitter system. Channel selection is then accomplished by routing one or more code bits to a control-terminator unit at the remote transmitter system. The code bits furnished to the remote control-terminator unit are in the form of ground potentials, supplied to corresponding code bit relays in the remote control-terminator unit. See figure 4-2 for a simplified channel-select circuit diagram, illustrating the functional circuitry of a channel-2 selection.

With the CHANNEL selector switch S102 set at the desired channel position (channel-2 for example), the TUNE pushbutton is pressed to initiate the channel selection. Pressing the TUNE pushbutton applies a ground return to the solenoids of relays K7 and K12, energizing them. With relay K7 energized, a ground potential is applied through the closed contacts 6 and 7 of relay K7 to the wiper of CHANNEL selector switch S102. This ground potential, in turn, is applied through the selector switch S102 to the arm-contact of relay K12. Relay K12, energized via the TUNE pushbutton, applies the ground potential through closed contacts 12 and 13 to the solenoid of relay K10, energizing it. Relay K10 energized supplies a ground potential, via contacts 9 and 10, to connector J103 where it is routed to the code bit relay (bit #2) in the remote control-terminator unit in the transmitter system.

the solenoid of relay K7, energizing it. A ground potential, available via the closed contacts 6 and 7 of relay K7, is applied to the corresponding code bit relay solenoids of the particular pushbutton depressed, i. e. HIGH VOLTAGE ON pushbutton applies a ground return to energize code bit relays K11, K10 and K9 (code bits 1, 2 and 3 respectively). The energizing ground potential is applied to all of the selected code bit relays simultaneously, by means of a ganged "de-layed-A" switch arrangement. With the particular pushbutton code bit relays energized, a ground potential from each code bit relay is routed, via closed contacts 9 and 10, to the corresponding code bit relays in the control-terminator unit of the remote transmitter system via connector J103.



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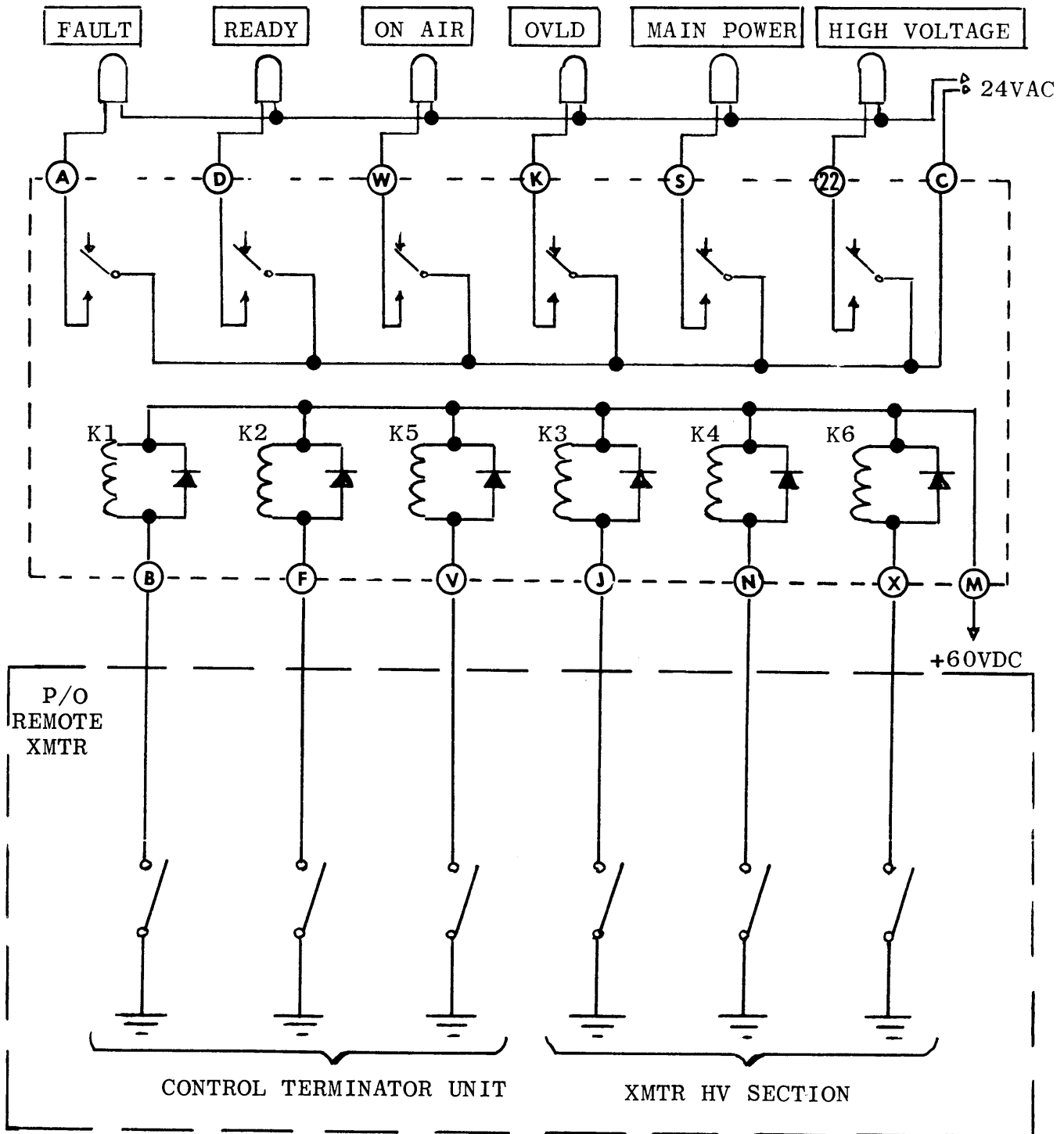
Figure 4-3. Pushbutton Select Circuit Diagram.

c. INDICATOR FUNCTIONS

Remote transmitter system conditions are displayed at the LSCA by means of indicator lamps. Although each indicator lamp signifies a different condition or indication, they all perform in the same basic manner, i. e., each indicator lamp operated by an individual relay energized by a remote switch or relay contact in the associated remote transmitter system. See figure 4-4 for a simplified circuit diagram illustrating indicator lamp circuitry and associated remote readback controlling circuitry.

The FAULT, READY and ON AIR indicator lamps, controlled by relays K1, K2 and K5 respectively, receive their energizing commands in the form of a ground potential from the control-terminator unit at the remote transmitter system.

The OVLD (overload), MAIN POWER and HIGH VOLTAGE indicator lamps, controlled by relays K3, K4 and K6 respectively, receive their energizing commands in the form of a ground potential from the remote transmitter system's high voltage section.



9810-9

Figure 4-4. Indicator Readback Circuit Diagram

TABLE 4-1. CONTROL FUNCTIONS vs. CODE BITS

CONTROL AND FUNCTION	CODE BITS
CHANNEL, rotary selector switch. Channel 1 Channel 2 Channel 3 Channel 4 Channel 5 Channel 6 Channel 7 Channel 8	1 2 3 1, 4 1, 2 2, 3 1, 3, 4 1, 2, 4
RESET, pushbutton	1, 2, 3, 4
HIGH VOLTAGE, pushbuttons ON OFF	1, 2, 3 1, 3
MAIN POWER, pushbuttons ON OFF	2, 3, 4 2, 4

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

5-2. TROUBLESHOOTING.

When a piece of equipment has been operating satisfactorily and suddenly fails, the cause of failure may be due to symptoms of past failures or due to component aging.

The first step in troubleshooting is to ascertain that proper equipment voltages are present, interconnecting cables are secure and functional, and that all fuses are in functional condition.

NOTE

Never replace a fuse with one of a higher rating unless continued brief operation is more important than probable equipment damage. If a fuse burns out immediately after replacement, do not replace it a second time until the cause of failure has been located and corrected.

If the above mentioned checks fail to locate the fault, and the fault is known to be that of the LSCA, disconnect power and interconnecting cable and remove the unit from its mounting. Remove the top and bottom dust covers and perform a visual check. Observe for trouble causing conditions such as arcing, grease, dirt, dust or other harmful conditions. Observe for loose connections, broken or burned wires, charred or discolored components. Perform continuity check, using schematic diagram. Check plug-in circuit board for similar trouble causing conditions, also observing for hair-line cracks in the circuit board.

If the fault has been localized to a particular function in the LSCA, the associated relay operation may be checked by the substitution method. Simply replace the suspected relay with one of a similar type (refer to the parts list in section 6) and observe the new condition. If the fault is corrected, replace the defective relay. If the fault still exists, point-to-point continuity checking will localize the

fault.

5-3. REPAIR AND REPLACEMENT.

Maintenance of the LSCA 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 first be tagged and marked for accurate identification when replacing.

When replacing components, the technician should observe for exact or equivalent replacements, by referring to the parts list in section 6.

Polarity and positioning of certain components should be observed before removing, so that the replacement component will fit and operate correctly. See figures 5-1 and 5-2 for chassis component locations.

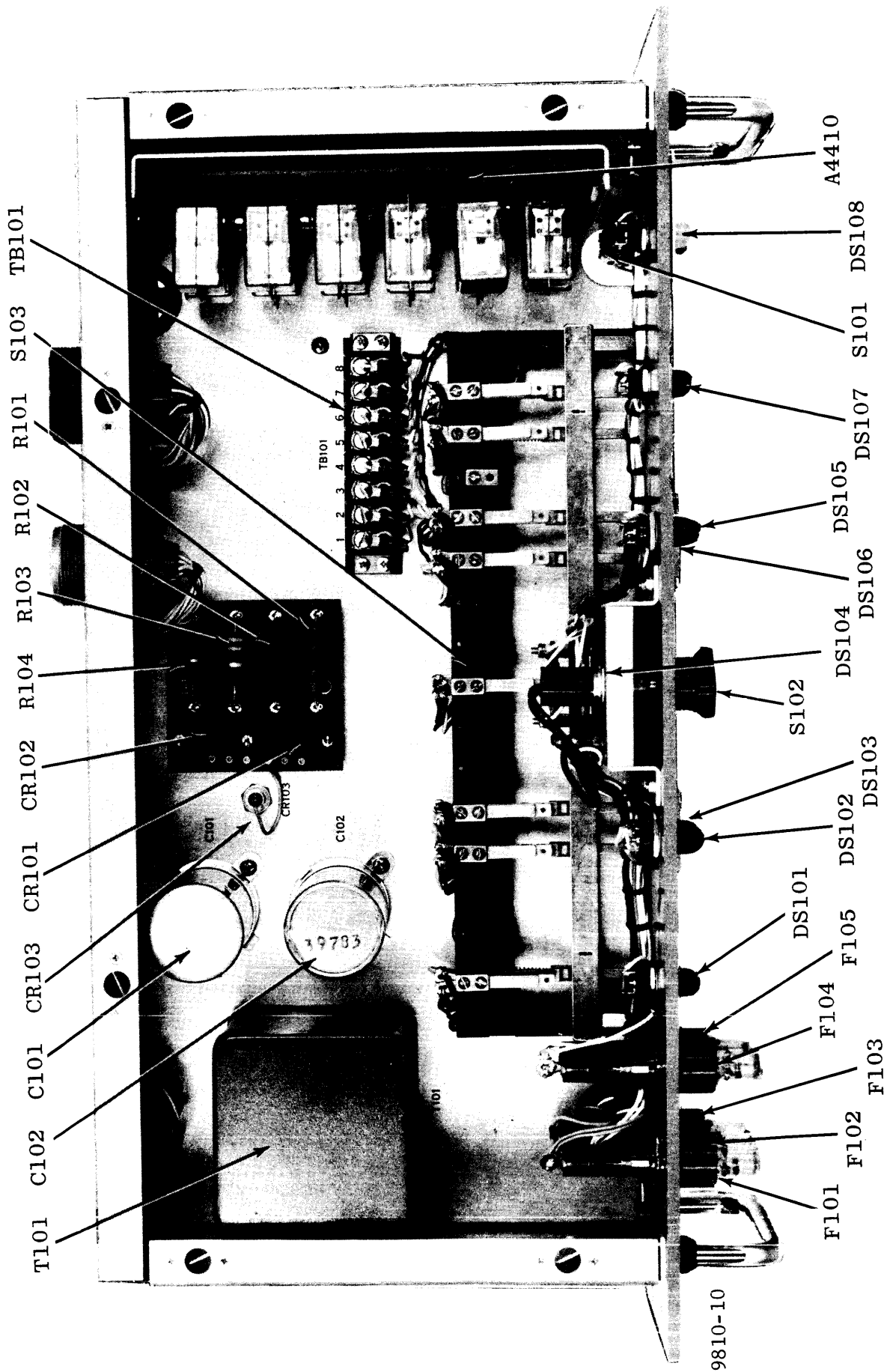


Figure 5-1. Component Locations, Top Chassis View

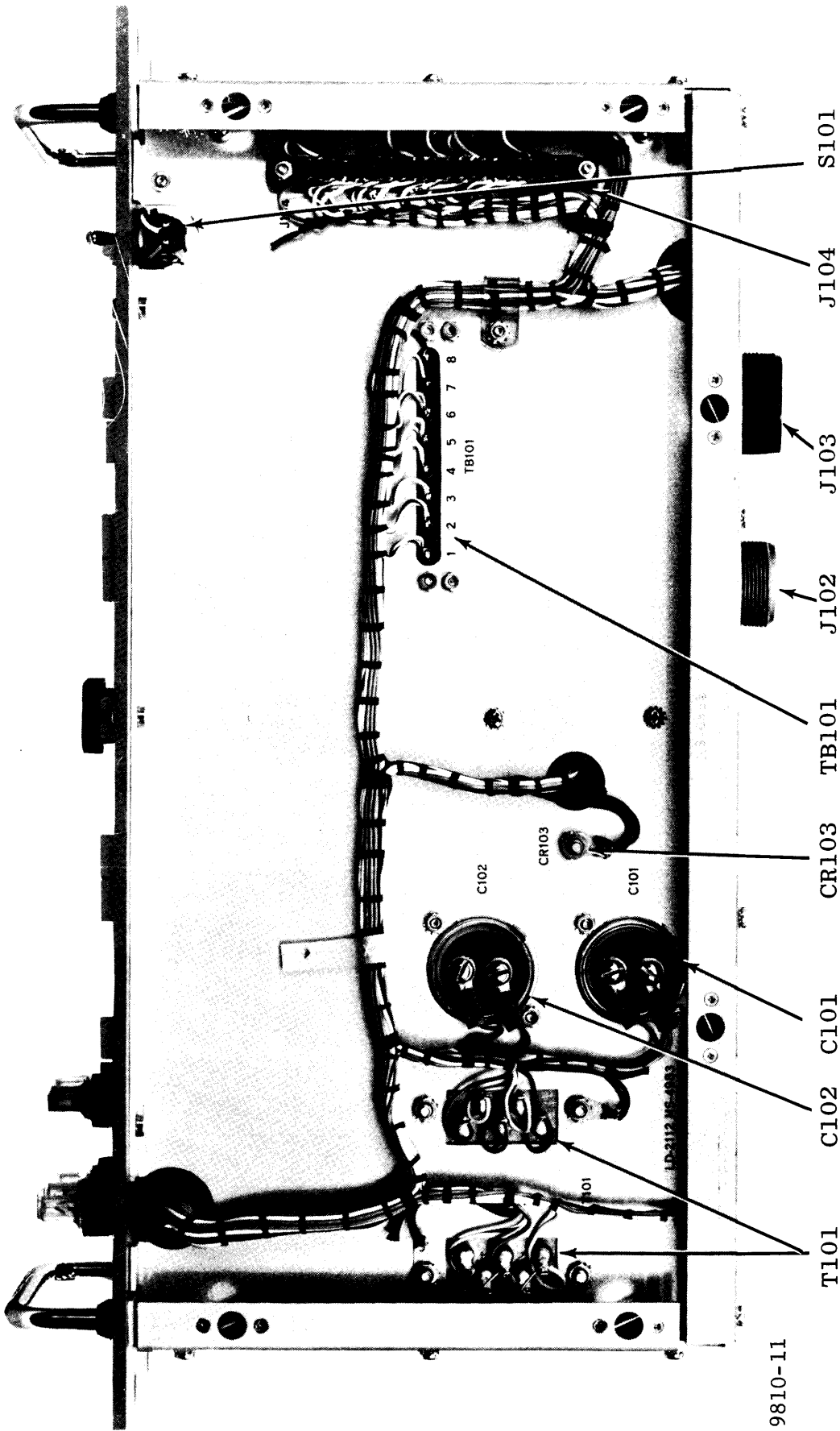


Figure 5-2. Component Locations, Bottom Chassis View

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. Reference symbol.
- b. Description as indicated in parts list.
- 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

<u>Assembly or Sub-assembly</u>	<u>Page</u>
REMOTE CONTROL UNIT, LSCA-1	6-2
PRINTED CIRCUIT BOARD, A4410	6-5

PARTS LIST
for
REMOTE CONTROL UNIT, LSCA-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C101	CAPACITOR, FIXED, ELECTROLYTIC: 2,600 uf, 50 WVDC; polarized.	CE112-6
C102	CAPACITOR, FIXED, ELECTROLYTIC: 1,700 uf, 75 WVDC; polarized.	CE112-8
CR101	SEMICONDUCTOR DEVICE, DIODE: rectifier bridge; peak reverse voltage 200 V; output current 1.5 amps DC at 50°C or 1.0 amps DC at 100°C; one cycle peak surge current 15 amps, recurrent forward current 5 amps; max. forward voltage drop 1 volt at 100°C; molded plastic case.	DD130-200-1.5
CR102	Same as CR101.	
CR103	SEMICONDUCTOR DEVICE, DIODE: silicon.	1N2989B
DS101	LAMP, INCANDESCENT: 28 VAC/DC; 0.04 amps; single contact, T-1-3/4 bulb.	BI110-7
DS102	Same as DS101.	
DS103	Same as DS101.	
DS104	LAMP, INCANDESCENT: 28 VAC/DC; 0.04 amps; miniature bayonet base T-3-1/4 bulb.	BI101-1819
DS105 thru DS108.	Same as DS101.	
F101	FUSE, CARTRIDGE: 1/2 amp; 1-1/4" long x 1/4" dia.; quick acting.	FU100-.500
F102	FUSE, CARTRIDGE: 1 amp; 1-1/4" long x 1/4" dia.; slo-blow.	FU102-1
F103	Same as F102.	
F104	FUSE, CARTIDGE: 1 amp; 1-1/4" long x 1/4" dia.; quick acting.	FU100-1
F105	FUSE, CARTIDGE: 1/4 amp; 1-1/4" long x 1/4" dia.; quick acting.	FU100-.250
J101	CONNECTOR, RECEPTACLE, ELECTRICAL: ACpower; 2 male contacts rated for 10 amps, 250 V; polarized.	JJ175

PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J102	CONNECTOR, RECEPTACLE, ELECTRICAL: 17 No. 16 socket type contacts.	MS3102A20-29S
J103	CONNECTOR, RECEPTACLE, ELECTRICAL: 24 No. 16 socket type contacts.	MS3102A24-28S
J104	CONNECTOR, RECEPTACLE, ELECTRICAL: 44 female contacts, rated for 5 amps at 1,800 V RMS; polarized.	JJ319-22DFE
R101	RESISTOR, FIXED, WIREWOUND: 3 ohms, $\pm 5\%$; 5 watts; non-inductive.	RR114-3W
R102	RESISTOR, FIXED, WIREWOUND: 500 ohms, $\pm 5\%$; 5 watts; non-inductive.	RR114-500W
R103	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, $\pm 5\%$; 2 watts.	RC42GF332J
R104	RESISTOR, FIXED, COMPOSITION: 56 ohms, $\pm 5\%$; 1 watt.	RC32GF560J
S101	SWITCH, TOGGLE: DPST; 30° angle of throw; bat type handle.	ST103-13-63
S102	SWITCH, ROTARY: 1 section, 8 positions; 30° angle of throw; non-shorting type contacts; bakelite wafer insulation.	SW424
S103	SWITCH, PUSHBUTTON: single row, 8 sections.	SW425
T101	TRANSFORMER, POWER: isolation and stepdown; primary 115/230 V, 50/60 cps; secondary terminals 5 and 6, 25 V RMS at 660 MADC, terminals 7 and 8, 23 V RMS at 400 MA RMS, terminals 9 and 10, 55 V RMS at 60 MADC.	TF339
TB101	TERMINAL BOARD, BARRIER: eight 6-32 thd x 1/4" lg. binding head machine screws; black phenolic body.	TM100-8
XDS101	LIGHT, INDICATOR: yellow lens, sub-miniature type.	TS153-3
XDS102	Same as XDS101.	
XDS103	LIGHT, INDICATOR: green lens, sub-miniature type.	TS153-2
XDS104	SOCKET, LAMP: for miniature bayonet base, T3-1-1/4 bulb.	TS127

PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XDS105	LIGHT, INDICATOR: red lens, sub-miniature type.	TS153-1
XDS106	LIGHT, INDICATOR: blue lens, sub-miniature type.	TS153-4
XDS107	Same as XDS105.	
XDS108	LIGHT, INDICATOR: white lens, sub-miniature type.	TS153-5
XF101	FUSEHOLDER: lamp indicating; accomodates cartridge fuse 1-1/4" long x 1/4" dia.; 33 to 45 V, 20 amps; incandescent lamp type with a 680 ohm lamp resistor; transparent amber flat sided knob; black body.	FH104-12
XF102	FUSEHOLDER: lamp indicating; accomodates cartridge fuse 1-1/4" long x 1/4" dia.; 90 to 300 V, 20 amps; neon lamp type with a 220 K ohm lamp resistor; transparent clear flat sided knob; black body.	FH104-3
XF103	Same as XF102.	
XF104	Same as XF101.	
XF105	FUSEHOLDER: lamp indicating; accomodates cartridge fuse 1-1/4" long x 1/4" dia.; 60 to 80 V, 20 amps; incandescent lamp type with a 1,750 ohm lamp resistor; transparent amber flat sided knob; brown body.	FH104-14

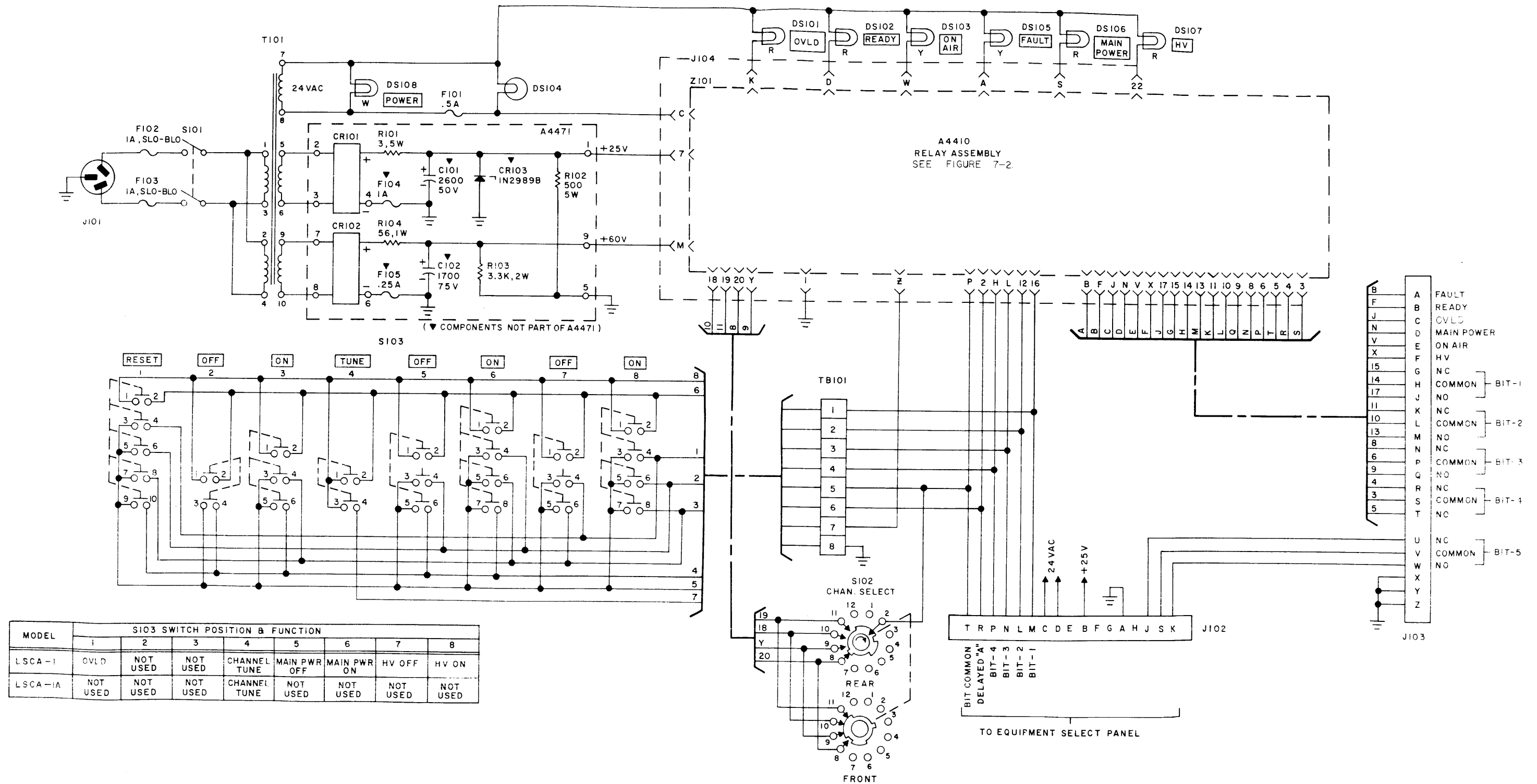
PARTS LIST
for
PRINTED CIRCUIT BOARD, A4410

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized.	CE105-100-25
CR1	SEMICONDUCTOR DEVICE, DIODE: germanium.	1N270
CR2 thru CR12	Same as CR1.	
K1	RELAY, ARMATURE: DPDT; 10,000 ohms, <u>+10%</u> DC resistance; operating voltage not rated; current rating 3.1 ma; power rating 85 mw at 25°C; 8 contacts rated for 0.5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-17
K2 thru K6	Same as K1.	
K7	RELAY, ARMATURE: DPDT; 5,000 ohms, <u>+10%</u> DC resistance; operating voltage 20.5 VDC; current rating 4.1 ma; power rating 85 mw at 25°C; 8 contacts rated 1 amp at 29 VDC; clear high impact styrene dust cover case.	RL156-4
K8	RELAY, ARMATURE: DPDT; 700 ohms, <u>+10%</u> DC resistance; operating voltage 24 VDC; current rating 35 ma; power rating 700 mw at 25°C; 8 contacts rated for 5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-1
K9 thru K11	Same as K8.	
K12	RELAY, ARMATURE: 4PDT; 1,000 ohms, <u>+10%</u> DC resistance; operating voltage 13 VDC; current rating 13 ma; power rating 175 mw at 25°C; 14 contacts rated for 0.5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-15
R1	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, <u>+5%</u> ; 1/2 watt.	RC20GF102J
XK1	SOCKET, RELAY: w/retainer; 6 male beryllium copper gold plated contacts; black phenolic base.	TS171-5

PARTS LIST (CONT)

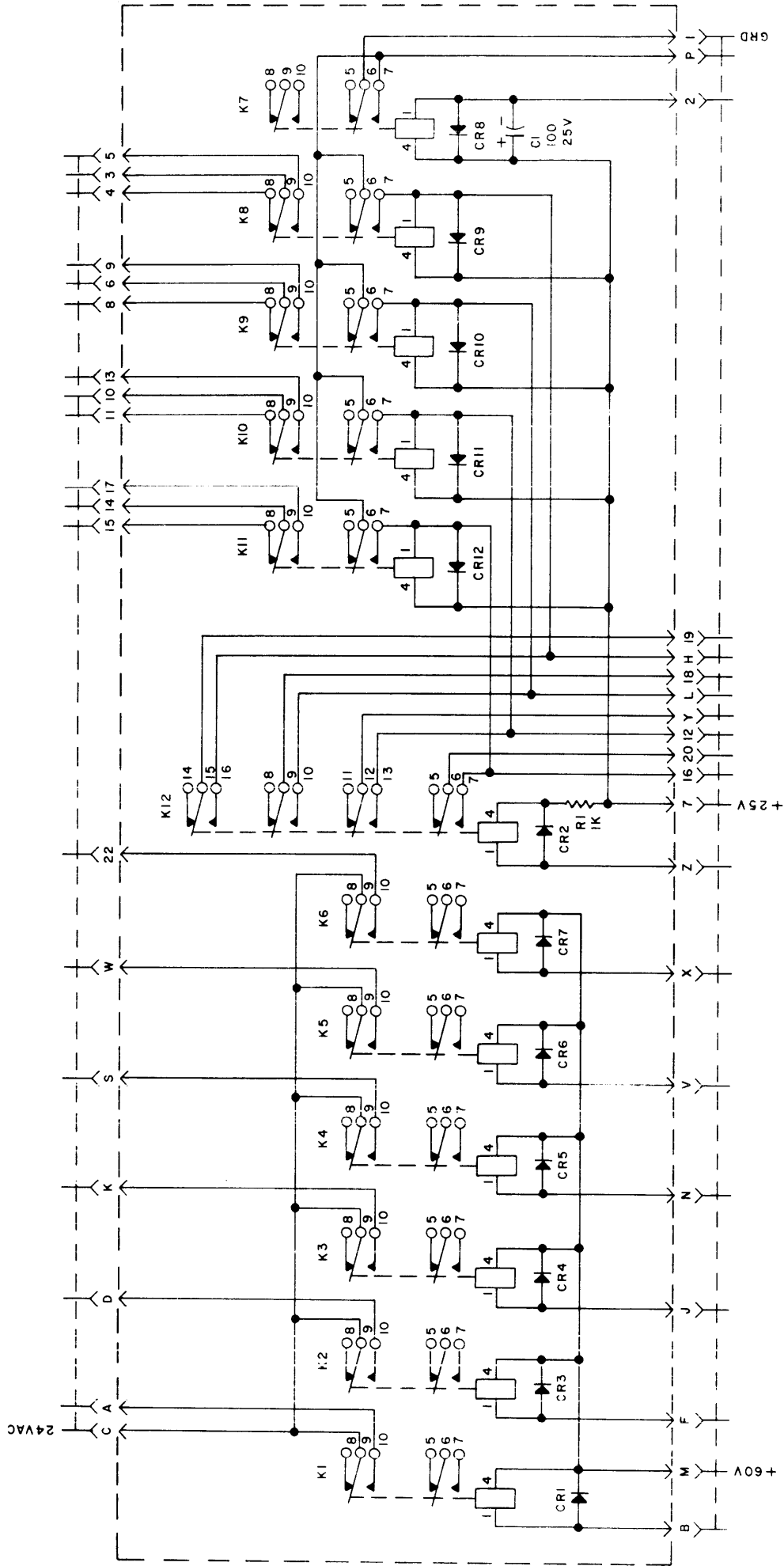
REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XK2 thru XK11	Same as XK1.	
XK12	SOCKET, RELAY: w/retainer; 12 male beryllium copper gold plated contacts; black phenolic base.	TS171-4

SECTION 7
SCHEMATIC DIAGRAMS



- UNLESS OTHERWISE SPECIFIED -
 1 - ALL RESISTOR VALUES ARE IN OHMS.
 2 - ALL CAPACITOR VALUES ARE IN MICROFARADS.

Figure 7-1. Schematic Diagram, Model LSCA-1



RELAY COIL RATING CHART		
SYMBOL	VOLTAGE	CURRENT RESISTANCE
K1 THRU K6	—	3.1 MA 10K
K7	—	4.1 MA 5K
K8 THRU K11	24VDC	700
K12	—	1.3 MA 1K

- UNLESS OTHERWISE SPECIFIED -
- 1-ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT.
- 2-ALL CAPACITOR VALUES ARE IN MICROFARADS.
- 3-ALL DIODES ARE IN270.

Figure 7-2. Schematic Diagram, A4410