

UNCLASSIFIED

TECHNICAL MANUAL

for

TRANSMITTER CONTROL GROUP

MODEL TCG ()-1



THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y.

OTTAWA, ONTARIO

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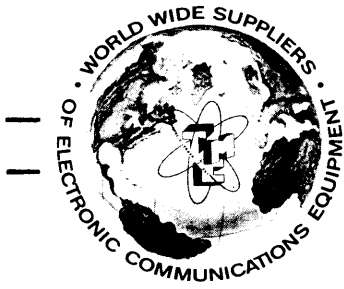


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THE TECHNICAL MATERIEL CORPORATION

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

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MAMARONECK, N. Y.

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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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*Electron tubes also include semi-conductor devices.

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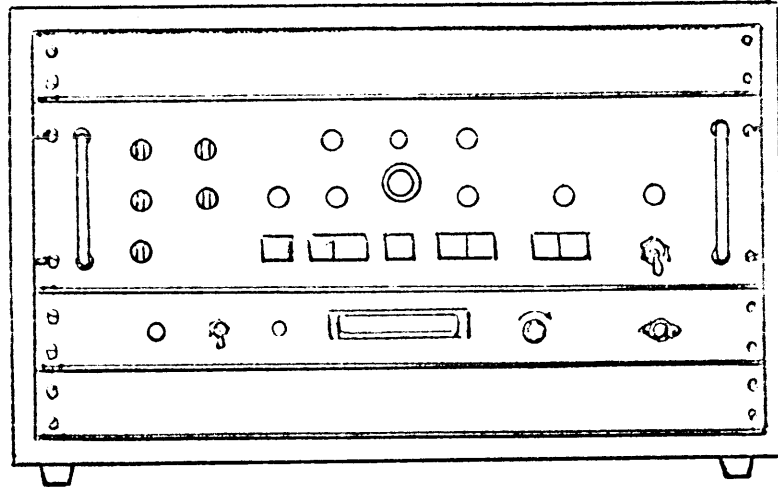
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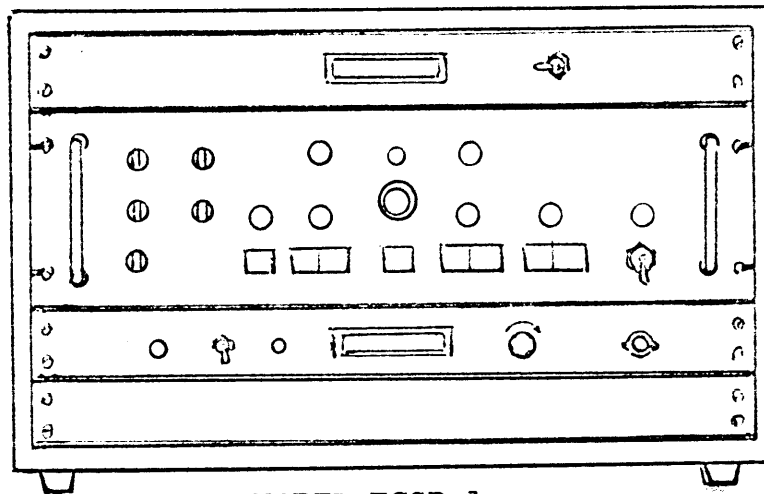
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MODEL TCGA-1



MODEL TCGB-1

Figure 1-1. Transmitter Control Group, Model TCG()-1

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION

Transmitter Control Group, Model TCG ()-1 (figure 1-1) is a remote control and monitor group, used to control and monitor a TMC *TechniMatiC transmitter system remotely.

The TCG equipment group comprises modular units mounted in a shelf-size equipment cabinet. The use of modular units, each operating independently of one another, enables system interchangeability as per customer requirements.

The TCGA-1 comprises a Remote Control Unit, Model LSCA-1 and a Microphone Preamplifier, Model MPA-1. These two units, mounted in an equipment cabinet CAB-3A, provide remote control and monitoring of various remote transmitter functions, via the LSCA, and microphone preamplification and output level monitoring via the MPA.

The TCGB-1 comprises the same units as in the TCGA-1, with the addition of a Remote RF Power Indicator, AX628. This unit enables remote transmitter output power monitoring, either forward or reflected.

1-2. PHYSICAL DESCRIPTION

The TCG consists of a single shelf-size equipment cabinet, housing all the necessary units for controlling and monitoring an automated remote transmitter system. All modular units are functionally designed and mounted to permit fingertip operation and ease of observation. The equipment cabinet measures 20-1/4-inches wide, 11-3/4-inches high and 17-inches deep. Four 1-inch high legs, (increasing the overall cabinet height one-inch), provide cabinet isolation

*Trademark applied for

when mounted or placed on a heat-producing equipment cabinet. All interconnections, output connections and power connections are made at the rear cabinet mounted connection box., AX658.

1-3. TECHNICAL SPECIFICATIONS

REMOTE CONTROL FUNCTIONS:

- LSCA-1: 1. Transmitter CHANNEL selection.
2. Overload RESET
3. MAIN POWER ON/OFF
4. HIGH VOLTAGE ON/OFF

REMOTE READBACK INDICATIONS:

- LSCA-1: 1. ON AIR
2. OVLD (overload)
3. MAIN POWER ON/OFF
4. HIGH VOLTAGE ON/OFF
5. READY
6. FAULT

MPA -1: 1. Microphone output level.

AX628: 1. Transmitter forward and reflected power output.

INPUT POWER REQUIREMENTS:

Modular units factory wired to receive an input of 115 volts a-c, 50/60 cps, single phase power.

Minor wiring changes may be made for 230 volts a-c operation. Refer to the modular unit instruction manuals for details.

DIMENSIONS:

20-3/8-inches wide x 11-27/32 inches high x 17-inches deep. See figure 2-1.

SECTION 2 INSTALLATION

2-1. INITIAL INSPECTION

Each unit comprising the TCG has been thoroughly checked and tested at the factory before shipment. Upon arrival of the equipment, 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 Materiel Corporation will assist in describing methods of repair and the furnishing of replacement parts.

2-2. MECHANICAL INSTALLATION

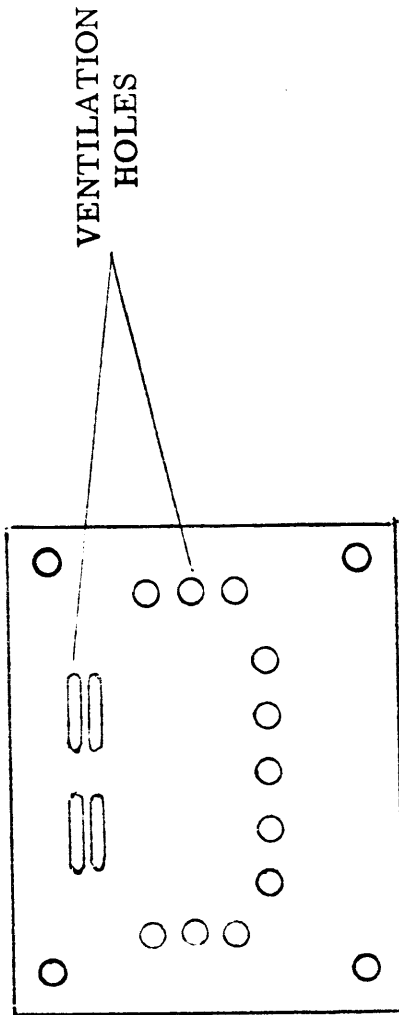
All of the modular units used in the TCG are equipped with standard width 19-inch front panels. They are to be mounted into the equipment cabinet as shown in figure 1-1. See figure 2-1 for equipment cabinet dimensions.

2-3. ELECTRICAL INSTALLATION

Electrical installation of the TCG is as shown in figure 2-2. All interconnecting modular unit cables are to be connected as shown in figure 2-3. System interface wiring is as shown in figure 2-4.

The TCG is factory wired to operate from a line voltage source of 115 volts a-c, 50/60 cps, single phase power. Operation from a 230 volts a-c source is possible by simple wiring changes shown in the modular unit instruction manuals.

CAB-3A



BOTTOM REAR VIEW

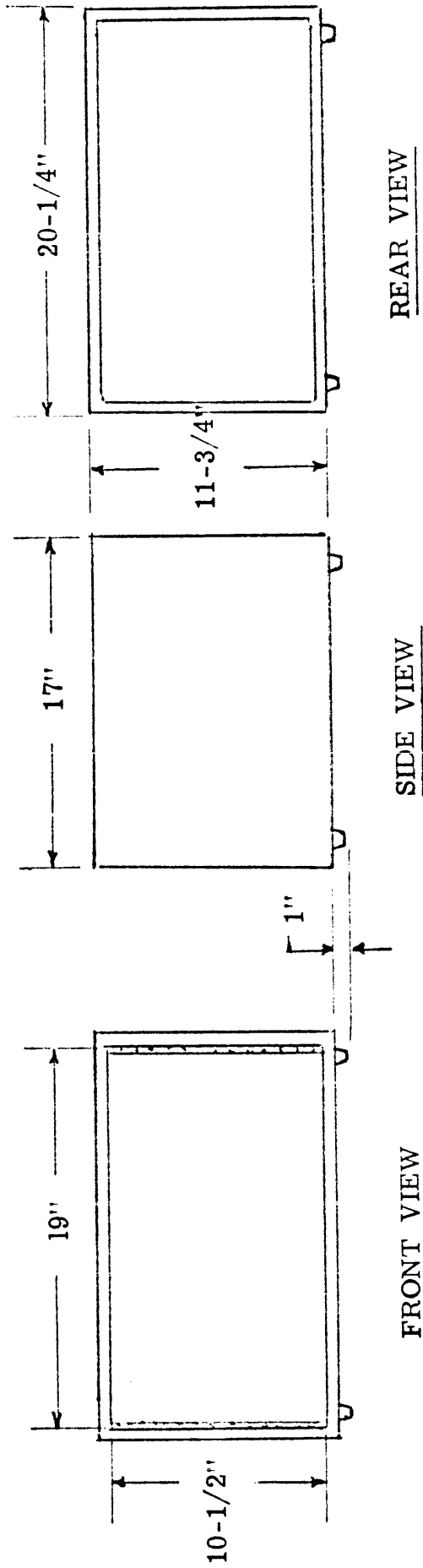


Figure 2-1. Outline Dimensional Drawing

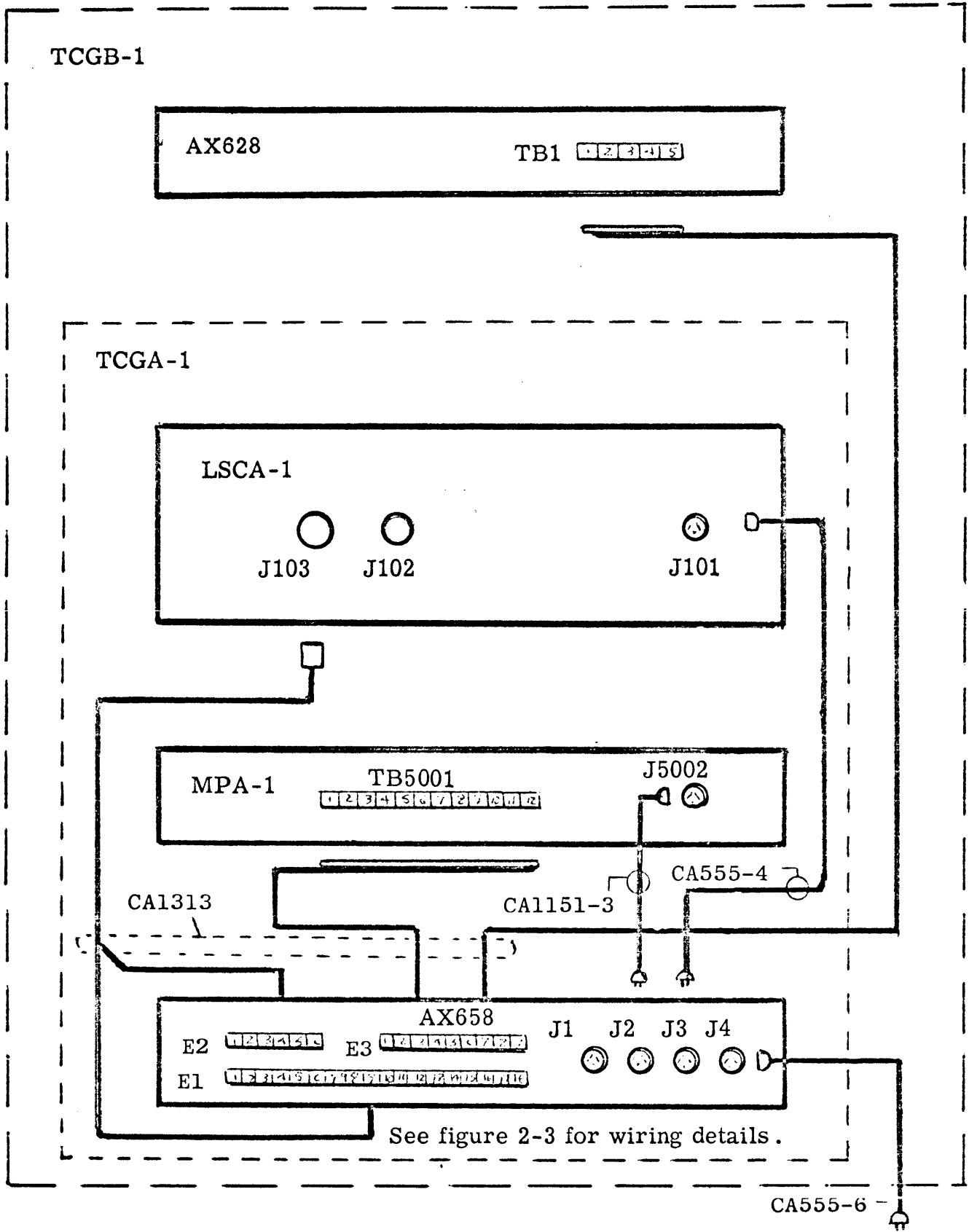


Figure 2-2. Interconnection Diagram

AC INPUT

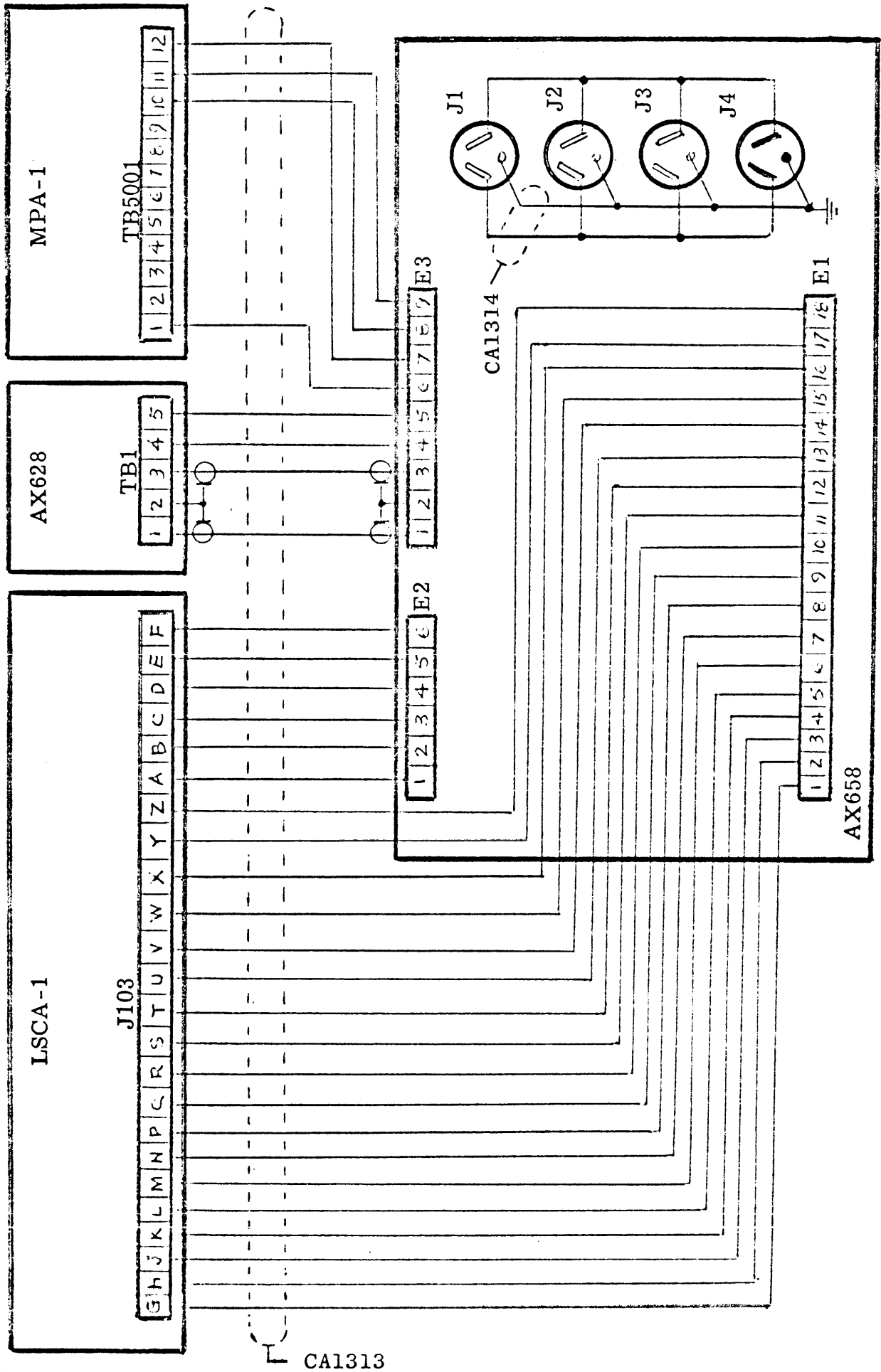


Figure 2-3. System Wiring Diagram

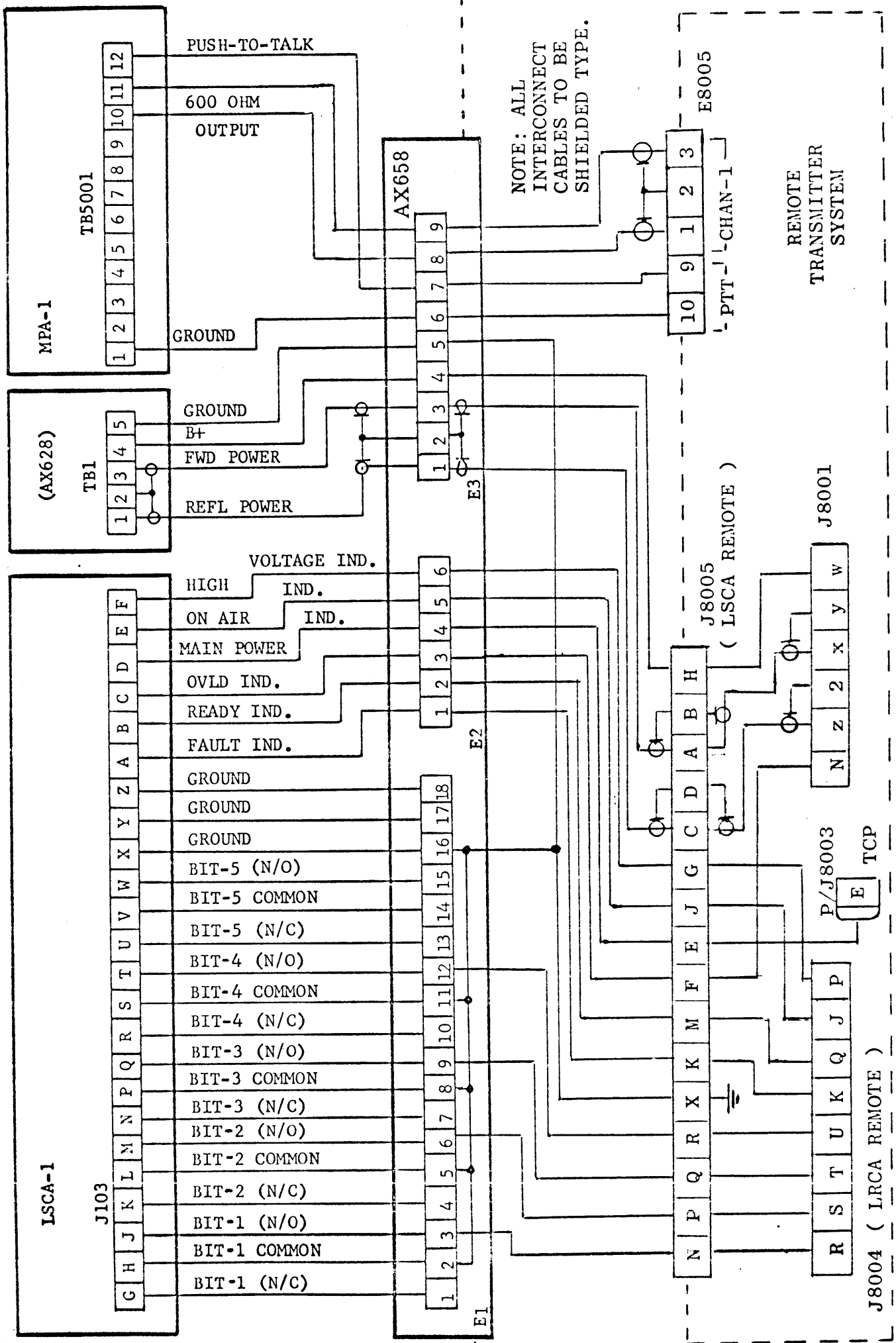


Figure 2-4. Typical System Interface Cabling

SECTION 3

OPERATOR'S SECTION

3-1. GENERAL

The TCG enables an operator to control and monitor an associated remote automated transmitter. By use of the various controls and indicators on the TCG, an operator may remotely activate, channel select, monitor, audio key and deactivate the associated transmitter. Refer to table 3-1, used in conjunction with figure 3-1, for control and indicator locations and functions.

3-2. OPERATOR'S INSTRUCTIONS

a. Remote Control Unit, LSCA-1 - 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.

b. Microphone Preamplifier, MPA-1 - To activate the MPA, the operator must set the power ON/OFF toggle switch at ON; the POWER indicator lamp should light. Ensuring that the rear panel terminal board jumper wires are wired for the correct microphone input, plug microphone into the front panel MICROPHONE connector; OUTPUT LEVEL meter reading should be set for an indication of 0 VU, adjusted by the front panel GAIN potentiometer control.

Refer to table 3-1, used in conjunction with figure 3-1, for control and indicator locations and functions.

c. Remote RF Power Indicator, AX628 - The AX628 contains one operating control: a METER toggle switch. Setting the METER toggle switch to either the FORWARD or REFLECTED position will enable the front panel POWER OUTPUT meter to indicate the selected power output reading.

The POWER OUTPUT meter is calibrated in kilowatts (0 to 5.0).
 The associated METER switch is a momentary contact, DPDT, center-off toggle switch.

Table 3-1. Controls and Indicators

SYMBOL DESIG. No. (Fig. 3-1)	PANEL DESIGNATION	FUNCTION
①	POWER OUTPUT, Horizontal scale meter.	Indicates forward or reflected output power level.
②	METER, FORWARD/REFLECTED momentary contact, center-off toggle switch	Used to select either forward or reflected output power monitoring on associated POWER OUTPUT meter.
③④	AC LINE, fuses; indicator type, 1.0A	Input a-c line voltage protective fuses.
⑤	24VAC, fuse; indicator type, 0.50A	Protective fuse for 24 volts a-c circuit.
⑥	+25V, fuse; indicator type, 1.0A	Protective fuse for +25 volts d-c circuit.
⑦	+60V, fuse; indicator type, 0.25A	Protective fuse for +60 volts d-c circuit.
⑧	READY, indicator lamp; Green.	When lit, indicates remote transmitter is ready for tuning.
⑨	Channel selector knob, 8-position	Used to select operation of any one of eight channels.
⑩	Channel selector window, illuminated.	Displays channel number selected by channel selector knob.
⑪	FAULT, indicator lamp; Red.	When lit, indicates a fault in the remote transmitter.
⑫	ON/OFF, power toggle switch.	When set at ON, applies operating voltage to unit.
⑬	POWER, indicator lamp; White.	When lit, indicates operating voltage is applied to unit, when power toggle switch is set at ON.
⑭	OVLD, indicator lamp. Red.	When lit, indicates an overload condition at the remote transmitter.

Table 3-1. Controls and Indicators (Cont)

SYMBOL DESIG. No. (fig. 3-1)	PANEL DESIGNATION	FUNCTION
15	RESET, pushbutton switch	When pressed, routes a reset signal to the remote transmitter; used to clear the overload condition.
16	ON AIR, indicator lamp. Red.	When lit, indicates remote transmitter is operational or "on the air".
17		NOT USED
18	TUNE, pushbutton switch	When pressed, routes a tune signal to the remote transmitter; used to initiate the tune cycle.
19	MAIN POWER OFF/ON, pushbutton switches.	Remote transmitter Main Power control switches.
20	MAIN POWER, indicator lamp. Amber.	When lit, indicates remote transmitter Main Power is applied.
21	HIGH VOLTAGE OFF/ON, pushbutton	Remote transmitter High Voltage control switches.
22	HIGH VOLTAGE, indicator lamp. Red.	When lit, indicates remote transmitter High Voltage is applied.
23	AC LINE, fuse .25 amp	Input line voltage protective fuse.
24	ON/OFF, toggle switch	Input line voltage on/off switch. When set at ON, applies line voltage to MPA power supply.
25	POWER, indicator lamp, red.	Lights when power on/off switch is set at ON, indicating activation of MPA.
26	OUTPUT LEVEL, horizontal scale VU meter.	Meter calibrated in db, used for monitoring MPA output level.
27	GAIN, potentiometer	Used to adjust output gain of MPA, monitored on OUTPUT LEVEL meter. Gain (output level) to be adjusted for OVU (.7v) on meter.
28	MICROPHONE, 6-pin receptacle.	Used to accept microphone input.

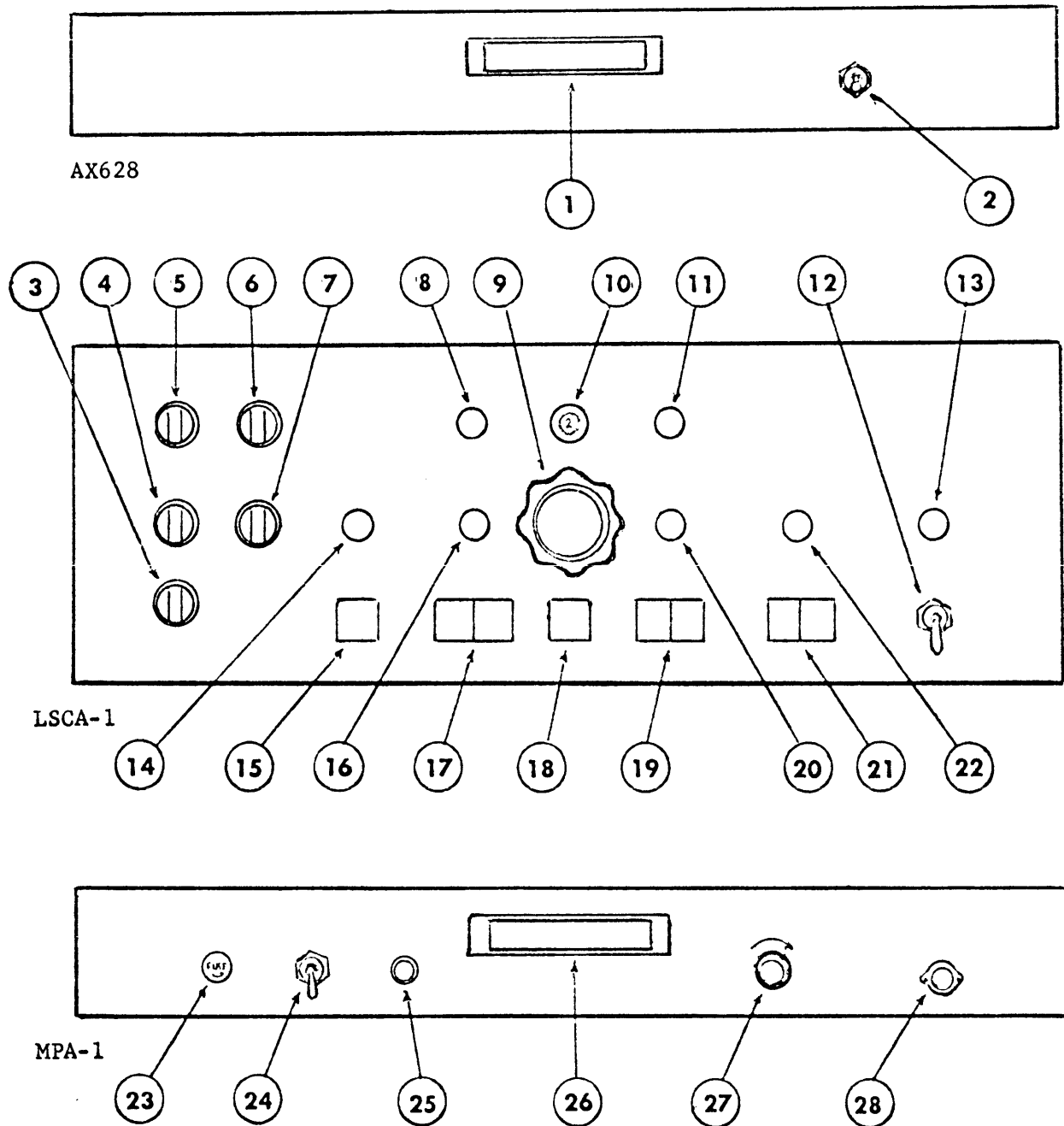


Figure 3-1. Controls and Indicators

SECTION 4

PRINCIPLES OF OPERATION

4-1. INTRODUCTION

The TCG is designed to function as a remote control system, permitting an operator to control and monitor a remote automated transmitter.

Transmitter control, from the LSCA, is accomplished by a front panel mounted CHANNEL selector switch and various function pushbutton switches. Activating any of these switches will initiate a particular functional bit-code signal to the associated remote transmitter. These bit-code signals, in a pre-set sequential order, are applied to a control terminator unit in the associated remote transmitter, where they are then decoded to initiate the particular remote selected function.

Transmitter monitoring, at the LSCA, is accomplished by read-back signals from the remote transmitter. These read-back signals light the various indicator lamps on the LSCA front panel.

Microphone and push-to-talk control, from the MPA, are straight-wire connected to the remote transmitter; the microphone input being preamplified at the MPA.

The monitored transmitter output power, at the AX628, is also straight wire connected. Forward and reflected power output monitoring is accomplished by a panel mounted toggle selector switch, controlling the panel OUTPUT LEVEL meter input.

See figure 4-1 for a simplified system block diagram.

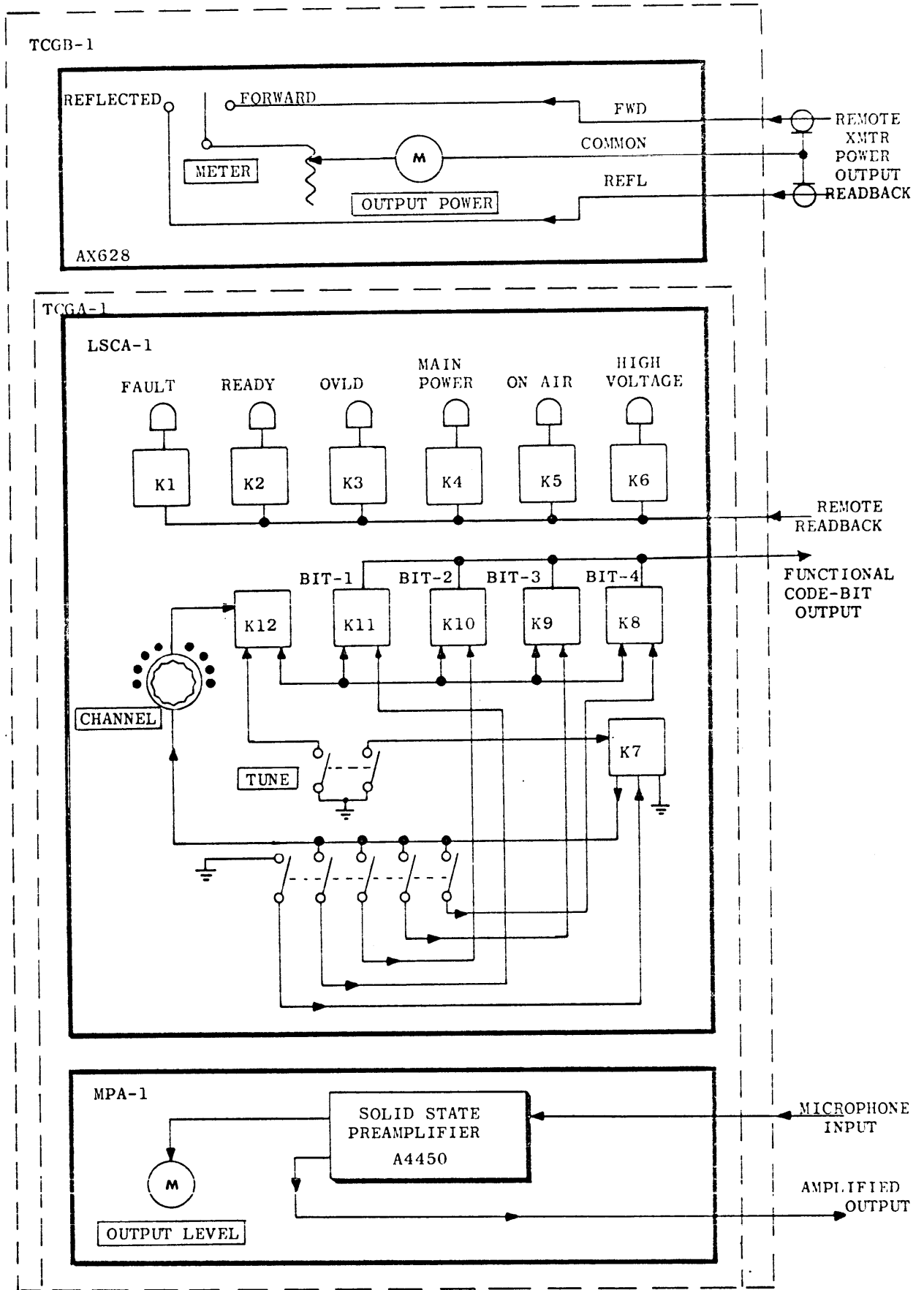


Figure 4-1. System Block Diagram

04670389

4-2. CIRCUIT DESCRIPTION

a. Remote Control Unit, LSCA-1 - 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. Refer to the LSCA-1 technical manual for further detailed circuit analysis.

b. Microphone Preamplifier, MPA-1 - The MPA is a solid state preamplifier unit with impedance matching input circuits to accept carbon, low impedance or high impedance microphone inputs. A variable gain control provides for manual adjustment of the MPA output level, monitored on a horizontal-scale VU meter. The microphone input is via the front-panel connector, impedance matched via rear-panel terminal board jumper wires. Refer to the MPA-1 technical manual for further detailed circuit analysis.

c. Remote RF Power Indicator, AX628 - The main function of the AX628 circuitry is to apply either the forward power output or the reflected power output of an associated receiver, to the unit

kilowatt calibrated meter. This is accomplished by use of a momentary-contact, center-off DPDT toggle switch S1. Setting the toggle switch to either position, FORWARD or REFLECTED, applied that selected input through a factory-adjusted potentiometer R1 to the panel meter M1. Meter M1 will indicate the kilowatt level of the applied voltage; the meter factory calibrated by adjustment of R1.

The associated transmitter's forward and reflected power outputs are applied to the AX628 via terminal board TB1, terminals 3 and 1 respectively, with terminal 2 as common. Refer to the AX628 technical manual for further detailed circuit analysis.

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.

Table 5-1. Fuse Functions

ITEM No. (fig 5-1)	REF. SYMBOL NO.	UNIT	FUSE RATING	FUNCTION
①	F104	LSCA	1.0A	Protective fuse for +25 volts d-c circuit.
②	F101	LSCA	0.5A	Protective fuse for 24 volts a-c circuit.
③	F105	LSCA	0.25A	Protective fuse for +60 volts d-c circuit.
④	F102 F103	LSCA	1.0A slo-blo	Protective fuses for a-c input line voltage.
⑤	F5001	MPA	0.25A	Protective fuse for a-c input line voltage.

CAUTION

Never replace a fuse with one of a higher rating unless brief continued 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 has been located and corrected.

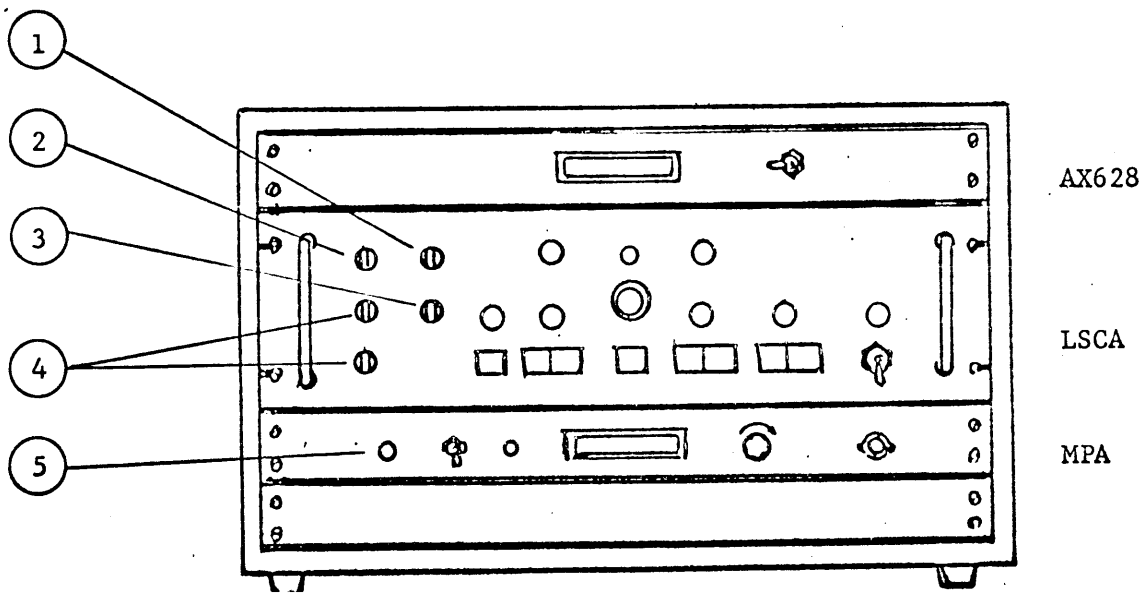


Figure 5-1. Fuse Locations.

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 operating voltages are present, interconnecting cables are secure, and that all fuses are in functional condition. Refer to table 5-1, used in conjunction with figure 5-1, for system fuse locations and functions.

If the above mentioned checks fail to locate the fault, the units should be removed from the cabinet and visually checked for signs of corrosion, dirt, dust, arcing, discoloration or any other harmful conditions.

The functions listed in table 3-1 provide normal indications of all the system control and indicator functions. If a normal indication is not observed, perform the procedures listed in the appropriate modular unit technical manual.

5-3. REPAIR AND REPLACEMENT

Maintenance of the TCG will consist mainly of component replacement. It should be noted that when replacing components having many wires, the wires should be tagged and marked for accurate identification when replacing. When replacing components, observe for proper component positioning and polarity to ensure proper operation. Refer to the parts list of the appropriate technical manual for exact or equivalent replacements.

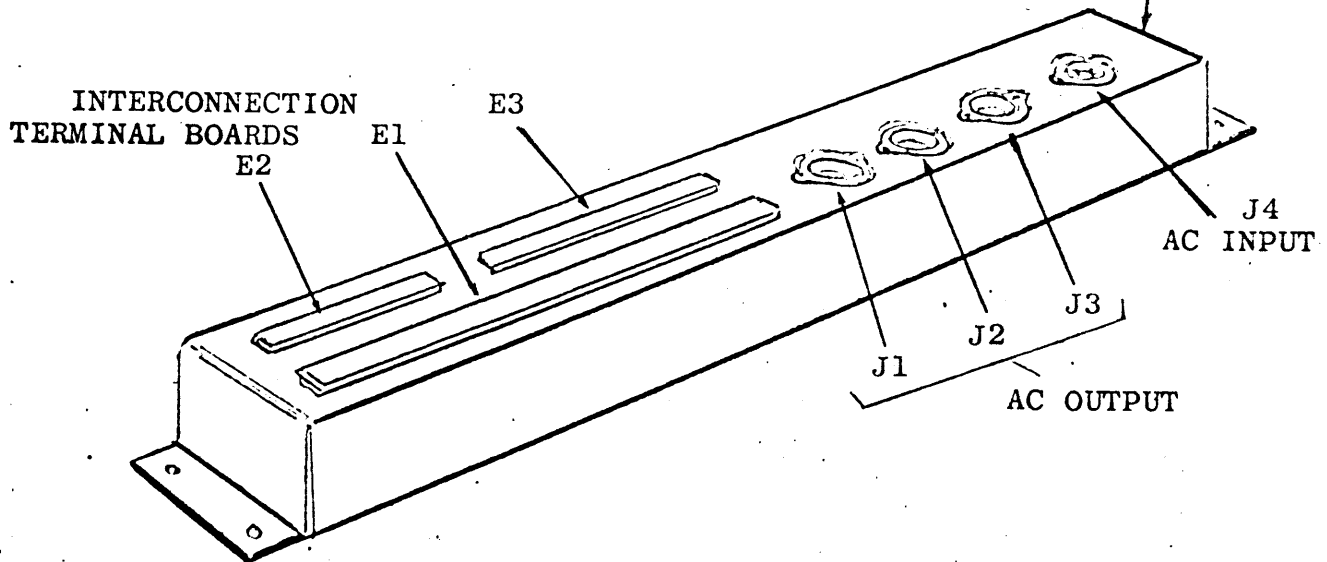
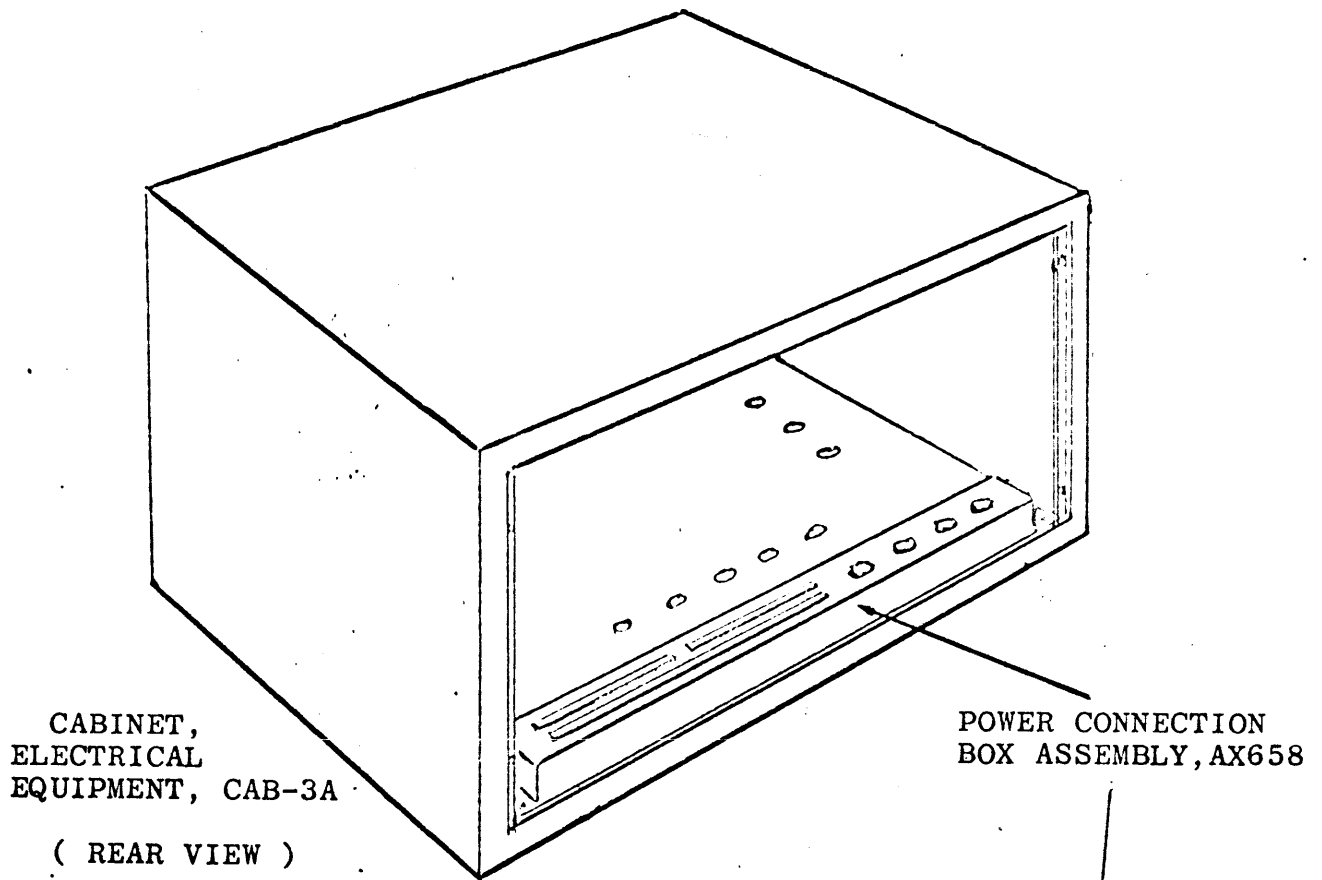


Figure 5-2. Cabinet Components

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

PARTS LIST
for
POWER CONNECTION BOX ASSY., AX658

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
E1	TERMINAL BOARD, BARRIER: eighteen 6-32 thd. x 1/4" binding head machine screws; black phenolic body.	TM100-18
E2	TERMINAL BOARD, BARRIER: six 6-32 thd. x 1/4" long binding head machine screws; black phenolic body.	TM100-6
E3	TERMINAL BOARD, BARRIER: nine 6-32 thd. x 1/4" long binding head machine screws; black phenolic body.	TM100-9
J1	CONNECTOR, RECEPTACLE, ELECTRICAL: female; 10 amps at 250 V or 15 amps at 125 V; twist lock type.	JJ235
J2	Same as J1.	
J3	Same as J1.	
J4	CONNECTOR, RECEPTACLE, ELECTRICAL: AC power; 2 male contacts rated for 10 amps at 250 V or 15 amps at 125 V; polarized; twist lock type.	JJ175