TECHNICAL MANUAL

FOR

ONE KILOWATT LINEAR POWER AMPLIFIER

MODEL LPA-1KC

8161

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, CANADA

TECHNICAL MANUAL
FOR
ONE KILOWATT LINEAR POWER AMPLIFIER
MODEL LPA-1K

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

IN2049 December 15, 1969.

TMC (Canada) LIMITED

TELECOMMUNICATIONS ENGINEERS

MAILING ADDRESS: R.R. No. 5, Ottawa, Ontario

A Subsidiary of The Technical Materiel Corporation, 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:

TMC (*Canada*) LIMITED
Engineering Services Department
R.R. No.5, Ottawa, Ontario
Telegraphic Address: TEPEI, Ottawa.

PRINTED IN CANADA

TECHNICAL MANUAL CHANGE NOTICE

DATE: Feb. 11th, 1971

MODEL AFFECTED: Linear Power Amplifier LPA-1KC

MANUAL NO. IN 2049

SECTION 1, GENERAL DESCRIPTION

Page 1-3 Table 1-1

ADD: CR 205, IN 2984B, 20V Zener Stabilizer

SECTION 3, OPERATOR'S SECTION

Page 3-2 Table 3-2

Function of Fuse F 201 is "Cuts off primary ac input to low voltage transformer, blower motors and servo boards". Fuse F 203 is changed from 2 amp quick-acting to 5 amp quick-acting.

SECTION 4, PRINCIPLES OF OPERATION

Page 4-2 Para. 4-4, ALDC and Meter Section

In second para. +28 volts should read +20 volts.

Page 4-3 Sub-para. (2) Low Voltage Section

DELETE: Last 12 lines

ADD: +28 volts dc output designated "V". "V" is connected to the wiper of wafer B of CHANNEL switch S 206 and servo board A 202 pin 10. The +28 volts at "V" is also fed via R 206 and pin J of J 203 to a remote unit for channel selection. The +28 volts is also connected through R 207 to zener stabilizer CR 205 which gives +20 volts at "Y".

SECTION 4, PRINCIPLES OF OPERATION (Cont'd)

"Y" is connected to the control potentiometers on A 10808-6 and A 10808-5, the feedback potentiometers R 301 and R 401, and via S205, in the TUNE and AUTO position, to the two servo boards (A 201 & A 202) pin 13.

Page 4-5 Figure 4-1 Sheet 1

Change F 203 from 2 AMP to 5 AMP.

At point E: Change +28 VDC "Y" to +20 VDC "Y"

Page 4-7 Figure 4-1 Sheet 2

At point E: Change +28 VDC "Y" to +20 VDC "Y"

Delete reference "V" from junction of A 10808-6 and A 10808-5 and from R 401. Both points should be connected to +20 VDC "Y" instead of "DC SUPPLY F".

SECTION 5, MAINTENANCE

Page 5-2, Para. 5-3 Trouble Shooting

Sub-Para. (3) (a) Delete after first sentence leaving only "Check that the HV ON lamp lights".

Page 5-3 Para. 5-5 Tuning Procedure.....

Sub-Para. (1) ADD: Turn the AL DC potentiometer fully counter-clockwise (Minimum of 10 times)

Sub-Para. (5) DELETE: .... 350 ma plate current.
ADD: .... 250 ma plate current.

Sub-Para. (8) Add to end: "Turn the HV switch OFF".

Table 5-3 Meter Readings.....

Two-tone plate current should read "390-475 ma".

Page 5-4 Para. 5-5 Tuning Procedure

ADD following sub-paras. after (12)

(13) Following alignment of all channels, select the channel which sets the LOAD control to its maximum clockwise position (minimum capacitance).

(14) Set HV switch ON.

(15) Offset the LOAD control manually clockwise and counter-clockwise in turn and note that the output voltage does not vary by more than 2 volts as the LOAD control re-sets from either direction.

(16) If the variation in output is greater than 2 volts set the multiturn potentiometer on A 202, counter-clockwise until the conditions of (15) are met.

(17) Reset the ALDC potentiometer as described in 5-6 (2).

SECTION 6, PARTS LIST

Page 6-2 ALDC and Program Board

DELETE: C 135, CAPACITOR, fixed, mica, 150 pf ±5% 500 WVDC
CM 15 F 151 J03

ADD: C 135, CAPACITOR, fixed, mica, 240 pf ±5% 500 WVDC
CM 15 F 241 J03

Page 6-3, Main Chassis

DELETE: A 201, SERVO BOARD, AZ 114
ADD: A 201, SERVO BOARD, A10957-5

DELETE: A 202, SERVO BOARD, AZ 114
ADD: A 202, SERVO BOARD, A10857

Page 6-4 Main Chassis

DELETE: Value of C 228 through C 230 (100 uf)
ADD: Value of C 228 through C 230 (100 pf)

Page 6-4 Main Chassis (Cont'd)

DELETE: F202, FUSE, slow-blowing, 1 amp, FU102-1
ADD: F202, FUSE, slow-blowing, 1/4 amp, FU102-.250

DELETE: F203, FUSE, quick-acting, 2 amp, FU100-2
ADD: F203, FUSE, quick-acting, 5 amp, FU100-5

ADD: CR205, DIODE, Zener, 20V, In2984B

Page 6-5 Main Chassis

DELETE: R206, RESISTOR, fixed, composition, 3.3 ohms ±5% 1W
RC32GF3R3J
ADD: R206, RESISTOR, fixed, wirewound, 3 ohms ±5% 5W
RW107-4
DELETE: R207, RESISTOR, fixed, composition, 18 ohms ±5% 2W
RC42GF180J
ADD: R207, RESISTOR, fixed, wirewound, 15 ohms ±5% 5W
RW107-10

Page 6-7 Tuning Motor Assembly A10782-1

DELETE: B301, MOTOR, ac, reversible, synchronous, 10 rpm, MO136
ADD: B301, MOTOR, ac, reversible, synchronous, 5 rpm, MO10001

Page 6-7 Bandswitch Assembly A10788

ADD: C244 CAPACITOR, fixed ceramic 100 pF ±10%, 5000 WVDC
CC109-28

C245 Same as C244

C246 Same as C244

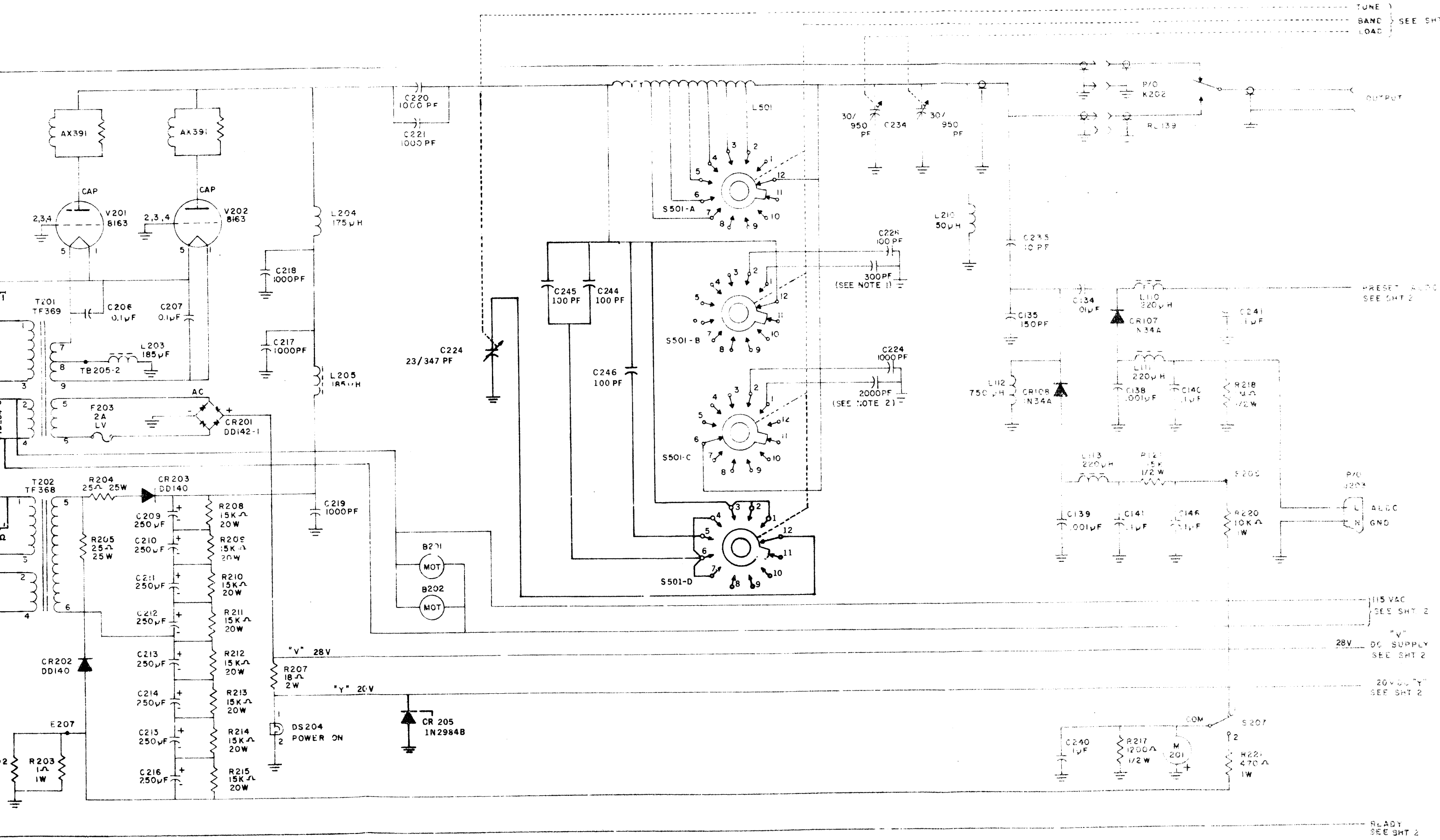
SECTION 6, GENERAL

ADD: Parts List A10857-5 (Servo Control Board)
ADD: Parts List A10957-5 (" " ")

SECTION 7

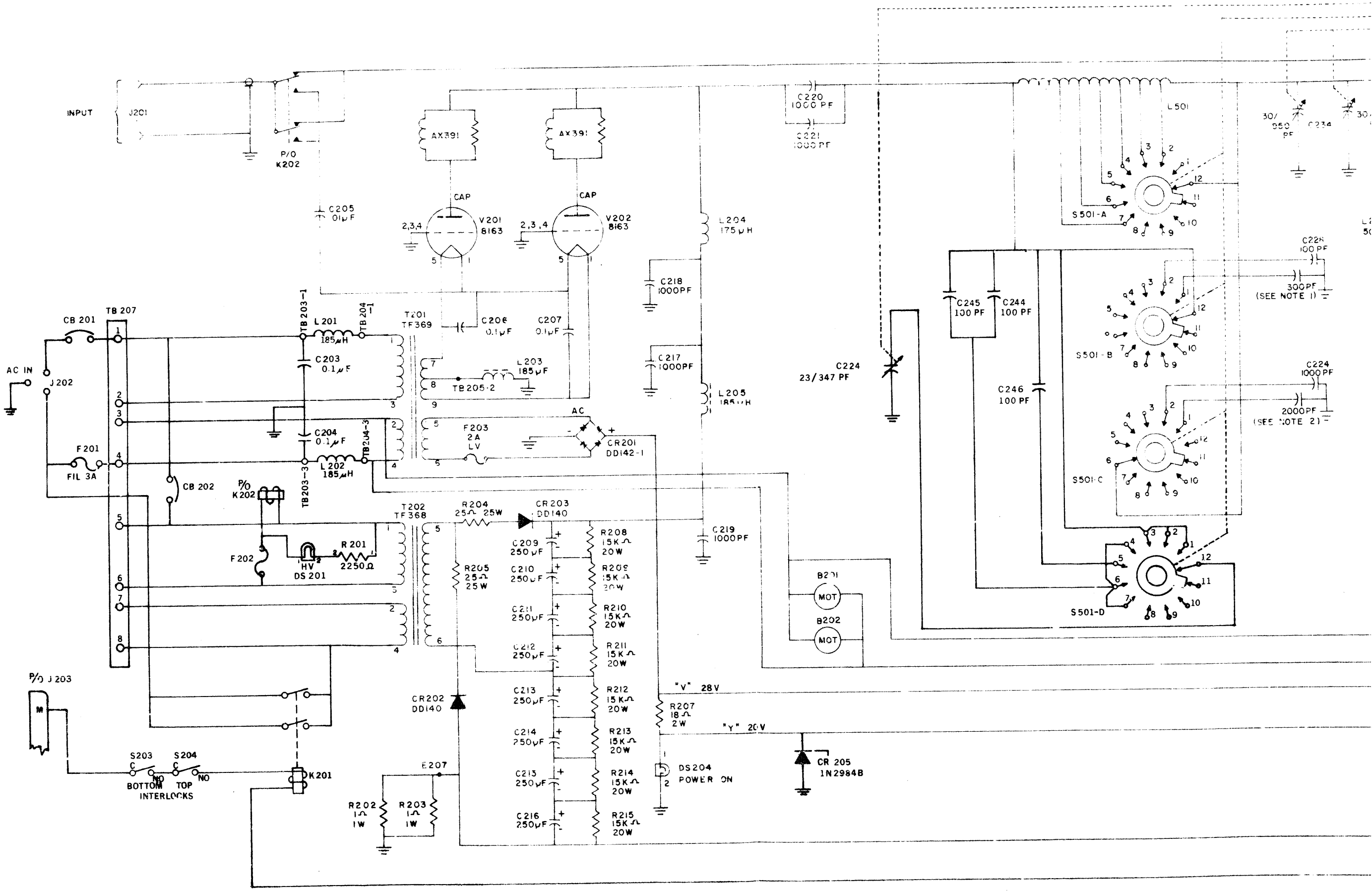
ADD: Schematic Diagram CK10753, Servo Control Board

ADD: Schematic Diagram CK10806, Servo Control Board



NOTES

1. THIS CAPACITOR (300 PF) IS MADE UP OF THREE PARALLEL 100 PF CAPACITORS, C229, C230, C243
2. THIS CAPACITOR (2000 PF) IS MADE UP OF TWO PARALLEL 1000 PF CAPACITORS, C232, C233



NOTES

1. THIS CAPACITOR (300 PF) IS MADE UP OF THREE PARALLEL 100 PF
2. THIS CAPACITOR (2000 PF) IS MADE UP OF TWO PARALLEL 1000 P

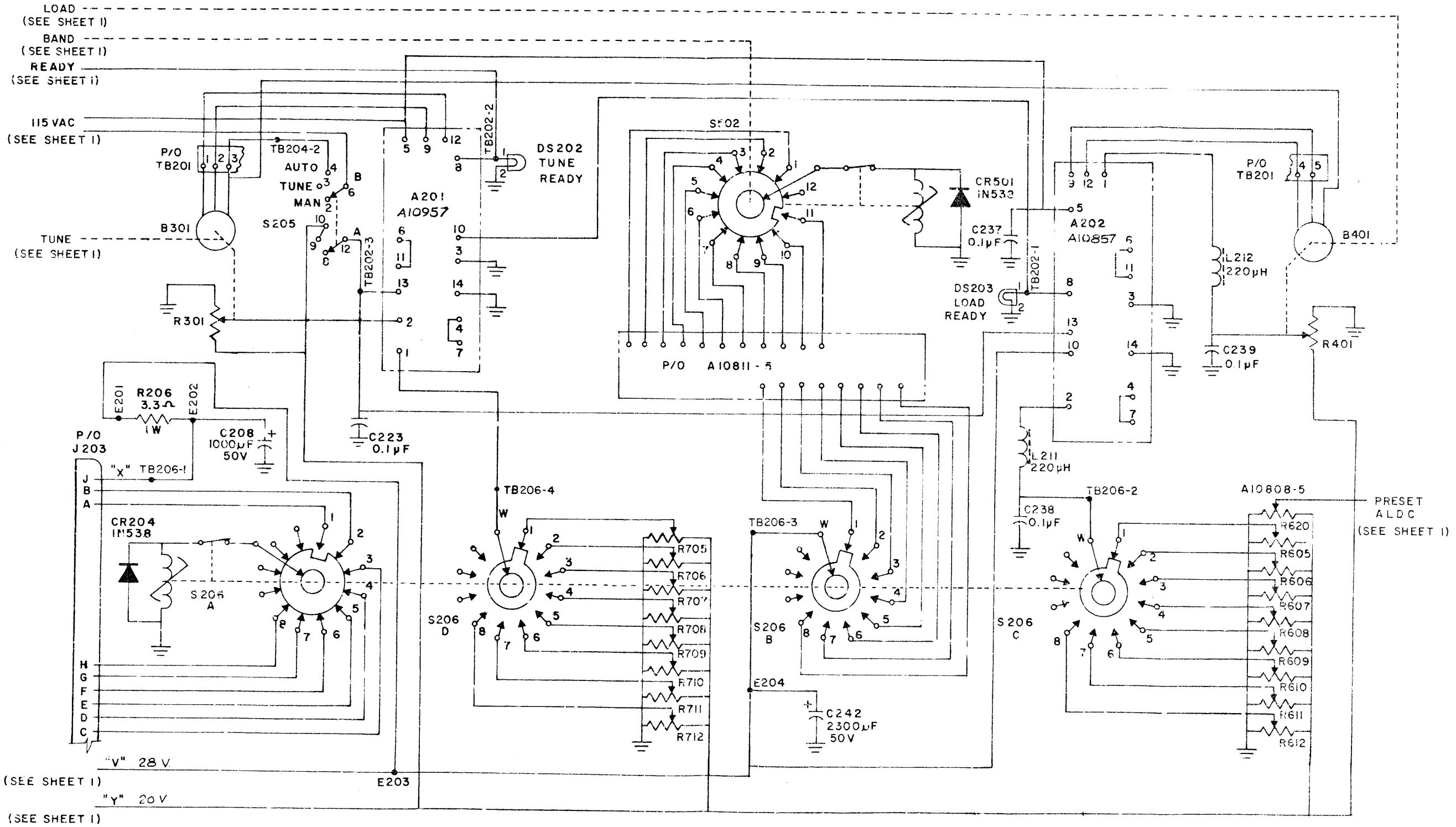


FIGURE 7-1. SCHEMATIC DIAGRAM.

IF IT IS FOUND DESIRABLE TO CHANGE ANY TOLERANCE OR OTHER DETAIL SPECIFIED ON THIS DRAWING NOTIFY THE PURCHASER PROMPTLY

MAXIMUM ALLOWABLE TOLERANCES HAVE BEEN DETERMINED AND DEVIATIONS WILL BE CAUSE FOR REJECTION. REMOVE ALL BURRS AND SHARP EDGES

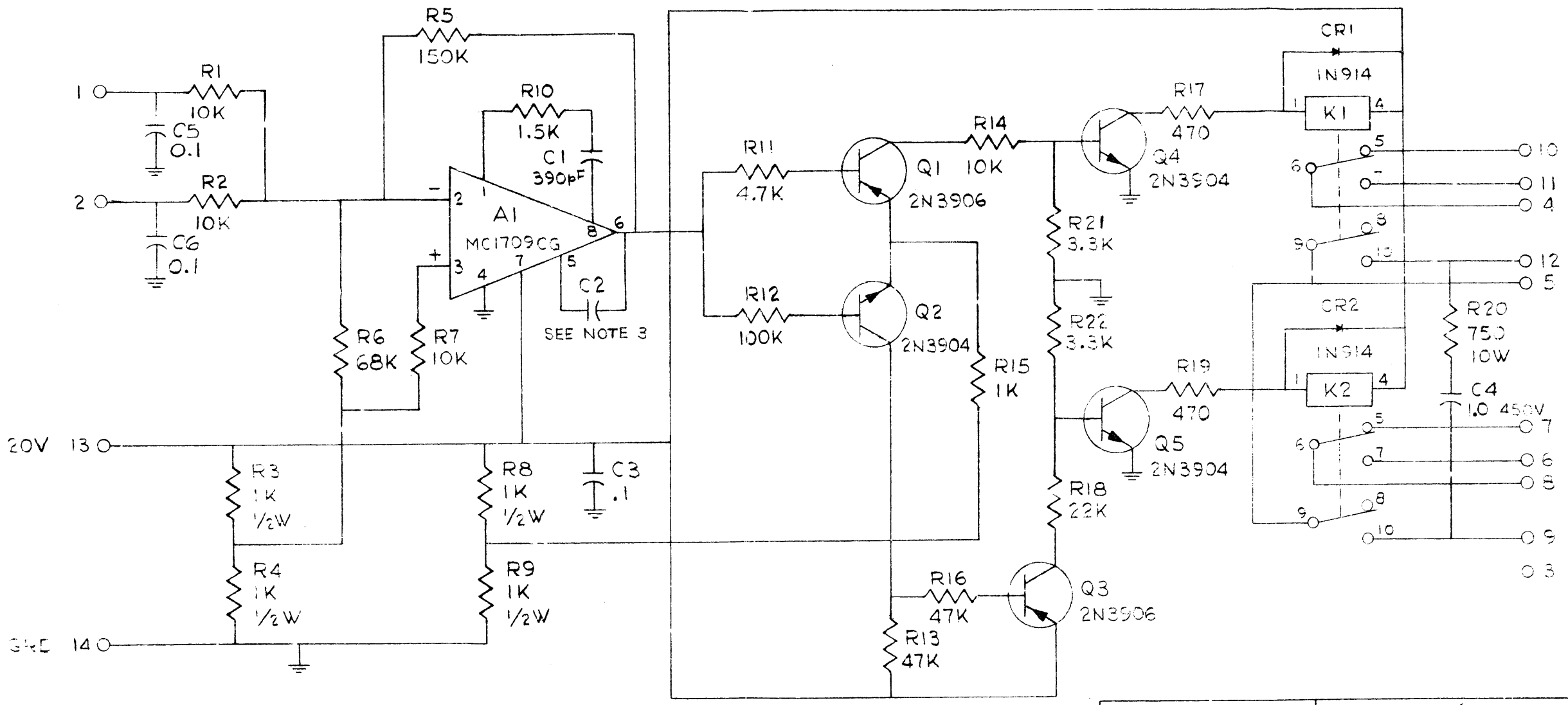
DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

ISSUE	ITEM	CHANGED FROM	DATE	CN NO	DRAFTS	CHECKER	ENG. APP
Ø		PROD RELEASE	12 FEB 71		NAT		

Ø

CK10806

REQ	ITEM	PART NO	DESCRIPTION	SYMBOL



NOTES:

UNLESS OTHERWISE STATED.

1- RESISTANCE IN OHMS.

2- CAPACITANCE IN MICROFARADS.

3- SELECT ON TEST. VALUE CAN BE 0pF, 5pF, 10pF OR 22pF

TOLERANCES UNLESS OTHERWISE SPECIFIED			SCALE
ALL OTHERS	DEC DIM ±	.X = .05 .XX = .01 .XXX = .005	DRILL, PUNCH, COMMERCIAL STOCK SIZES AND MANUFACTURERS TOLERANCES ARE NOT INCLUDED.
	FRAC DIM ± 1/64		
	ANGULAR DIM ± 0°30'		

MODEL	PROJECT NO	ASS'Y NO	DATE
LPA-1KC	088/70	A10957-5	17 DEC 70

USED ON

STOCK SIZE

MATERIAL | WEIGHT PER PC

TYPE & TEMPER

HEAT TREAT SPEC

FINISH & SPEC NO

TMC (Canada) LIMITED
OTTAWA ONTARIO

SCHEMATIC

SERVO CONTROL BOARD

DRAWN	ELEC DES APP	MECH DES APP
M. Degenais		

CHECKED | FINAL APPROVAL

CK10806 Ø

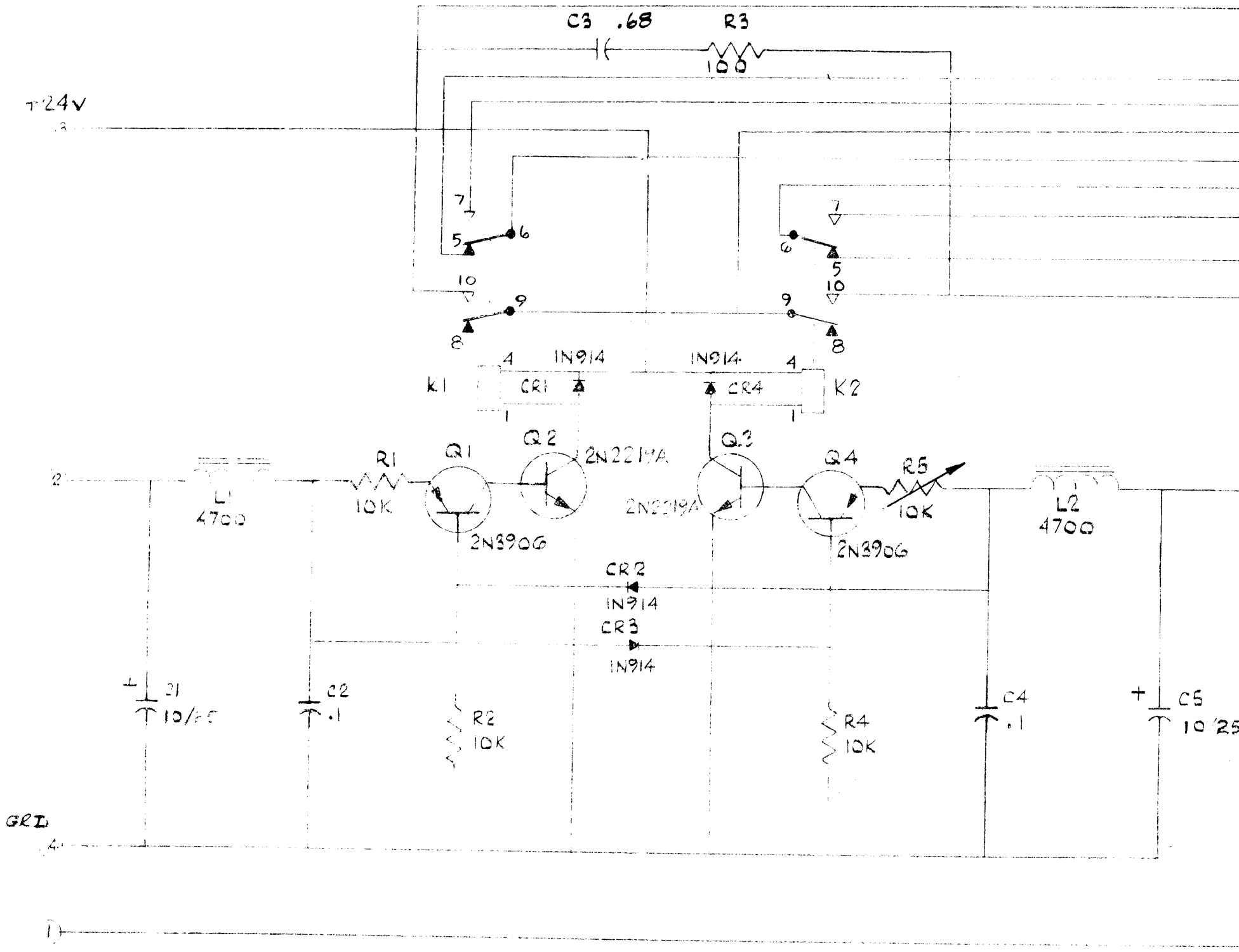
FORM 128

IF IT IS FOUND DESIRABLE TO CHANGE ANY TOLERANCE OR OTHER DETAIL SPECIFIED ON THIS DRAWING NOTIFY THE PURCHASER PROMPTLY.

UNLESS OTHERWISE ALLOWABLE TOLERANCES HAVE BEEN DETERMINED AND DEVIATIONS WILL BE CAUSE FOR REJECTION. REMOVE ALL BURRS AND SHARP EDGES.

DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

LTR	ITEM	CHANGED FROM	DATE	CN. NO.	DRAFTS	CHECKER	ENG. APP.
Ø		REL. TO PROD	31 DEC 69		AF		
A		REVISE TO CEMN	MAY 24/70	749	MP		
B		REVISED PER CEMN	15 FEB 71	911	MAT		

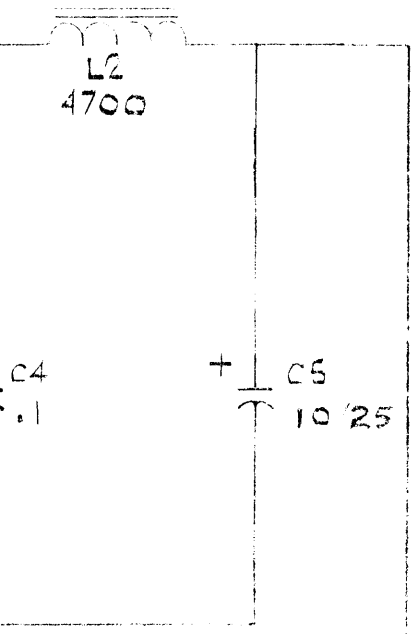


TOLERANCES			SCALE: NONE
ALL OTHERS	DEC. DIM. ±	.X= .05	DRILL, PUNCH, COMMERCIAL STOCK SIZES AND MANUFACTURERS TOLERANCES ARE NOT INCLUDED.
	FRAC. DIM. ± 1/64	.XX=. 1	
	ANGULAR DIM. ± 0° 30'	.XXX=.005	

	101 / 70
MODEL	PROJECT NO.

FORM — 129

REQ	ITEM	PART NO.	DESCRIPTION	SYMBOL
	12			
	10			
	11			
	5			
	4			
	2			
	6			
	7			
	9			



UNLESS OTHERWISE STATED -
RESISTANCE IN OHMS 1/2 WATT
CAPACITANCE IN µF
INDUCTANCE IN µH

	101 / 70	A1085T - 5	18 Nov 69
MODEL	PROJECT NO.	ASS'Y. NO.	DATE

USED ON

STOCK SIZE	TMC (Canada) LIMITED OTTAWA ONTARIO	
MATERIAL / WEIGHT PER PC.	SCHEMATIC DIAGRAM	
TYPE & TEMPER	Slave Control Board	
HEAT TREAT SPEC	DRAWN: RCC	ELEC. SEE APP. (4)
FINISH & SPEC. NO.	CHECKED: AF	FINAL APPROVAL: [illegible]
		24 10753 A

Total Sheets 1

Rev. Ø 6 JAN.70
A 16 FEB.70
B 20 MAR. 70
C 5 OCT. 70

Model
A-10857-5

Title
SERVO CONTROL BOARD

Used On

Model	Section	Qty
LPA-1K	A10844	2

LIST SECTIONS — Sheet No.

1. Supporting Notes — See Below
2. Supporting Lists
3. Electrical/Mechanical
4. Supp Assy/Ref Dwgs
5. Specifications
6. Loose Items
7. Parts Peculiar

SUPPORTING LISTS

Compiled
Checked
Approved
Engr. Appr.
Engr. Date

MATERIAL LIST NUMERICAL PARTS LIST

TOTAL SHEET 1 OF 1

REV | USED ON MODEL: LPA 1K | USED ON SECTION: | ASSY SHEET 1 OF 1

NEXT ASSY: | QTY PER NEXT ASSY | ASSY LEVEL: | ASSY DESC: SERVO CONTROL BOARD | ASSY PART NO. A10857-5

LIST SECTION

PART NO.	DESCRIPTION	ITEM LOCATION			QTY. PER ASSY	REFERENCE SYMBOLS	REMARKS
		USED ON ASSEMBLY	USED TO MOUNT	QTY PER U/T/M			
A10857-1	P.C.BOARD ETCH	A10857-2			1		
A10857-2	P.C.BOARD,MACH	A10857-3			1		
A10857-3	P.C.BD, LETTERING	A10857-4			1		
A10857-4	P.C.BD, ASSY	A10857-5			1		
CC10011-8	CAP,FXD, CER.	A10857-5			2	C2, C4	
CC10011-13	CAP,FXD, CER.	A10857-5			1	C3	
CE105-10-25	CAP,FXD, ELECT.	A10857-5			2	C1, C5	
4 CK10753	SCHEMATIC	"			1		
CL275-472	COIL, R.F. FXD	A10857-5			2	L1,L2	
RC20GF101J	RES, FXD, COMP.	A10857-5			1	R3	
RC20GF103J	RES. FXD. COMP.	A10857-5			3	R1,R2,R4,	
RL156-14	RELAY, ARMATURE	A10857-5			2	K1, K2	
RV10005-7P	RES. VAR.	A10857-5			1	R5	
TE127-2	TERM. STUD	A10857-5			14		
TS171-5	SOC, RELAY	A10857-5			2		
IN914	Diode				4	CR1,CR2,CR3,CR4	
2N2219A	TRANSISTOR	A10857-5			2	Q2 , Q3	
2N3906	TRANSISTOR	A10857-5			2	Q1, Q4	

Revision Sheet

RHC(Canada) Limited
Ottawa Ontario

Model A10857-5 Project No. 088/69

Date	Rev.	Page	Item	Description	Mod. Chk. No.	App.
6 JAN. 70	Ø	ALL	ALL	RELEASED TO PRODUCTION		
16 FEB. 70	A	COV.		REVISED BY CEMN 720		
20 MAR. 70	B	1		REVISED BY CEMN 746		
5 OCT. 70	C	1		REVISED BY CEMN 838		

TOTAL SHEETS 2

REV. Ø 11 FEB. 71

MODEL
A10957-5

TITLE
SERVO CONTROL BD.

USED ON

MODEL	SECTION	QTY
LPA-1K C	A10844	2

LIST SECTIONS

		Sheet No.
1.	SUPPORTING NOTES	See Below
2.	SUPPORTING LISTS	
3.	ELECTRICAL/MECHANICAL	
4.	SUPP ASSY/REF DWGS.	
5.	SPECIFICATIONS	
6.	LOOSE ITEMS	
7.	PARTS PECULIAR	

SUPPORTING LISTS

COMPILED J. RESCORLA
CHECKED N. A. Thomas
APPROVED
FNL APPR
ISS DATE

MATERIAL LIST/NUMERICAL PARTS LIST

TOTAL SHEET 1 OF 2

ASSY SHEET 1 OF 2

LIST SECTION

REV

USED ON MODEL: LPA-1KC

USED ON SECTION:

NEXT ASSY:

QTY PER NEXT ASSY:

ASSY LEVEL:

ASSY DESC: SERVO CONTROL BD

ASSY PART NO: A10957-5

PART NO.	DESCRIPTION	ITEM LOCATION			QTY. PER ASSY.	REFERENCE SYMBOLS	REMARKS
		USED ON ASSEMBLY	USED TO MOUNT	QTY PER U/T/M			
A10957-1	PC BD ETCH	A10957-2			1		
A10957-2	PC BD MACH	A10957-3			1		
A10957-3	PC BD LRTG	A10957-4			1		
A10957-4	PC BD S/A	A10957-5			1		
CC10011-8	CAP FLAT FOIL	A10957-5			3	C3,5,6	
CC10025	" " "	"			1	C4	
CK10806	SCHEMATIC	A10957-5			1		
CM111D050J5S	CAP FXD MICA	A10957-5			1	C1	
CM111D391J5S	" " "	"			1	C2	S1200 NOTE 34
MC1709CG	INTRG. CIRCUIT	A10957-5			1	A1	
PX104-022	SLVG. INSUL	A10957-5			X		-
RC07GF102J	RES FXD COMP	A10957-5			1	R15	
RC07GF103J	" " "	"			4	R1,2,7,14	
RC07GF104J	" " "	"			1	R12	
RC07GF152J	" " "	"			1	R10	
RC07GF154J	" " "	"			1	R5	
RC07GF223J	" " "	"			1	R18	
RC07GF332J	" " "	"			2	R21,22	
RC07GF471J	" " "	"			2	R17,19	

MATERIAL LIST/NUMERICAL PARTS LIST

TOTAL SHEET 2 OF 2

REV | USED ON MODEL: LPA-1KC | USED ON SECTION: | ASSY SHEET 2 OF 2

NEXT ASSY: | QTY PER NEXT ASSY: | ASSY LEVEL: | ASSY DESC: SERVO CONTROL BD | ASSY PART NO: A10957-5

LIST SECTION

PART NO.	DESCRIPTION	ITEM LOCATION			QTY. PER ASSY.	REFERENCE SYMBOLS	REMARKS
		USED ON ASSEMBLY	USED TO MOUNT	QTY PER U/T/M			
RC07GF472J	RES FXD COMP	A10957-5			1	R11	
RC07GF473J	" " "	"			2	R13,16	
RC07GF683J	" " "	"			1	R6	
RC20GF102J	RES FXD COMP	A10957-5			4	R3,4,8,9	
RL156-14	RELAY	A10957-5			2	K1,2	
RW10010	RES FXD COMP	A10957-5			1	R20	
TE127-2	TERM STUD	A10957-5			14		
TE149-120	TERM LUG	"			1		
TS171-5	SOCK. RELAY	A10957-5			2		
WL100-7	WIRE BUSS	A10957-5			X		
1N914	DIODE	A10957-5			2	CR1,2	
2N3904	TRST	A10957-5			3	Q2,4,5	
2N3906	TRST	"			2	Q1,3	

Revision Sheet

TMC(Canada)Limited
Ottawa Ontario

Model A10957-5

Project No. 088/71

Date	Rev.	Page	Item	Description	Mod.Chk. No.	App.
11/2/71	Ø	ALL	ALL	RELEASED TO PRODUCTION CAN REF.-(DR005)		

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

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LIST OF ILLUSTRATIONS

LIST OF TABLES

ADDENDUM

Interface Unit for the LPA-1K and Modified Marconi CH25MB HF Single Sideband Transceiver

IN2049
(MOD. KIT 10031)

Nov. 14, 1969

The Interface Unit is provided as an integral part of the LPA. Its functions are (a) to provide a positive-going ALDC output to the CH25MB, and (b) to provide the CH25MB with a push-to-talk capability for switching the RF input to the amplifier and tuning circuitry.

Transistor Q1 in the Interface Unit inverts the ALDC output from assembly A10811-5 to a positive-going signal. The ALDC signal from A10811-5 is connected to R1 on the Interface Unit; +28 volts dc is connected to R3 in the Interface Unit; and the ALDC output from the Interface Unit is connected to pin L on connector J203.

Relay K1 in the Interface Unit is connected through pins I and K of J203 on the LPA to the CH25MB. When K1 is energized from the CH25MB, a ground connection is made to relay K201 in the LPA through cover interlock switches S203 and S204. Provided the LPA is not tuning, (READY lamps off) K201 will be energized which in turn energizes bypass relay K202, connecting the RF input to amplifiers V101 and V102.

PARTS LIST

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR: fixed, electrolytic; 50 uf, 15 WVDC	CE105-50-15
C2	CAPACITOR: fixed, ceramic; 0.1 uf, +80%, -20%, 100 WVDC	CC100-28
C3	Same as C2	
K1	RELAY	RL156-2
Q1	TRANSISTOR	MPF104
R1	RESISTOR: fixed, composition; 100 Kohms ±5%, 1/4 W	RC07GF104J
R2	RESISTOR: fixed, electrolytic; 1 Mohm ±5%, 1/4 W	RC07GF105J
R3	RESISTOR: fixed, composition; 47 Kohms ±5%, 1/4 W	RC07GF473J
R4	RESISTOR: fixed, composition; 10 Kohms ±5%, 1/4 W	RC07GF103J

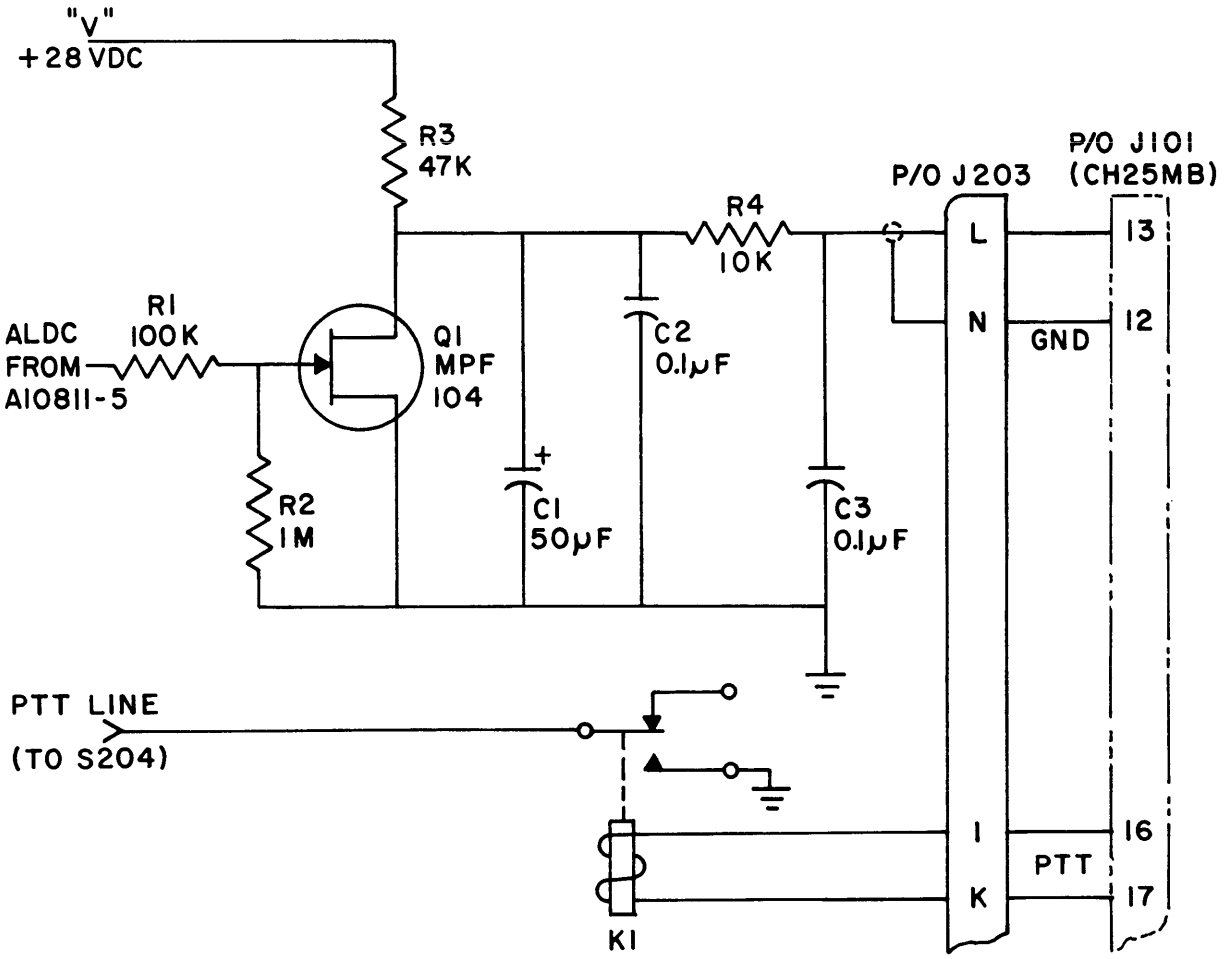


FIGURE 1. SCHEMATIC DIAGRAM, INTERFACE UNIT

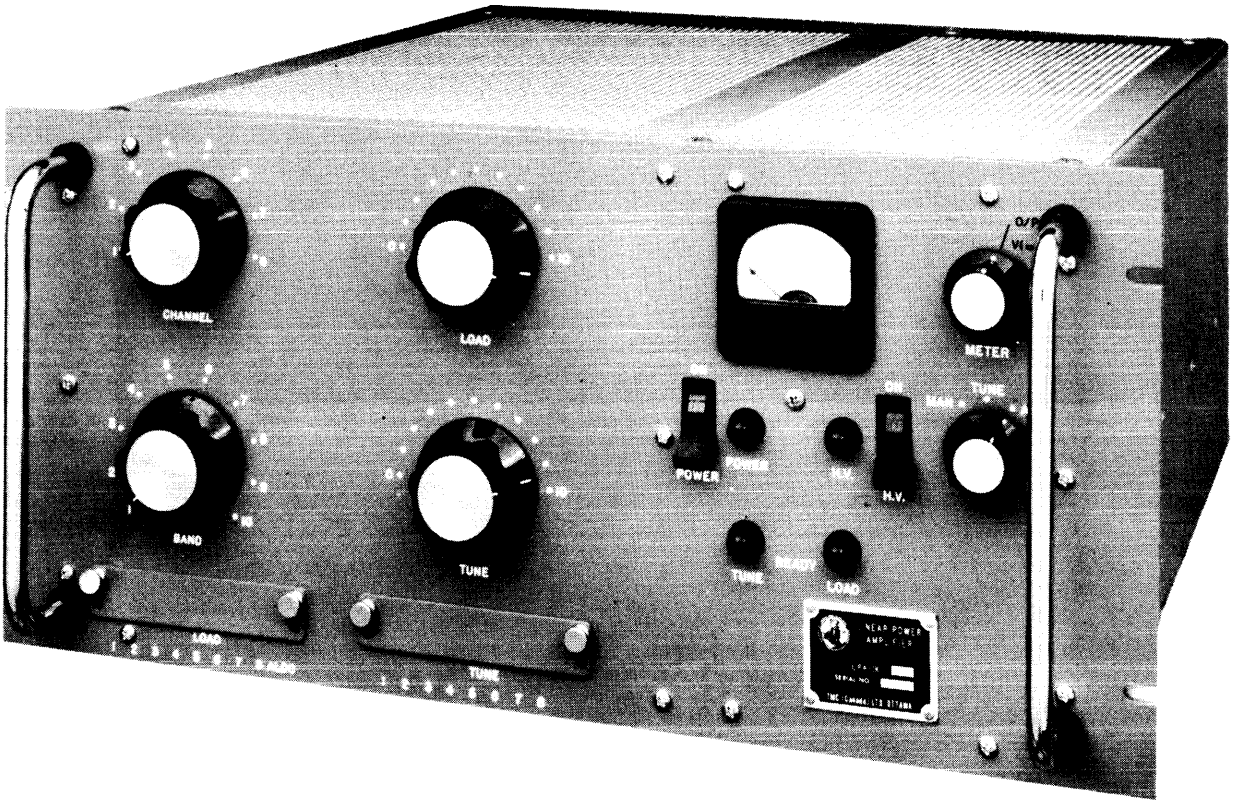


FIGURE 1-1. ONE KILOWATT LINEAR POWER AMPLIFIER, MODEL LPA-1K

SECTION 1
GENERAL DESCRIPTION

1-1 FUNCTIONAL DESCRIPTION

The One Kilowatt Linear Power Amplifier, Model LPA-1K (figure 1-1) is an eight channel amplifier designed to operate over a frequency range of 1.6 to 18 MHz. Each channel may be preset to any frequency within this range. Tuning is either automatic or manually controlled. The LPA is designed primarily for SSB operation but may also be used for AM or CW operation without modification. To achieve full rated output power of 1 kilowatt PEP, the LPA must be driven with an RF signal of 50 watts average power for full carrier inputs or 100 watts PEP for reduced carrier inputs. The LPA includes bypass relays which route the RF input directly to the antenna output should the amplifier plate voltage ever be cut off.

The LPA is wired for operation from 115 volt ac, 50-60 cycle, single phase power, but with slight modification, can be operated from 230 volt ac, 50-60 cycle, single phase power.

1-2 PHYSICAL DESCRIPTION

The LPA is designed for mounting in a standard 19 inch rack. All operating controls are located on the front panel of the unit, and connectors and fuses are located on the rear panel. Tubes and semiconductor devices used in the LPA are listed in table 1-1.

REFERENCE DESIGNATION	TYPE	FUNCTION
CR107	1N34A	ALDC detector and rectifier
CR108	1N34A	Rectifier for RF monitor signal to meter M201
CR201	DD142-1	Rectifier for 28 volt dc signals in low voltage power supply
CR202 and CR203	DD140	Rectifiers in voltage doubler network of high voltage power supply
CR204	1N538	Arc suppressor in the ledex for CHANNEL switch S206
V201 and V202	8163	RF amplifier tubes
CR501	1N538	Arc suppressor in the ledex for band switch S502

Table 1-1 TUBE AND SEMICONDUCTOR COMPLEMENT

1-3 TECHNICAL SPECIFICATIONS

Operating frequencies	Any eight preset frequencies in the 1.6 to 18 MHz range
Band widths	Band 1: 1.6 to 2 MHz Band 2: 2 to 3 MHz Band 3: 3 to 4 MHz Band 4: 4 to 6 MHz Band 5: 6 to 8 MHz Band 6: 8 to 12 MHz Band 7: 12 to 18 MHz
Modes of operation	SSB, AM
Power output	1000 watts PEP into 50 ohms
Output impedance	50 ohms, nominal. Output will accommodate a load with up to 2:1 VSWR
Input impedance	50 ohms, nominal
Input RF power	50 watts average power for full carrier inputs; 100 watts PEP for reduced carrier, two-tone inputs
Tuning	Manual or fully automatic
Signal distortion ratio	35 dB below either tone of a standard two-tone test at 1 Kwatt PEP
Harmonic suppression	Spurious and harmonic suppression is at least 40 dB down from full PEP output
ALDC	An automatic load and drive circuit is incorporated to generate a dc voltage for external control of an associated exciter
Metering	Plate current or RF output indication
Environmental conditions	Ambient operating temperatures between 0° and 50°C, at humidities up to 90%.
Cooling	Forced air
Safety features	Full interlock, overload and fuse protection
Size	Height: 8-3/4 inches Depth: 18 inches Width: 19 inches
Weight	70 pounds
Primary power	115 volts ac, 50-60 Hz, single phase
Power consumption	Approximately 1300 watts under full power output, 200 watts on standby

SECTION 2
INSTALLATION

2-1 INITIAL INSPECTION

When the LPA is unpacked, visually inspect for possible damage; check all front panel controls for ease of operation; remove all covers and check the inside of the unit for damaged components; check that all tubes are properly seated in their tube sockets. Replace all covers.

With respect to equipment damage for which the carrier is liable, TMC (Canada) Limited will assist in describing methods of repair and the furnishing of replacement parts.

2-2 EQUIPMENT LOCATION

For ease of operation, sufficient clearance should be allowed around the unit for making connections to the rear panel and setting the controls on the front panel. Ensure that there is no obstruction to the air flow at the rear or top of the LPA.

2-3 ELECTRICAL CONNECTIONS

Once the LPA has been properly mounted in its operating location, electrical connections can be made to the unit at the connectors listed in table 2-1, and shown in figure 2-1.

2-4 INITIAL TUNING

The LPA must be tuned upon installation following the procedure outlined in paragraph 5-5.

CONNECTOR	FUNCTION
J201	RF signal input
J202	Primary power input
J203	Channel information input and ALDC output to transmitter-receiver
J204	ALDC output
Connector with K202	Antenna output

Table 2-1 LPA CONNECTOR FUNCTIONS

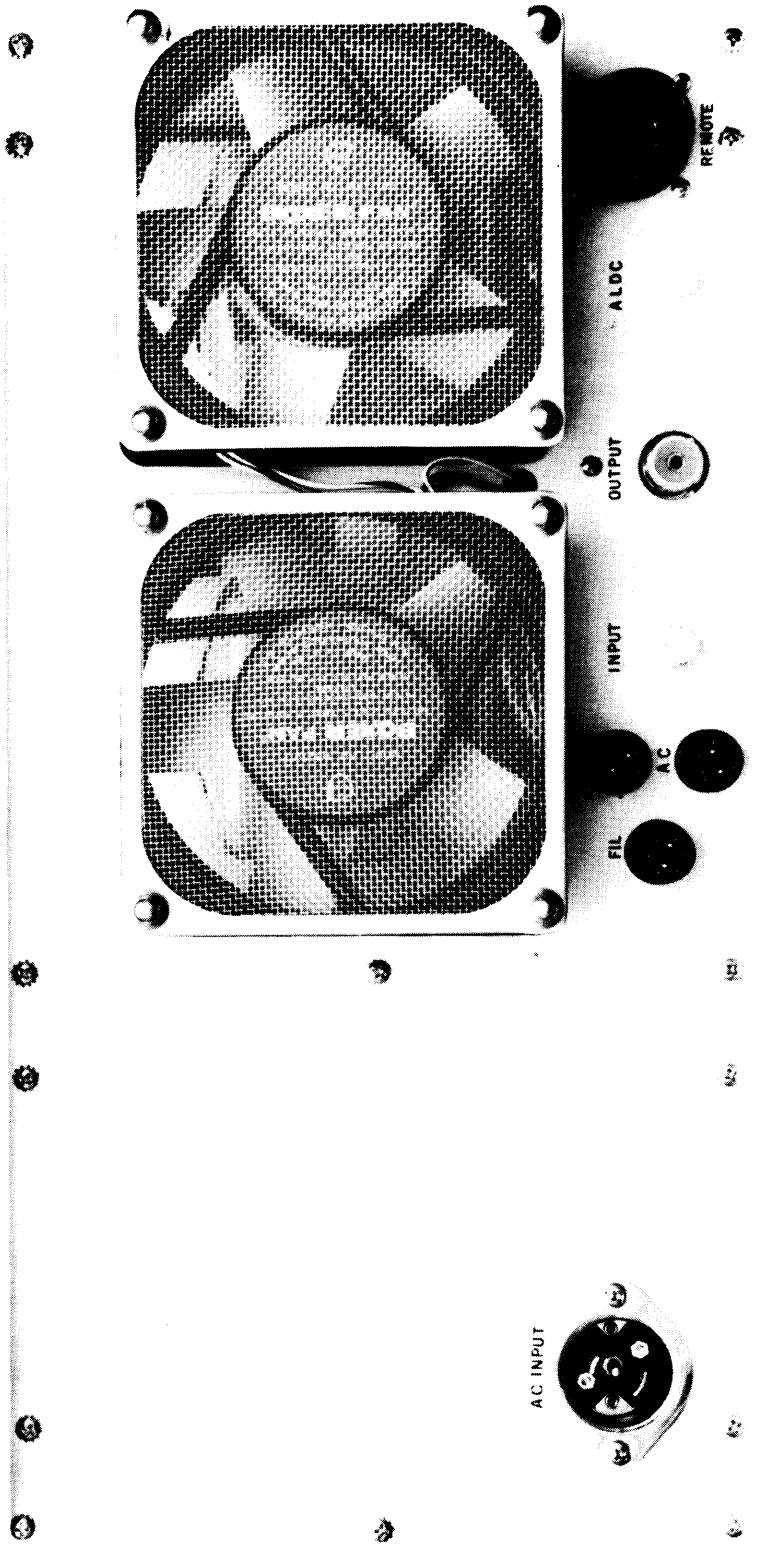


FIGURE 2-1. REAR PANEL, LPA-1K

SECTION 3
OPERATOR'S SECTION

3-1 CONTROLS AND INDICATORS

Before attempting to operate the LPA, the operator should become familiar with the controls and indicators on the front panel of the unit (figure 3-1). Table 3-1 gives the designation and a brief description of the function of each control and indicator. Access to the channel control potentiometers and the ALDC potentiometer on A10808-5 and A10808-6 is provided at the front panel; however, these potentiometers are not normally adjusted by the operator. It is good practice to keep the covers over these potentiometers to prevent inadvertent changing of their settings.

3-2 PROTECTIVE DEVICES

The LPA contains protective devices listed in table 3-2. If a failure should occur in the LPA, check the protective devices to determine the source of the failure.

CAUTION

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

3-3 OPERATING PROCEDURES

CAUTION

For two-tone inputs never exceed a plate current reading on the front panel meter of 500 ma. For single-tone inputs, never exceed a plate current reading of 700 ma.

When turning on the LPA, use the following procedure.

(a) Set the POWER switch (CB201) to the ON position and allow 60 seconds for the LPA to warm up.
(b) Turn the HV switch to the ON position.
(c) Ensure that the MAN/TUNE/AUTO switch (S205) is in the AUTO position.

DESIGNATION	FUNCTION
POWER switch (CB201)	Controls primary power to the LPA
HV switch (CB202)	Controls power to the high voltage section of the LPA power supply
POWER ON lamp (DS204)	Lights when low voltage section of the LPA power supply is operative
HV ON lamp (DS201)	Lights when the high voltage section of the LPA power supply is operative
READY TUNE lamp (DS202)	Lights when tuning capacitor C224 and loading capacitor C234 are set for the selected operating frequency. Note that the lamp is always on during manual operation.
READY LOAD lamp (DS203)	Lights when loading capacitor C234 is set for the selected operating frequency. Note that the lamp is always on during manual operation.

Table 3-1 CONTROLS AND INDICATORS

DESIGNATION	FUNCTION
MAN/TUNE/AUTO switch (S205)	Permits either automatic operation of the LPA as part of a system or manual operation using controls on the LPA
CHANNEL switch (S206)	Permits selection of one of the eight preset operating frequencies during manual operation using controls on the LPA
BAND switch (S501 and S502)	Permits selection of one of the seven available bands during manual operation
TUNE control	Permits adjustment of capacitor C224 for manual operation of the LPA
LOAD control	Permits adjustment of capacitor C234 for manual operation of the LPA
METER switch (S207)	Connects either an RF output monitor signal (O/P position) or a plate current monitor signal (Ip position) to the front panel meter
METER	Indicates RF output or plate current depending on the setting of the METER switch S207

Table 3-1 CONTROLS AND INDICATORS

DESIGNATION	FUNCTION
Circuit breaker CB201	Controls primary power to the LPA
Circuit breaker CB202	Controls power to the high voltage section of the LPA power supply
Interlock switch S203	Switches off high voltage when top cover of LPA is removed
Interlock switch S204	Switches off high voltage when bottom cover of LPA is removed
Fuse F201 (3 amp. quick-acting)	Cuts off primary ac input
Fuse F202 (1 amp. slow-blow)	Cuts off ac power to relay K202 so RF signal bypasses LPA
Fuse F203 (2 amp. quick-acting)	Cuts off the +28 volt dc outputs from the low voltage section of the LPA power supply assembly

Table 3-2 PROTECTIVE DEVICES

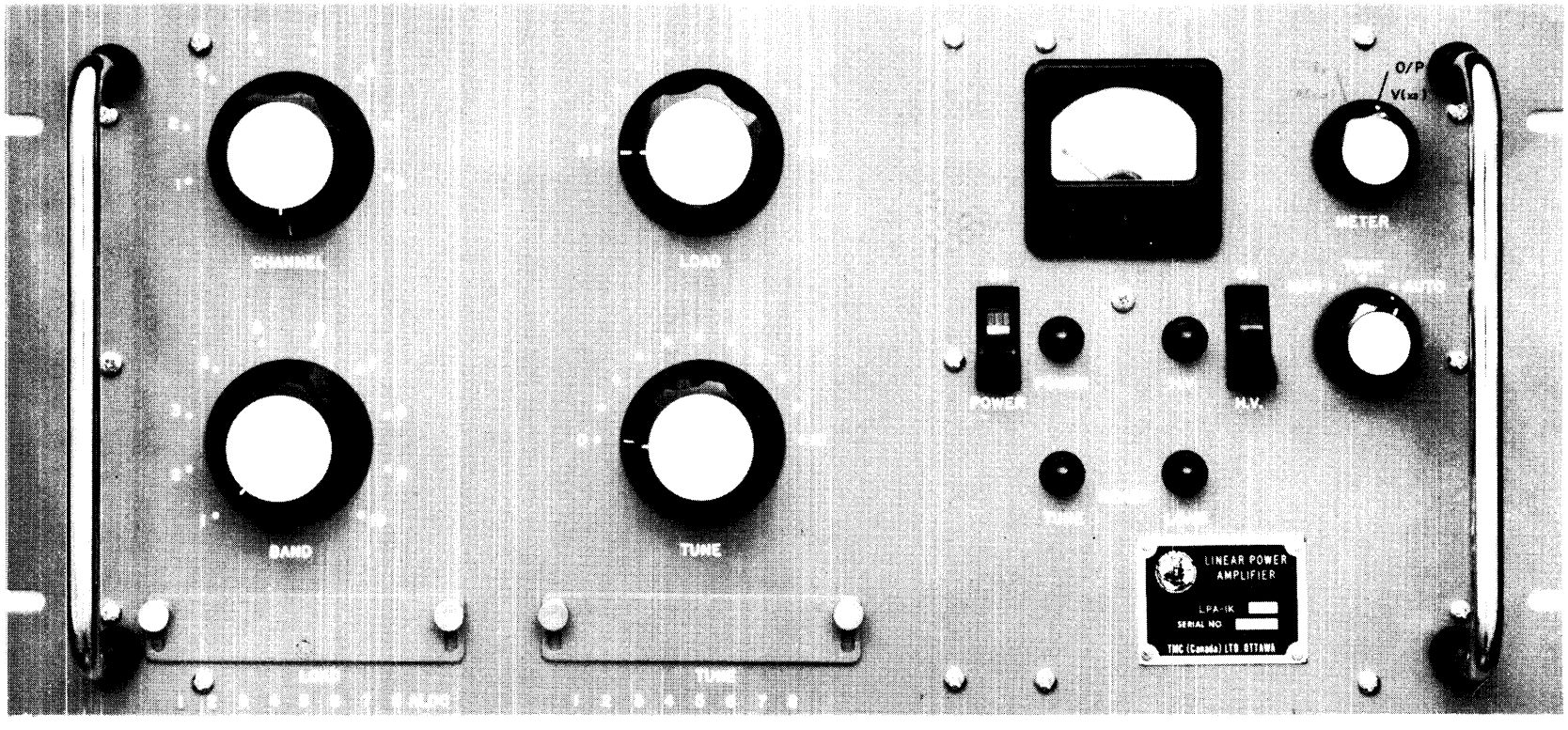


FIGURE 3-1. FRONT PANEL, LPA-1K

SECTION 4
PRINCIPLES OF OPERATION

4-1 GENERAL

The LPA is designed to amplify the RF signal from an associated exciter unit, providing a 1000 watt PEP RF output at any one of eight preset frequencies in the 1.6 to 18 MHz range. The circuitry in the LPA consists of the following:

(1) RF amplifier section
(2) Tuning and loading section
(3) ALDC and meter section
(4) Power supply section.

Refer to the block diagram, figure 4-1.

4-2 RF AMPLIFIER SECTION

The RF input to the LPA is connected from J201 to two amplifier tubes through bypass relay K202, provided the relay is energized. All of the following conditions must be met for K202 to be energized:

(1) Primary power must be connected to the LPA.
(2) POWER and HV switches must both be on.
(3) The top and bottom cover interlock switches S203 and S204 must be closed.
(4) Pin M on J203 must be connected to ground either at the remote unit or at pin N of J203.

When K202 is deenergized, the RF input is switched through a second section of this bypass relay to the output connector, and fed directly to the antenna.

The RF amplifier comprises two self-biasing triodes, V201 and V202, connected in parallel. The RF input signal is applied to the cathode of these grounded-grid triodes, and the 1000 watt PEP plate circuit output is applied to the tuning and loading circuit (paragraph 4-3). The 10 volt filament voltage and the +2400 volt dc plate voltage are provided by the power supply section of the LPA (paragraph 4-4). Parasitic suppressors A203 and A204 are incorporated in the plate circuits to reduce undesirable oscillations produced by the triodes.

4-3 TUNING AND LOADING SECTION

This section employs an adjustable pi network to match the impedance of the plate signal from the RF amplifier to the antenna at all operating frequencies. This involves selection of the band containing the desired frequency and setting the tuning and loading capacitors for resonance at that frequency.

(1) BAND SELECTION

Band selection is controlled by BAND switch S502 on A10788, and S502 is, in turn, positioned by the ALDC and program board A10811. Since the eight operating frequencies may be located anywhere in the 1.6 to 18 MHz range, the ALDC and program board provides the means of locating the eight channels in the proper frequency bands. The channels may be all in one band or in any combination of bands.

The CHANNEL switch S206 may be positioned either on the front panel of the LPA during manual operation or by a remote unit during automatic operation. For remote setting the +28 volt dc switching signal provided at pin J of connector J203 is returned to the LPA through the pin on J203 corresponding to the channel selected. This switching signal causes the control wafer of S206 to rotate until contact with the signal is broken. The control wafer is then set for the selected channel. Since wafer B of S206 is ganged to the control wafer, it will also be positioned to the selected channel. +28 volts dc is provided to the wiper of S206B from the LPA low voltage power supply. The contacts of wafer B of S206 are connected to the appropriate channel terminals on ALDC and program board A10811. Jumpers connect the channel terminals to the appropriate band terminals on A10811, which are, in turn, connected to the BAND switch S502. The dc voltage causes S502 to rotate to the position of the band containing the selected channel. Wafer A of switch S501 (ganged to S502) connects the appropriate section of tank coil L501 into the pi network.

(2) TUNING

Included in the pi network of the LPA is a variable capacitor C224 for tuning to the selected operating frequency. This tuning capacitor can be set either manually or automatically depending on the position of the MAN/TUNE/AUTO switch S205. For manual operation, the TUNE control on the front panel of the LPA is used. For automatic operation, the tuning capacitor is positioned by motor B301 on A10782-1 which is controlled by servo board A201.

Resistor board A10808-6 includes eight potentiometers, each of which is preset for one of the eight required channels. The wipers of

these channel control potentiometers (R705 to R712) are connected to wafer D of CHANNEL switch S206. Wafer D is ganged to the control wafer of S206 and hence rotates to the position representing the selected channel. Thus the dc voltage from the appropriate channel control potentiometer is fed to servo board A201. The dc voltage on the wiper of the adjustable feedback potentiometer (R301 on assembly A10782-1) is also connected to servo board A201. If these two voltages are at the same level a null condition exists. If the voltages differ, the servo board will use the resulting error voltage to rotate B301 either clockwise or counter-clockwise, depending on the polarity of the error voltage until a null point is reached. The motor then adjusts the feedback potentiometer to achieve a null condition. Since tuning capacitor C224 is ganged to the feedback potentiometer, it will also be set to the correct position for the channel selected. The 115 volt ac motor drive is routed from the LPA power supply through section B of the MAN/TUNE/AUTO switch S205. This switch must be in the AUTO position for the motor to receive power.

For some bands it is necessary to switch padding capacitors into the tuning circuit with wafer B of switch S501. S501B is ganged to BAND switch S502 and hence is positioned to the band containing the selected channel.

Once the plate circuit is tuned, the null condition is reached and servo board A201 turns off the relays controlling the motor. The READY TUNE lamp on the front panel lights when the tuning and loading capacitors, C224 and C234, are set for the selected frequency.

(3) LOADING

The pi network in the LPA includes a variable capacitor C234 for adjusting the load for the selected operating frequency. The loading capacitor can be set either manually or automatically, depending on the position of the MAN/TUNE/AUTO switch S205. For manual operation, the LOAD control on the front panel of the LPA is used. For automatic operation, the loading capacitor is positioned from a remote control unit in the same way as the tuning capacitor (paragraph 4-3(2)). Motor B401 on assembly A10782-2 is used and is controlled by servo board A202. Resistor board A10808-5 contains the eight channel control potentiometers preset for the eight channels of operation as on A10808-6. The wipers of these potentiometers are connected through wafer C of CHANNEL switch S206 to servo board A202. The wiper of feedback potentiometer R401 on assembly A10782-2 is also connected to A202. As in the tuning circuit, the two inputs to the servo board are compared and if an error voltage exists, motor B401 is activated to adjust the feedback potentiometer, and the loading capacitor C234 ganged to it, until a null condition is reached. Wafer C of switch S501 is used to add the padding capacitors required on some bands. The READY LOAD lamp on the front panel lights when the loading capacitor is set for the selected frequency.

4-4 ALDC AND METER SECTION

Voltage divider C135-C235 provides a monitor of the RF output signal from the pi network for both the ALDC and meter circuits located on printed circuit assembly A10811.

In the ALDC circuit, the RF output monitor signal is connected to reverse-biased diode CR107. The wiper of ALDC adjust potentiometer R620 on assembly A10808-5 is also connected to CR107 through L110, and +28 volts dc is applied to one end of R620. When the RF output signal exceeds the level preset on R620, CR107 conducts and a rectified ALDC signal is provided through filter network C138-L111-C140 to rear panel jack J204 and to pin L on J203.

The RF output monitor signal is fed to the front panel meter when the METER switch S207 is in the O/P position. The RF output monitor signal to the meter is rectified by CR108 and filtered by C139-L113-C141 before being fed to the meter.

When the METER switch is in the Ip position the meter reads the dc plate current of the amplifier tubes.

4-5 POWER SUPPLY SECTION

(1) HIGH VOLTAGE SECTION

The primary ac input is connected to the high voltage section of the LPA power supply through POWER switch CB201 and HV switch CB202 on one side of the ac line, and through interlock relay K201 on the other. +28 volts dc is provided to one side of K201 from servo board A201 when the LPA is tuned and the other side is connected through interlock switches S203 and S204 to pin M on J203. This connection permits control of the high voltage

by a remote unit. If not connected to a remote unit, pin M must be jumpered to ground (pin N of J203) to activate interlock relay K201. Interlock switch S203 opens when the top cover is removed, and S204 opens when the bottom cover is removed.

When the primary ac input is connected to the high voltage transformer T202, the HV ON lamp will light. In addition, the ac signal will activate bypass relay K202 so that the RF input signal is applied to the amplifier tubes and pi tuning and loading network in the LPA. When K202 is deenergized the RF input is routed directly to the OUTPUT jack.

The 1200 volts on the secondary winding of T202 is rectified by CR202-CR203 and applied to a voltage doubling network consisting of capacitors C209 to C216 and resistors R208 to R215. +2400 volts dc is then provided to the plates of RF amplifier tubes V201 and V202 through a decoupling network and parasitic suppressors A203 and A204.

(2) LOW VOLTAGE SECTION

Primary ac power is connected to the low voltage section of the LPA power supply at filament transformer T201 through POWER switch CB201 and fuse F201. The ac input to T201 is also connected to the two blowers in the LPA, to servo boards A201 and A202, and to the motors on A10782-1 and A10782-2. Filament transformer T201 has two secondary windings, one of which provides 10 volts ac to the filaments of both RF amplifier tubes V201 and V202. The centre tap of this winding is at dc ground. The second winding of T201 is connected to CR201 which provides a rectified +28 volt dc output at three points, "X", "Y" and "V". Point "X" is connected through J203 to a remote unit for channel selection. The +28 volts dc from point "V" is used as a reference voltage by channel control potentiometers on A10808-6 and A10808-5, feedback potentiometers on A10782-1 and A10782-2, ALDC adjust potentiometer R620 on A10808-5. Point "V" is also connected to the wiper of wafer B of CHANNEL switch S206. Point "Y" is used as the reference voltage by servo boards A201 and A202.

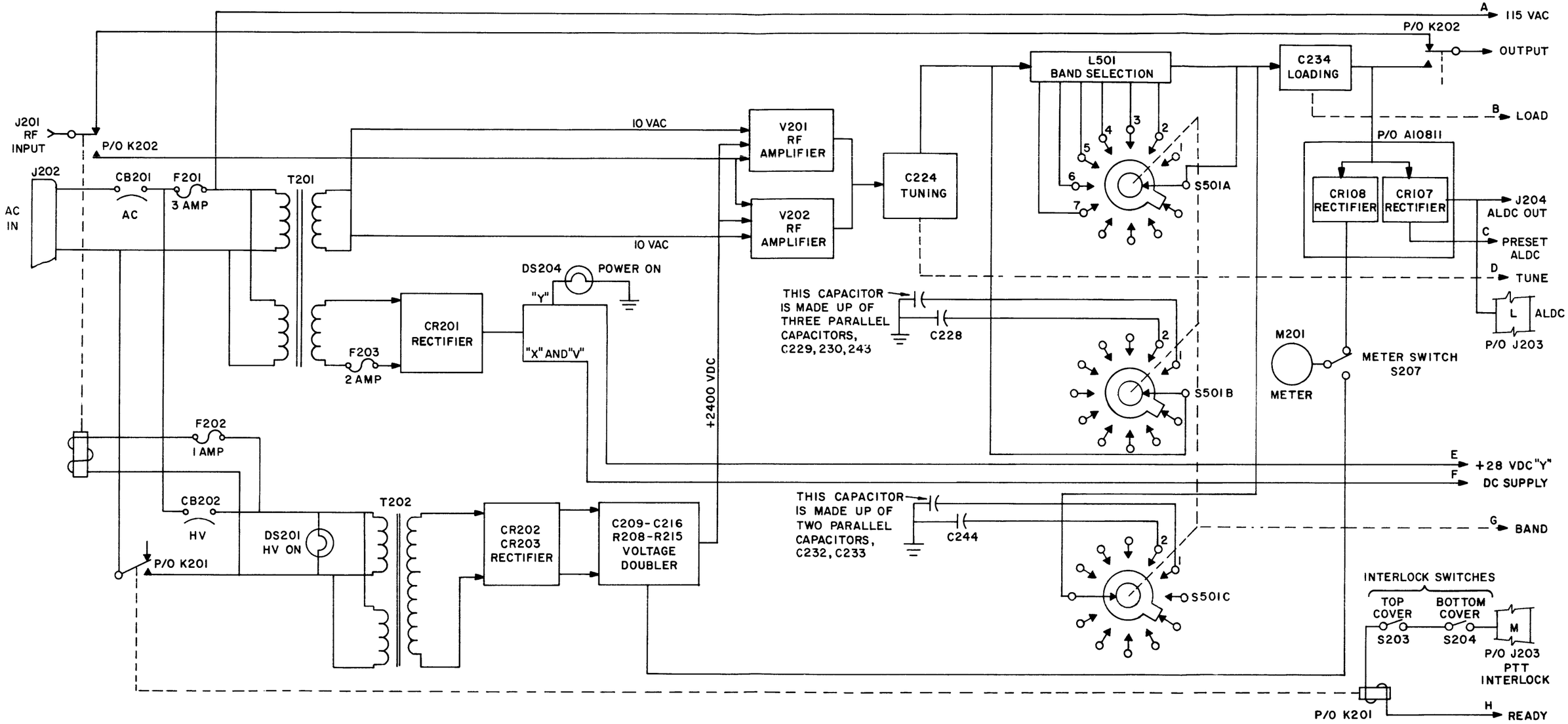


FIGURE 4-1. BLOCK DIAGRAM, LPA-1K, SHEET 1 OF 2

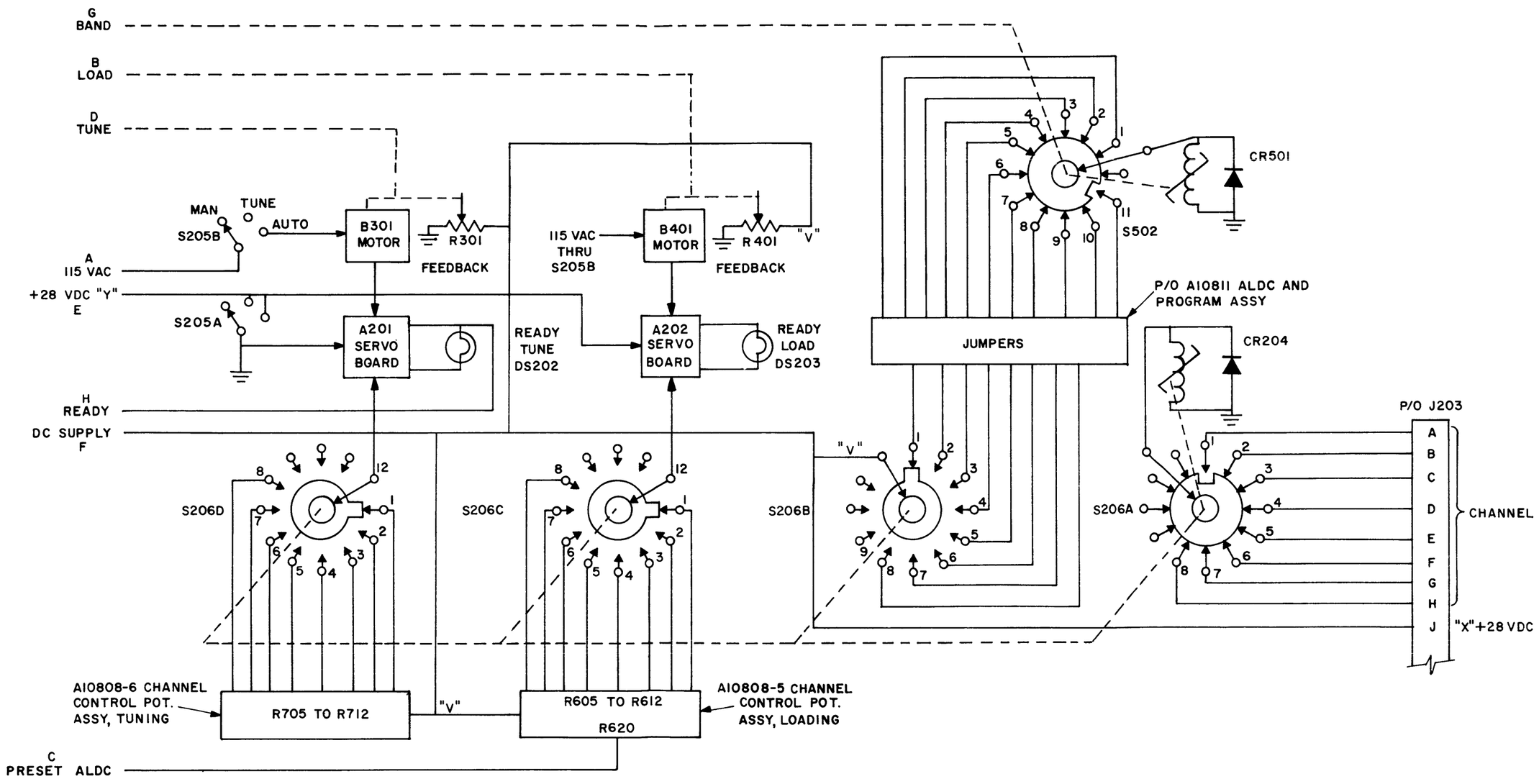


FIGURE 4-1. BLOCK DIAGRAM, LPA-1K, SHEET 2 OF 2

SECTION 5
MAINTENANCE

5-1 GENERAL

The LPA has been designed to provide long-term, trouble-free operation. It is recommended that any necessary maintenance be done by a competent maintenance technician familiar with troubleshooting techniques. Table 5-1 specifies the test equipment required for maintenance. Refer to figures 5-1 and 5-2 for aid in identification of components.

WARNING

The voltages used in the LPA are sufficiently high to endanger life. All personnel are advised to be thoroughly familiar with the LPA before troubleshooting with the high voltage on. Insulated tools should be used wherever possible.

5-2 PREVENTIVE MAINTENANCE

In order to prevent failure of the equipment due to corrosion, tube failure, dust, or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to. At least every six months the equipment should be taken from the rack and all accessible covers removed for cleaning and inspection.

Remove any accumulated dust with a soft brush or a vacuum cleaner. Remove the blower screens and clean thoroughly. Clean dirt or grease from electrical parts with trichlorethylene, and from metalwork with any good dry cleaning fluid.

WARNING

When using trichlorethylene, make certain that adequate ventilation exists. Avoid prolonged contact with skin.

Table 5-2 suggests items which should be inspected during preventive maintenance.

EQUIPMENT	SPECIFICATIONS
Vacuum tube voltmeter	Hewlett Packard Model 401B, or equivalent
Multimeter	Simpson Model 260, or equivalent
Dummy load	50 ohm, 1000 watt resistor

Table 5-1. TEST EQUIPMENT REQUIRED.

WHAT TO INSPECT	DEFECTS TO LOOK FOR
All electrical connectors on rear panel	Loose pins, dirt, frayed cables
Knobs, screws, connectors	Loose or missing hardware
Wiring	Loose connections or frayed wires
Resistors	Cracks, chipping, blistering, discolouration, and other signs of overheating
Capacitors	Poor seating
Meters	Bent needle, cracked case, broken glass
Ledex switches	Dirty interrupter contacts, stiffness of rotary solenoid plate

Table 5-2. PREVENTIVE MAINTENANCE INSPECTION.

5-3 TROUBLESHOOTING

The troubleshooting procedure is intended as an aid in locating, diagnosing and correcting equipment trouble and maladjustment in the LPA.

CAUTION

Although removal of the top or bottom cover will prevent the high voltage from being applied, it must be remembered that the primary ac power is still supplied to the blowers and the low voltage section of the LPA power supply assembly. The RF input at J201 should be disconnected, particularly when the bottom cover is removed.

(1) Connect an antenna or 50 ohm dummy load to the OUTPUT jack of the LPA (part of K202). Check that all covers are securely in place, the HV switch is off, and pin M on connector J203 is grounded either at a remote unit or at pin N of J203.

(2) Switch the POWER switch to the ON position.

(a) Allow 60 seconds for the LPA to warm up. Check that the filaments of amplifier tubes V201 and V202 glow and both blowers are operative. If these conditions are not evident, check fuse F201. If this fuse burns out repeatedly upon replacement, check for a short circuit in transformer T201, the blowers, or their associated circuitry.

(b) Check that the POWER ON lamp lights and relay K201 is energized. If not, check fuse F203 and regulator CR201 and its associated circuitry in the low voltage section of the LPA power supply assembly.

(3) Set the HV switch to ON.

(a) Check that the HV ON lamp lights. If not, check fuse F202. If this fuse burns out repeatedly upon replacement, check for a short in power transformer T202 and associated circuitry. If fuse F202 is intact check lamp DS201 for continuity.

(b) Check that both sections of relay K202 energize. If not, check for an open connection in their associated circuitry.

(4) Turn the HV switch off.

(5) Tune the LPA following the tuning procedure described in paragraph 5-5.

(a) Check that the front panel meter reading for plate current increases as the RF input from the associated exciter is increased. If not, check that;

(i) the exciter is providing an RF output
(ii) the RF signal is applied to the cathodes of amplifier tubes V201 and V202 and +2400 volts dc is applied to the plates
(iii) the meter is not defective.

(b) At the point of resonance, the front panel meter should indicate a dip in the plate current. If not, check the pi network for an open or short circuit.

(c) Increase the RF input signal from the exciter until the front panel indicates 350 ma plate current. If this reading cannot be obtained, replace the RF amplifier tubes V201 and V202.

(6) Select a channel at the associated control unit.

(a) Observe that the CHANNEL control rotates to the selected channel, and that the BAND control rotates to the band in which this channel is located. If not, check the +28 volt dc output from the low voltage section of the LPA power supply. Check all wafers of rotary switches S206, S501 and S502 for continuity. Check for evidence of electrical or mechanical overloading of the ledex which could cause stiffness of the solenoid plate.

(b) Observe that the motors on assemblies A10782-1 and A10782-2 drive the TUNE and LOAD controls to the correct positions, tuning the LPA to the selected frequency. If the proper tuning is not obtained, check that the 115 volt ac input is connected to the

motors through the AUTO/TUNE/MAN switch, wafer B, and that the alignment of the appropriate channel control potentiometer is correct (see paragraph 5-5). Check for power to servo boards A201 and A202, and check the associated board circuitry.

(7) Turn the ALDC potentiometer (R620) on printed circuit assembly A10808-5 fully counterclockwise. With an RF input supplied to connector J201, a dc voltage should be present at connector J204. If not, check the ALDC circuitry on assembly A10811.

5-4 REPAIR

Repair work generally consists of the replacement of an electrical component, and the following precautions should be observed:

(1) Always replace a component with its exact duplicate.

(2) Place any new component in the same position as the one it replaces. It is not good practice to alter the existing layout. This applies to the layout of wiring as well as discrete components.

(3) Never use a soldering iron having a power rating of more than 100 watts on printed circuit boards or delicate components. Use a pair of long-nose pliers as a heat sink while soldering.

(4) Extreme caution must be taken when replacing components on a printed circuit board as excess heat applied to the board may cause the printed wiring to lift off.

(5) Double check all solder joints made, as cold or loose solder connections can cause trouble at a later date.

5-5 TUNING PROCEDURE FOR ADJUSTING OPERATING FREQUENCIES

With all power to the LPA off, connect a 50 ohm, 1000 watt dummy load at the OUTPUT connector and complete the following steps for each of the eight channels in turn.

(1) Turn the MAN/TUNE/AUTO switch to the MAN position.

(2) Set the POWER switch to the ON position and allow 60 seconds for the LPA to warm up.

(3) Turn the HV switch to the ON position.

(4) Turn the METER switch to the Ip position and check that the meter reads 160 ma with no RF input from the associated exciter.

(5) Using a two-tone RF input from the exciter, adjust its level until the meter indicates 350 ma plate current.

(6) Set the TUNE and LOAD controls both to zero.

(7) Slowly increase the setting of the TUNE control until a dip is observed on the meter.

(8) Turn the METER switch to the O/P position and observe the meter as the LOAD control setting is increased. As the meter reading increases, readjust the TUNE control for a dip in the plate current reading as before. Continue this procedure until the values shown in table 5-3 are observed.

INPUT	PLATE CURRENT	RE OUTPUT
Two-tone	475 ma	225 volts
Single-tone	700 ma	225 volts

Table 5-3 METER READINGS FOR LPA TUNING

(9) Set the MAN/TUNE/AUTO switch to the TUNE position.

(10) Move the covers on the front panel of the LPA to provide access to the channel control potentiometers on A10808-5 and A10808-6.

(11) Adjust the potentiometer for the selected channel on load assembly A10808-6 until the READY LOAD lamp lights.

(12) Adjust the corresponding potentiometer on tune assembly A10808-5 until the READY TUNE lamp lights.

Disconnect the 50 ohm, 1000 watt dummy load.

5-6 ALIGNMENT

The LPA is aligned at the factory and should not normally need adjustment. In the event that alignment is required, the following procedures should be used.

(1) FEEDBACK POTENTIOMETERS

Two feedback potentiometers are provided in the LPA; R301 which is used for automatic setting of tuning capacitor C224, and R401 which is used for automatic setting of loading capacitor C234. The following alignment procedure is applicable for both feedback potentiometers.

CAUTION

Remove all power from the LPA before aligning feedback potentiometers.

(a) Loosen the set screw on the coupling between the capacitor and the gear drive-shaft. Make sure that all other set screws in the assembly are tight.

(b) Manually rotate the gear assembly and feedback potentiometer until an ohmmeter reading of 150 ohms is observed between the feedback potentiometer wiper and ground.

(c) Manually turn the capacitor rotor until the plates are fully meshed, (point of maximum capacitance). Be careful not to change the setting of the feedback potentiometer.

(d) Tighten the coupling between the capacitor and gear drive-shaft.

(e) The feedback potentiometer is properly aligned when its resistance increases as the capacitance of the associated capacitor (C224 or C234) is decreased.

(2) ALDC POTENTIOMETER

The ALDC potentiometer is located on assembly A10808-5 and is accessible at the front panel of the LPA.

(a) Turn on the LPA following the procedure in paragraph 3-3.

(b) Set the METER switch to the O/P position.

(c) Turn the ALDC potentiometer, R620 on assembly A10808-5, fully counter-clockwise.

(d) Adjust the RF input at J201 from the associated exciter until the meter indicates an output signal of 225 volts.

(e) Turn the ALDC potentiometer clockwise until the meter reading is 210 volts.

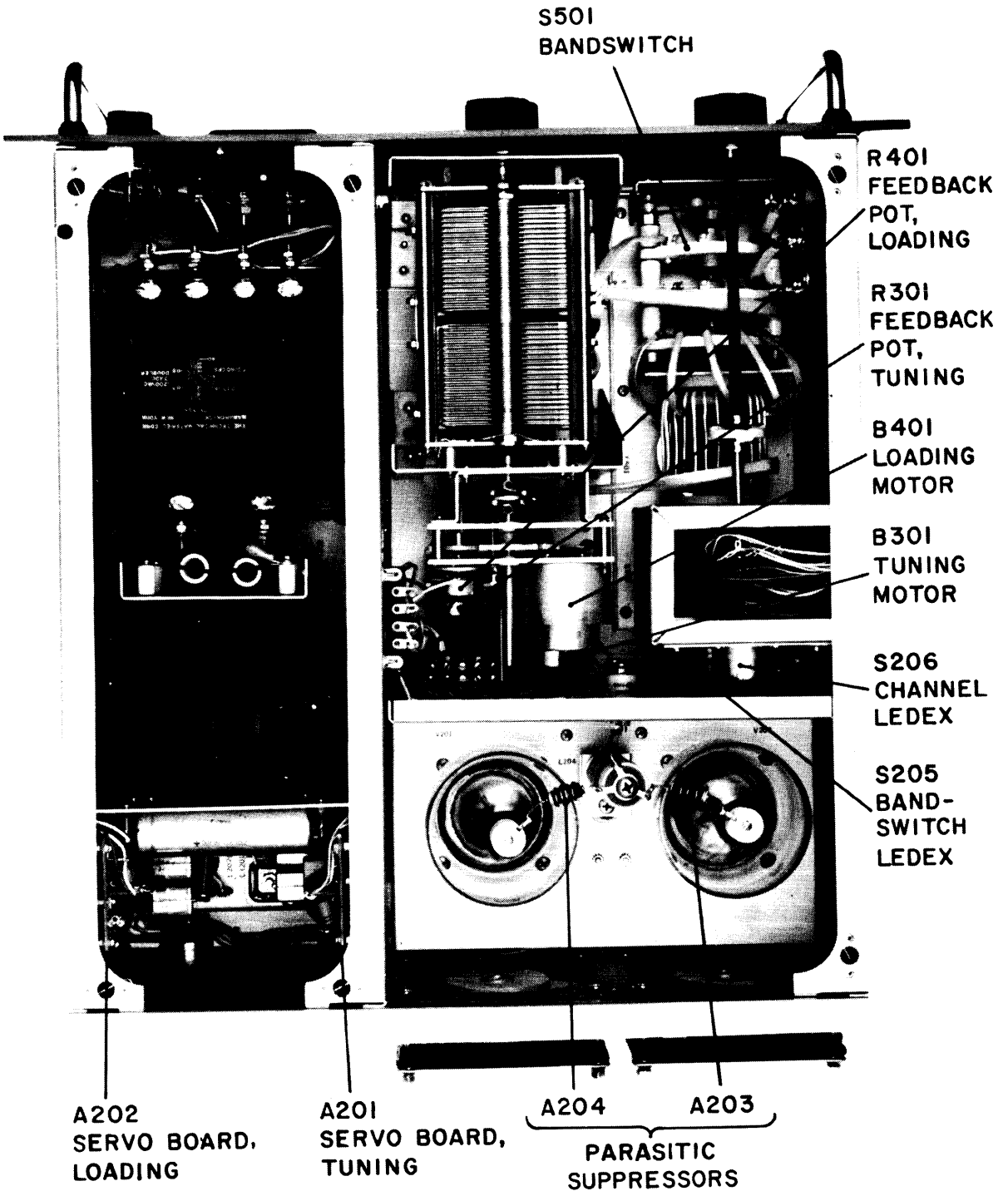


FIGURE 5-1. TOP VIEW, COVER REMOVED, LPA-1K

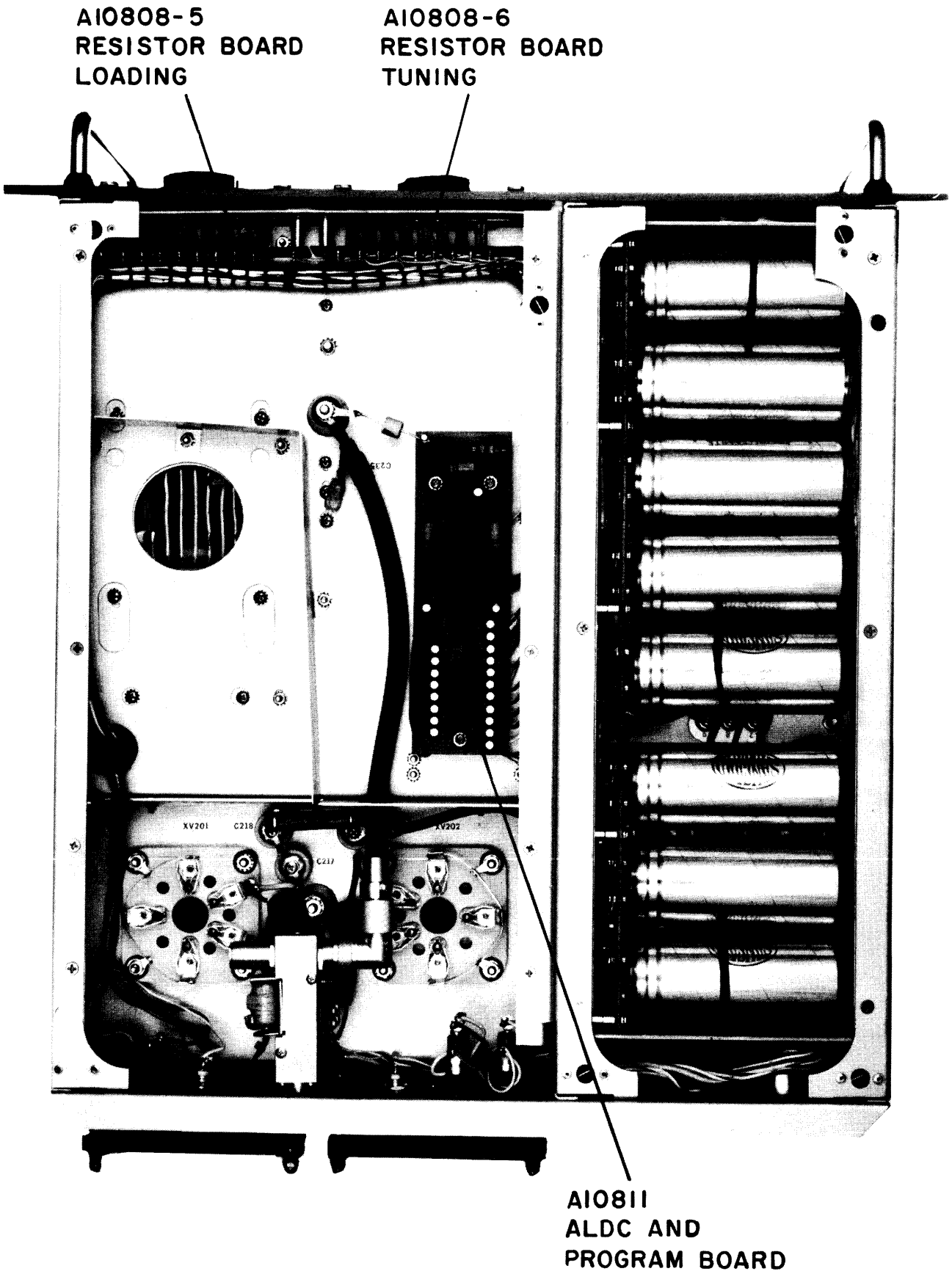


FIGURE 5-2. BOTTOM VIEW, COVER REMOVED, LPA-1K

SECTION 6
PARTS LIST

6-1 INTRODUCTION

Reference designations have been assigned to identify all electrical parts of the equipment. These designations are used for marking the equipment (adjacent to the parts they identify) and are included on drawings, diagrams and the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, transistor, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as transistor or fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for tube V201 is designated XV201. To expedite delivery, when ordering replacement parts, specify the TMC part number and the model number of the equipment.

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
C101 through C133	Not used	
C134	Capacitor: fixed, ceramic; 0.01 uf GMV, 500 WVDC	CC100-16
C135	Capacitor: fixed, mica; 150 pf ± 5%, 500 WVDC	CM15F151J03
C136	Not used	
C137	Not used	
C138	Capacitor: fixed, ceramic; 0.001 uf GMV, 500 WVDC	CC100-29
C139	Same as C138	
C140	Capacitor: fixed, ceramic; 0.1 uf +80%, -20%, 500 WVDC	CC100-32
C141	Same as C140	
C142 through C145	Not used	
C146	Same as C140	
CR101 through CR106	Not used	
CR107	Diode	1N34A
CR108	Same as CR107	
L101 through L109	Not used	
L110	Coil: RF, fixed;220 uH ±10% at 790 KHz	CL140-6
L111	Same as L110	
L112	Coil: RF, fixed; 750 uH ± 10%	CL100-5
L113	Same as L110	
R101 through R120	Not used	
R121	Resistor: fixed, composition; 15 Kohms ±5%, 1/2 W	RC20GF153J

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
A201	Servo Board	AZ114
A202	Same as A201	
A203	Parasitic suppressor	AX391
A204	Same as A203	
B201	Fan: axial	BL106-5
B202	Same as B201	
C201	Not used	
C202	Not used	
C203	Capacitor: fixed, ceramic; 0.1 uf, +80%, -20%, 500 WVDC	CC100-32
C204	Same as C203	
C205	Capacitor: fixed, mica; 0.01 uf ±5%, 300 WVDC	CM35C103J03
C206	Same as C201	
C207	Same as C201	
C208	Capacitor: fixed, electrolytic; 1000 uf, -10%, +150%, 50 WVDC	CE116-8VN
C209 through C216	Capacitor: fixed, electrolytic; 250 uf, -10% +75%, 450 WVDC	CE112-1
C217 through C221	Capacitor: fixed, ceramic; 1000 pf ±20%, 5000 WVDC	CC109-38
C222	Not used	
C223	Same as C201	
C224	Capacitor: variable; 23-347 pf, 3000 WVDC	CB175
C225	Not used	
C226	Same as C201	

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
C227	Not used	
C228 through C230	Capacitor: fixed, ceramic; 100 uf ±10 %, 5000 WVDC	CC109-28
C231	Same as C201	
C232	Same as C217	
C233	Same as C217	
C234	Capacitor: variable, air	CB10007
C235	Capacitor: fixed, ceramic; 10 pf ±10%, 5000 WVDC	CC109-5
C236	Not used	
C237 through C241	Same as C201	
C242	Capacitor: fixed, electrolytic; 2300 uf, 50 WVDC	CE119-2300-50
C243	Same as C228	
C244	Same as C217	
CB201	Circuit breaker	SW461-2
CB202	Circuit breaker	SW461-1
CR201	Rectifier	DD142-1
CR202	Rectifier	DD140
CR203	Same as CR202	
CR204	Diode	1N538
DS201 through DS204	Lamp: incandescent	BI110-9
F201	Fuse: quick-acting; 3 amp.	FU100-3
F202	Fuse: slow-blowing; 1 amp.	FU102-1
F203	Fuse: quick-acting; 2 amp.	FU100-2
J201	Connector	UG625B/U
J202	Connector	JJ175
J203	Connector	MS3102A-20-27P

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
J204	Same as J201	
K201	Relay	RL116DC3C24
K202	Relay: coaxial	RL139-4-110AC
L201 through L203	Coil: RF, fixed; 185 uH ±15 uH	CL178
L204	Coil: RF, fixed; 175 uH	CL10048
L205	Same as L201	
L206	Coil: RF, fixed; 220 uH ±10%	CL140-6
L207	Not used	
L208	Not used	
L209	Same as L206	
L210	Coil: RF; 50 uH	CL10013
L211	Same as L206	
L212	Same as L206	
M201	Meter	MR10005-2
R201	Resistor: wirewound; 2250 ohms, 5 W	RW107-41
R202	Resistor: wirewound; 1 ohm, 1 W	RW10006
R203	Same as R202	
R204	Resistor: fixed, wirewound; 25 ohms, 25 W	RW111-6
R205	Same as R204	
R206	Resistor: fixed, composition; 3.3 ohms ±5%, 1 W	RC32GF3R3J
R207	Resistor: fixed, composition; 18 ohms ±5%, 2 W	RC42GF18OJ
R208 through R215	Resistor: fixed, wirewound; 15 Kohms, 20 W	RW110-35
R216	Not used	
R217	Resistor: fixed, composition; 1.2 Kohms ±5%, 1/2 W	RC20GF122J
R218	Resistor: fixed, composition; 1 Mohm ±5%, 1/2 W	RC20GF105J

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
R219	Not used	
R220	Resistor: fixed, composition; 10 Kohms ±5%, 1 W	RC32GF103J
R221	Resistor: fixed, composition 470 ohms ±5%, 1 W	RC32GF471J
S201	Not used	
S202	Not used	
S203	Switch: interlock	SW219
S204	Same as S203	
S205	Switch: rotary	SW120
S206	Switch: rotary, solenoid	SZ10007
S207	Switch: meter	SW10052
T201	Transformer	TF369
T202	Transformer	TF368
TB201	Terminal strip	TM100-5
V201	Tube: electronic	8163
V202	Same as V201	

TUNING MOTOR ASSEMBLY
A10782-1

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
B301	Motor: ac, reversible, synchronous; 10 rpm	MO136
R301	Resistor: variable, composition; 1.5 Kohms ± 10%	RV4NAYSD152A

LOADING MOTOR ASSEMBLY
A10782-2

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
B401	Motor: reversible, synchronous ac	MO10001
R401	Resistor: variable, composition; 1.5 Kohms ± 10%	RV4NAYSD152A

BANDSWITCH ASSEMBLY
A10788

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
CR501	Diode	1N538
L501	Coil: RF	CL10045
S501	Switch	SW218-B
S502	Solenoid	SZ10005

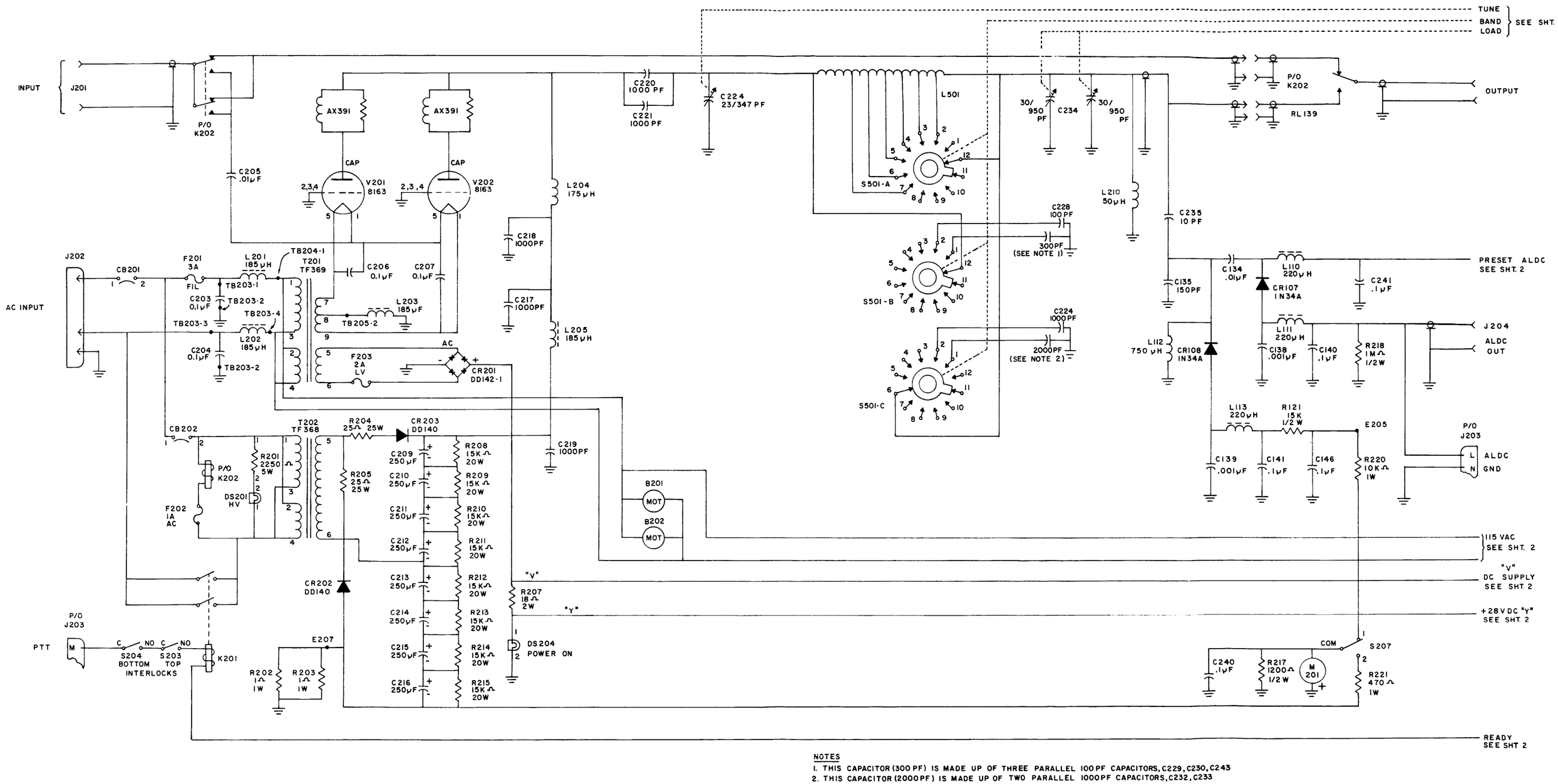
RESISTOR BOARD, LOADING
A10808-5

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
R601 through R604	Not used	
R605 through R612	Resistor: variable, composition; 5 Kohms, 1 W at 50°C	RV119-1-502C
R613 through R619	Not used	
R620	Resistor: variable, composition; 100 Kohms, 1/2 W at 50°C	RV119-1-104B

RESISTOR BOARD, TUNING
A10808-6

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
R701 through R704	Not used	
R705 through R712	Resistor: variable, composition; 5 Kohms, 1 W at 50°C	RV119-1-502C

SECTION 7
SCHEMATIC DIAGRAMS



NOTES

1. THIS CAPACITOR (300 PF) IS MADE UP OF THREE PARALLEL 100 PF CAPACITORS, C229, C230, C243
2. THIS CAPACITOR (2000 PF) IS MADE UP OF TWO PARALLEL 1000 PF CAPACITORS, C232, C233

FIGURE 7-1. SCHEMATIC DIAGRAM, LPA-1K, SHEET 1 OF 2

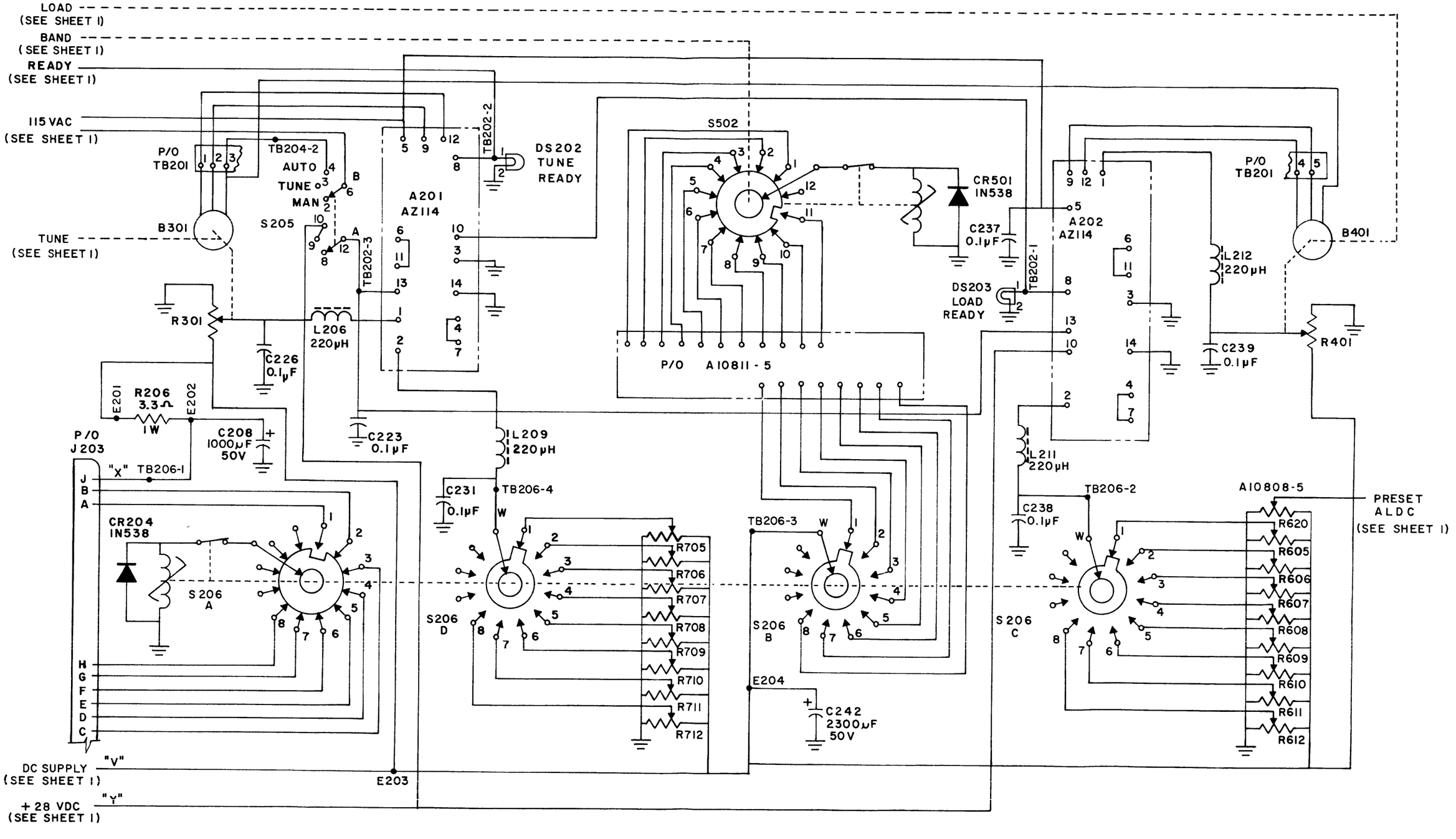


FIGURE 7-1. SCHEMATIC DIAGRAM, LPA-1K, SHEET 2 OF 2