DRAKE

MODEL

ML-2

Marker Luxury

Maxi-Vib

Instruction Manual

STANDARD WARRANTY

R. L. DRAKE COMPANY warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use, and service discloses such defect, provided the unit is delivered by the owner to us or to our authorized radio dealer or wholesaler from whom purchased, intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgement that it is thus defective. Should a malfunction be suspected, write in detail to our Service Department for suggestions concerning the operation, repair or return of your unit if it should prove necessary.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside our factory, nor in cases where the serial number thereof has been removed, defaced or changed, nor to units used with accessories not manufactured or recommended by us.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

The R. L. DRAKE COMPANY reserves the right to make any improvements to its products which it may deem desirable without obligating itself to install such improvements in its previously manufactured products.

R. L. DRAKE COMPANY

MIAMISBURG, OHIO 45342

ML-2 CORRECTIONS & PART CHANGES

In some ML-2's the following parts have been changed as noted below. In each case these parts are electrically interchangeable.

2SC460	changed to	2SC838
2SC458	" "	2SC945
2SC741	" "	2SC319
1S1555	" "	1S953
Diode 2007 or 207	"	RD-7A-M
Diode SR1EM1	" "	F-14A
Diode SR1EM8	" "	F-14D

ML-2 TRANSMIT & RECEIVE CRYSTALS

Crystals for your ML-2 are available from the R. L. Drake Company at a cost of $5.00 per crystal. Prior authorization must be obtained from the R. L. Drake Company before returning crystals for any reason.

Serial No. 10933

R. L. Drake Company
September 21, 1971

ML-2 MARKER LUXURY TRANSCEIVER

1. GENERAL DESCRIPTION

1.1 FEATURES

The ML-2 is a 2 meter VHF - FM Transceiver with a capacity for 12 channels and will operate from either 120 VAC 50 - 60 Hz or 13.5 VDC.

1.2 SPECIFICATIONS

1.2.1 GENERAL

Frequency Coverage: 144 - 148 MHz
Completely transistorized with a 6360 PA tube.

Number of Channels: 12 channels, 3 supplied.

	Channel 1	Channel 2	Channel 3
Receive:	146.94 MHz	----------	146.76 MHz
Transmit:	146.34 MHz	----------	146.34 MHz
Simplex:	----------	146.94 MHz	----------

Modulation: Frequency Modulation

Transmitter Control: Push-to-talk

Power Drain:

	A.C.	D.C.
Receive:	6 watts	0.5 amps
Transmit:	50 watts	4.0 amps

Power Source: A.C. 120 Volts, 50 - 60 Hz.
D.C. 13.5 Volts, ± 10%

Dimensions: 7-7/8" W x 2-3/4" H x 10-1/4" D

Weight: 8-1/4 pounds.

Accessories Supplied: Dynamic Microphone,
~~Antenna,~~
~~Antenn~~a Connector Plug,
AC/DC Power Cord,
Speaker Plug,
Mobile Mounting Bracket.

1.2.2 RECEIVER

Receiver Circuit:	Completely transistorized crystal controlled double conversion superheterodyne.
1st I.F. Frequency:	10.7 MHz
2nd I.F. Frequency:	455 kHz
Antenna Input Impedance:	50 to 75 ohms
Sensitivity:	0.5 microvolt or less for 20 dB quieting. 1 microvolt or less (30 dB S + N/N ratio at 10 kHz deviation with 1 kHz modulation.
Spurious Sensitivity:	Greater than - 60 dB
Audio Output:	0.5 watt at 10% or less distortion

1.2.3 TRANSMITTER

RF Output Power:	10 watts conservative
Frequency Deviation:	Adjustable to 15 kHz maximum. Factory set to 5 kHz
Frequency Stability:	± .001% or less.
Spurious Radiation:	Greater than - 80 dB below carrier.

2. INSTALLATION

2.1 UNPACKING

Carefully remove the Marker Luxury Transceiver from its carton and examine it closely for signs of shipping damage. Should any be apparent, notify the delivering carrier immediately stating the full extent of the damage. Fill out and mail the enclosed registration card so your warranty will be effective. Save the packing material. You may need it later for reshipment or storage.

Inspect the packing material closely before putting it away to be sure you have not overlooked the accessories packed with the unit.

2.2 LOCATION

In general, the location of the Marker Luxury is not critical. However, care should be taken to insure that space is provided around the unit to allow adequate air circulation. Extremely hot locations, such as near radiators or heating units, should be avoided. DO NOT cover the top of the unit with books, papers or pieces of equipment or overheating may result.

2.3 ANTENNA REQUIREMENTS

The Marker Luxury Transceiver is designed for use with antennas resonant on the operating frequency and having an impedance of 50 ohms. The antenna we supply must be adjusted to the operating frequency. Tools and a chart are supplied for this adjustment.

The antenna can be adjusted most accurately with a Drake WV-4 Wattmeter in the transmission line. With the WV-4 Wattmeter in the line, adjust the length of the antenna for minimum reverse power reading.

2.4 VERTICAL ANTENNAS

Vertical antennas without their ground planes should not be used with the ML-2. Omission of the ground plane causes excessive RF ground current on the ML-2 case resulting in RF feedback and reports of hum on the ML-2 transmitted signal.

2.5 POWER REQUIREMENTS

The Marker Luxury Transceiver is factory wired for use with 120 volts 50 - 60 Hz and 13.5 volts DC. For use on 120 volts, insert the power connector with the line cord attached, into the power plug on the rear of the transceiver. For use with 13.5 volts DC, insert the power connector with the red and black wires attached, into the power plug on the rear of the transceiver. The red wire is the positive lead and the black wire negative. The fuse in the positive lead has a value of 6 amperes. The 120 volt fuse has a value of 2 amperes.

2.6 SPEAKER AND HEADPHONE REQUIREMENTS

The Marker Luxury Transceiver has a built-in speaker. An external 8 ohm headphone or speaker may be plugged into the miniature phone jack on the rear of the transceiver chassis next to the R.F. output connector. Plugging an external speaker or headphone into this jack turns off the built-in speaker.

2.7 MICROPHONE REQUIREMENTS

A 500 ohm dynamic microphone with a push-to-talk switch is supplied with the Marker Luxury Transceiver. A carbon microphone may be used with the transceiver and connection to the microphone plug is shown in the schematic.

3. CONTROL FUNCTIONS

3.1 FRONT PANEL CONTROLS

3.1.1 ON-OFF SWITCH

The ON-OFF switch is a toggle switch in the left bottom of the front panel and turns the transceiver on when the switch lever is in the up position.

3.1.2 VOLUME

The AUDIO GAIN control is the inner knob of the concentric controls at the left top of the front panel. Clockwise rotation of this control increases audio gain.

3.1.3 SQUELCH

The SQUELCH control is the outer knob of the left top concentric front panel controls. Clockwise rotation increases the signal level required to defeat the squelch circuit and allow reception.

3.1.4 CHANNEL SELECTOR

The knob in the center of the front panel selects one of twelve possible transmit and receive crystal pairs.

3.2 INTERNAL CONTROLS

3.2.1 DEVIATION CONTROL

With the cover removed and front panel facing you, the transmitter circuit board is visible looking into the top of the transceiver. The final amplifier tube and relay are also exposed. The deviation control is the trimmer resistor at the right rear of the transmitter circuit board . This control is set by ourselves to 5 kHz deviation. Greater deviation than this can be obtained by counter-clockwise rotation of this control. Use an insulated screwdriver for this adjustment. Accidental connection between the deviation control and ground will destroy IC 201.

3.2.2 TRANSMITTER FREQUENCY ADJUSTMENT

With the front panel facing you and looking into the top of the transceiver, the transmitter crystals correspond to the channel numbers and are numbered right to left, 1 through 12. There are two banks of trimmer capacitors for frequency adjustment. The row closest to the front panel adjusts even numbered crystals right to left, 2 through 12. The row next to the sockets adjust odd numbered crystals right to left, 1 through 11.

3.2.3 RECEIVER FREQUENCY ADJUSTMENT

With the front panel facing you and looking into the bottom of the transceiver, the receiver crystals correspond to the channel numbers and are numbered right to left, 1 through 12. There are two banks of trimmer inductors for fre-

quency adjustment. The row closest to the front panel adjusts odd numbered crystals right to left, 1 through 11. The row next to the crystal sockets adjust even numbered crystals right to left, 2 through 12. The slugs are anchored with wax. Before adjusting the slugs, carefully melt the wax out of the coil.

The discriminator output for setting the receiver frequency is available at a terminal lug on the receiver circuit board. With the front panel facing you and the ML-2 upside down, the discriminator terminal is the far right lug on the circuit board edge closest to the front panel. This lug has nothing connected to it. Ground for a voltmeter connected to this lug is most convenient at the heat sink of the audio output transistors near the discriminator terminal.

Note that all circuit board grounds are NOT connected to the ML-2 chassis.

3.2.4 S-METER SENSITIVITY ADJUSTMENT

The S-METER response sensitivity is determined by the trim pot at the right rear of the receiver circuit board. The receiver board is the bottom front board in the transceiver.

3.2.5 RELATIVE RF OUTPUT METER ADJUSTMENT

The RELATIVE RF OUTPUT METER sensitivity is determined by the trim pot at the right rear of the power supply board. The power supply board is the bottom rear board in the transceiver.

4. CRYSTAL ORDERING INFORMATION

Accessory channel crystals may be ordered from the R. L. Drake Company. To order, specify the desired receive and transmitting frequency.

If you desire to order crystals from another source, the following information should accompany your order.

TRANSMIT CRYSTALS:
Fundamental mode parallel resonant with 30 pF load capacity in HC-25/U holder. Divide transmit frequency by 12 to obtain crystal frequency.

RECEIVE CRYSTALS:
Overtone mode series resonant in HC-25/U holder.
Subtract receive frequency by 10.694 MHz and divide by 3 to obtain crystal frequency.

5. TROUBLE SHOOTING

Careful consideration has been given to the design and testing of the ML-2 to keeping maintenance problems to a minimum. If you experience difficulty, we recommend that you return the unit to your Drake dealer or write direct to our Customer Service Department describing your problem in detail.

DO NOT RETURN EQUIPMENT TO THE FACTORY WITHOUT PRIOR AUTHORIZATION.

ML-2 ELECTRICAL PARTS

A. POWER SUPPLY

R301	Resistor	300	3W
R302	Resistor	.10	3W
R303	Resistor	5	3W WW
R304	Resistor	1K	1/4 W
R305	Resistor	330	1/4 W
R306,307	Resistors	470	1/4 W
R308	Resistor	470	1/2 W
C301	Capacitor	1000 uf	25 V Electrolytic
C302	Capacitor	100 uf	16 V Electrolytic
C303,304,310	Capacitors	47 uf	16 V Electrolytic
C305	Capacitor	.047 uf	400 V Oil
C306,307	Capacitors	.005 / .01	500 V Ceramic
C308,309	Capacitors	60 uf	160 V Electrolytic
C311,312,313	Capacitors	.001 uf	50 V Ceramic
C314	Capacitor	.01 uf	500 V Ceramic
Q301,302,303	Transistors	2 SB 337	
Q304	Transistor	2 SC 460	
D301,302,306	Diodes	SEIEM 1	
D303,304	Diodes	SEIEM 8	
D305	Diode	MZ207	
PL301	Pilot Lamp	18 V	
S301	Switch	AC Power DPST	
T301	Transformer	Power	
J301	Connector, Plug	12 P Power	
P301	Connector, Socket	12 P DC	
P302	Connector, Socket	12 P AC	
F301	Fuse	2 amp	
F302	Fuse	6 amp	

B. TRANSMITTER

R201,205,207,208,216, 219,222,228	Resistors	1 K Ohms
R225	Resistor	100 Ohms
R202,215	Resistors	47 K
R203	Resistor	330 Ohms
R204	Resistor	100 K or 220 K
R206	Resistor	33 K
R210	Resistor	3.3 K
R213,214,220,223,227	Resistors	10 K
R217	Resistor	82 K
R218	Resistor	4.7 K
R221,224	Resistors	150 Ohms
R226	Resistor	10 Ohms
R231	Resistor	1.5 K
R209	Resistor	470 Ohms
R211	Resistor	330 Ohms
R229,212	Resistors	10 K
R230	Resistor	20 K
R232	Resistor	12 K
VR201, 202	Resistors	10 K Variable
C202,219,237,250,260,261,262, 263,252,253,254,255	Capacitors	.01 W Ceramic
C204,212,210	Capacitors	.1 u Ceramic or Mylar
C213,223,225,230,235,236,238, 239,242,231,256,257	Capacitors	.001 W Ceramic
C214,215	Capacitors	500 pf Ceramic
C216,217	Capacitors	200 pf Ceramic
C218	Capacitor	60 pf Ceramic
C220,233,241	Capacitors	5 pf Ceramic
C221,228	Capacitors	80 pf Ceramic
C222	Capacitor	300 pf Ceramic
C224	Capacitor	15 pf Ceramic
C226,229	Capacitors	2 pf Ceramic
C227	Capacitor	20 pf Ceramic
C232,249	Capacitors	1 pf Ceramic
C234	Capacitor	10 pf Ceramic
C243,244	Capacitors	.001 or .005 W Ceramic
C257	Capacitor	7.5 pf N750
258	Capacitor	33 pf Ceramic
C259	Capacitor	25 pf Ceramic
C245,246	Capacitors	50 pf Ceramic

ML-2 ELECTRICAL PARTS

B. TRANSMITTER

C247	Capacitor	100 pf Ceramic
C248, C264 thru 275	Capacitors	7 pf Ceramic
C201, 203, 211	Capacitors	.5 uf 10 V Alum.
C205, 207, 208	Capacitors	4.7 W 16 V Elect.
C206	Capacitor	10 W
C209	Capacitor	33 W
C240	Capacitor	100 W
VC201 thru 214	Capacitors, Var.	50 pf
VC215	Capacitor, Var.	20 pf x 2
Q201, 202, 203	Transistors	2SC460
Q204	Transistor	2SC717
Q205	Transistor	2SC741
IC201	IC	LA1201
D201	Diode	1N60
D202	Diode	MZ207
D203	Diode	SC20
V201	Tube	6360
F201	L.P. Filter	LPF
J201	Jack, Mic.	4-pin
CH201	Choke, Iron 80 mH	
L201 thru 205	Choke, RF	
LC201 thru 209	Coil, RF	

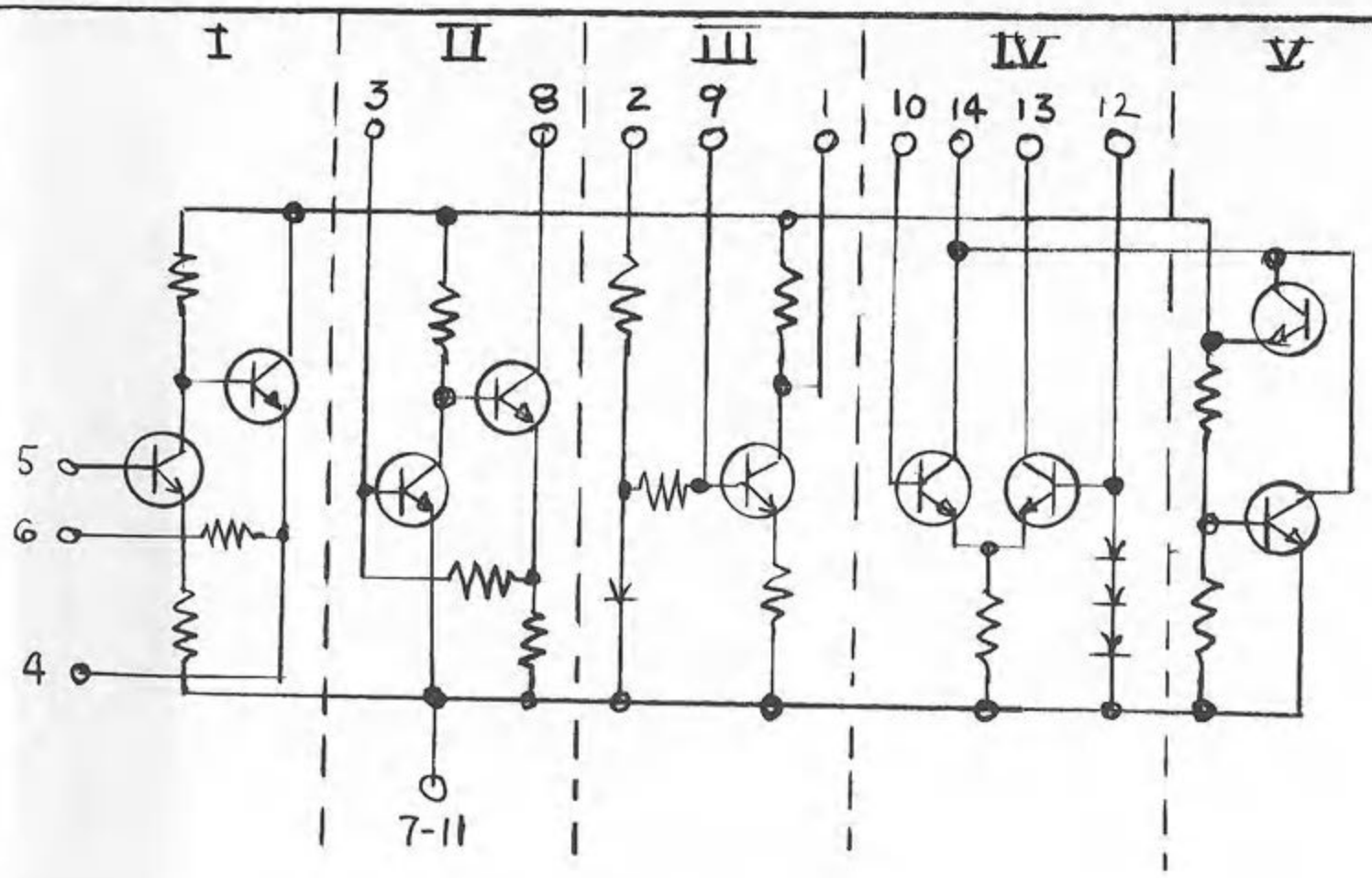
C. RECEIVER

R101,102,116,115,133	Resistors	100 K
R103,126,130,150,158	Resistors	22 K
R104,105,122,134,141,149	Resistors	4.7 K
R106,107,109,112,114,145	Resistors	100 u
R108,111,124,142,147,151,154,159, 118,and 180 thru 191	Resistors	1 K u
R110,121	Resistors	330 u
R113	Resistor	620 u
R119,123,140	Resistors	33 K
R125,143,160	Resistors	470 u
R127,128,135,137,153	Resistors	47 K
R129,136,144,155,161	Resistors	10 K
R131	Resistor	470 K
R132	Resistor	220 K
R138,139	Resistor	82 K
R148	Resistor	10 u
R152,120,117,157	Resistors	3.3 K
R156	Resistor	1.5 K
R146	Resistor	50 u
VR101	Resistor,Var.	10K x 2
VR102	Resistor,Var.	10K x 2
C101,102A and D,107,108,109,113, 110,133,134,171,142,172,135,256, 257, 111	Capacitors	.001
C103,104,112,116,118	Capacitors	1.0 pf
C121	Capacitor	25 pf
C106,259	Capacitors	25 pf
C105	Capacitor	3.0 pf
C169,120	Capacitors	2.0 pf
C115,117,119,122,124,125, 129,130,127, 126,140,141,172, 149,128,158,143,150,166,167,164, 144.	Capacitors	.01 u
C123	Capacitor	10 pf
C135	Capacitor	200 pf
C134,136,138,139,165	Capacitors	.04 u
C145,146	Capacitors	330 pf
C147,153,163	Capacitors	100 pf
C148	Capacitor	.005 u
C258	Capacitor	33 pf

ML-2 ELECTRICAL PARTS

C. RECEIVER

VC101	Capacitor, Var.	50 pf
C162	Capacitor,	500 pf
C160	Capacitor	47 u
C131	Capacitor	.5 u
C151	Capacitor	150 pf
C152,156	Capacitors	4.7 u
C154	Capacitor	1.0 u
C155,159	Capacitors	.1 u
C157	Capacitor	10 u
C161	Capacitor	47 u
Q101,103,105,106	Transistors	2SK19/33
Q102	Transistor	3SK22
Q108,109,107	Transistors	2SC460
Q110,111,112,113,114	Transistors	2SC458
Q104	Transistor	2SC717
Q115,116	Transistors	2SB77
IC101	I.C.	LA1201
D101,102,103,104,107,108,109,110	Diode	1N60
D105,106	Diode	IS1555 or IS953
F101	Filter	455 kHz
X101	Crystal	10.245 MHz
T101	Transformer	10 K : 2 K input
T102	Transformer	400 ohm : 8 ohm output
J101	Jack, Speaker	
SP101	Speaker	8 ohm



I C FUNCTION

Receiver (IC101)

Section I - Emitter follower driving meter amp (Q109) and Sections II and III in IC.

Section II - Amplifier driving Section IV.

Section III - AVC amplifier for receiver front end.

Section IV - Limiter

Section V - Voltage regulator for Sections I, II and III. Section IV not regulated.

Transmitter (IC 201)

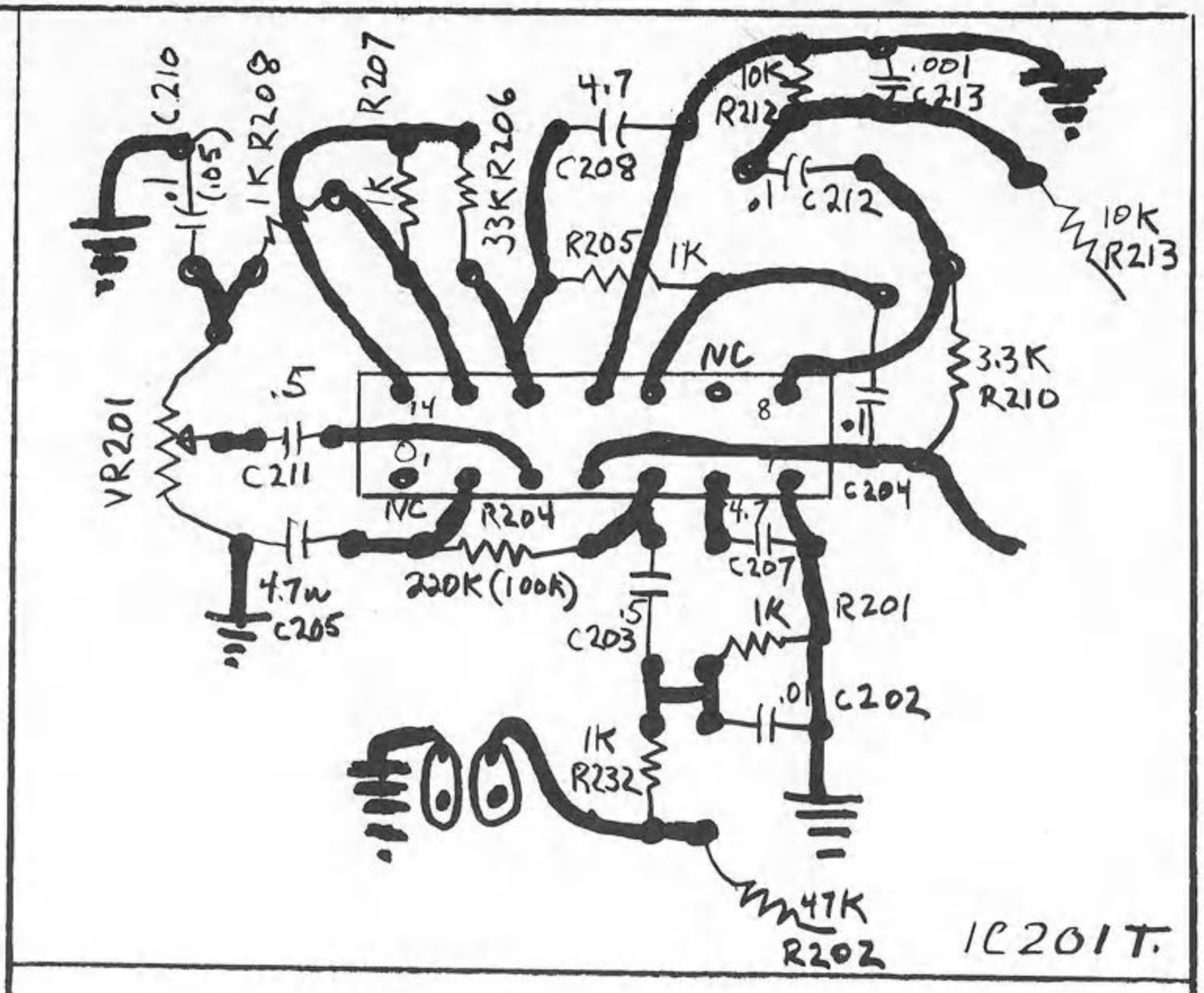
Section I - Microphone amplifier feeding Section IV.

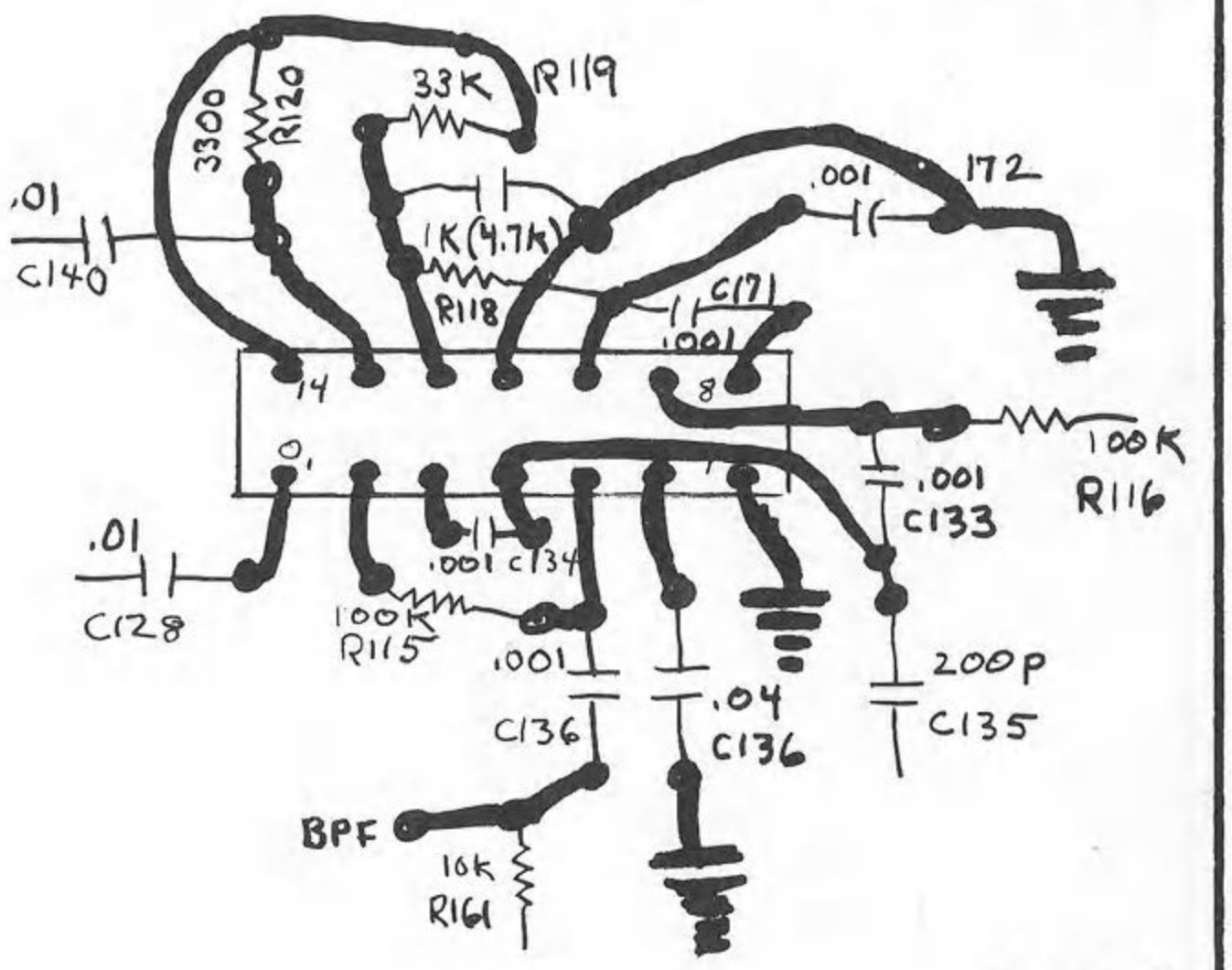
Section IV - Amplifier stage fed by Section I, output of IV goes to deviation pot. then to input of II.

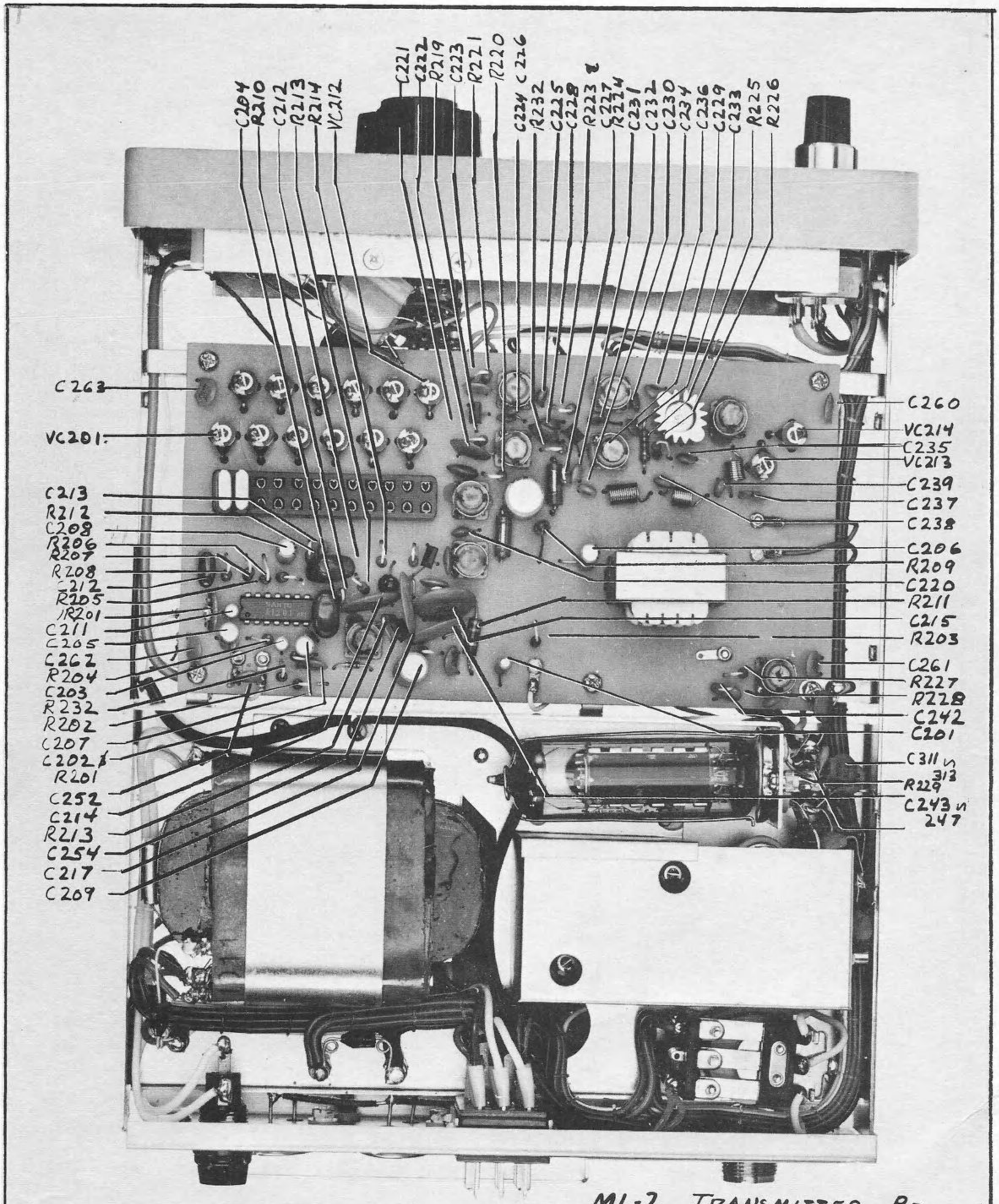
Section II - Amplifier stage fed by IV thru deviation pot, output feeds modulator.

Section III - Not used.

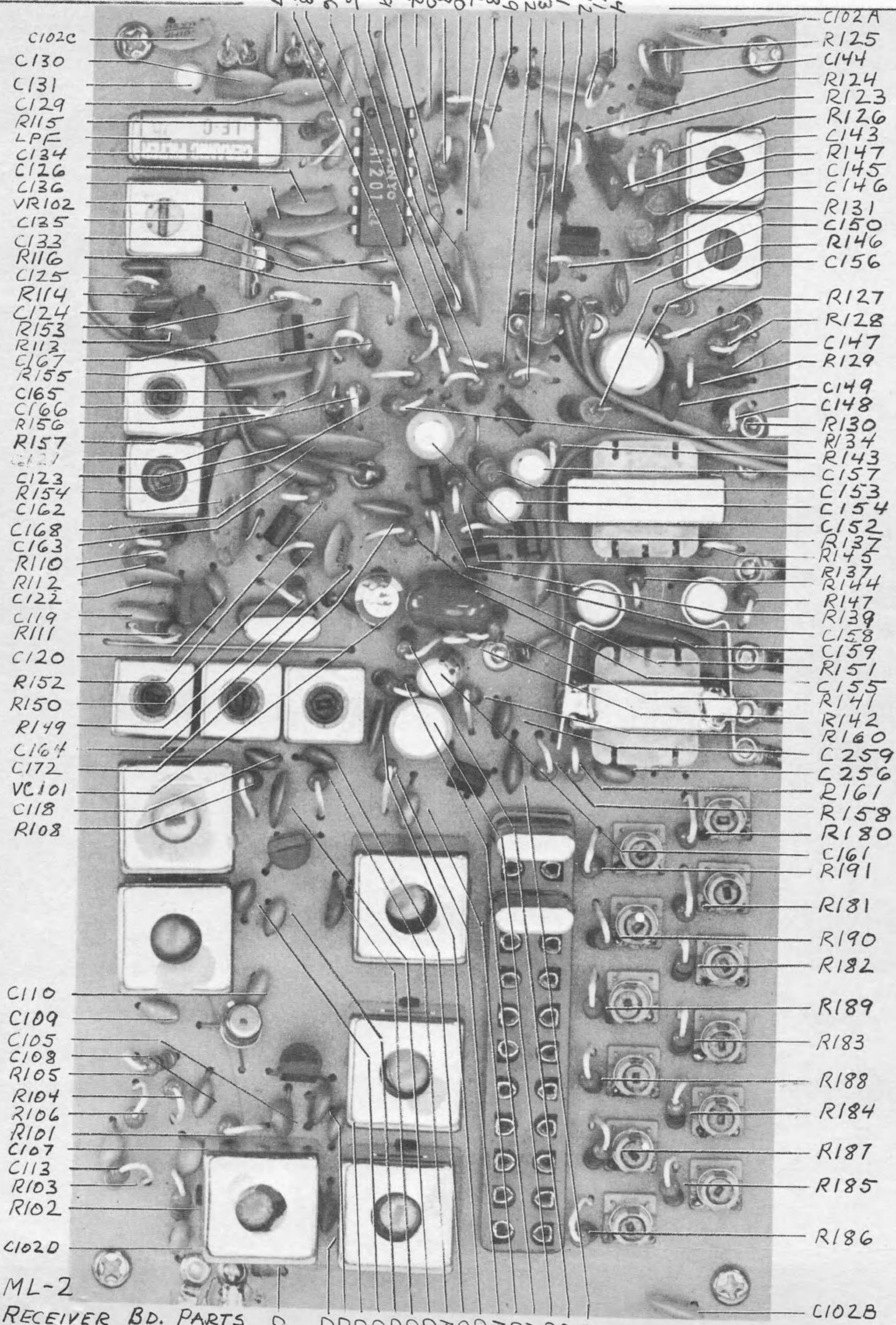
Section V - Regulator for I and II.





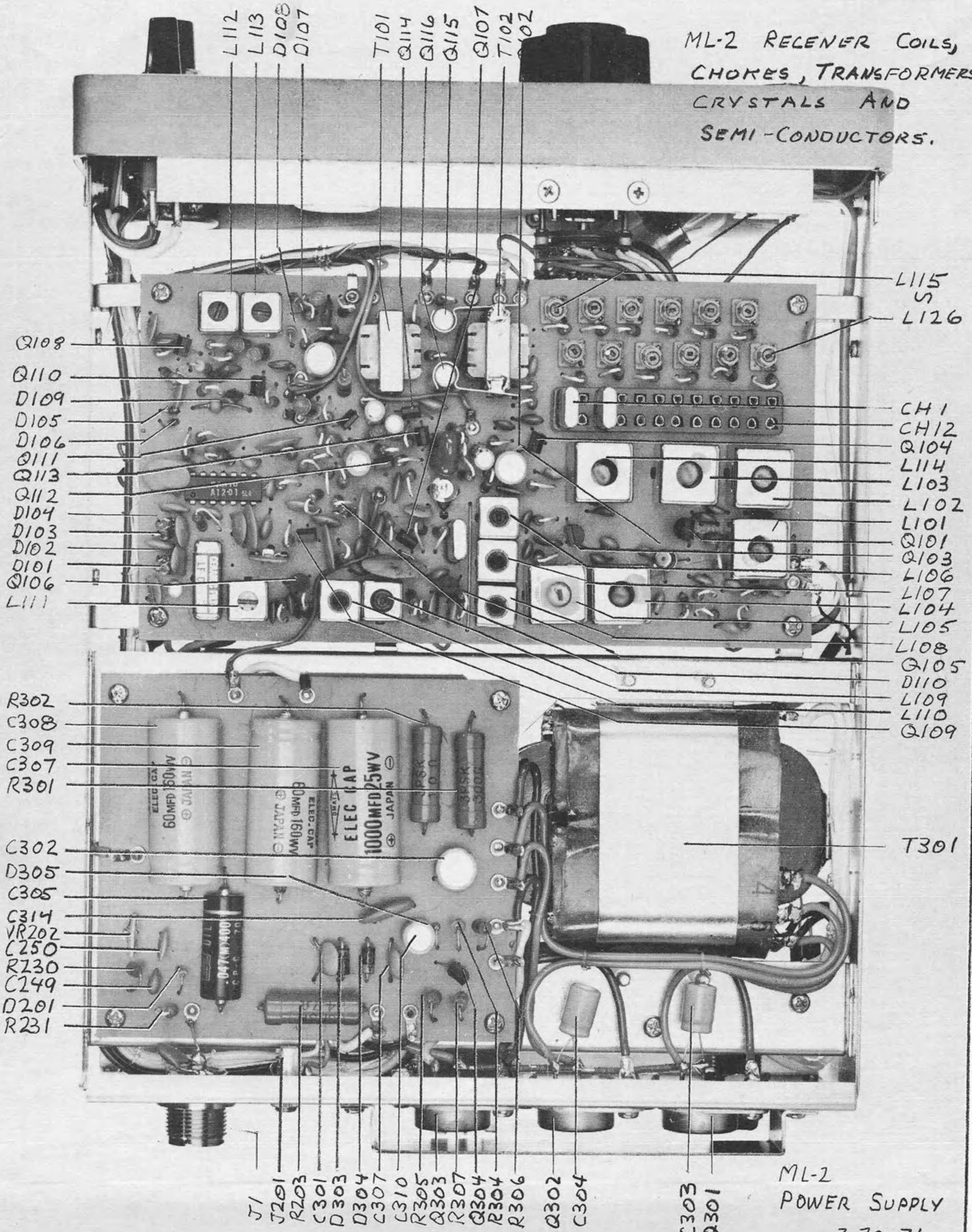


ML-2 TRANSMITTER BD
RESISTORS & CAPACITORS.

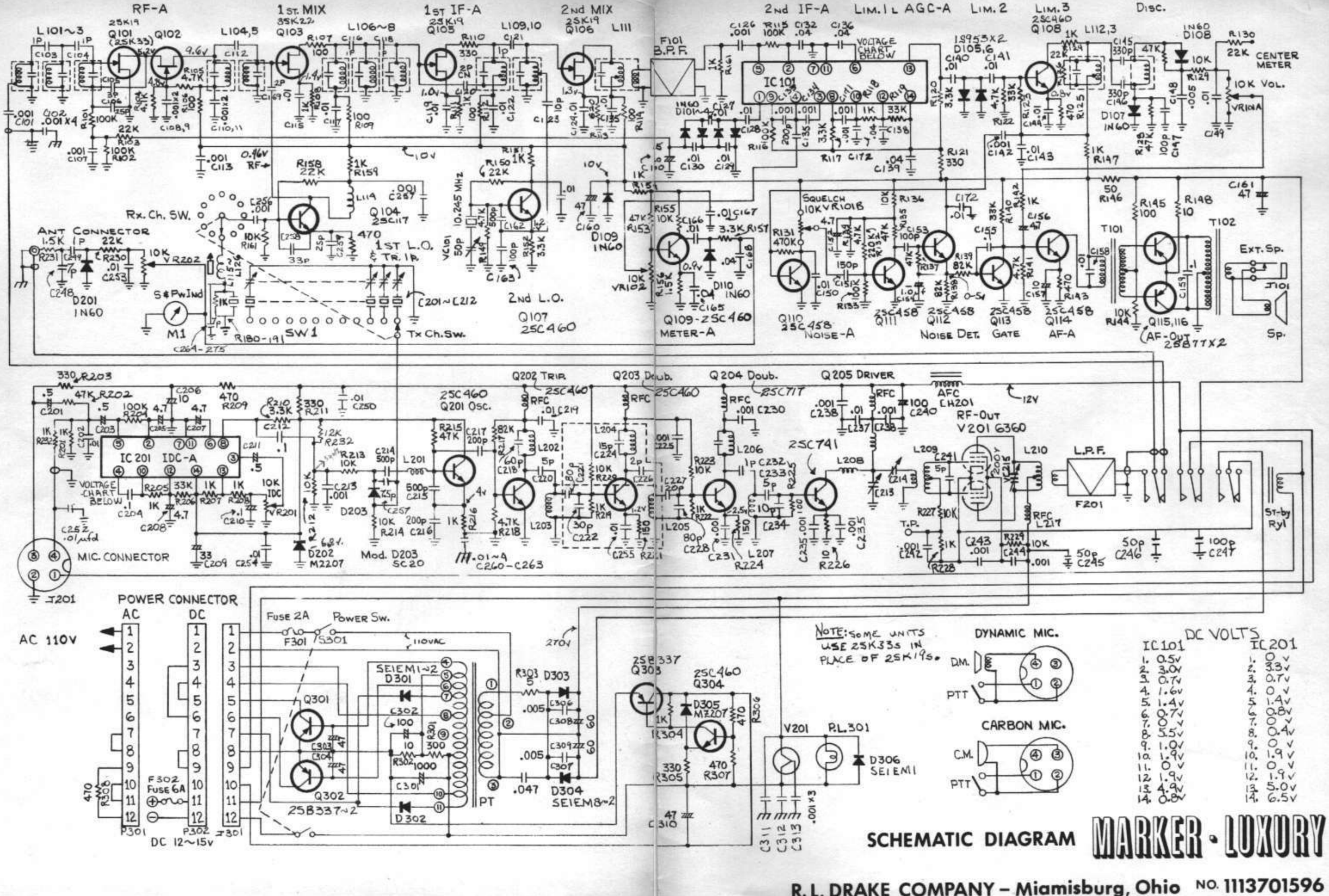


ML-2
RECEIVER BD. PARTS

ML-2 RECENER COILS, CHOKES, TRANSFORMERS, CRYSTALS AND SEMI-CONDUCTORS.



ML-2
POWER SUPPLY
7-20-71



DC VOLTS

	IC101	IC201
1.	0.5v	0 v
2.	3.0v	3.3v
3.	0.7v	0.7v
4.	1.6v	0 v
5.	1.4v	1.4v
6.	0.7v	0.8v
7.	0 v	0 v
8.	5.5v	0.4v
9.	1.0v	0 v
10.	1.9v	1.9 v
11.	0 v	0 v
12.	1.9v	1.9 v
13.	4.9v	5.0v
14.	0.8v	6.5v

SCHEMATIC DIAGRAM

MARKER • LUXURY

R. L. DRAKE COMPANY – Miamisburg, Ohio NO. 1113701596