

ML-2 MARKER LUXURY TRANSCEIVER

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6. SCHEMATIC FOR ML-2	Fold Out

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, $\pm 10\%$

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,~~
Antenna 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:

$\pm$.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	

ML-2 ELECTRICAL PARTS

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	

ML-2 ELECTRICAL PARTSC. 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



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.

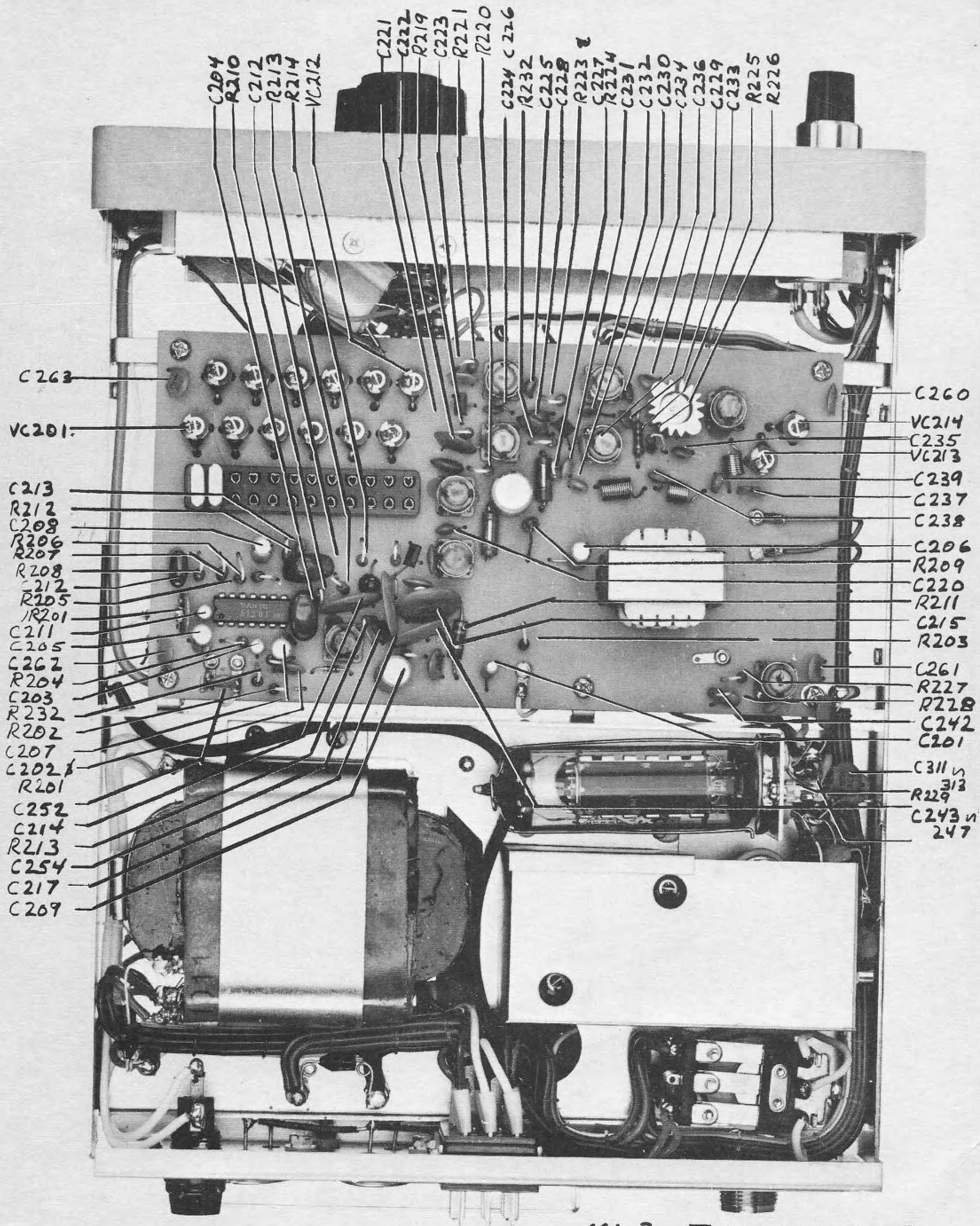
Section IV - Amplifier stage fed by Section I, output of IV goes to deviation pot. then to input of II.

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.

C102C
 C130
 C131
 C129
 R115
 LPF
 C134
 C126
 C136
 VR102
 C135
 C133
 R116
 C125
 R114
 C124
 R153
 R113
 C167
 R155
 C165
 C166
 R156
 R157
 C121
 C123
 R154
 C162
 C168
 C163
 R110
 R112
 C122
 C119
 R111
 C120
 R152
 R150
 R149
 C164
 C172
 VC101
 C118
 R108

C110
 C109
 C105
 C108
 R105
 R104
 R106
 R101
 C107
 C113
 R103
 R102

C102D

ML-2
 RECEIVER BD. PARTS

R124
 C141
 C142
 C151
 R133
 R132
 R119
 R138
 C172
 R120
 R118
 C140
 C132
 C171
 C139
 R117
 R135
 R136
 C128
 R121
 C127

C101
 C103
 C104
 C112
 C111
 C109
 C115
 R107
 C116
 C112
 R154
 C257
 R109
 C160
 R140
 C208

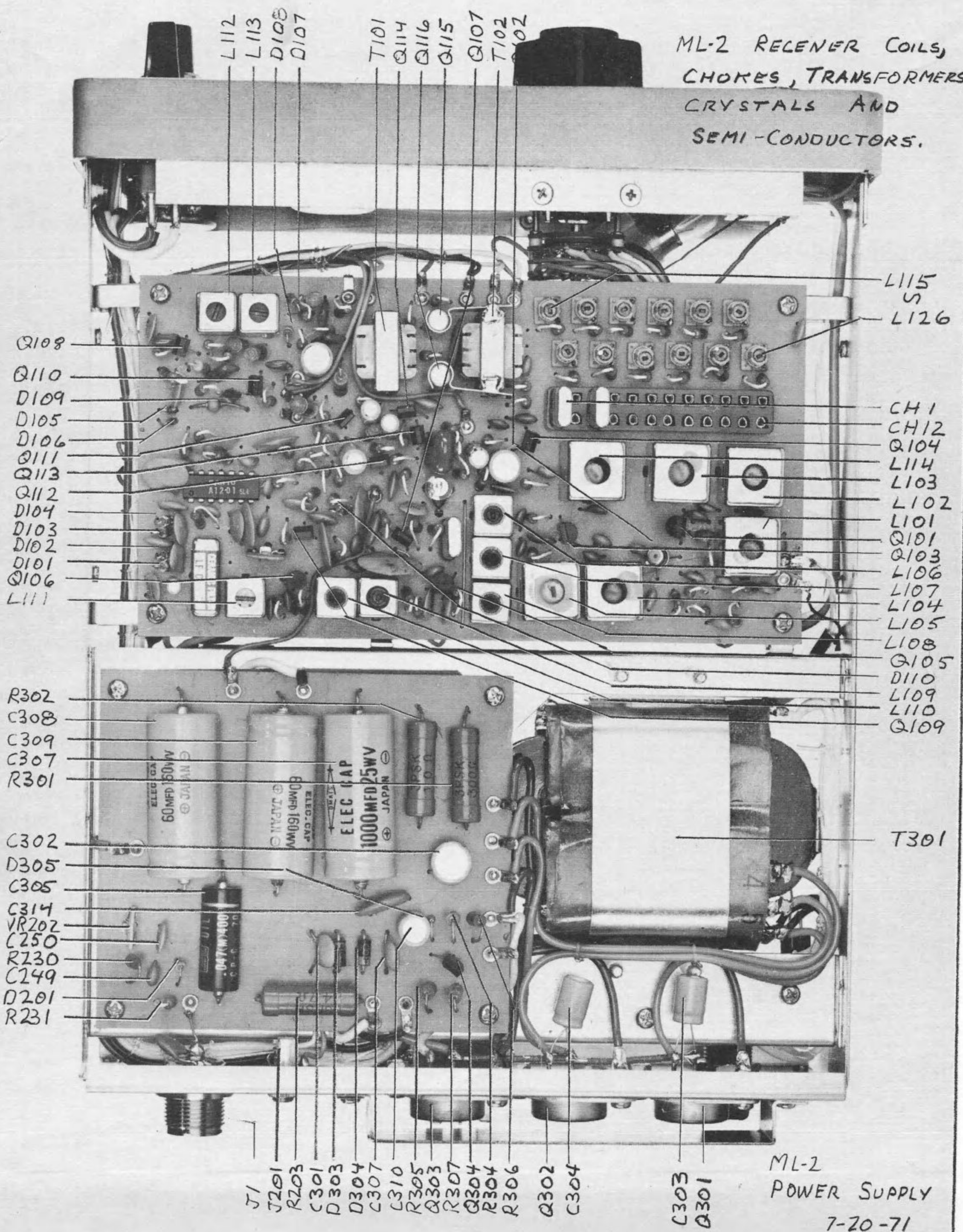
C102A
 R125
 C144
 R124
 R123
 R126
 C143
 R147
 C145
 C146
 R131
 C150
 R146
 C156

R127
 R128
 C147
 R129
 C149
 C148
 R130
 R134
 R143
 C157
 C153
 C154
 C152
 R137
 R145
 R137
 R144
 R147
 R139
 C158
 C159
 R151
 C155
 R141
 R142
 R160
 C259
 C256
 R161
 R158
 R180
 C161
 R191

R181
 R190
 R182
 R189
 R183
 R188
 R184
 R187
 R185
 R186

C102B

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



ML-2
POWER SUPPLY
7-20-71

