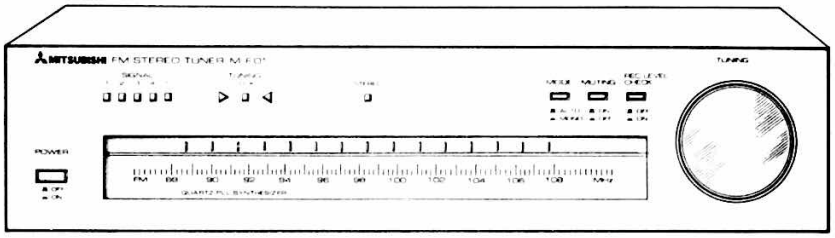
MITSUBISHI
AUDIO SYSTEMS

SERVICE MANUAL

FM STEREO TUNER

MODEL M-F01



CONTENTS

MELCO SALES INC.

3030 East Victoria Street Compton, California 90221

SPECIFICATIONS

Circuit system	Quartz PLL synthesizer system MOS FET, 5-gang variable capacitor 4-pole linear phase filter PLL MPX with carrier canceller Built-in oscillator for off-air recording
Sensitivity	Less than 10.3 dBf (1.8 μV)
Image interference ratio	More than 110 dB
IF interference ratio	More than 110 dB
Spurious interference ratio	More than 100 dB
Frequency response	30 Hz to 16 kHz (±1 dB)
Signal-to-noise ratio	Monaural: Better than 80 dB Stereo: Better than 77 dB
Capture ratio	Less than 1.0 dB
Selectivity	More than 70 dB
AM suppression ratio	More than 65 dB
Total harmonic distortion	Monaural: 1 kHz, less than 0.08% Stereo: 1 kHz, less than 0.1%
Stereo separation	Better than 50 dB at 1 kHz
Output level/output Impedance	FIXED: 150 mV/5 kohms VARIABLE: 0 to 500 mV/5 kohms
Semiconductors	7 ICs, 5 FETs, 45 transistors 27 diodes
Power consumption	11 W
Dimensions	270(W) x 70(H) x 249(D) mm
Weight	Approx. 3.5 kg

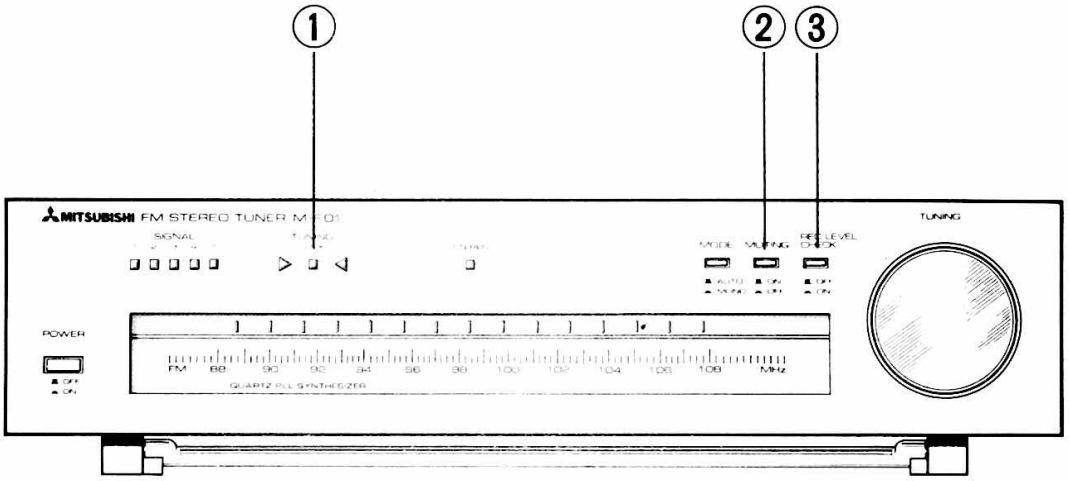
* Specifications and design subject to change without notice for improvement.

FRONT PANEL

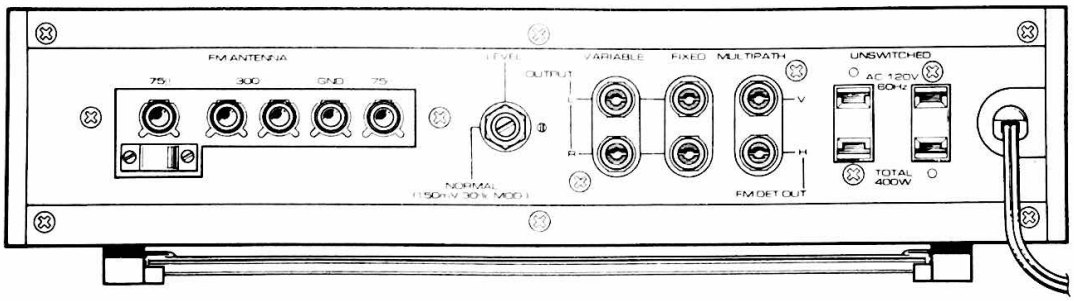
① TUNING indicator
Tune in the station so that the center green LOCK indicator only comes on.

② MUTING switch
When this switch is depressed to the ON position (■), the interstation noise will be suppressed and you will find it easier to tune in the desired station. However, release the switch (OFF position) (▮) when tuning in weak-signal stations where the sensitivity is insufficient for normal listening.

③ AIR CHECK (off-air recording) switch
When this switch is depressed to the ON position (■), a continuous signal with a 440 Hz level, equivalent to FM 50% modulation, will be supplied. Use the switch for setting the recording level when you intend to record a program off the air.



REAR PANEL



ADJUSTMENTS

1. Front end adjustments

1) Connect the FM-SG output to the FM-ANT terminal of the stereo tuner. Take the output from pin (34) of PWB AFT-29, and connect a electronic voltmeter.
2) Set the tuning pointer of the tuner to the lowest frequency, and set the SG frequency to 87.5 MHz. Adjust the L5 local oscillator coil so that only the center tuning indicator lamp comes on.
3) Set the tuning pointer of the tuner to the highest frequency, and set the SG frequency to 109 MHz. Now adjust the CT5 trimmer capacitor so that only the center tuning indicator lamp comes on.
4) Set the tuning pointer to 88 MHz and set the SG frequency to 88 MHz. Adjust L1, L2 and L4 so that the electronic voltmeter's indication is brought to its maximum.
5) Set the tuning pointer to 109 MHz and set the SG frequency to 109 MHz. Adjust CT1, CT2, CT3 and CT4 so that the electronic voltmeter's indication is brought to its maximum.

* **Simple adjustment method**

Tune in a broadcasting station with as a high a frequency as possible, and connect a tester to pin (34) of the PWB AFT-29. Now adjust front trimmers CT1, CT2, CT3 and CT4 so that the deflection of the tester's pointer is brought to its maximum. Now tune in a broadcasting station with as low a frequency as possible, and adjust coils L1, L2, L3 and L4 so that the deflection of the tester's pointer is brought to its maximum.

2. MPX (multiplex) adjustment

Connect a frequency counter to TP (14) of PWB AFT-29 and connect pin 2 of IC3 (HA11223) to ground. Adjust VR301 so that the readout on the frequency counter is 76 kHz ±76 Hz.

* **Simple adjustment method**

Tune in a station broadcasting in stereo, with the VR301 semi-fixed variable resistor at its leftmost position, rotate it to the right and memorize the position where the stereo indicator comes on. Next, with the same variable resistor at its rightmost position, rotate it to the left and memorize the position where the stereo indicator comes on. Adjust VR301 so that the indicator comes on exactly midway between the two positions which have been memorized.

3. Carrier canceller circuit adjustment

Connect a stereo modulator to the SG. Adjust VR302 so that the leakage into the 19 kHz signal output is brought to its minimum for both the left and right channels.

4. Stereo separation adjustment

Connect the stereo modulator to the SG. Adjust VR403 so that the leakage from the left channel into the right channel and from the right channel into the left channel is brought to its minimum.

5. Off-air recording oscillator adjustment

Extract a 1 kHz, 50% modulated, 65 dB output signal from the SG. Adjust VR402 so that the demodulation level of the signal and the level of the off-air recording oscillator are made equal.

6. Signal indicator adjustment

Set the input voltage of the tuner to 65 dB (release voltage), and now adjust VR101 so that all five signal indicators come on.

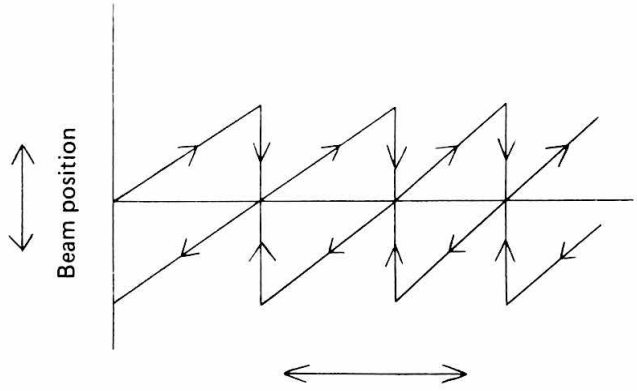
7. Discriminator transformer adjustment (simple method)

Tune in a station which is broadcasting on a multiple of 100 kHz, and adjust the primary (T4) of the discriminator transformer so that the voltage across pin (12) and pin (15) of IC2 (HA11211) is set to zero.

8. PLL DC bias adjustment

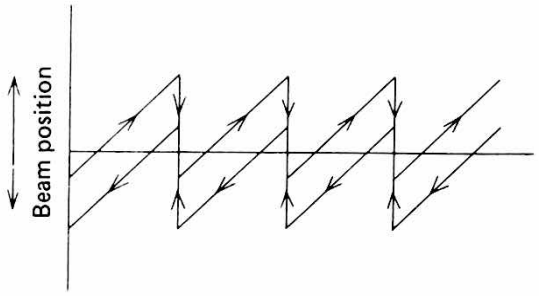
Set the tuner so that it is not receiving signals. Now connect an oscilloscope to test point TP(3), and adjust the vertical position control knob so that the trace (beam) is aligned with the center scale line on the CRT. Now connect the oscilloscope to test point TP(2), rotate the tuning knob to the left or right, and adjust VR201 so that the trace is brought near the center scale line on the CRT as illustrated in the figure below.

PLL DC bias adjustment figure

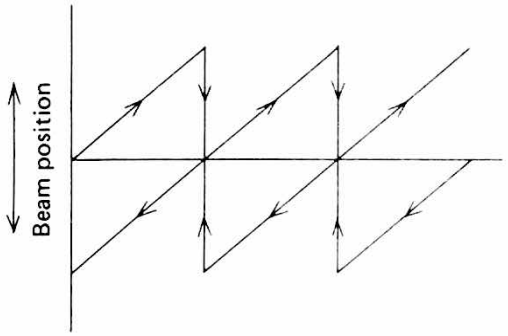


9. PLL loop gain adjustment

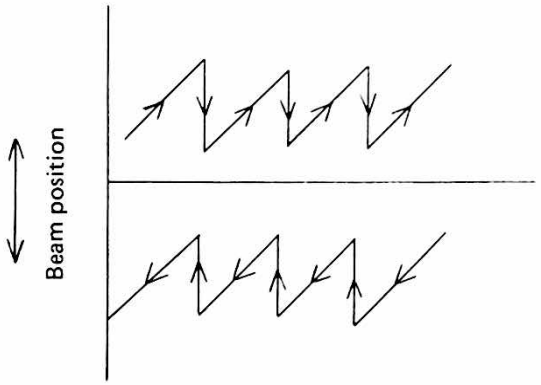
When VR202 is rotated counterclockwise, the loop gain decreases. Conversely, when it is rotated clockwise, it increases. Connect an oscilloscope to the test point TP(2), rotate the tuning knob to the left or right, and adjust VR202 so that the trace approaches the center scale line on the CRT as illustrated in the figures below.



Loop gain is too low

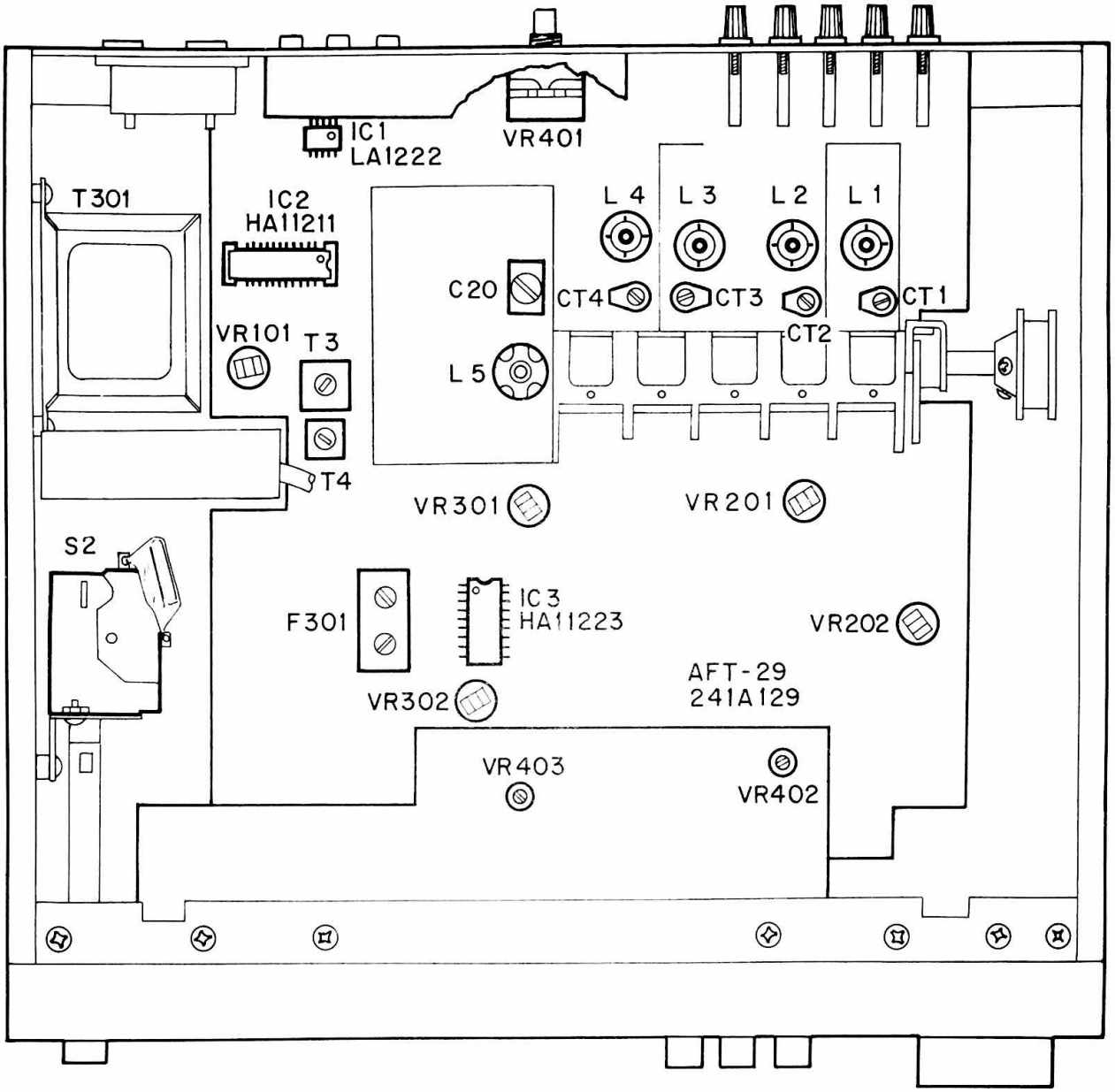


Correct loop gain

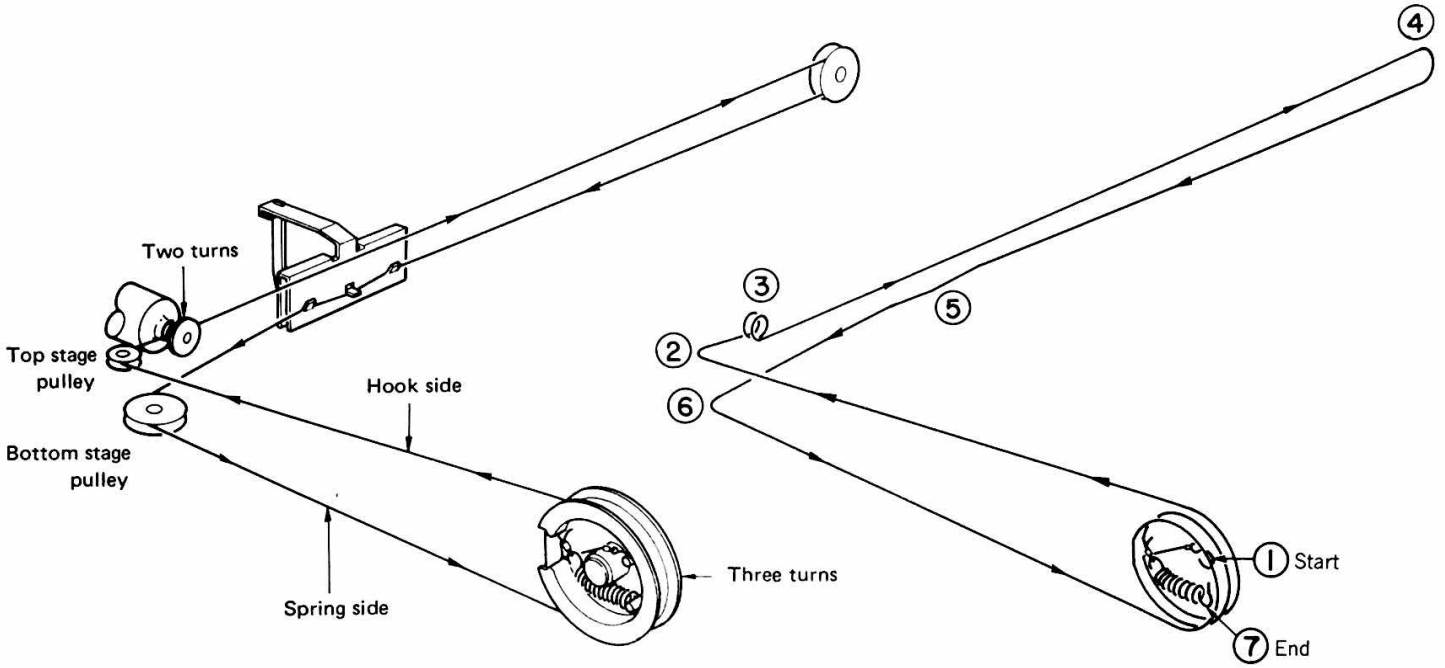


Loop gain is too high

PARTS LOCATION



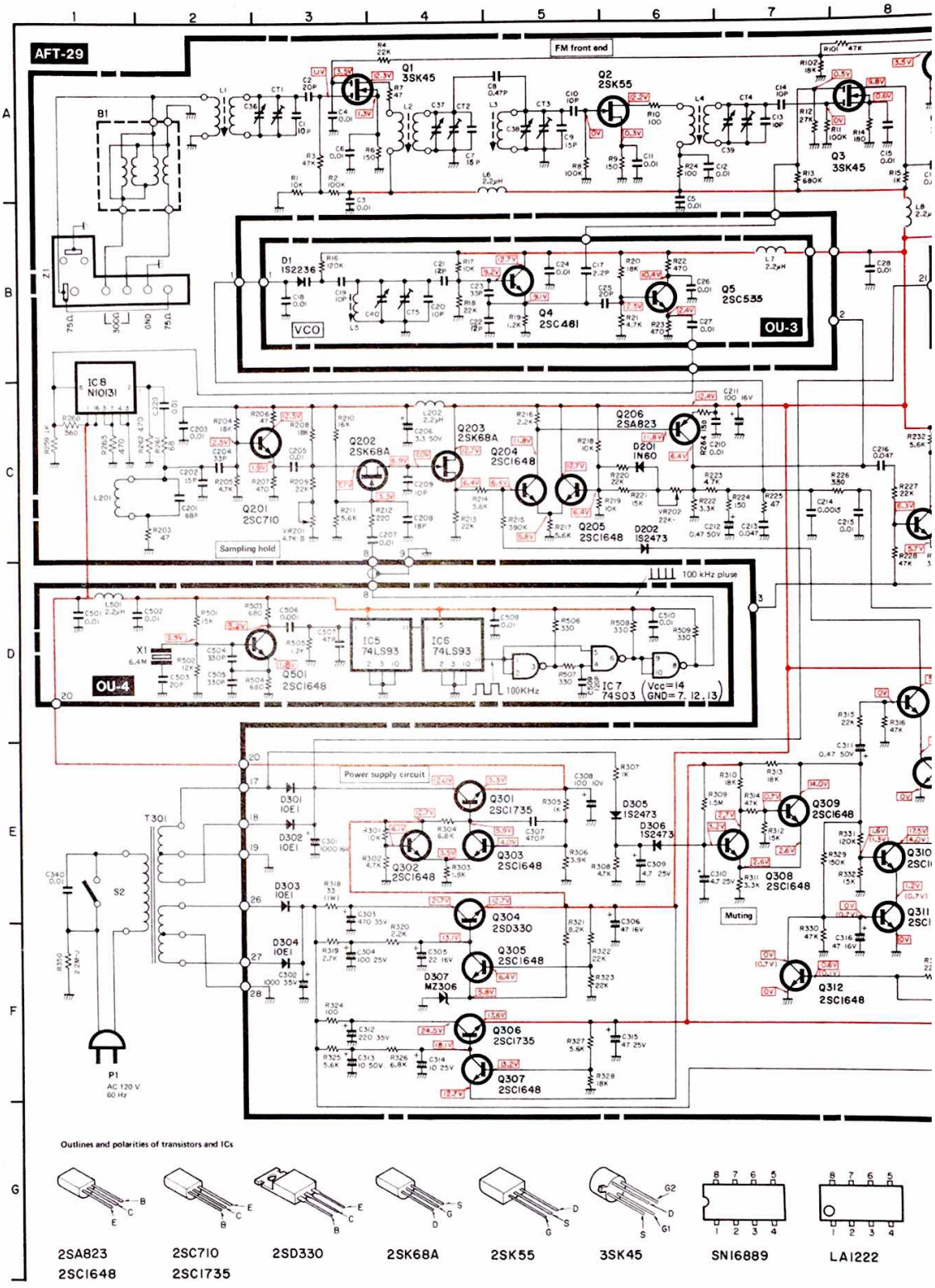
DIAL THREAD WINDING FIGURE

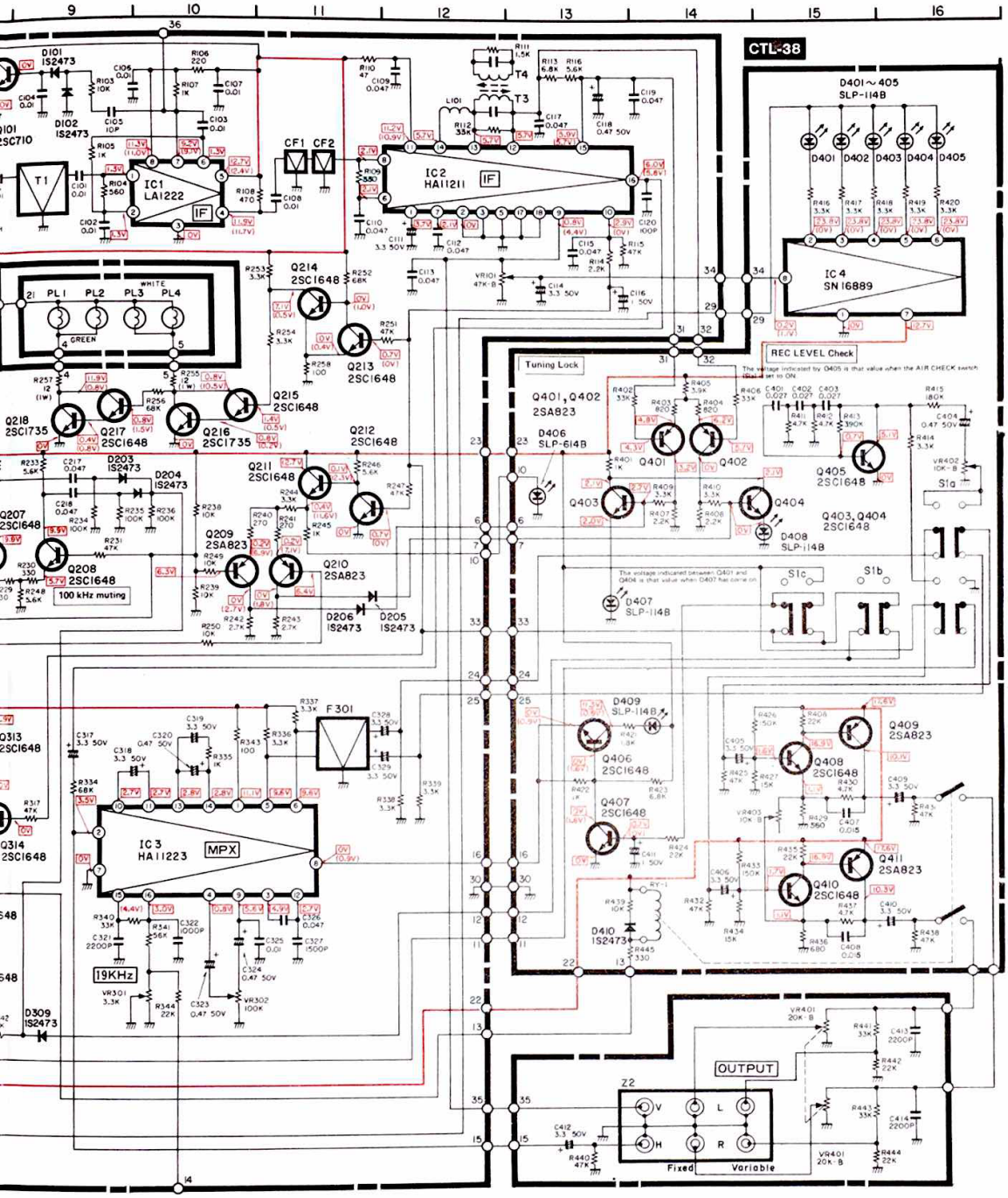


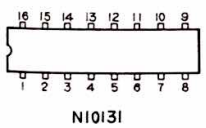
Wind the dial thread at the position where the frequency is at its maximum (minimum variable capacitor capacitance).

MEMO

SCHEMATIC DIAGRAM





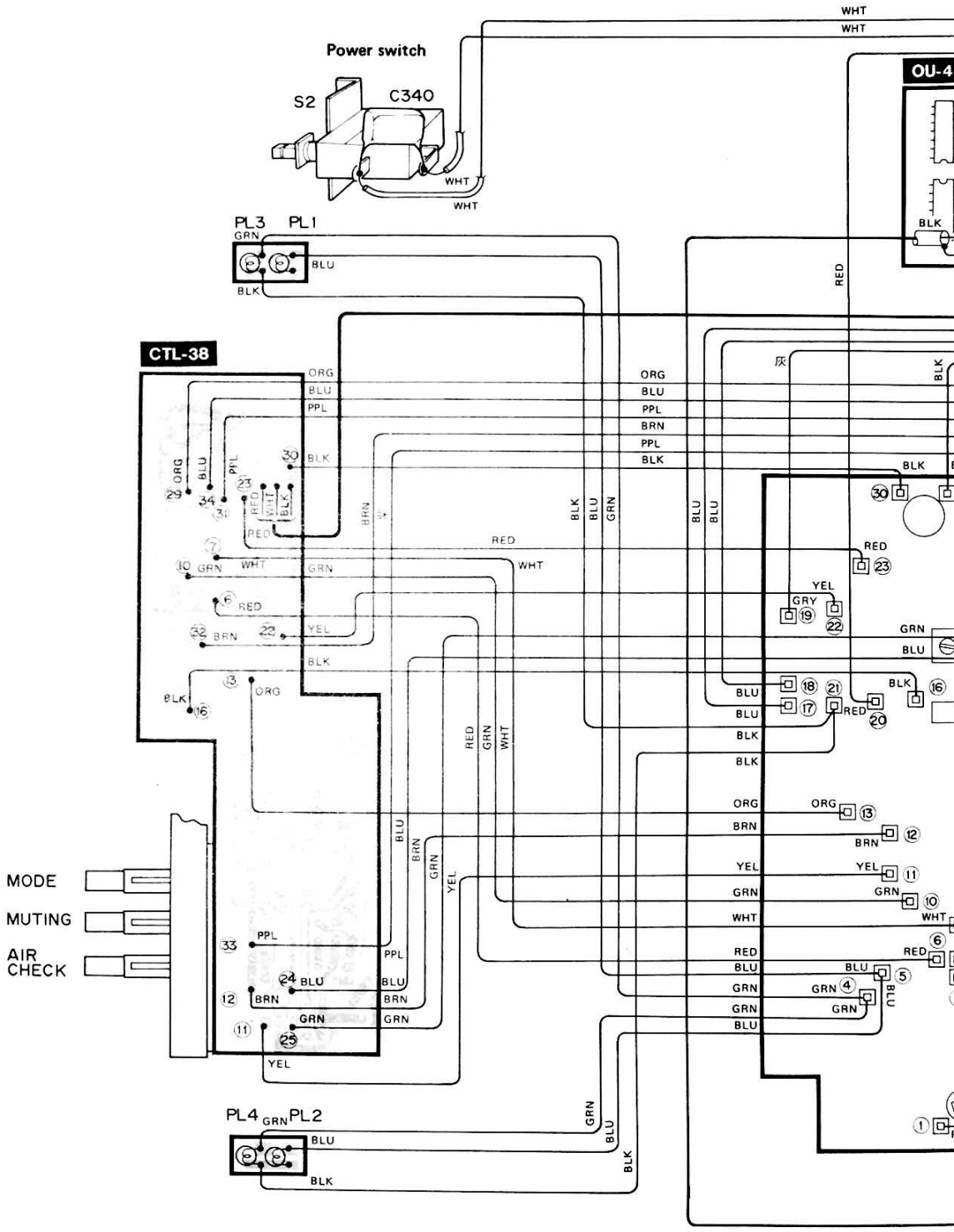


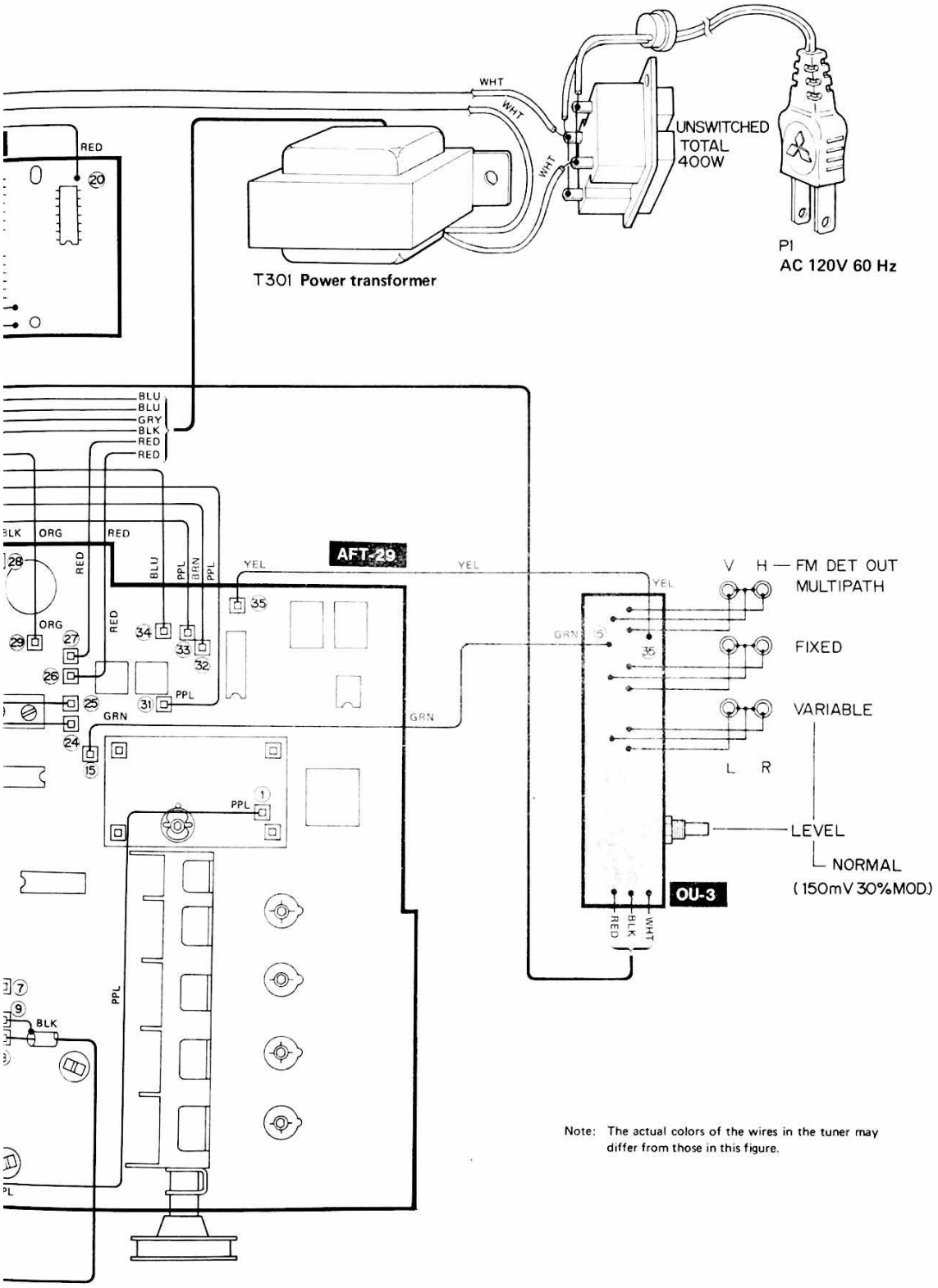
N10131

Note 1. Capacitor and resistor units
C ..... no-signal: μF
P symbol: pF
R ..... no-signal: Ω
K symbol: kΩ
2. All the resistors are carbon 1/4 W units unless otherwise specified.
3. The voltages are the values measured using a DC 20 kΩ/V tester.

This schematic is the basic schematic diagram and the constants are subject to change due to improvements.

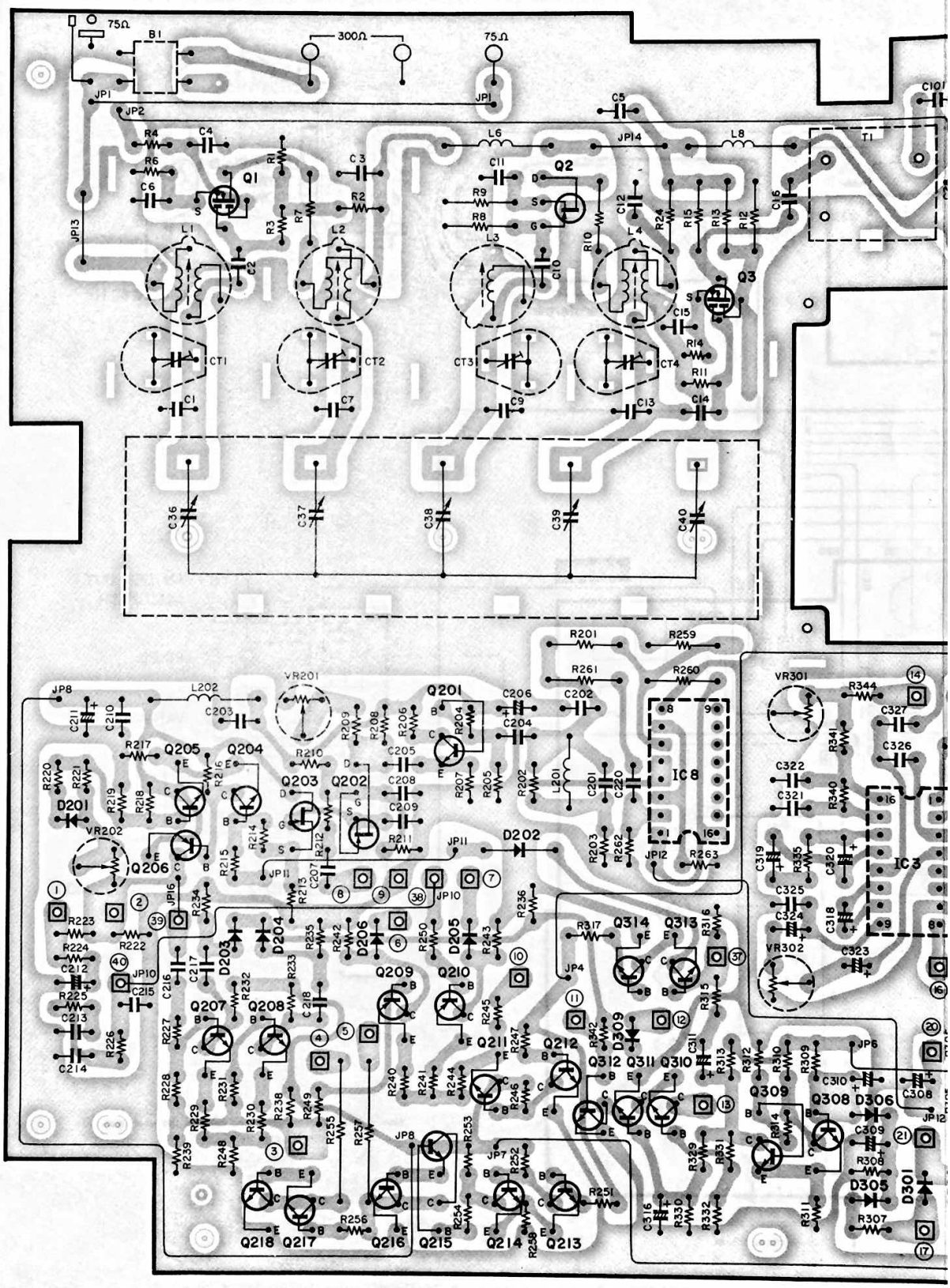
WIRING SCHEMATIC

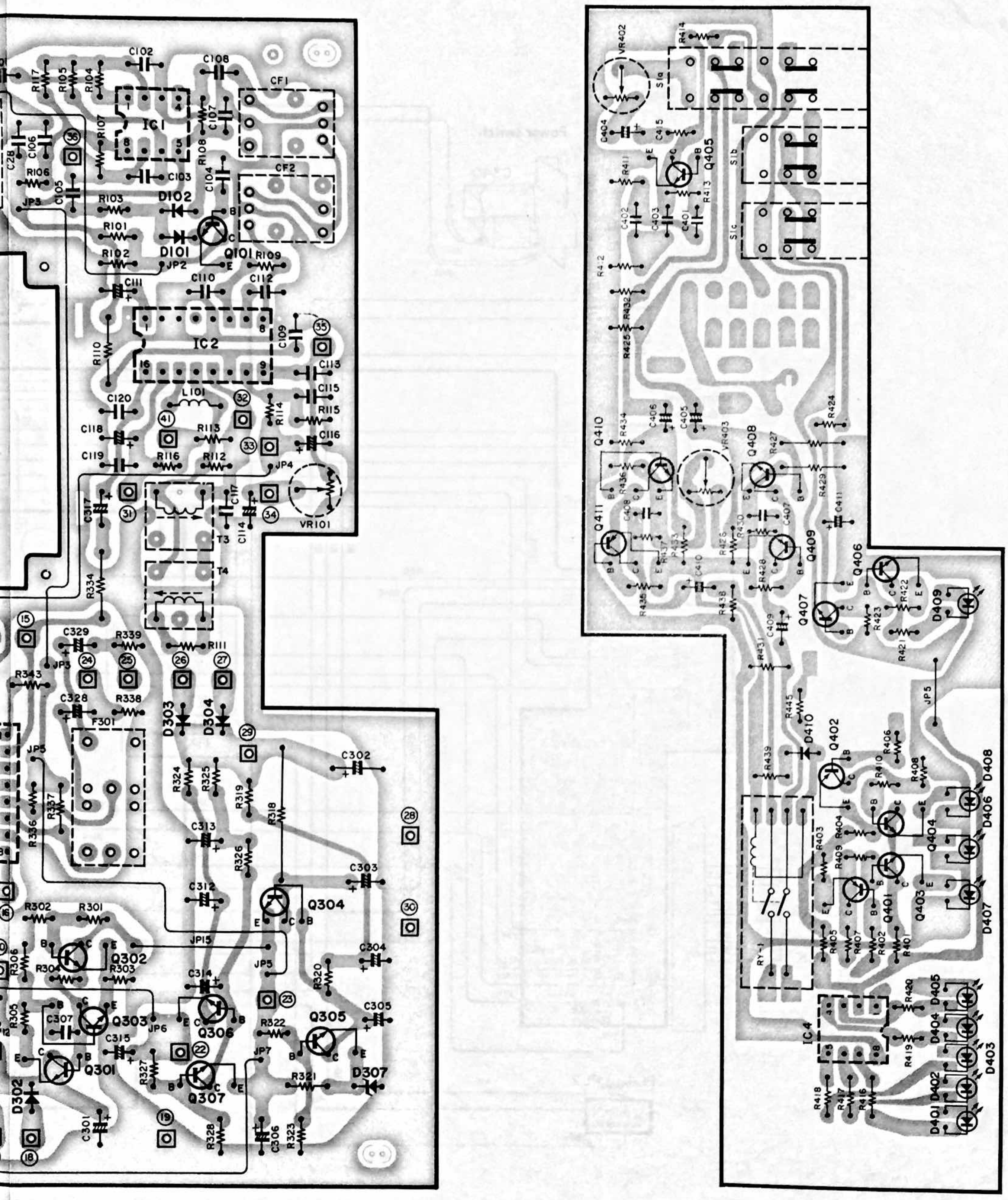




Note: The actual colors of the wires in the tuner may differ from those in this figure.

PRINTED CIRCUIT BOARD




IC1
IC2
IC4
CF1
CF2
C102
C108
C103
C104
C105
C106
C107
C109
C110
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C112
C113
C114
C115
C116
C117
C118
C119
C120
R101
R102
R103
R104
R105
R106
R107
R108
R109
R110
R111
R112
R113
R114
R115
R116
R117
D101
D102
Q101
L101
T3
T4
VR101
JP2
JP3
JP4
JP5
JP6
JP7
JP15
F301
C301
C302
C303
C304
C305
C306
C307
C312
C313
C314
C315
C317
C328
C329
R301
R302
R303
R304
R305
R306
R318
R319
R320
R321
R322
R323
R324
R325
R326
R327
R328
R334
R336
R337
R338
R339
R343
D302
D303
D304
D307
Q301
Q302
Q303
Q304
Q305
Q306
Q307
VR402
VR403
S1a
S1b
S1c
RY-1
C401
C402
C403
C404
C405
C406
C407
C408
C409
C410
C411
C415
R401
R402
R403
R404
R405
R406
R407
R408
R409
R410
R411
R413
R414
R416
R417
R418
R419
R420
R421
R422
R423
R424
R425
R427
R428
R429
R430
R431
R432
R433
R434
R435
R436
R437
R438
R439
R445
D401
D402
D403
D404
D405
D406
D407
D408
D409
D410
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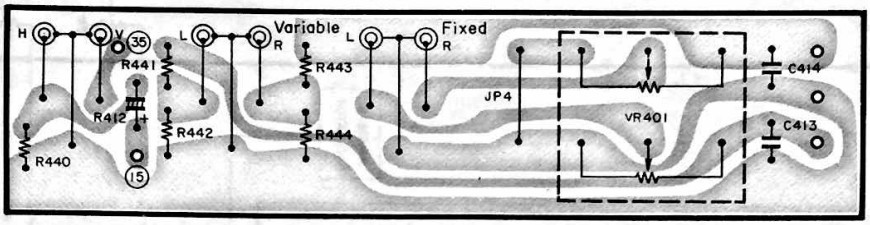
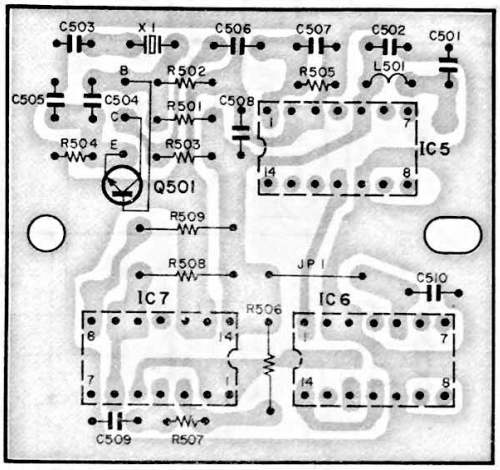
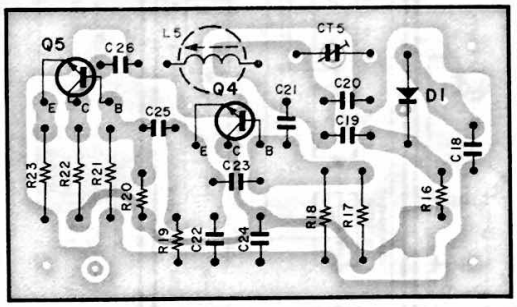
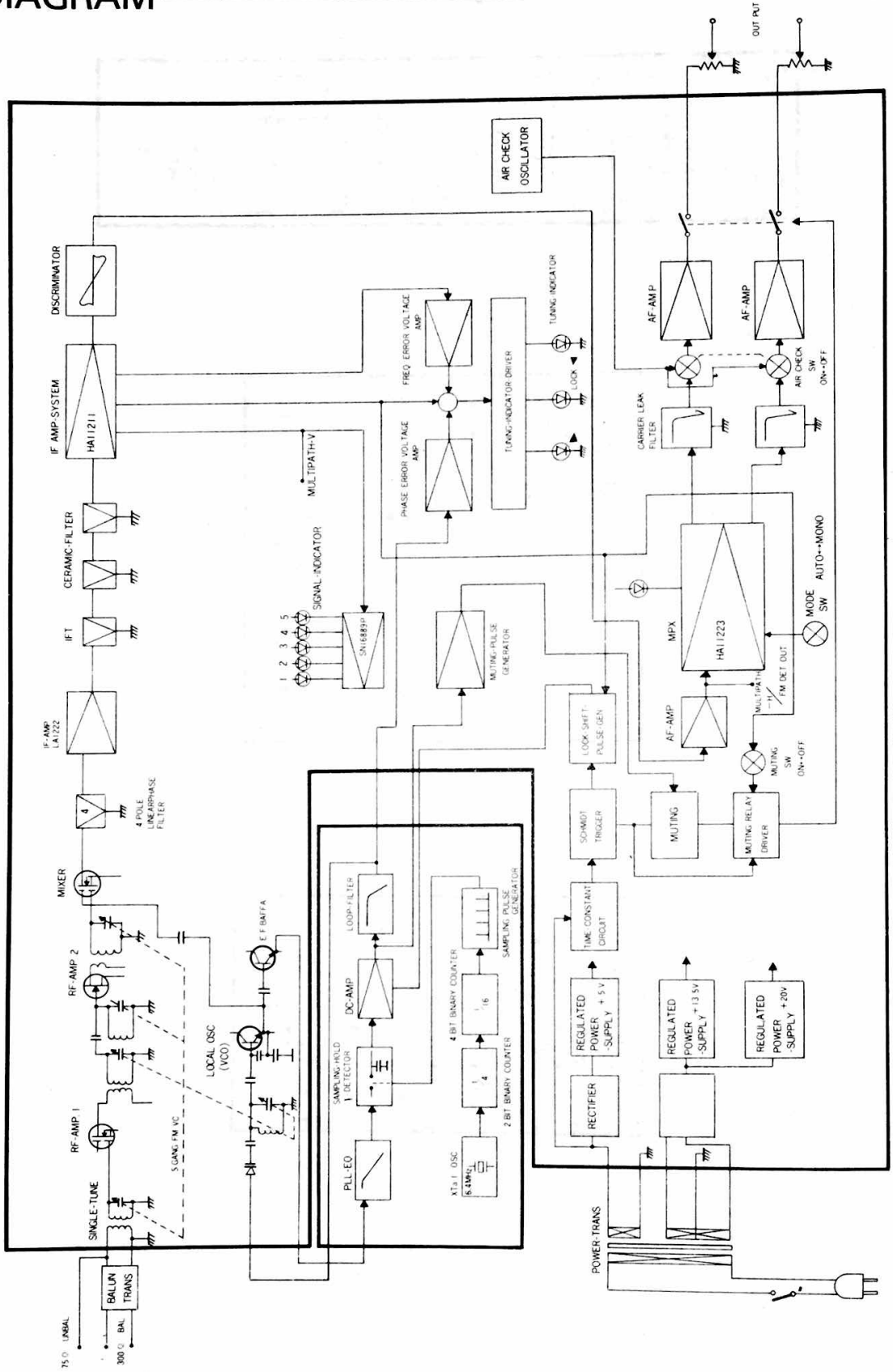
Q402
Q403
Q404
Q405
Q406
Q407
Q408
Q409
Q410
Q411


H
V
35
R441
R412
R442
R440
15
L
Variable
R
R443
R444
L
Fixed
R
JP4
VR401
C414
C413


C503
X1
C506
C507
C502
C501
B
R502
R505
L501
C505
C504
C
R501
C508
1
7
R504
E
R503
IC5
14
8
Q501
R509
R508
JP1
C510
IC7
R506
IC6
8
14
7
1
1
7
14
8
C509
R507


Q5
C26
L5
CT5
Q4
C21
C20
D1
E
C
B
C25
C19
C18
R23
R22
R21
R20
C23
R16
R19
C22
C24
R18
R17

BLOCK DIAGRAM



SERVICE PARTS LIST

SYMBOL NO.	PART NO.	DESCRIPTION
Q1	M07085303	TRANSISTOR 3SK45
Q2	M07152303	TRANSISTOR 2SK55
Q3	M07085303	TRANSISTOR 3SK45
Q4	M04070304	TRANSISTOR 2SC710
Q5	M04070304	TRANSISTOR 2SC710
Q201	M04070304	TRANSISTOR 2SC710
Q202	M07139304	TRANSISTOR 2SK68A
Q203	M07139304	TRANSISTOR 2SK68A
Q204	M05104310	TRANSISTOR 2SC1648
Q205	M05104310	TRANSISTOR 2SC1648
Q206	M05104312	TRANSISTOR 2SA823
Q207	M05104310	TRANSISTOR 2SC1648
Q208	M05104310	TRANSISTOR 2SC1648
Q209	M05104312	TRANSISTOR 2SA823
Q210	M05104312	TRANSISTOR 2SA823
Q211	M05104310	TRANSISTOR 2SC1648
Q212	M05104310	TRANSISTOR 2SC1648
Q213	M05104310	TRANSISTOR 2SC1648
Q214	M05104310	TRANSISTOR 2SC1648
Q215	M05104310	TRANSISTOR 2SC1648
Q216	M07128303	TRANSISTOR 2SC1735
Q217	M05104310	TRANSISTOR 2SC1648
Q218	M07128303	TRANSISTOR 2SC1735
Q301	M07128303	TRANSISTOR 2SC1735
Q302	M05104310	TRANSISTOR 2SC1648
Q303	M05104310	TRANSISTOR 2SC1648
Q304	M07151310	TRANSISTOR 2SD330
Q305	M05104310	TRANSISTOR 2SC1648
Q306	M07128303	TRANSISTOR 2SC1735
Q307	M05104310	TRANSISTOR 2SC1648
Q308	M05104310	TRANSISTOR 2SC1648
Q309	M05104310	TRANSISTOR 2SC1648
Q310	M05104310	TRANSISTOR 2SC1648
Q311	M05104310	TRANSISTOR 2SC1648
Q312	M05104310	TRANSISTOR 2SC1648
Q313	M05104310	TRANSISTOR 2SC1648
Q314	M05104310	TRANSISTOR 2SC1648
Q401	M05104312	TRANSISTOR 2SA823
Q402	M05104312	TRANSISTOR 2SA823
Q403	M05104310	TRANSISTOR 2SC1648
Q404	M05104310	TRANSISTOR 2SC1648
Q405	M05104310	TRANSISTOR 2SC1648
Q406	M05104310	TRANSISTOR 2SC1648

SYMBOL NO.	PART NO.	DESCRIPTION
Q407	M05104310	TRANSISTOR 2SC1648
Q408	M05104310	TRANSISTOR 2SC1648
Q409	M05104312	TRANSISTOR 2SA823
Q410	M05104310	TRANSISTOR 2SC1648
Q411	M05104312	TRANSISTOR 2SA823
Q501	M05104310	TRANSISTOR 2SC1648
D1	M07085320	DIODE 1S2236
D101	M07060320	DIODE 1S2473
D102	M07060320	DIODE 1S2473
D201	M04097320	DIODE 1N60
D202	M07060320	DIODE 1S2473
D203	M07060320	DIODE 1S2473
D204	M07060320	DIODE 1S2473
D205	M07060320	DIODE 1S2473
D206	M07060320	DIODE 1S2473
D301	M07323320	DIODE 10E1
D302	M07323320	DIODE 10E1
D303	M07323320	DIODE 10E1
D304	M07323320	DIODE 10E1
D305	M07060320	DIODE 1S2473
D306	M07060320	DIODE 1S2473
D307	M05129320	DIODE MZ306
D309	M07060320	DIODE 1S2473
D401	M05129321	DIODE (RED) SLP-114B
D402	M05129321	DIODE (RED) SLP-114B
D403	M05129321	DIODE (RED) SLP-114B
D404	M05129321	DIODE (RED) SLP-114B
D405	M05129321	DIODE (RED) SLP-114B
D406	M07357320	DIODE (GREEN) SLP-614B
D407	M05129321	DIODE (RED) SLP-114B
D408	M05129321	DIODE (RED) SLP-114B
D409	M05129321	DIODE (RED) SLP-114B
IC1	M07115343	IC LA1222
IC2	M07357344	IC HA11211
IC3	M07357345	IC HA11223
IC4	M07236344	IC SN16889
IC5	M07357343	IC 74LS93
IC6	M07357343	IC 74LS93
IC7	M07236347	IC 74S03
IC8	M07292343	IC N10131
S1	M07357451	PUSH SWITCH (MODE, MUTING AIR CHECK)

SYMBOL NO.	PART NO.	DESCRIPTION
S2	M07357450	PUSH SWITCH (POWER)
PL1	M07357250	LAMP 8 V, 100 MA (GREEN)
PL2	M07357250	LAMP 8 V, 100 MA (GREEN)
PL3	M07357251	LAMP 8 V, 100 MA (WHITE)
PL4	M07357251	LAMP 8 V, 100 MA (WHITE)
X1	M07236310	CRYSTAL 6.4 MHz
VR401	M07357400	VARIABLE RESISTOR W–B20–K15
RY–1	M07236465	RELAY
	M05147120	KNOB (POWER)
	M07357211	KNOB (MODE, MUTING AIR CHECK)
	M07357210	KNOB (TUNING)
	M05147910	CUSHION-MOLD
	M07357900	PACKING BOX

MELCO SALES, INC.
3030 East Victoria Street, Compton, California 90221, U.S.A.
Tel.: (213) 537-7132, Telex: 0673278
Toll Free: (800) 421-1132 (Outside of California)

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