

GENERAL RADIO

Standard-Signal Generator

1003

SPECIFICATIONS

Frequency: 67 kHz to 80 MHz in 10 ranges of 67 to 156, 131 to 312, 270 to 625, 540 to 1250 kHz, 1.08 to 2.5, 2.16 to 5, 4.32 to 10, 8.64 to 20, 17.28 to 40, and 34.56 to 80 MHz. **ACCURACY:** $\pm 0.25\%$ ($\pm 0.1\%$ typical); 140-in. logarithmic scale, plus logging scale, with vernier, of 8500 div, 0.01%/div.

Crystal Calibrator (in some models): Markers at 50-kHz, 200-kHz, and 1-MHz intervals, accurate to 20 ppm. Beat level adjustable and suitable for sweep-calibration purposes.

Tuning: **MANUAL:** 1% per revolution of manual fine-tuning control, calibrated in 0.01% increments; fast tuning by push-button-controlled drive motor. **ELECTRONIC:** Internal ± 500 ppm nominal, settable to better than 2 ppm. External ≈ 60 ppm/V to ± 1000 ppm typical, limited fm capability. Input ± 15 V max into 15 k Ω ; + V increases frequency.

Auto-Control (Auto-Control models only): **TUNING:** Tunes on command to preset frequencies (2 set by panel controls, others by external voltages or voltage dividers); tuning speed $\approx 5\%/s$, positioning accuracy 0.1%. **SWEEP:** Width adjustable from 0.2% of center frequency to full width of selected range. Rate adjustable from $\Delta f/f$ of 0.05% to 5%/s. Sweep-voltage output of 1 V/1% frequency change for sweep widths to 4% ($\pm 2\%$ of center frequency) for wide sweeps output ≈ 65 mV for 1% frequency change. Either output can be centered with respect to ground. Blanking voltage of +9 V behind 15 k Ω (separate from sweep voltage) available during return sweep. **ANALOG OUTPUT:** ≈ -7 V to 0 V behind 7.5 k Ω (≈ 82 mV/1% frequency change) proportional to shaft position or logging scale.

Stability: < 5 ppm per 10 min after warmup, 1 ppm typical. Frequency varies < 1 ppm with $\pm 10\%$ line-voltage change, range switching (instant restabilization), rf-level adjustments, or load variations. Warmup drift, 150 ppm typical, in 3 h at 20°C.

Distortion and Noise: **DISTORTION:** $< 5\%$ typical. **RESIDUAL A-M** due to hum and noise within 15 kHz: ≥ 85 dB down, relative to carrier. **RESIDUAL FM:** < 3 Hz pk at high-frequency end, < 1 Hz pk at low-frequency end.

Rf Output: **CW:** 0.05 μ V to 3 V across 50 Ω (-133 to $+22.6$ dBm; to 180 mW). **MODULATED:** 0.05 μ V to 1.5 V across 50 Ω (-133 to $+16.6$ dBm; to 45 mW). **IMPEDANCE:** 50 Ω . **SWR:** < 1.02 with attenuator set for 0 dBm or less, < 1.05 for $+10$ dBm, < 1.20 for $+20$ dBm. **CONTROL:** 155 dB total, i.e., 140 dB in 10-dB steps with attenuator plus 10 dB or more with continuous control. **LEVELING:** At full power, accurate to ± 1 dB; allowance for attenuator, ± 0.1 dB/10-dB step, ± 0.5 dB max accumulated error. **STABILITY:** Warmup drift < 0.3 dB, temperature effects < 0.01 dB/°C, line-voltage variations < 0.02 dB. **METER:** Reads volts across 50 Ω and dBm.

Modulation: **LEVEL:** 0 to 95% continuously adjustable. Stable within ± 1 dB independent of carrier or modulation frequency (within modulation bandwidth) and output level. **BANDWIDTH:** At 100-kHz carrier, 500-Hz max modulation frequency for 95% a-m and 2 kHz for 30% a-m; > 1 -MHz carrier, 3 kHz max for 95%; > 2.5 -MHz carrier, 10 kHz max for 50%. **METER:** Reads 0 to 100%. Accuracy $\pm 5\%$ fs with internal modulation, $\pm 10\%$ fs with external modulation, 0 to 95% within modulation bandwidth. **INCIDENTAL ANGLE MODULATION:** < 0.1 rad pk at 30% a-m. **INTERNAL:** 400 and 1000 Hz $\pm 0.5\%$, 2-V output behind 100 k Ω available at panel connector. Envelope distortion: $< 1\%$ at 50% a-m, $< 2\%$ at 70% a-m. **EXTERNAL:** Ac coupled, 20 Hz to 20 kHz, 2 V into 2.5 k Ω for 95% modu-

lation within modulation bandwidth. Dc coupled, dc to 20 kHz, carrier off with 0-V input; 1.5-V output into 50 Ω with $+5$ V into 10 k Ω . Max input 10 V pk.

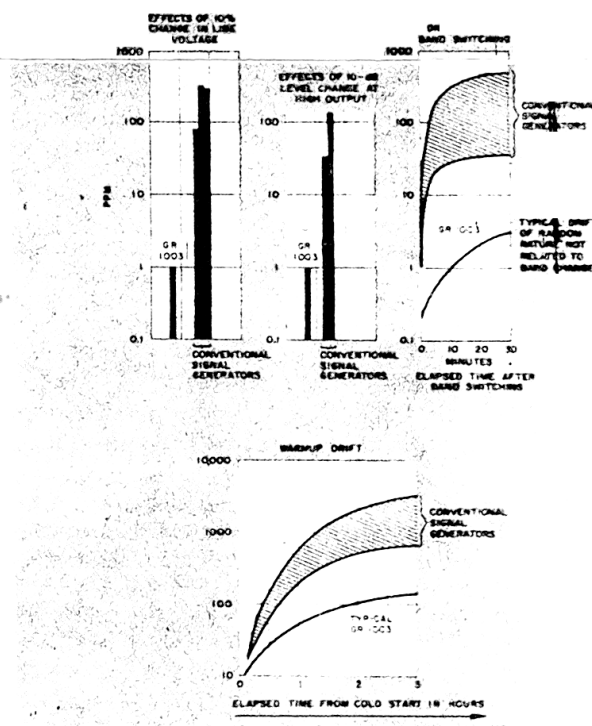
Auxiliary Outputs: **MAIN FREQUENCY:** ≥ 0.5 V p-p pk cw into 50 Ω at output carrier frequency. **SUBHARMONIC FREQUENCY:** ≥ 0.3 V pk-pk \approx squarewave behind 50 Ω . Frequency between 67 and 156 kHz is coherent and integrally related to carrier frequency by factor N shown on main dial.

Environment: **LEAKAGE:** Negligible effect on receiver sensitivity measurements down to 0.1 μ V. **TEMPERATURE:** 10 to 50°C operating.

Supplied: GR874-to-GR874 patch cord, power cord, two 12-pin connectors for external controls.

Power: 105 to 125, 195 to 235, or 210 to 250 V, 50 to 60 Hz (to 400 Hz for Auto-Control models), 33 W max.

Mechanical: Rack-bench cabinet. **DIMENSIONS** (wxhxd): Bench, 19x11x15.25 in. (483x279x387 mm); rack, 19x10.5x12.75 in. (483x267x324 mm). **WEIGHT:** 64 lb (30 kg) net, 87 lb (40 kg) shipping.



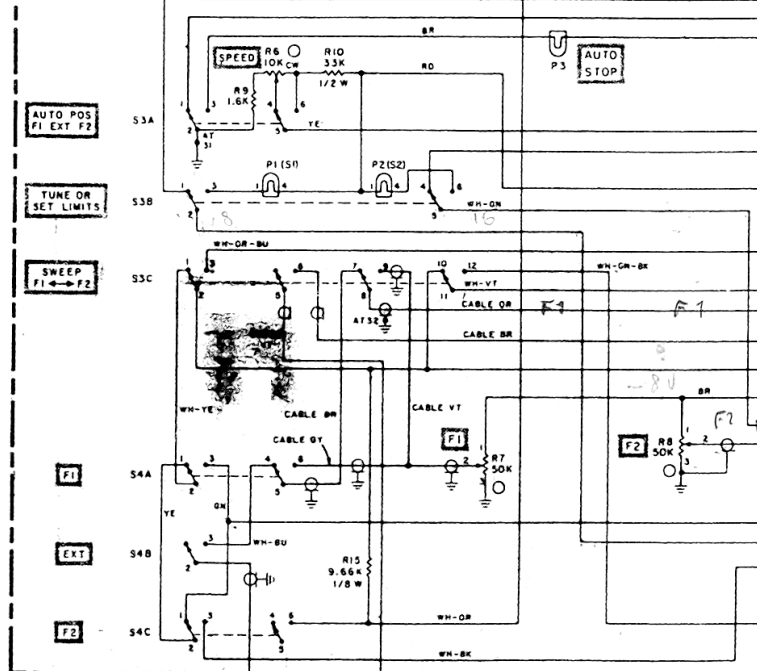
The stability of the 1003 compared with that of other signal generators.

Description	Catalog Number
1003 Standard-Signal Generator	
Basic model	1003-9701
with Auto-Control/Sweep Unit	1003-9702
with Crystal Calibrator	1003-9703
with Auto-Control and Crystal Calibrator	1003-9705
Patent Number 3,529,260.	

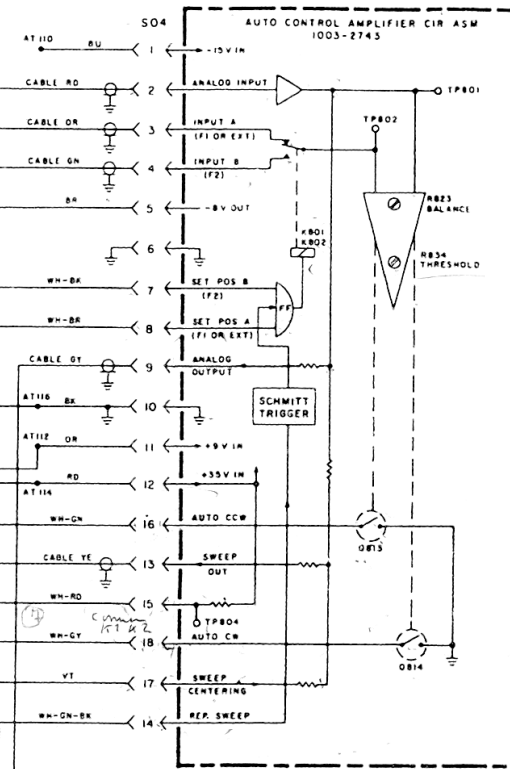
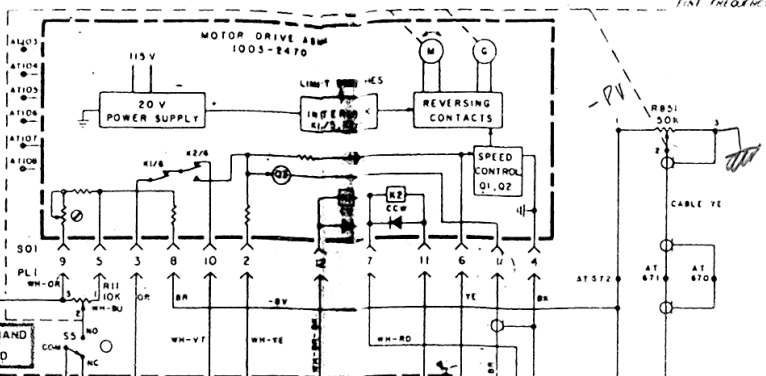
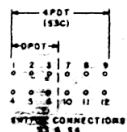
Ⓢ Federal stock numbers are listed before the Index.

- NOTE: UNLESS SPECIFIED
1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE
 2. CONTACT NUMBERING OF SWITCHES UNPLAINED ON SEPARATE SHEET SUPPLIED IN INSTRUCTION BOOK
 3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM
 4. RESISTORS 1/4 WATT
 5. RESISTANCE IN OHMS
 6. CAPACITANCE VALUES ONE AND OVER IN MICROARADS, LESS THAN ONE IN MICROARADS
 7. KENOR CONTROL
 8. SCREWDRIVER CONTROL
 9. AT - ANCHOR TERMINAL
 10. TP - TEST POINT

AUTO CONTROL PANEL ASM 1003-2460



NOTE: S3A, S4A ARE INTERLOCKING PUSH-BUTTON SWITCHES; ONE OF THE THREE SECTIONS OF EACH SWITCH IS NORMALLY DEPRESSED, BUT ALL ARE SHOWN RELEASED.



8V
2 emu sur
auto control ampli
C R 81
Pursu... ch... Cas

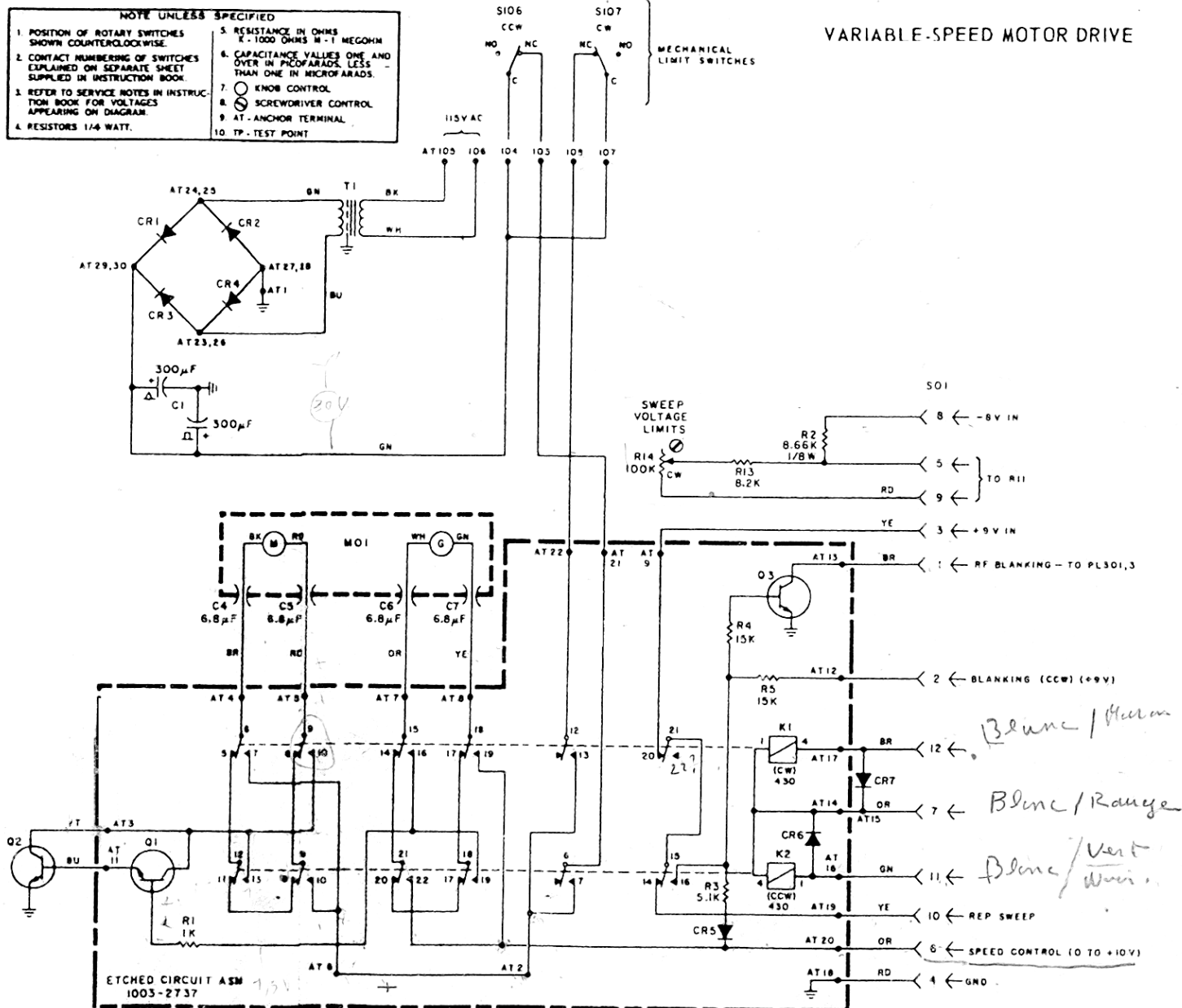


Figure 6-32. Motor-Drive Assembly schematic diagram (P/N 1003-2470) for models 1003-9702 and -9705 only.

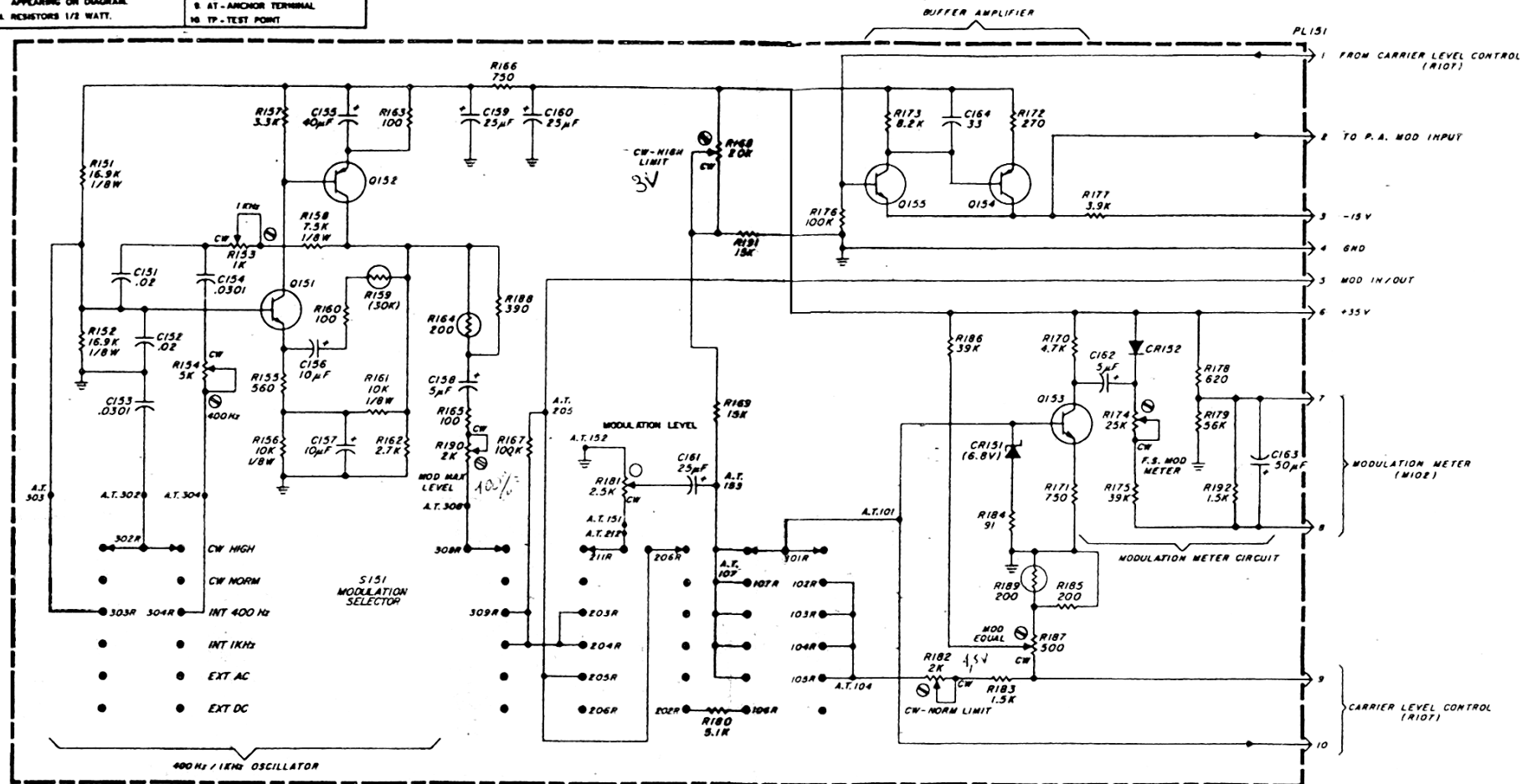
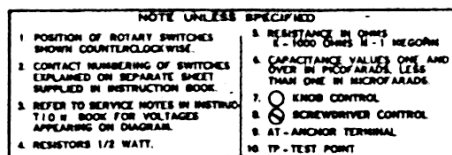
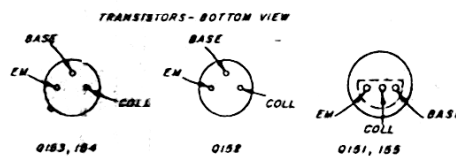


Figure 6-18. Modulator schematic diagram (P/N 1003-2786).

BOARD NO.: 1003-2786



- NOTE: UNLESS SPECIFIED
1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE
 2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON SEPARATE LABEL SUPPLIED IN INSTRUCTION BOOK
 3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM
 4. RESISTORS 1/4 WATT
 5. RESISTANCE IN OHMS $\times 1000$ OHMS $\times 1$ MEGOHM
 6. CAPACITANCE VALUES ONE AND OVER IN MICROARADS, LESS THAN ONE IN MICRORADS
 7. ∇ KNOB CONTROL
 8. ∇ SCREWDRIVER CONTROL
 9. AT ANCHOR TERMINAL
 10. TP - TEST POINT

CRYSTAL CALIBRATOR ASSEMBLY

TRANSISTORS - BOTTOM VIEW



Q701



COLL

Q702, Q703, Q706,
Q717, Q750, Q752, Q776,
Q777, Q778, Q779

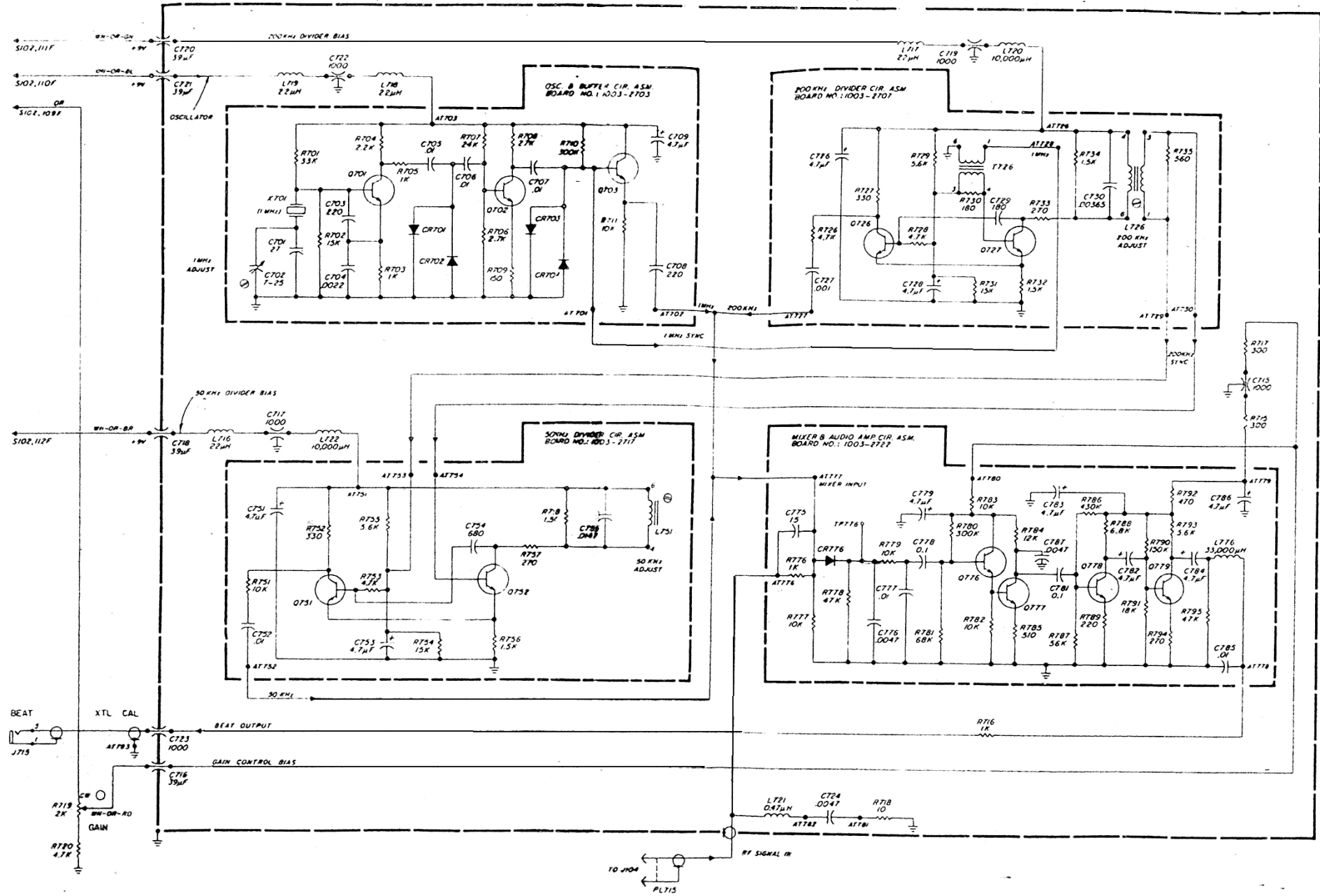


Figure 6-29. Crystal Calibrator Assembly schematic diagram (P/N 1003-3013) for models 1003-9703, -9704, and -9705.

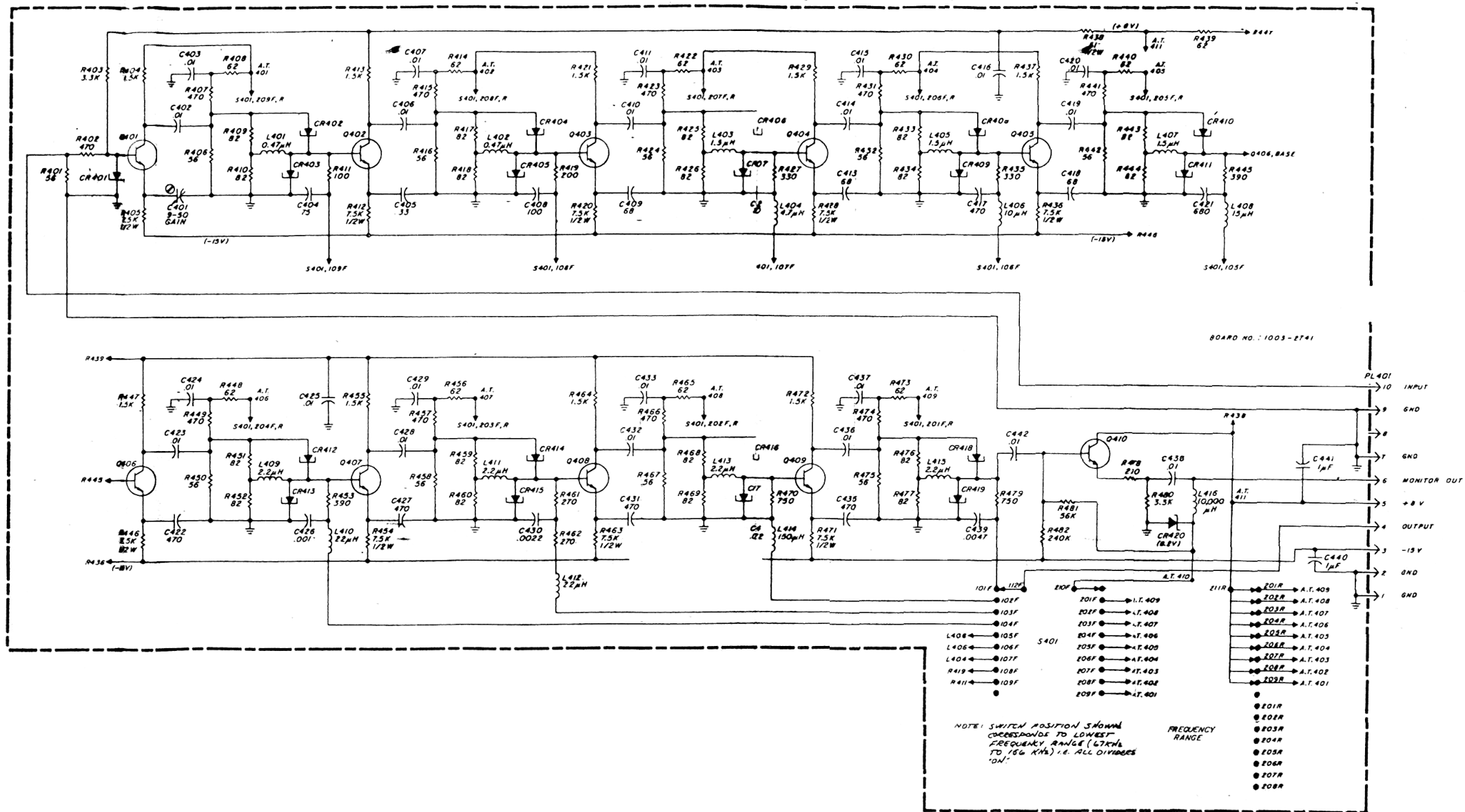




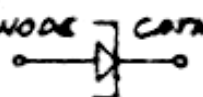
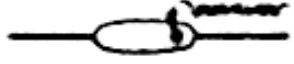

Figure 6-10. P.A. Divider schematic diagram.

NOTE UNLESS SPECIFIED

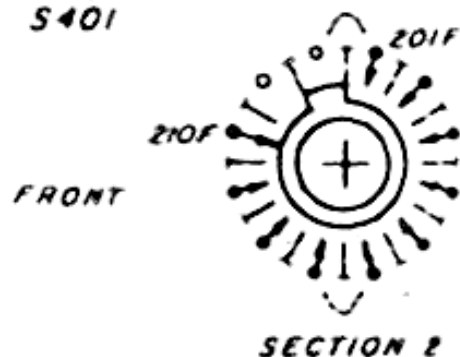
1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE.
2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON SEPARATE SHEET SUPPLIED IN INSTRUCTION BOOK.
3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM.
4. RESISTORS 1/4 WATT.
5. RESISTANCE IN OHMS
K - 1000 OHMS M - 1 MEGOHM
6. CAPACITANCE VALUES ONE AND OVER IN PICOFARADS LESS THAN ONE IN MICROFARADS.
7.  KNOB CONTROL
8.  SCREWDRIVER CONTROL
9. AT - ANCHOR TERMINAL
10. TP - TEST POINT

Rotary switch sections are shown as viewed from the panel end of the shaft. The first digit of the contact number refers to the section. The section nearest the panel is 1, the next section back is 2, etc. The next two digits refer to the contact. Contact 01 is the first position clockwise from a strut screw (usually the screw above the locating key), and the other contacts are numbered sequentially (02, 03, 04, etc), proceeding clockwise around the section. A suffix F or R indicates that the contact is on the front or rear of the section, respectively.

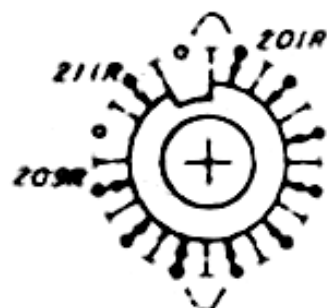
TUNNEL DIODE CONNECTIONS

ANODE	CATHODE	TYPE
		
		TD-253
		TD 718 TD 719

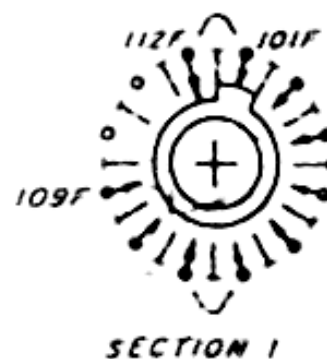
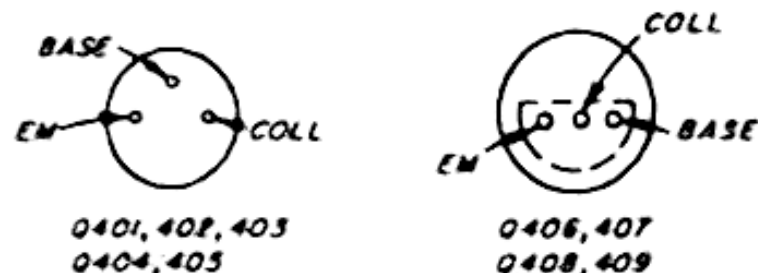
S401

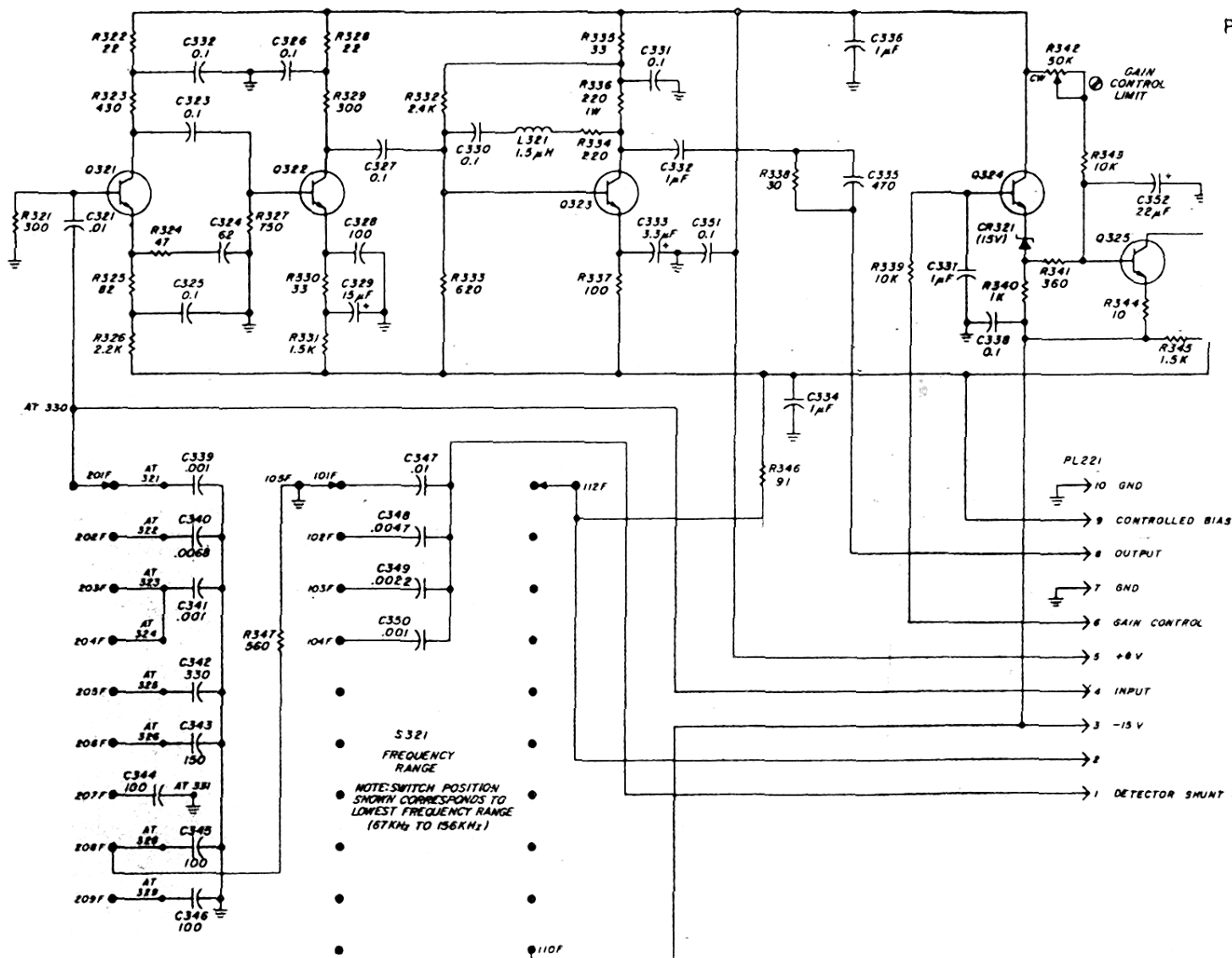
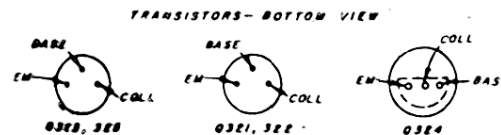
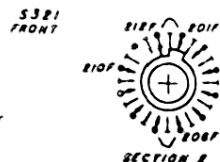
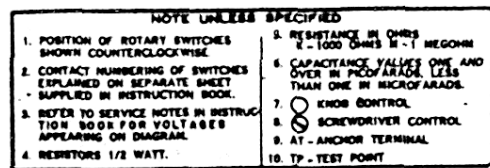


REAR



TRANSISTORS - BOTTOM VIEW





P.A. INTERMEDIATE AMPLIFIER CIRCUIT

Rotary switch sections are shown as viewed from the base end of the shaft. The first digit of the contact number refers to the section. The section nearest the panel is 1, the next section back is 2, etc. The next two digits refer to the contact. Contact 01 is the first position clockwise from a strut screw (usually the screw above the locking key), and the other contacts are numbered sequentially (02, 03, 04, etc.), proceeding clockwise around the section. A suffix = or > indicates that the contact is on the front or rear of the section, respectively.

Figure 6-12. P.A. Intermediate Amplifier schematic diagram.

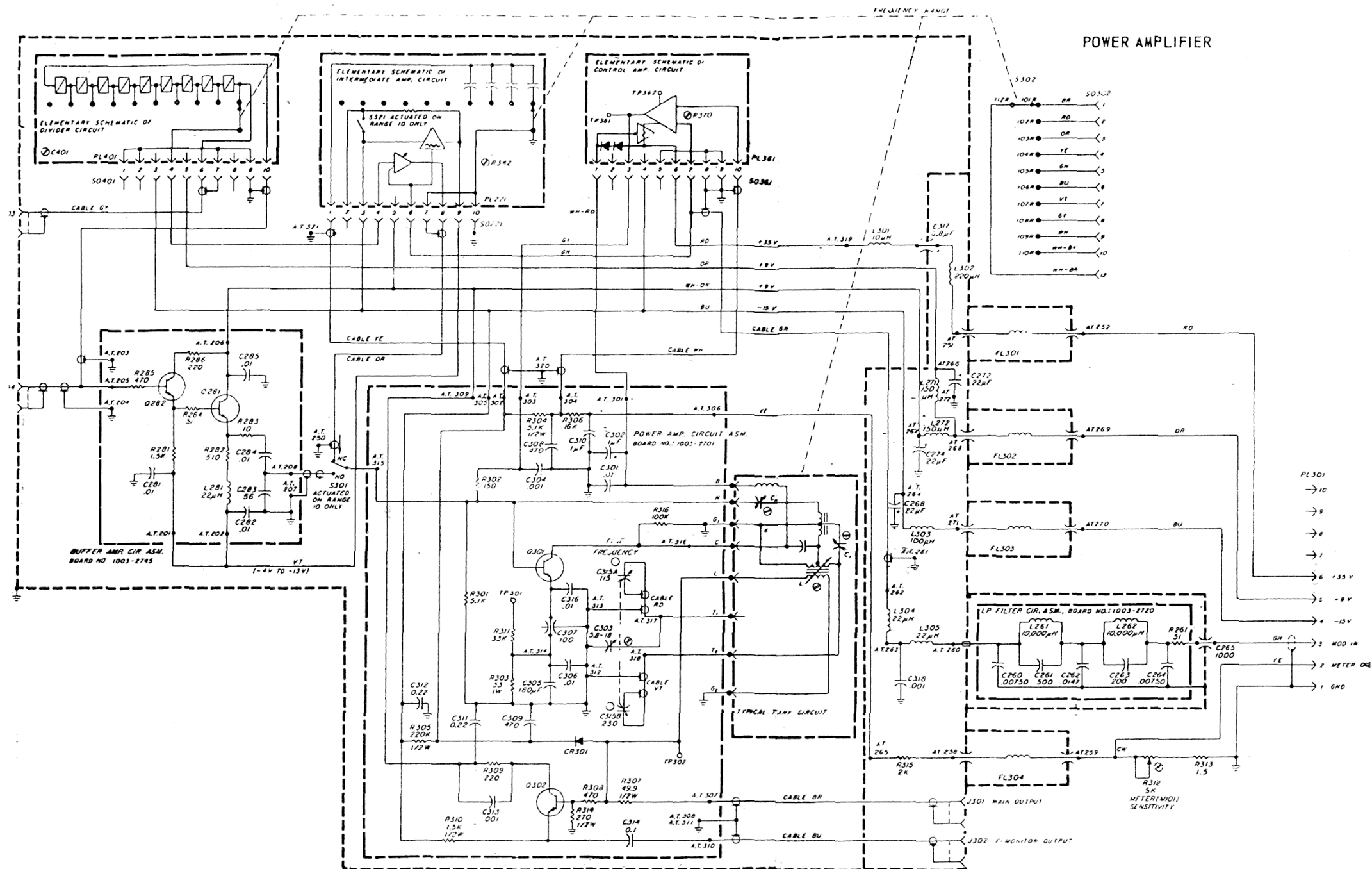


Figure 6-8. Power-Amplifier Assembly schematic diagram (P/N 1003-2020).

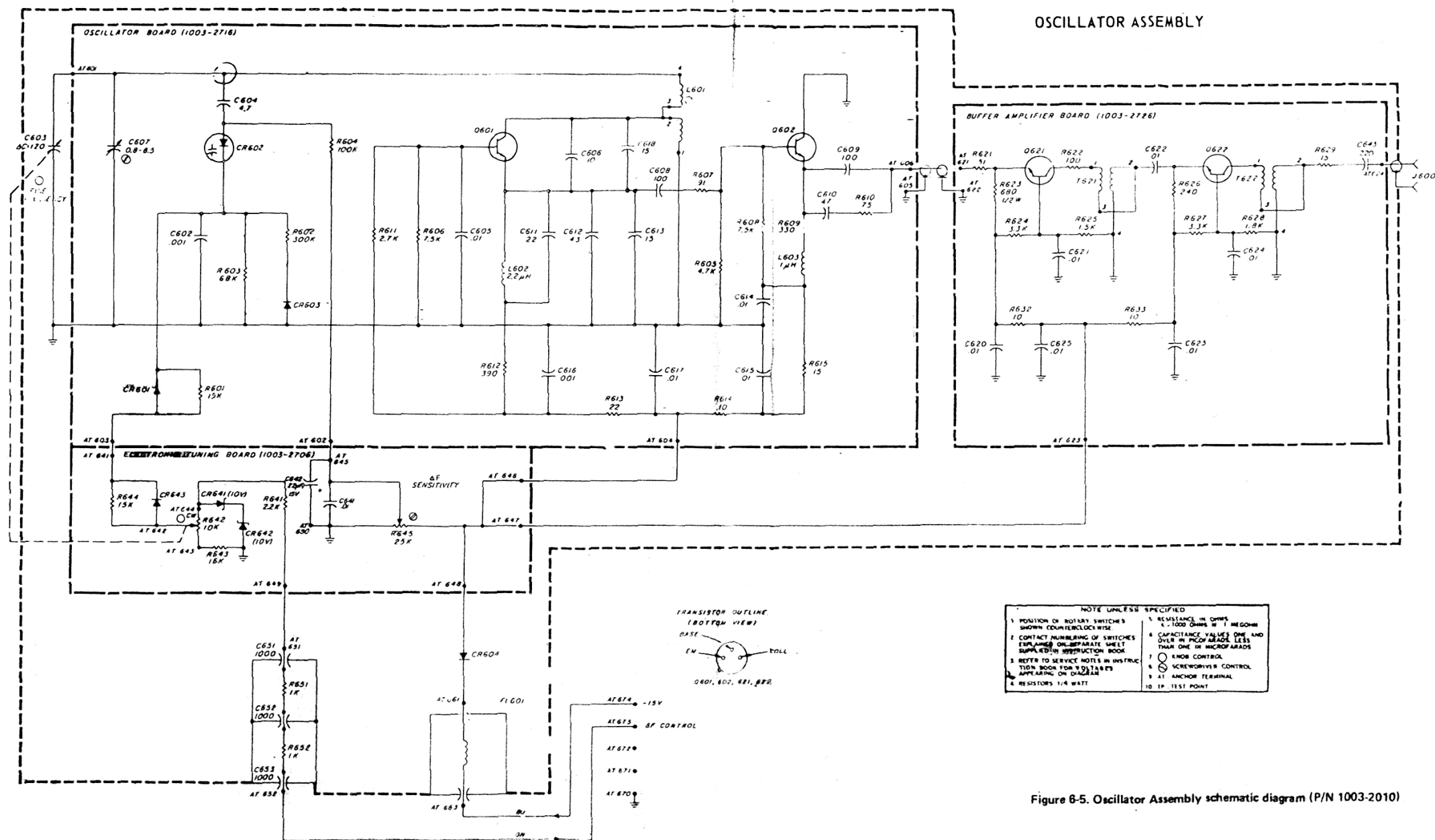
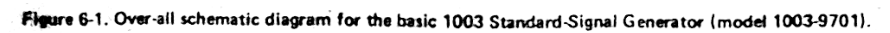


Figure 8-5. Oscillator Assembly schematic diagram (P/N 1003-2010)

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1 an inversia de March



APPEARING ON DIAGRAM
4. RESISTORS 1/4 WATT.
1. 1/2 - ANCHOR TERMINAL
10. TP - TEST POINT

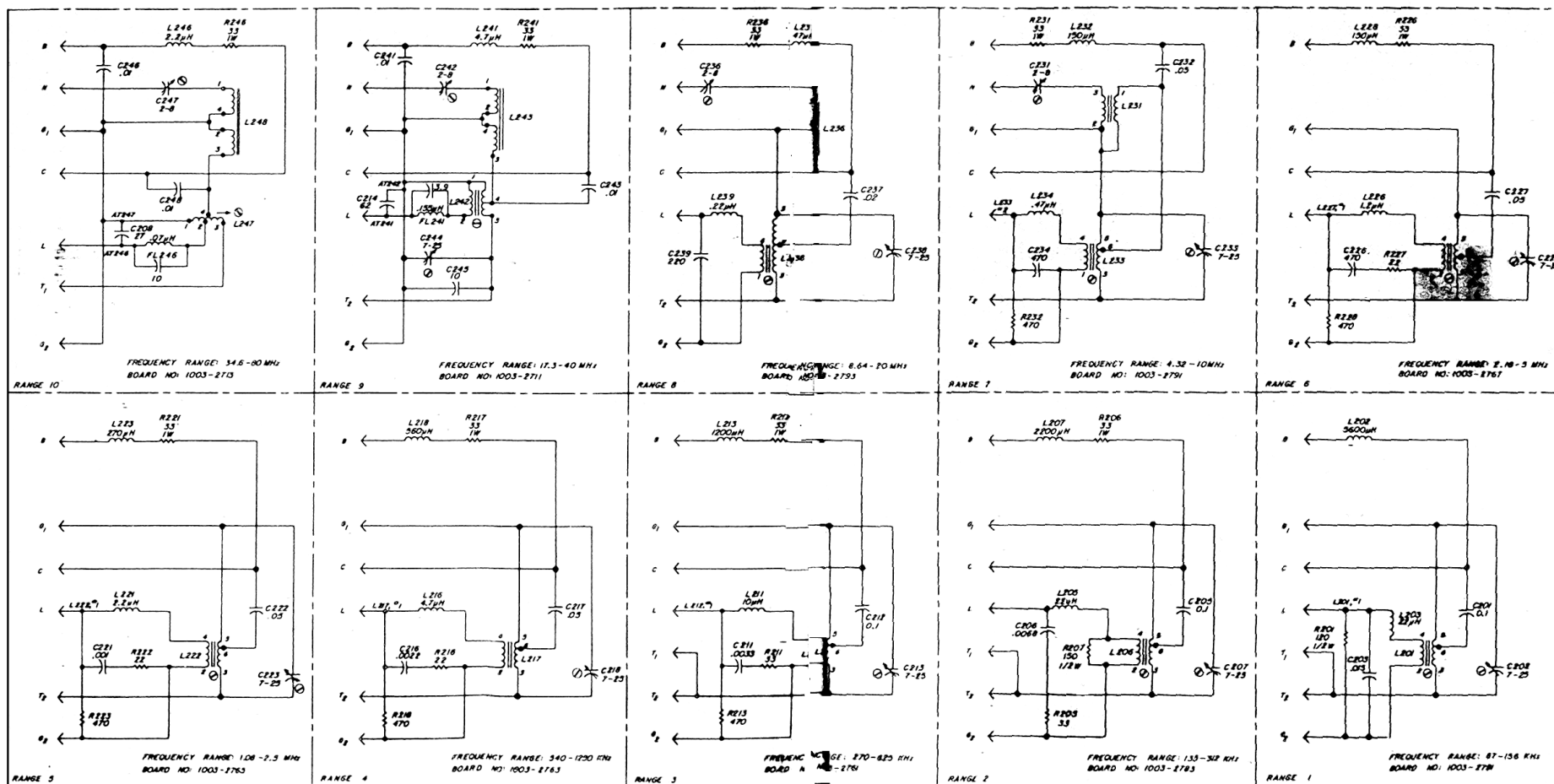


Figure 6-14. P.A. Turret Assembly schematic diagrams.