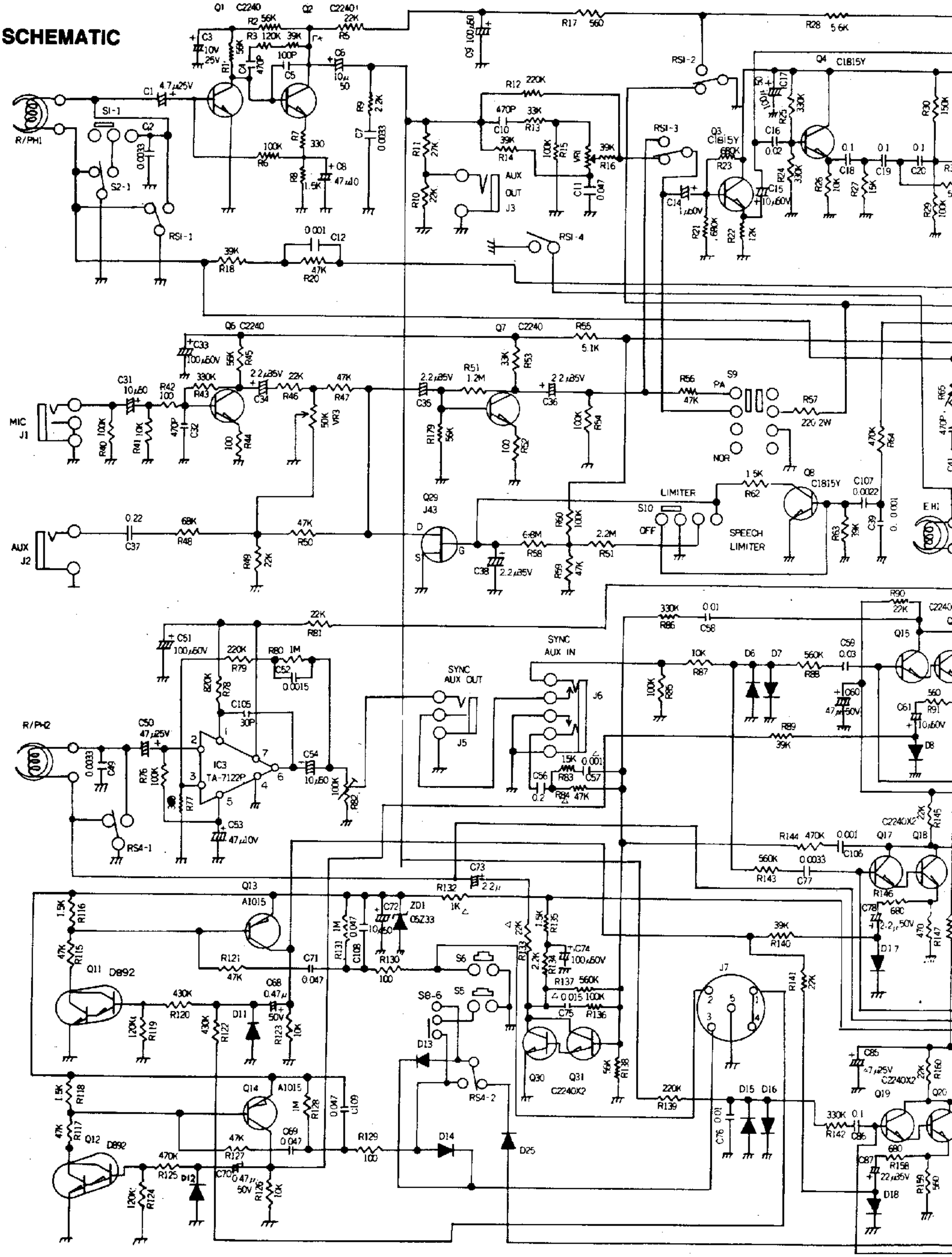
SCHEMATIC


Q1 C2240
Q2 C2240
R2 56K
R3 120K 39K
R5 22K
C3 10V 25V
C4 470P
C5 100P
C6 10µ 50
R1 56K
C1 4.7µ25V
SI-1
R/PH1
C2
0.0033
S2-1
RSI-1
R6 100K
R7 330
R8 1.5K
C8 47µ10
R9 2.2K
C7 0.0033
C9 100µ50
R17 560
R28 5.6K
RSI-2
Q4 C1815Y
R12 220K
C10 470P
R13 33K
R14 39K
R15 100K
VR1
R16 39K
R11 27K
R10 22K
AUX OUT J3
C11 0.047
RSI-3
Q3 C1815Y
R23 680K
C14 1µ50V
R21 680K
R22 12K
C16 0.02
C17 100µ50
R25 330K
R24 330K
C15 10µ50V
R26 10K
R27 15K
C18 0.1
C19 0.1
C20 0.1
R30 150K
R29 100K
C12 0.001
R18 39K
R20 47K
RSI-4
MIC J1
R40 100K
R41 10K
C31 10µ50
R42 100
R43 390K
C32 470P
R44 100
C34 2.2µ35V
R46 22K
R47 47K
VR3 50K
Q5 C2240
C33 100µ50V
R45 56K
AUX J2
C37 0.22
R48 68K
R49 22K
R50 47K
Q7 C2240
R55 5.1K
R53 33K
C35 2.2µ35V
R51 1.2M
C36 2.2µ35V
R179 56K
R52 100
R54 100K
R56 47K
S9 PA NOR
R57 220 2W
Q29 J43
C38 2.2µ35V
R58 6.8M
R60 100K
R59 47K
R51 2.2M
S10 OFF
LIMITER
SPEECH LIMITER
R62 1.5K
Q8 C1815Y
C107 0.0022
R63 39K
C39 0.0001
EHi
R64 470K
R65 470P
R90 22K
C2240X2
330K R86
0.01 C58
Q15
SYNC AUX IN
SYNC AUX OUT
J6
J5
R87 10K
D6 D7
R88 560K
C59 0.03
R85 100K
C60 47µ50V
R91 560
C61 10µ50V
D8
R89 39K
R/PH2
C50 47µ25V
C49 0.0033
R76 100K
R77
IC3 TA-7122P
C53 47µ10V
C54 10µ50
R82 100K
RS4-1
R79 220K
R80 1M
C52 0.0015
R78 820K
C105 30P
R81 22K
C56 0.2
R83 1.5K
C57 0.001
R84 47K
C73 2.2µ
R132 1K
C72 10µ50
ZD1 05Z33
R131 1M
C108 0.047
R130 100
C71 0.047
R121 47K
S6
S8-6
S5
D13
RS4-2
D14
D25
Q30 Q31 C2240X2
R135 1.5K
R133 22K
R134 2.2K
C74 100µ50V
R137 560K
C75 0.015
R136 100K
R138 56K
R139 220K
R140 39K
R141 22K
J7
D15 D16
C76 0.01
C85 47µ25V
C2240X2
R160 22K
Q19
Q20
330K R142
0.1 C86
680 C87
R158 22µ35V
R159 560
D18
R144 470K
0.001 C106
Q17
Q18
560K R143
0.0033 C77
R146
C78 680
2.2µ50V
R147 470
D17
R145 22K
C2240X2
Q13 A1015
R116 1.5K
R115 47K
Q11 D892
R119 120K
R120 430K
R122 430K
D11
C68 0.47µ
50V
R123 10K
R121 47K
C71 0.047
R131 1M
C108 0.047
R130 100
Q14 A1015
R118 1.5K
R117 47K
Q12 D892
R124 120K
R125 470K
D12
C70 0.47µ 50V
R126 10K
R128 1M
C109 0.047
C69 0.047
R127 47K
R129 100

S1 – PLAY-REC
S2 – AUDIO-REC
S3 – 50HZ-1KHZ
S4 – SYNC ENABLE
S5 – STOP
S6 – ADVANCE
S7 – MOTOR SW
S8 – 150HZ NO2

EXT S P J4

S.P 8Ω

150HZ BPF/OSC

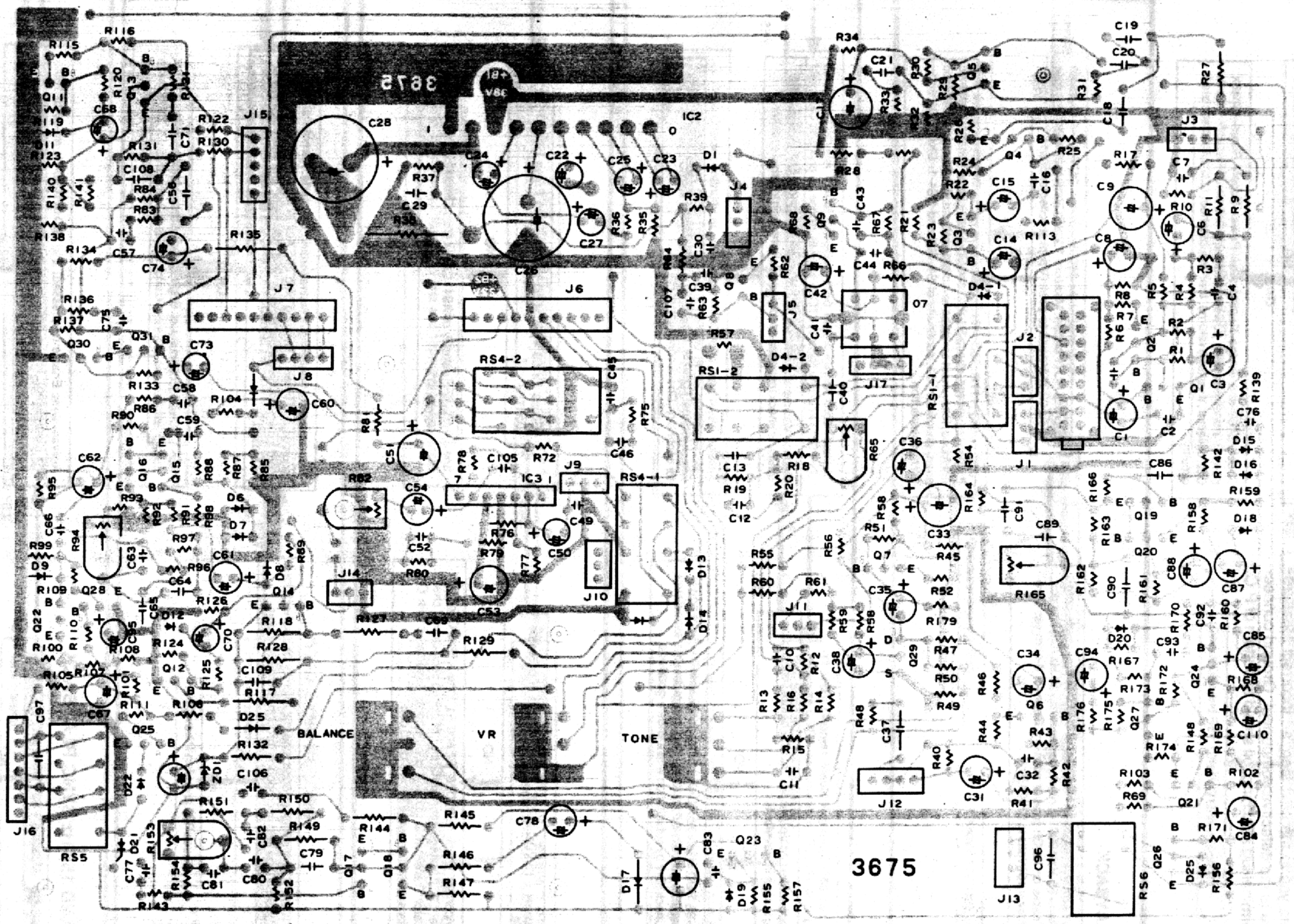
1KHZ BPF/OSC

50HZ BPF/OSC

PROJECTO

JB

AC 120



MAIN P.C. BOARD

Top View

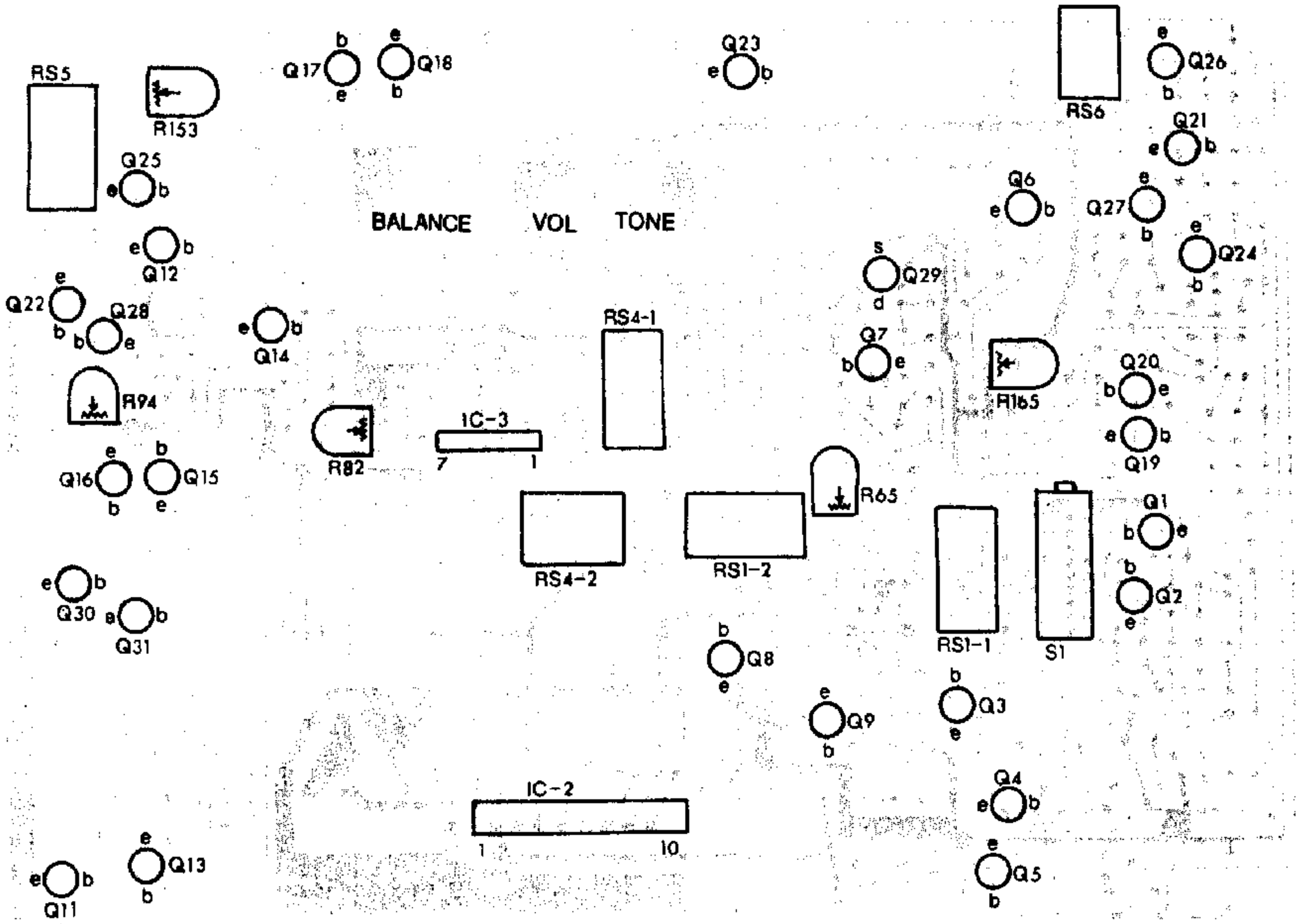
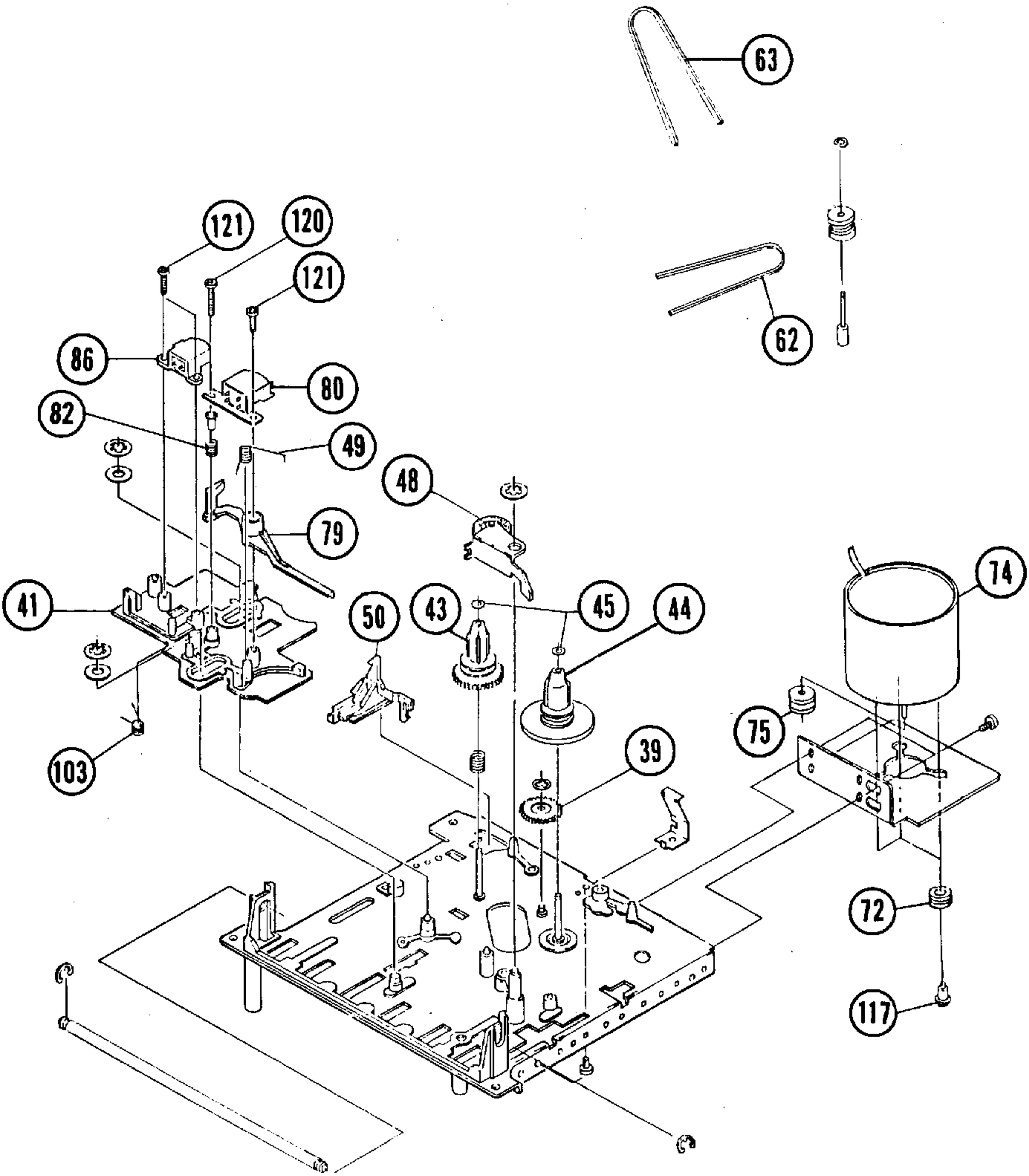


Figure 1. Selected Component Layout Bottom View

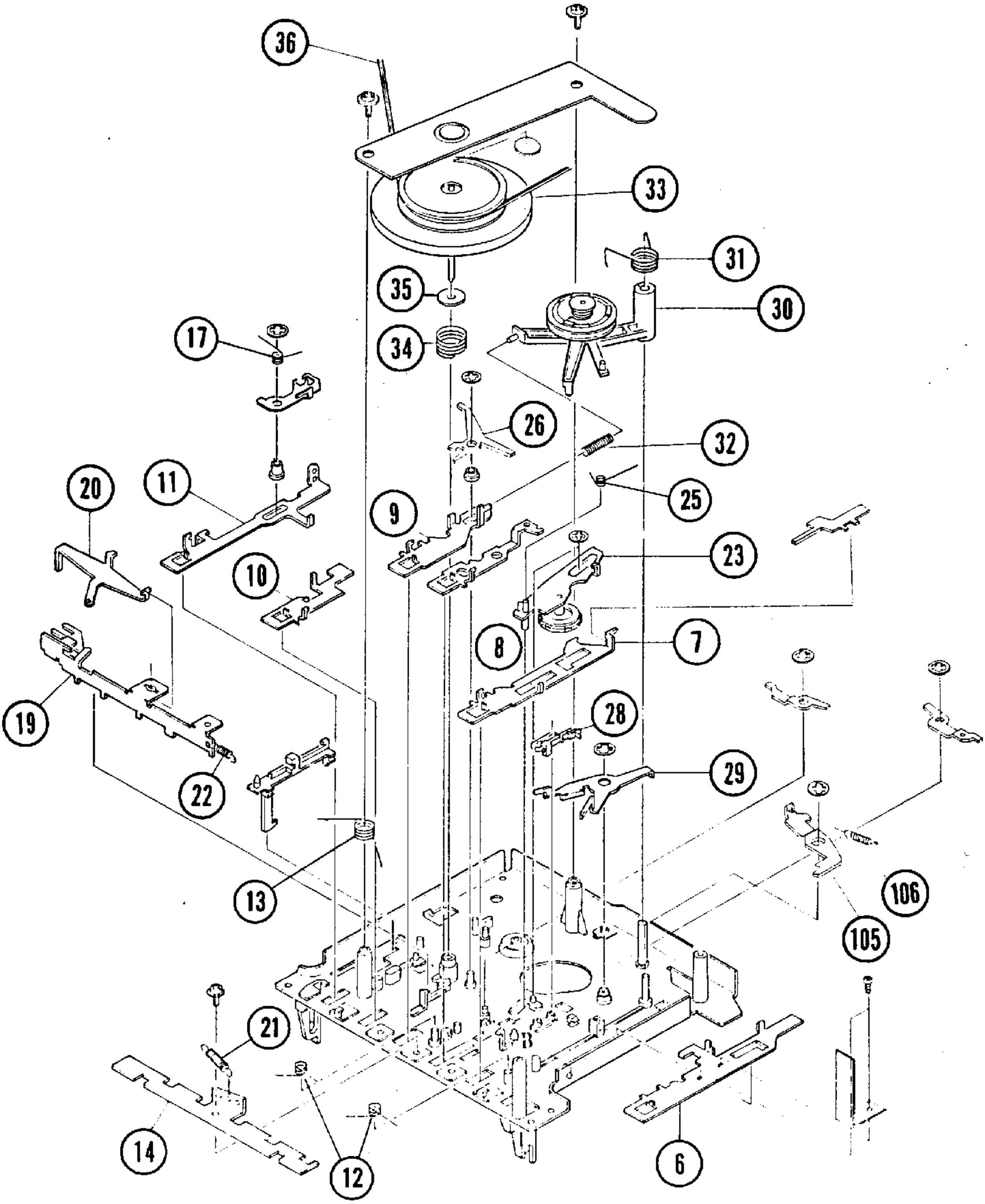
JACK	CONNECTS TO
J1	J8
J2	Record/Play Head 1 (Audio)
J3	Aux Out Jack
J4	PA/Mon Switch and Level Meter
J5	Limiter Switch
J6	Audio Record, Sync Enable, and 50 Hz/1000 Hz Swiches
J7	Visual Advance, Stop/Restart, and Audio Record Switches
J8	J1
J9	Record/Play Head 2 (Sync)
J10	150 Hz Mode Switch
J11	Limiter and PA/Mon Switches
J12	Mic In and Aux In Jacks
J13	Visual Advance on Proj Out Jack
J14	Sync Out Jack
J15	Sync In Jack
J16	150 Hz Mode Switch, Remote In Jack
J17	Erase Head (Audio and Sync)

Table 1. Destination of Jacks



TRANSPORT MECHANISM

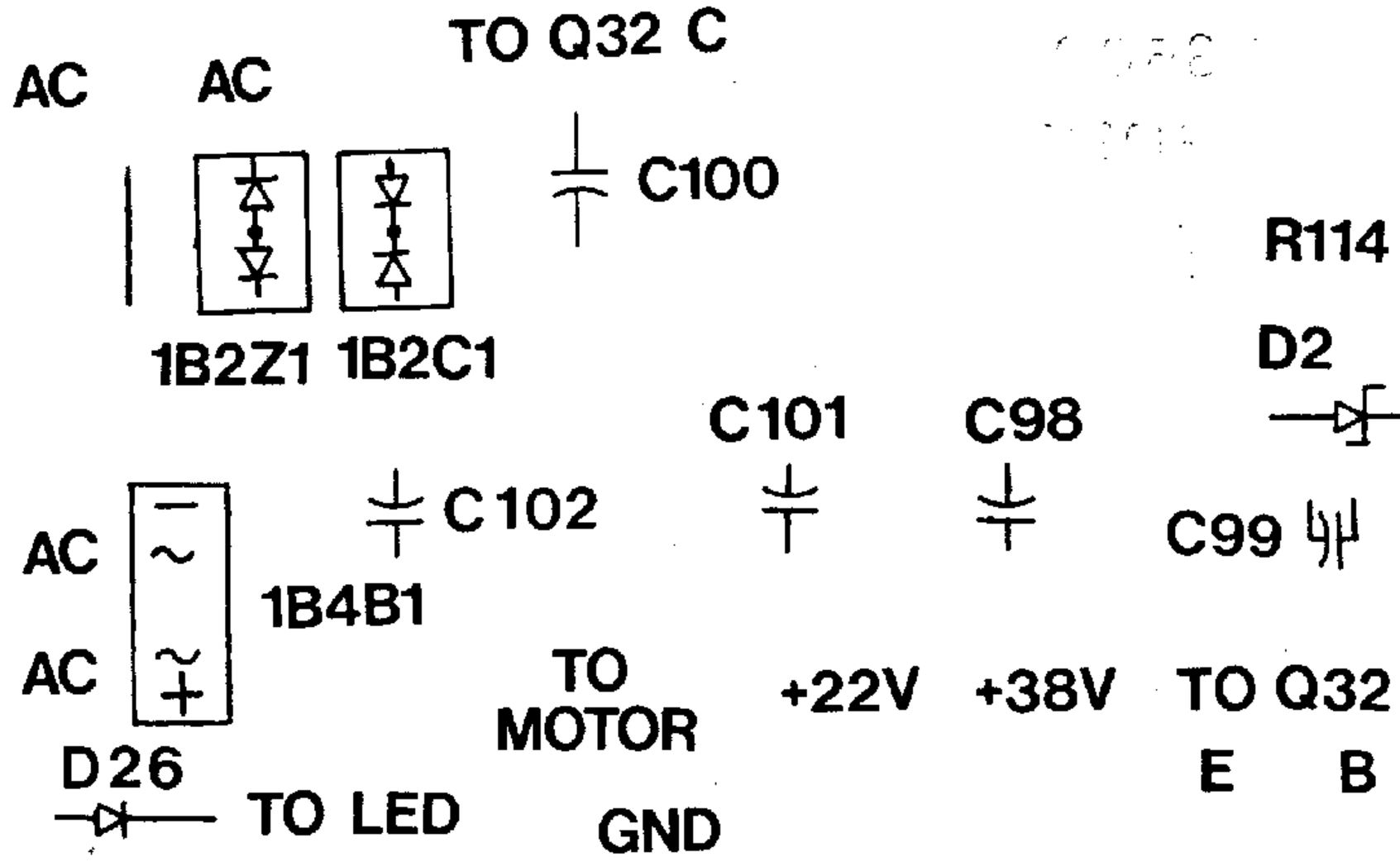
Top Side



TRANSPORT MECHANISM

Bottom Side

R/PHI



MIC J1

AUX J2

Figure 2. Power Supply P.C. Board

INTERNAL ADJUSTMENTS

R/P

1. Record Bias Adjustment
   A. Connect one lead of an AC voltmeter (response to 50 kHz) between junction of R65 and R18. Connect other lead to ground.
   B. Depress Audio Record pushswitch. Insert blank cassette and depress Record and Play buttons.
   C. Adjust R65 to indicate 8V-10V RMS.

2. Sync Playback Level
   A. Insert MTT-212 test tape (0 dB = 250 nW/m) into cassette compartment.
   B. Connect AC Voltmeter to SYNC AUX OUT jack.
   C. Depress Play button.
   D. Adjust R82 to indicate 0.5 V RMS.

3. 150 Hz Bandpass Filter/Oscillator Tuning
   A. Connect a 39K ohm ¼ W resistor between + lead of ZD 1 and + lead of C61.
   B. Depress Sync Enable pushswitch and 50 Hz/ 1000 Hz pushswitch (to 1000 Hz position).
   C. Connect Frequency Counter to collector of Q16.
   D. Adjust R94 to indicate 150 Hz.

4. 50 Hz Bandpass Filter/Oscillator Tuning
   A. Connect a 39K ohm ¼ W resistor between + lead of ZD1 and + lead of C87.
   B. Depress Sync Enable pushswitch and set 50 Hz/1000 Hz pushswitch to 50 Hz (up) position.
   C. Connect Frequency Counter to collector of Q20.
   D. Adjust R165 to indicate 50 Hz.

5. 1 kHz Bandpass Filter/Oscillator Tuning
   A. Connect a 39 K ohm ¼ W resistor between + lead of ZD1 and + lead of C78.
   B. Depress Sync Enable pushswitch and 50 Hz/ 1000 Hz pushswitch (to 1000 Hz position).
   C. Connect Frequency Counter to collector of Q18.
   D. Adjust R153 to indicate 1 kHz.

TROUBLESHOOTING PROCEDURE

Directons: Follow each test in order. The correct voltage or waveform will lead you to the next step; an incorrect measurement will lead you to the defective component. Ground connection is taken at terminal lug attaching foil shield to bottom of P.C. Board.

POWER SUPPLY

Measure about + 38 VDC at "To Q32 collector" pin on Power Supply Board (Figure 2).

YES → Measure + Supply Boar

NO → Check C100 and Bridge Rectifiers on Power Supply Board. Check power transformer, fuse, power switch, and line cord. Remove wire to Q32 collector; if voltage returns, then troubleshoot Q32 and associated circuitry.

Check R114, C98, C + 38 VDC wire to ma ponent or trace exist

38 VDC d (Figu

AUDIO PLAYBACK

Insert a standard level cassette recorded at 0 VU* into cassette compartment. Place 50 Hz/1000 Hz mode switch in the 50 Hz (up) position and Sync Enable on its On (down) position. Connect 8-ohm resistive load rated at least 10 Watts to SPKR jack.

Depress PLAY button. Measure 1.2 VDC and scope for about 0.175 V peak-to-peak (V p-p) at collector of Q1.

YES → Measure 2 Q2.

NO → If incorrect voltage, check R1, R2, and C3. Check Q1. If voltage problem not found, follow next six steps to isolate problem. If incorrect waveform seen, check C1, C2, continuity of S1, S2, and RS1-1. Check Q1 and Q2 by substitution.

If incorrect DC volta Check continuity of next five steps to isol C6, C8, R5, R7 and

VDC

ge me RS1-2 ate pro R9. Ch

Scope at least 28 Vp-p at pin 2 of IC-2 before visible clipping is seen in waveform.

YES → Reduce Volume and remove 8-ohm load from SPKR jack. Increase Volume and check for undistorted sine wave through internal speaker.

YES → Insert 8-ohm load in area between NORI 0.5 Vp-p at pin 6 of IC

o SPK AAL ar :-2.

NO → Measure + 38 VDC at pin 3 of IC-2. If not, find break in line from power supply. Check for shorted SPKR jack. Check components associated with IC-2. Check IC-2 by substitution with a known-good one.

NO → Check internal speaker. Check internal speaker contacts on SPKR jack for continuity. Check continuity of RS1-2.

Check R37, Level Meter

R38.

Measure +10 VDC and 20 Vp-p at 50 kHz at collector of Q9.

YES → Scope for 50 Vp-p at 50 kHz going to Erase Head 1 (EH1) at J17.

YES → Scope for (R.PH1) at J2.

0 Vp-

NO → If voltage incorrect, check R66, D26, S2 and S1. Check Bias Oscillator Transformer O7. If voltage approximately OK but no oscillations, check Bias Oscillator Transformer O7 and components associated with Q9. Check Q9 by substitution with a known-good one.

NO → Check continuity of RS1. Check Bias Oscillator Transformer O7.

Check C4 R65. Check

Bias contin

Set Mon/PA to PA and speak through external microphone. Check for mixing of signal on tape with microphone through internal speaker.

YES → Rewind tape to beginning of test recording just made. Remove all signal sources and insert a shorting plug into Aux In jack. Place unit into Record for several seconds. Rewind tape, playback, and verify that signal is erased.

YES → Place Sync Enable (up). Insert test cas a known-good 3675

50 Hz SYNC PLAY

On (de ette w

NO → Check R56 and Mon/PA switch.

NO → Check continuity of RS5. Check Erase Head by substitution.

1 kHz AND 150 Hz SYNC PLAYBACK

Measure + 33 VDC at pin 7 of IC-3.

YES → Activate Sync Enable (depressed) and 50 Hz/1000 Hz mode to 1000 Hz (depressed). Play a test cassette with 1 kHz tones recorded on it (from a known-good 3675). Scope for 0.7 Vp-p at base of Q17.

YES → Measure VDC Q18.

NO → Check R81 and C51. Check IC-3 by substitution.

NO → Check output at pin 6 of IC-3. If not OK, check IC-3 and associated components. Check Rec/Play Head and attaching wires. If OK, check Sync Aux Out and Sync Aux In jacks. Check R87, D6, D7, R143, and C77. Check Q17 by substituting with a known-good one.

If incorrect voltage, and S4. Check Q17 check R154 and R and Q18 by substitu

heck Q nd Q1 47. Ch on.

38 VDC at "To Q32 emitter" pin on Power
1 (Figure 2).

YES

NO

Measure + 22 VDC at " + 22 VDC" pin on Power Supply Board (Figure 2).

YES

NO

Measure about + 6 VDC across pins marked "to r
in Figure 2.

NO

:99, and D2. Check Q32 by substitution. Remove
un P.C. board; if voltage returns, then shorted com-
s on main P.C. board.

Remove + 22 VDC wire to main P.C. Board. If voltage returns, then shorted component or trace exists on main P.C. Board. Check transformer by substitution.

Check C102, Motor diode bridge, and transforme
ondary.

VDC and 5V p-p waveform at collector of

YES

NO

Measure about 1.25 Vp-p at wiper of Tone Control VR1.

YES

NO

Measure + 26 VDC at collectors of Q3, Q4, ar
Scope for about 1.25 Vp-p at emitters of Q3, Q
Q5.

NO

ge measured, check R5, R17, R26, C6, and C9.
RS1-2. If voltage problem is not found, follow the
ate problem. If incorrect waveform seen, check C5,
R8. Check Q2 by substitution.

Check R10 and R11. Check Tone Control and associated components.

If incorrect DC voltage measured, check R34, check for s
Q3, Q4, Q5, C17, and associated circuitry. If voltage prob
follow next three steps to isolate stage. If incorrect wa
check C14, C15, and circuitry associated with Q3, Q4, a
Q3, Q4, and Q5 by substitution with a known-good one.

AUDIO RECORD

o SPKR jack. Level Meter needle should be in clear
AL and HIGH when Volume Control is adjusted for
-2.

YES

NO

Set limiter to Off, Mon/PA to Norm, Audio Record On (depressed), Balance to mid-position and Volume Control to maximum (fully up). Insert a blank cassette and depress Record, Play, and Pause buttons. Apply 1 kHz signal into Mic In jack at enough level to set Level Meter in clear area between Norm and High (about 0.3 mV RMS).

Measure 19 VDC and 0.1 Vp-p at collector of Q

NO

R38, R39, C29, and C30. Check D1 and

If incorrect DC voltage, check R45, R55, R44, and C33.
incorrect signal level, check Mic In jack, Balance Contr
R40, R41, R43, and R44. Check Q6 by substituting with a
one.

---

0 Vp-p at 50 kHz going to Rec/Play Head 1
2.

YES

NO

Remove signal from Aux In jack and plug in external microphone into Mic In jack. With Limiter in Off, measure about 7.5 VDC at gate of Q29. With Limiter in Music or Speech, voltage at gate of Q29 should vary between 7.5 VDC to as low as 0.6 VDC during speech.

YES

NO

Release Pause and make sample recording from externa
With Volume Control at Max, supply 1 kHz signal into A
enough level to set Level Meter into clear area between No

Bias Oscillator Transformer O7, C40, and
continuity of S2 and RS1-1.

Check R64, C39, C107, Q8, Limiter Switch, and associated circuitry.

AYBACK

n (depressed) and 50 Hz/1000 Hz mode in 50 Hz
tte with 50 Hz tones recorded on it (generated by

At collector of Q19 and Q20, measure + 8 VDC and 14 Vp-p (when 50 Hz tone is present on tape).

YES

NO

At Q24 emitter, measure 6 VDC and 5 Vp-p ramp
(only during 50 Hz tones).

NO

If incorrect voltage, check R160, R148, C85, R103, continuity of S3 and S4. If voltage appears on one side of R103 but not on Q21 side, then check Q21, continuity of S2 and S1.

Check components associated with Q24 and Q24
Check R160-R165 and C88-C91.

DC and 12 Vp-p at collectors of Q17 and

YES

NO

Scope for a 6V peak half sine wave at emitter of Q23.

YES

NO

Measure + 1.4 VDC at base of Q26 only when tone
played, 0 VDC when tones are absent.

NO

ck C60, R145, R104, D10, and continuity of S3
d Q18 for shorts or opens. If incorrect waveform,
. Check R149-R153 and C79-C82. Check Q17
.

Check C83, D19, and R157. Check Q23 by substitution.

Check R156, C84, and R171. Check Q26 by subs
tion. If voltage remains high, check for shorted Q24.

s marked "to motor"

YES

Check continuity of S7 (motor leaf switch) and S8 (150 Hz Mode Switch).

YES

+ 6 VDC measured at small P.C. board near motor and motor turns.

YES

NO

and transformer sec-

Insert a blank cassette into cassette compartment. Depress PLAY and PAUSE buttons. Place SYNC ENABLE in its off (Up) position. Measure + 6 VDC at small P.C. board near motor.

NO

Check motor and belts.

---

of Q3, Q4, and Q5.
itters of Q3, Q4, and

YES

Remove 315 Hz test cassette and insert test cassette with 50 Hz tones recorded on it (generated by a known-good 3675). While scoping hot end of Volume Control VR2, switch 50 Hz/1000 Hz mode switch in and out. Signal should measure about 1V p-p in 1000 Hz position and about 0.1V p-p in 50 Hz position.

YES

Remove 50 Hz test cassette and insert 315 Hz 0 VU test cassette. Adjust Volume Control so 0.5 Vp-p is measured on scope at pin 6 of IC-2.

YES

34, check for shorted or open
If voltage problem not found,
If incorrect waveform seen,
with Q3, Q4, and Q5. Check
n-good one.

NO

Check continuity of S3. Check Q3, Q4, Q5, and associated circuitry.

NO

Check Volume Control and C22.

---

at collector of Q6.

YES

Without resetting any controls or levels, check for 15 VDC and 0.5 Vp-p at collector of Q7.

YES

Remove signal from Mic In jack and supply 1 kHz signal into Aux In jack at enough level to set Level Meter in clear area between Norm and High (about 0.1 VRMS). Scope for about 0.5 Vp-p at hot side of Volume Control.

YES

R44, and C33. Check Q6. If
Balance Control, C31, C32,
bstituting with a known-good

NO

If incorrect DC voltage, check R53 and R52. Check Q7. If incorrect signal level, check C35, R179, R52, and C36. Check Q7 by substituting with a known-good one. Remove Q29 from circuit (note lead orientation); if signal appears, troubleshoot Limiter circuitry (Q8 and Q29).

NO

Check Aux In jack, C37, Balance Control, and associated components. Check continuity of RS1-3.

---

ng from external microphone.
Hz signal into Aux In jack at
rea between Norm and High.

During recording, set Mon/PA switch to Mon. Verify that low-level signal is heard through internal speaker.

YES

Lower Volume Control, playback test recording and check for undistorted sound.

YES

NO

Check R57 and Mon/PA switch S9.

NO

Check signals and waveforms from beginning of Audio Playback section of this Troubleshooting Guide. Check Record/Play Head 1 (R/PH 1) by substitution.

---

nd 5 Vp-p ramp wave

YES

Measure + 22 VDC at Q26 collector when no tones are present. Measure about + 1 VDC when tone is played.

YES

Check that resistance across pins 1 and 3 of Proj Out jack goes to 0 ohms during tones. Check that Visual Advance LED DL4 illuminates during tone.

YES

th Q24 and Q24 itself.

NO

Check C84, R171, and R169. Check Q26 by substitution. Check continuity of RS-6 coil.

NO

Check continuity of RS6, D25, LED DL4, and R177.

---

26 only when tones are
sent.

YES

Measure + 22 VDC at collector of Q26 during absence of tones. Measure about + 1 VDC during tones.

YES

Continued on next page

heck Q26 by substitu-
for shorted Q24.

NO

Check continuity of RS6 coil. Check Q26 by substitution.

---

* The Test Cassette used for 0 VU reference is the TEAC MTT-112. If a standar reference test cassette is unavailable, you may make a test cassette as follows:

1. On a properly functioning cassette recorder, record a tone of about 315 Hz.
2. The recording level is approximately correct when, upon playback, the leve meter reads 0 VU (or at the clear area between Normal and High).
3. Note that this test cassette is NOT recorded at 0 VU. It can ONLY be use for checking the presence of an undistorted signal. Therefore, the level of th scope waveforms outlined above may not match the levels you measure. In thi case, look for the presence of an undistorted sine wave rather than a particula signal voltage reading.

sure + 8 VDC and 13 Vp-p at collectors of Q15 and

YES

NO

check R90. Check Q15 and Q16 for opens or shorts.
m, check R98 and R92. Check R93-R97 and C62-
d Q16 by substitution.

Scope for about 10V peak half sine wave at emitter of Q22.

YES

NO

Check C86, R99, and D9. Remove Q28 (note lead orientation); if signal appears, troubleshoot Q28 and associated components.

Measure 0.7 VDC at base of Q28 when 150 Hz tones are played and Stop/Restart LED is illuminated. 150 Hz tone should be scoped at Q28 collector only momentarily as LED lights.

YES

NO

Symptom of Q28 failure is several pushes of Stop/Restart button is required to restart tape. Check R109, R108, C95, and R107. Check Q28 by substitution.

YES

1 kHz AND 150 Hz SYNC RECORD

rt.

YES

Depress Record, Play, and Pause buttons. Depress Sync Enable and Audio Record. Place 50 Hz/1000 Hz mode switch in 1000 Hz position. Set 150 Hz mode switch to Normal.

Measure + 34 VDC at emitters of Q13 and Q14.

NO

Check R132, ZD1, C72, and C108. Check Q13 and Q14 for shorts.

YES

Measure + 34 VDC at bases of Q13 and Q14.

NO

For Q13, check R116; check Q13 for shorts. For Q14, check R118; check Q14 for shorts.

YES

YES

Measure + 32 VDC at collector of Q11 (1 kHz) and Q12 (150 Hz) dropping to 0.5 V for 0.5 sec when their Sync button is depressed.

NO

(1 kHz): Check C68, R123, D11, R120, R115, and R119. Check Q11 by substitution. (150 Hz): Check C70, R126, D12, R125, R124, and R117. Check Q12 by substitution.

YES

(1 kHz) At junction of C78 (+ end) and D17 and (150 Hz) at junction of C61 (+ end) and D8, measure 0 VDC followed by 0.6 V for 0.5 sec when their Sync button is depressed.

NO

(1 kHz): Check R140 and D17.
(150 Hz): Check R89 and D8.

YES

YES

Scope for 50 kHz at 30 Vp-p record bias at either end of C73.

NO

Check operation of bias oscillator in "Audio Record" section of troubleshooting procedure. Check continuity of RS5. Check C45 and R75.

YES

Release Pause and record 1 kHz and 150 Hz tones generated by depressing Visual Advance and Stop/Restart buttons. Rewind tape and verify proper operation of each Sync section.

NO

Check proper operation of Sync circuits by following "1 kHz and 150 Hz Sync Playback" troubleshooting procedure. Check Record/Play Head and its connecting wires.

YES

YES

Check sync timing circuitry by following the first six steps of "1 kHz and 150 Hz Sync Record" section, referring to procedures marked for "1 kHz."

At junction of C87 (+ end) and D18, measure 0 VDC followed by 0.6 V for 0.5 sec when Visual Advance is depressed.

NO

Check R141 and D18.

YES

YES

Release Pause and record 50 Hz tones generated by pressing Visual Advance button. Rewind tape and verify proper operation of Sync section.

NO

Check proper operation of Sync circuits by following "50 Hz Sync Playback" troubleshooting procedure. Check R176 and C94.

TROUBLESHOOTING PROCEDURE Continued

Check that resistance of pins 1 and 3 of Proj Out jack go to 0 ohms during tones and increases to infinity during absence of tones. Check that Visual Advance LED is seen during tones.

YES

NO

Check D25, continuity of RS6, R177, and Visual Advance LED.

Set 150 Hz mode switch to NORM. Without resetting any controls or switches, play a test cassette with 150 Hz tones recorded on it (from a known-good 3675). Scope for 0.7 Vp-p at base of Q15.

YES

NO

Check C59 and R88. Check Q15 by substitution.

Measure +8 VDC and 13 Vp
Q16.

If incorrect voltage, check R90. Check Q15
If incorrect waveform, check R96 and R92
C65. Check Q15 and Q16 by substitution.

1 kHz Al

Measure +1.4 VDC at base of Q25 when tone is present and Stop/Restart LED is lit.

YES

NO

If no voltage appears at any time, check R101, C67, R111. Check Q25 by substitution. If voltage appears but does not remain, check R105, continuity of S8 (150 Hz mode switch) and RS5.

Motor should stop when 150 Hz tone is played.

YES

NO

Check continuity of RS5.

Depress Stop/Restart switch. Motor should restart.

YES

NO

Check R106, D25, continuity of RS4, S8, and S5.

Depress
Audio Re
Set 150 H

(1 kHz): Depress Visual Advance. (150 Hz): Depress Stop/Restart. Using DC coupling on scope, at base of Q13 (1 kHz) and Q14 (150 Hz), measure rapid shift to –2V followed by rapid shift to 0V.

YES

NO

(1 kHz): Check continuity of S6. Check R130, C71, and R121. Check Q13 by substitution. (150 Hz): Check continuity of S5. Check R129, C69, and R127. Check S8 (150 Hz mode switch). Check Q14 by substitution.

(1 kHz): Depress Visual Advance. (150 Hz): Depress (Stop/Restart). Measure 0 VDC at collector of Q13 (Q14) and +32V for 0.5 sec when their Sync button is depressed.

YES

NO

(1 kHz): Check C68 and R123. Check Q13 by substitution. (150 Hz): Check C70 and R126. Check Q14 by substitution. (Both Sync Tones). If voltage is seen but does not disappear after 0.5 sec, proceed to next step.

At collector of Q17 (1 kHz) and Q15 (150 Hz) measure 12 Vp-p for 0.5 sec when their Sync button is depressed.

YES

NO

(1 kHz): Check C61, R91, and R92. (150 Hz): Check C78, R146, and R147. (Both Sync Tones). Review "1 kHz and 150 Hz Sync Playback" troubleshooting procedure.

At collectors of Q30 and Q31, measure (1 kHz) 3 Vp-p and (150 Hz) 5 Vp-p for 0.5 sec when their Sync button is depressed.

YES

NO

(1 kHz): Check R144 and C106. (150 Hz): Check R86 and C58. (Both Sync Tones). Check components associated with Q30 and Q31. Check Q30 and Q31 by substitution.

Rewind tape to beginning of test recording just made, depress Play and Record but do not depress any Sync tone buttons. Rewind tape and verify that Sync tones are erased from tape.

YES

NO

Measure 50 kHz at about 50 Vp-p going to erase head 2 at J17. If not, check RS5. If waveform OK at J17, check wires to erase head. Check erase head by substitution.

50 Hz SYNC RECORD

Depress Record, Play, and Pause buttons. Depress Sync Enable and Audio Record. Place 50 Hz/100 Hz Mode in 50 Hz (up) position. Set 150 Hz Mode to Normal.

At collector of Q19, measure 50 Hz at 15 Vp-p for 0.5 sec when Visual Advance is depressed.

YES

NO

Check C87, R158, and R159. Review "50 Hz Sync Playback" troubleshooting procedure.

At collector of Q27, measure 11.5 VDC and 50 Hz at 12 Vp-p when signal is present.

YES

NO

Check R170, C93, R172-175. Check Q27 by substitution.