

LOWREY  
TROUBLE SHOOTING  
PROCEDURES

- AUTOMATIC RHYTHM -

- AMPLIFIER/POWER SUPPLIES -

## RHYTHM UNIT TROUBLE SHOOTING LIST

BASIC RHYTHM PROBLEMS CAN BE RELATED TO THREE MAIN SECTIONS IN THE ORGAN.

### 1. POWER SUPPLY

- (A) LOSS OF NEGATIVE OR POSITIVE VOLTAGE CAUSING DEAD RHYTHM
- (B) OPEN FILTER CAPACITORS CAUSING ERRATIC RUNNING OF THE CLOCK AND NOISY INSTRUMENTATION
- (C) BROKEN GROUND WHICH CAN CAUSE THE SAME EFFECT AS IN 1B

### 2. RHYTHM BOARD

- (A) DEFECTIVE IC CHIPS
- (B) BROKEN SOLDER CONNECTIONS
- (C) PARTS FAILURE

### 3. RHYTHM SWITCH ASSEMBLY

- (A) POOR MECHANICAL CONTACT CAUSING DEAD RHYTHM
- (B) ERRATIC START OF THE CLOCK
- (C) DEAD RHYTHM PATTERNS
- (D) IN SOME UNITS, CONTINUOUS RUNNING IN TRIPLET TIMING

WHEN ENCOUNTERED WITH THE FOLLOWING, YOU CAN SUSPECT A DEFECTIVE IC CHIP AS CAUSING THESE PROBLEMS.

- 1. LOSS OF AUTOMATIC BASS
- 2. LOSS OF VARIATION ON AUTOMATIC ACCOMPANIMENT
- 3. INCOMPLETE RHYTHM PATTERNS

IF RHYTHM IS COMPLETELY DEAD, CHECK TO SEE IF CLOCK MULTI-VIBRATOR IS RUNNING.

NOTE: THIS PROCEDURE SHOULD NOT BE TAKEN AS A DIRECT PROBLEM AND CURE METHOD, BUT MERELY AS A GUIDE TO ISOLATE SOME OF THE COMMON PROBLEMS FOUND IN INCORRECT RHYTHM OPERATIONS.

MODEL K RHYTHM UNITS

*13 Button*

SYMPTOMS

SUSPECTED DEFECTS

- |  |  |
|--|--|
| 1. INTERMITTENT OR MISSING SNARE,<br>BRUSH CYMBAL NOISE                            | NOISE GENERATOR TRANSISTOR                           |
| 2. INCOMPLETE RHYTHM PATTERNS ON<br>ALL SELECTIONS                                 | SHIFT REGISTER TRANSISTOR<br>SHIFT REGISTER NETWORKS |
| 3. MISSING BEATS ON ALL OR SOME OF<br>THE RHYTHM PATTERNS                          | LOGIC GATE TRANSISTORS                               |
| 4. ONE OR MORE MISSING INSTRUMENTA-<br>TION IN ALL RHYTHM PATTERNS                 | PULSE AMPLIFIER                                      |
| 5. SNARE AND CASTANETS PLAY WITHOUT<br>KEYING WHEN FUNCTION SWITCH IS<br>DEPRESSED | OPEN SNARE AND CASTANET<br>KEYING LINE               |

6. *250 mike cap breaks loose chirps or hum  
sounds to dixie (make crash cymbal sound)  
can cause whistle without rhythm turned on*
7. *Note comes at high volume (check pots on top board)*

-1 RHYTHM UNITS

SYMPTOMS

SUSPECTED DEFECTS

- |  |   |
|--|---|
| 1. MISSING BEATS OR ALL INSTRUMENTATION KEYING AT ONCE   | DEFECTIVE IC SOCKETS ON ROM WITH POSSIBLE ROSIN BUILD-UP OR CONTACTS NOT MAKING               |
| 2. LOSS OF ALTERNATING BASS OR INCOMPLETE RHYTHM PATTERNS  | DEFECTIVE IC SOCKET ON RESETABLE COUNTER, WITH POSSIBLE ROSIN BUILD-UP OR CONTACTS NOT MAKING |
| 3. ERRATIC START OF THE CLOCK  | DEFECTIVE START SWITCH AND/OR POOR MECHANICAL CONTACT   |
| 4. THE LARGER COMPONENTS ON THE RHYTHM BOARDS TEND TO CRACK SOLDER JOINTS OR BREAK EYELETS DUE TO VIBRATION.   |   |
| 5. ON RHYTHM BOARDS, WHERE THE IC CHIPS ARE NOT STRAPPED TO THE SOCKET, THE CHIPS TEND TO LOOSEN IN THE SOCKETS. <i>CHECK SOCKET</i>                             |   |
| 6. MIS-ADJUSTMENT OF THE INSTRUMENTATION POTS FOR THE -1 MODELS WILL NOT CAUSE SELF-OSCILLATION, BUT IF ADJUSTED TO LOW, COULD CAUSE THAT STAGE TO BE DEAD.      |   |
| 7. IF AUTO ACCOMPANIMENT TENDS TO HAVE A STEADY TONE OR POSSIBLY NO TONE AT ALL, THE F.E.T. ACCOMPANIMENT MODULATOR TRANSISTOR COULD BE SUSPECTED.               |   |
| 8. IF ALL RHYTHM PATTERNS ARE TRIPLET TIMED, THE POSSIBLE CAUSE COULD BE DIODE D161, 163, OR 166 (LOCATED ON THE RHYTHM-SWITCH ASSEMBLY) TO BE LEAKY OR SHORTED. |   |

*IC-10  
page 32*

GENIE RHYTHM TROUBLE SHOOTING CHART

<u>SYMPTOMS</u>	<u>SUSPECTED DEFECTS</u>
1. A) REPETITIOUS KEYING ON ALL RHYTHM PATTERNS	<i>6.2k 4.2k</i> TP-1, 2 AND/OR 3 <i>CHIPS</i>
B) INCOMPLETE RHYTHM PATTERNS WITH REPETITIOUS KEYING	"
2. NO VARIATION IN RHYTHM PATTERNS AND NO DOWN-BEAT LIGHT	VARIATION DIVIDER DRIVER TRANSISTOR #1 AND/OR #2  IC VARIATION DIVIDER CHIP
3. RHYTHM DOES NOT START CORRECTLY ON THE DOWN BEAT	DEFECTIVE START SWITCH  RESET #2 TRANSISTOR  IC VARIATION DIVIDER CHIP
4. PAUSE BETWEEN BARS ON SWING, WALTZ AND DIXIE	TP-1, 2  TP-3
5. INTERMITTENTLY MISSING HIGH OR LOW ALTERNATING BASS	<i>DIRTY POT</i> IC BASS DIVIDER OR KEYSWITCH ADJUSTMENT
6. NO ALTERNATING BASS	BASS SELECTOR DIVIDER
7. NO AUTOMATIC ACCOMPANIMENT	F.E.T. ACCOMPANIMENT MODULATOR

*30V Zener in power supply  
dirty pot. noisy rhythm*

## POWER SUPPLY SHORTS CHECK

1. ALL RESISTANCE READINGS TAKEN WITH SIMPSON MODEL 260 VOM.  
ALL READINGS TAKEN ON RX1 SCALE, UNLESS OTHERWISE STATED.  
ALL READINGS TAKEN WITH COMMON LEAD OF THE METER TO CHASSIS GROUND UNLESS OTHERWISE STATED.  
ALL RESISTANCE READINGS TAKEN WITH THE POWER SUPPLY REMOVED FROM THE ORGAN.
  
2. ACTUAL TAILORING PROCEDURES WILL VARY DEPENDING ON THE MODEL.

### COMMON CHECKS USED ON ALL POWER SUPPLIES

- A. VISUAL INSPECTION OF POWER SUPPLY FOR SIGNS OF BURN-UPS, CRACKED BOARDS AND MISSING PARTS
- B. CHECK ALL FUSES
- C. VISUAL CHECK ON ALL HEAT SENSING DIODES FOR CRACKS

TEENIE GENIE P.S.

NO. 997-022022

ZENER AND DIODES CHECK

1. AT THE JUNCTION OF 47 OHM 2 WATT RESISTOR AND Z1 ZENER DIODE, THE FORWARD RESISTANCE READING IS 200 OHMS AND REVERSE IS 13 OHMS.
2. AT THE JUNCTION OF 47 OHM 2 WATT AND D4, D5 THE FORWARD RESISTANCE IS 200 OHMS AND REVERSE IS 11 OHMS.
3. AT THE JUNCTION OF <sup>115 OHM 2 W</sup> 330 OHM 2 WATT RESISTOR AND Z2 ZENER DIODE, THE FORWARD RESISTANCE IS 12 OHMS AND THE REVERSE IS ~~1K~~ OHMS.
4. AT THE JUNCTION OF 330 OHMS 2 WATT RESISTOR AND Z3 ZENER DIODE, THE FORWARD RESISTANCE IS 12 OHMS AND THE REVERSE RESISTANCE IS ~~∞~~ OHMS.  
*INFINITY*

POWER TRANSISTOR SHORTS CHECK-IN CIRCUIT

- |                  |                  |
|------------------|------------------|
| 1. ** Q8 (NPN)   | 2. Q9 (NPN)      |
| C TO E = 70 OHMS | C TO E = 60 OHMS |
| C TO B = 12 OHMS | C TO B = 12 OHMS |

NOTE: \* VALUE OF THIS RESISTOR MAY CHANGE DEPENDING ON EARLY OR LATE PRODUCTION MODEL.

\*\* APPROXIMATE READINGS TAKEN WITH THE COMMON LINE OF THE METER TO THE COLLECTOR OF THE TRANSISTOR.

MODEL ICG-1 P.S.  
NO. 997-019094

ZENER AND DIODES CHECK

1. AT THE JUNCTION OF D3 AND D8, YOU SHOULD GET A KICK ON THE METER SHOWING DISCHARGE OF A FILTER CAPACITOR AND METER READING RETURNING TO INFINITY. (THIS IS A B+ LINE CHECK).
2. THE SAME SHOULD APPLY FOR READINGS AT THE JUNCTION OF Z2 ZENER DIODE AND 560 OHM 5 WATT RESISTOR.
3. THE SAME SHOULD APPLY FOR READINGS AT THE JUNCTION OF 15 OHM 5 WATT RESISTOR AND Z3 ZENER DIODE.
4. AT THE JUNCTION OF 35 OHM 5 WATT RESISTOR AND 1000 MFD CAPACITOR, THE FORWARD RESISTANCE SHOULD READ APPROXIMATELY 10 OHMS.

\* POWER TRANSISTOR SHORTS CHECK - IN CIRCUIT

- |                   |                  |
|-------------------|------------------|
| 1. Q20 (NPN)      | 2. Q21 (NPN)     |
| C TO E = 100 OHMS | C TO E = 70 OHMS |
| C TO B = 10 OHMS  | C TO B = 10 OHMS |

- \* APPROXIMATE READINGS TAKEN WITH THE COMMON LINE OF THE METER TO THE COLLECTOR OF THE TRANSISTORS.

MODEL TLOKS AND TLOKS-A P.S.

DUAL CHANNEL

NO. 997-021103 (TLOKS-A)

ZENER AND DIODE CHECK

1. AT THE JUNCTION OF DIODE D3 AND 2.2K OHM RESISTOR, THE FORWARD RESISTANCE READING SHOULD GO TO INFINITY AFTER DISCHARGE OF CAPACITOR. REVERSE IS APPROXIMATELY 11 OHMS.
2. AT THE JUNCTION OF DIODES D9, D4 AND 1K, THE FORWARD RESISTANCE IS 300 AND REVERSE APPROXIMATELY 11 OHMS.
3. AT THE JUNCTION OF 390 OHM 2 WATT RESISTOR AND DIODE D8 THE FORWARD RESISTANCE IS 11 AND REVERSE IS INFINITY.

\* POWER TRANSISTOR SHORT CHECK-IN CIRCUIT

Q61	NPN	Q62	NPN	Q70	NPN
C TO E = 200 OHMS		C TO E = 40 OHMS		C TO E = 40 OHMS	
C TO B = 10 OHMS		C TO B = 10 OHMS		C TO B = 10 OHMS	

Q69 NPN  
C TO E = 200 OHMS  
C TO B = 10 OHMS

- \* APPROXIMATE READING TAKEN WITH THE COMMON LINE OF THE METER TO THE COLLECTOR OF THE TRANSISTOR.

MODEL GAK25H-1 P.S.

DUAL CHANNEL

NO. 997-019744

ZENER AND DIODE CHECK

1. AT THE JUNCTION OF 550 OHM 4 WATT RESISTOR AND Z6 ZENER DIODE, THE FORWARD RESISTANCE IS 2K AND REVERSE ABOUT 11 OHMS.
2. AT THE JUNCTION OF 350 OHM 10 WATT RESISTOR AND Z5 ZENER DIODE, THE FORWARD RESISTANCE IS 1 TO 2K OHMS AND REVERSE ABOUT 11 OHMS.
3. AT THE JUNCTION OF 20 OHM 20 WATT RESISTOR AND Z10 ZENER DIODE, THE FORWARD RESISTANCE IS 1 TO 2K OHMS AND REVERSE ABOUT 11 OHMS.
4. AT THE JUNCTION OF 270 OHM 2 WATT RESISTOR, DIODES D60 AND D61, THE FORWARD RESISTANCE IS 10 OHMS AND REVERSE ABOUT 400 OHMS.

\* POWER TRANSISTOR SHORT CHECK - IN CIRCUIT

Q126	NPN	Q125	NPN	Q117	NPN
C TO E = 150 OHMS		C TO E = 35 OHMS		C TO E = 150 OHMS	
C TO B = 10 OHMS		C TO B = 10 OHMS		C TO B = 10 OHMS	
Q118	NPN	Q128	NPN		
C TO E = 50 OHMS		C TO E = INFINITY			
C TO B = 10 OHMS		C TO B = 10 OHMS			

\*\* APPROXIMATE READINGS TAKEN WITH THE COMMON LINE OF THE METER TO THE COLLECTOR OF THE TRANSISTOR.

MODEL LC-98K-1 P.S.

NO. 997-019409

ZENER AND DIODE CHECK

1. AT THE JUNCTION OF THE 560 OHM 4 WATT RESISTOR AND Z2 ZENER DIODE, THE FORWARD RESISTANCE SHOULD GO TO INFINITY AFTER SHOWING DISCHARGE OF CAPACITOR. REVERSE IS ABOUT 12 OHMS.
2. AT THE JUNCTION OF 25 OHM 5 WATT RESISTOR AND Z5 ZENER DIODE, THE FORWARD RESISTANCE IS 400 OHMS AND REVERSE IS 12 OHMS.
3. AT THE JUNCTION OF 75 OHM 5 WATT RESISTOR AND Z5 ZENER DIODE, THE FORWARD RESISTANCE IS 12 OHMS AND REVERSE IS INFINITY.

\* POWER TRANSISTOR SHORTS CHECK - IN CIRCUIT.

1. Q8 NPN

C TO E = 17 OHMS  
C TO B = 11 OHMS

2. Q9 NPN

C TO E = 20 OHMS  
C TO B = 15 OHMS

\* APPROXIMATE READINGS TAKEN WITH THE COMMON LINE OF THE METER TO THE COLLECTOR OF THE TRANSISTOR.

MODEL IC-44AR-1 P.S.

NO. 997-019913

ZENER AND DIODE CHECK

1. AT THE JUNCTION OF THE 390 OHM AND 560 OHM 5 WATT RESISTORS, THE FORWARD RESISTANCE IS ABOUT 1K OHMS AND REVERSE RESISTANCE SHOULD BE AROUND 14 OHMS. NOTE: ANY READING LOWER THAN 1K OHM CHECK Z1 OR Z2 ZENER DIODE FOR SHORTS.
  
2. AT THE JUNCTION OF 15 OHM 5 WATT RESISTOR AND Z3 ZENER DIODE, THE FORWARD RESISTANCE SHOULD GO TO INFINITY AFTER A KICK ON THE METER SHOWING DISCHARGE OF A CAPACITOR. REVERSE RESISTANCE SHOULD BE AROUND 11 OHMS.

\* POWER TRANSISTOR SHORTS CHECK - IN CIRCUIT

- |          |          |          |         |
|----------|----------|----------|---------|
| 1. Q23   | NPN      | 2. Q25   | NPN     |
| C TO E = | 100 OHMS | C TO E = | 25 OHMS |
| C TO B = | 10 OHMS  | C TO B = | 10 OHMS |

\* APPROXIMATE READINGS TAKEN WITH THE COMMON LINE OF THE METER TO THE COLLECTOR OF THE TRANSISTOR.

MODEL IC-44AR P.S.

NO. 997-017924

ZENER AND DIODE CHECK

1. AT THE JUNCTION OF 390 OHM RESISTOR AND Z1 RESISTOR,  
FORWARD RESISTANCE SHOULD GO TO INFINITY AFTER DISCHARGE OF  
CAPACITOR.
2. AT THE JUNCTION OF 560 OHM 5 WATT RESISTOR AND Z2 ZENER DIODE,  
FORWARD RESISTANCE IS SAME AS NO. 1.
3. AT THE JUNCTION OF 15 OHM 5 WATT RESISTOR AND Z3, FORWARD  
RESISTANCE IS SAME AS NO. 1.
4. AT THE JUNCTION OF 650 OHM 5 WATT RESISTOR AND Z4 ZENER DIODE,  
THE FORWARD RESISTANCE IS ABOUT 12 OHMS.

\* POWER TRANSISTOR SHORTS CHECK - IN CIRCUIT

- |                   |     |                  |     |
|-------------------|-----|------------------|-----|
| 1. Q23            | NPN | 2. Q25           | NPN |
| C TO E = 100 OHMS |     | C TO E = 35 OHMS |     |
| C TO B = 10 OHMS  |     | C TO B = 10 OHMS |     |

\* APPROXIMATE READINGS TAKEN WITH THE COMMON LINE OF THE METER  
TO THE COLLECTOR OF THE TRANSISTOR.

MODEL IC-44K-1 P.S.

NO. 997-019658

ZENER AND DIODE CHECK

1. AT THE JUNCTION OF 390 OHM 5 WATT RESISTOR AND 560 OHM 5 WATT RESISTORS, FORWARD RESISTANCE IS APPROXIMATELY 1K AND REVERSE RESISTANCE OF 14 OHMS. (IF THE READING IS LOWER THAN 1K, Z1 OR Z2, ZENER DIODE MAY BE SHORTED.
2. AT THE JUNCTION OF 15 OHM 5 WATT RESISTOR AND Z3 ZENER DIODE, THE FORWARD RESISTANCE SHOULD GO TO INFINITY AFTER DISCHARGE OF CAPACITOR. REVERSE RESISTANCE APPROXIMATELY 11 OHMS.
3. AT THE JUNCTION OF 75 OHM 5 WATT RESISTOR AND Z5 ZENER DIODE, THE FORWARD RESISTANCE IS ABOUT 11 OHMS AND THE REVERSE RESISTANCE IS INFINITY.

\* POWER TRANSISTOR SHORTS CHECK - IN CIRCUIT

1. Q33 NPN

2. Q34 NPN

C TO E = 80 OHMS  
C TO B = 10 OHMS

C TO E = 20 OHMS  
C TO B = 10 OHMS

\* NOTE: APPROXIMATE READINGS TAKEN WITH THE COMMON LEAD OF THE METER TO THE COLLECTOR OF THE TRANSISTOR

## GENERAL TAILORING PROCEDURES

1. WHEN TAILORING ANY POWER SUPPLY WHETHER IT IS A SINGLE OR DUAL CHANNEL, THE INPUT SIGNALS MUST BE SHORTED OUT TO CHASSIS GROUND.
  - A. IN SINGLE CHANNEL AMPLIFIERS, BREAK THE RED LINE B+ COLLECTOR VOLTAGE TO THE POWER TRANSISTOR AND INSTALL THE SIMPSON 260 METER IN SERIES WITH THE CIRCUIT. SET THE SIMPSON ON THE 500 MA SCALE AND TAILOR ACCORDING TO CHARTS BELOW.
2. ON DUAL CHANNEL AMPLIFIERS, BREAK THE RED JUMPER LINE ON THE AMPLIFIER BOARDS WHICH SUPPLIES B+ VOLTAGE TO THE CHANNEL FURTHEST AWAY FROM THE POWER SUPPLY. CONNECT THE SIMPSON 260 METER IN SERIES WITH THE CIRCUIT AND SET THE METER UP FOR THE 500 MA SCALE AND TAILOR FOR 40MA. THEN, RECONNECT THIS B+ LINE. THEN BREAK THE RED B+ LINE COMING FROM THE POWER SUPPLY TO THE FIRST AMPLIFIER CHANNEL. INSERT THE METER IN SERIES AND TAILOR FOR 80 MA.

IC-TYPE CHASSIS

98-TYPE CHASSIS

GA-TYPE CHASSIS

20MA (10 TO 40 MA)

ADJUST FOR 35 MA

40MA FOR SINGLE

SINGLE

SINGLE

40 - 80MA FOR DUAL