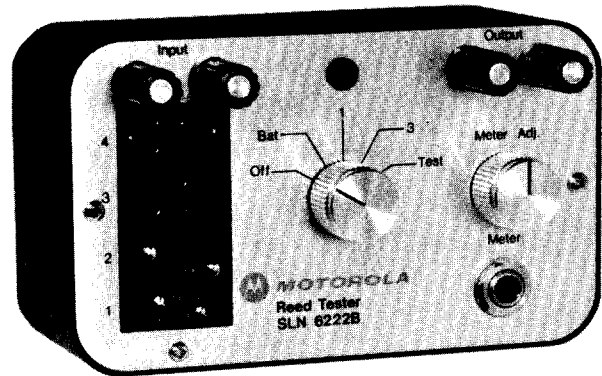




 **MOTOROLA**  
test equipment

# REED TESTER



**SLN-6222A**  
**SLN-6222B**

# (RESONANT) REED TESTER

MODELS SLN6222A AND SLN6222B

APPLICATION TABLE

REED TESTER GROUP NO.	"VIBRASPONDER" RESONANT REED	
	MODEL SERIES	DESCRIPTION
1	TLN6709AA-AH TLN6709BA-BH TLN8381A	Four-Pin, Contactless Reed
2	NLN6024A TU333AA-AZ	Four-Pin, Contact Reed
3	TLN6406A TLN6474AA-AD TLN8957AA-AF TLN8958AA-AF	Six-Pin, Contact Reed
4	TLN6492AA TLN6492BA	Six-Pin, Combination Reed; (Includes "Vibrasender" Section)

## 1. APPLICATION

The Models SLN6222A and SLN6222B Reed Testers are used to check the operation of "Vibrasponder" resonant reeds used in Motorola two-way radios and portable radio pagers. Refer to the APPLICATION TABLE for specific resonant reed models.

The reed tester provides the following tests: insertion loss, threshold sensitivity, and contact duration (dwell). Due to resonant reed design differences, the operational tests vary with model type. One or more of these tests are used for each model group. In these instructions, the Group number corresponds to the reed socket number screened on the reed tester.

## 2. DESCRIPTION

The tester is a small, battery powered unit with four different socket types to accommodate the various "Vibrasponder" resonant reed types. Six-

way binding posts are used for monitoring the INPUT and the OUTPUT levels, and waveforms by the connection of an ac voltmeter or oscilloscope. A meter phone jack and METER ADJ control provide for connection of the Motorola Portable Test Set. An indicator light lamp is used for the indication of proper insertion loss or contact continuity. A function switch has OFF, BAT and TEST positions, and numbered 1 and 3 positions corresponding to the reed socket numbers.

### NOTE

Model SLN6222B is completely interchangeable with Model SLN6222A. All references to Model SLN6222A in these instructions are fully applicable to the Model SLN6222B.

## 3. BATTERY TEST

Set the function switch in the BAT position. The indicator lamp should light. If the indicator does not light, or blinks on and off, replace the battery.



**NOTE**

If a dc voltmeter is used to measure the battery voltage, it should indicate 5.5 V or more with the function switch in the BAT position. Replace the battery if its voltage is less than 5.5 V.

**4. TESTING GROUP 1 REEDS**

Group 1 reeds are tested only for insertion loss, as follows:

Step 1. Check reed tester battery to insure proper operation.

Step 2. Connect the test equipment as shown in Figure 1 or Figure 2 (alternate set up).

Step 3. Plug the "Vibrasponder" resonant reed into the socket marked 1.

Step 4. Set the function switch in position 1.

Step 5. Plug the "Vibrasender" resonant reed on the same frequency as the "Vibrasponder" resonant reed being tested into the tone generator (Figure 1), or set the audio oscillator (Figure 2) to that frequency by using the frequency counter set to 0.1 Hz resolution or 10 second count.

Step 6. Set the output of the tone generator or audio oscillator to minimum. Increase the output level slowly until the reed tester indicator lights.

Step 7. Set the function switch in the TEST position. The indicator will light if the insertion loss is within the specified 20 dB maximum. If the indicator blinks on and off, the reed is marginal.

**NOTE**

Marginal reeds may be more accurately checked by measuring the voltage at the input and output terminals using an ac voltmeter. Reed with an insertion loss of over 20 dB may be usable if the reserve gain of circuitry, which in the "Vibrasponder" resonant reed are used, is high enough to compensate for the greater loss.

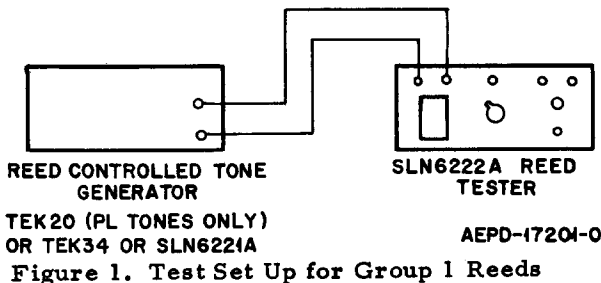


Figure 1. Test Set Up for Group 1 Reed

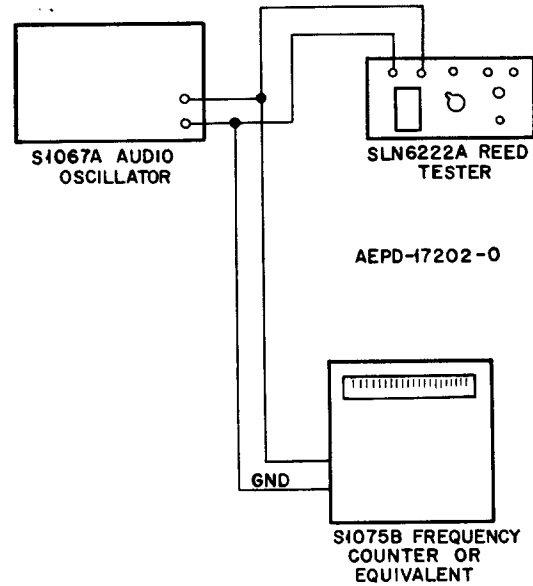


Figure 2. Alternate Test Set Up For Group 1 Reed

**5. TESTING GROUP 2 REEDS**

Group 2 reeds are tested only for threshold sensitivity, as follows:

Step 1. Check reed tester battery to insure proper operation.

Step 2. Connect the test equipment as shown in Figure 3 or Figure 4 (alternate set up). Use shielded cables to avoid hum pickup. For Model NLN6024A only, bias the INPUT terminals with 3.1 mA at any convenient battery voltage, as shown in Figure 5.

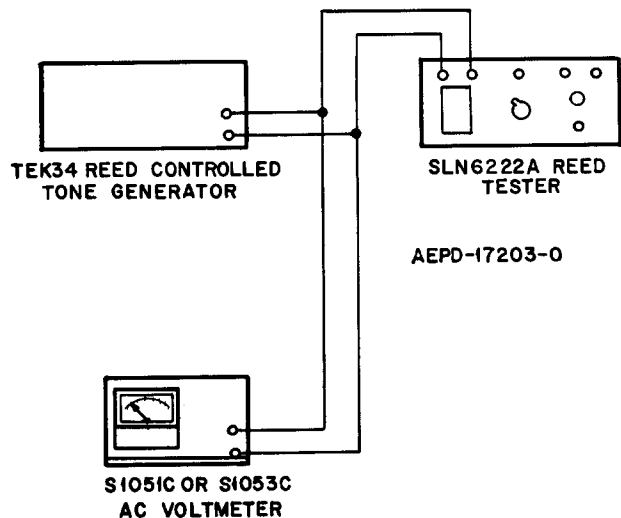


Figure 3. Test Set Up For Group 2 Reed

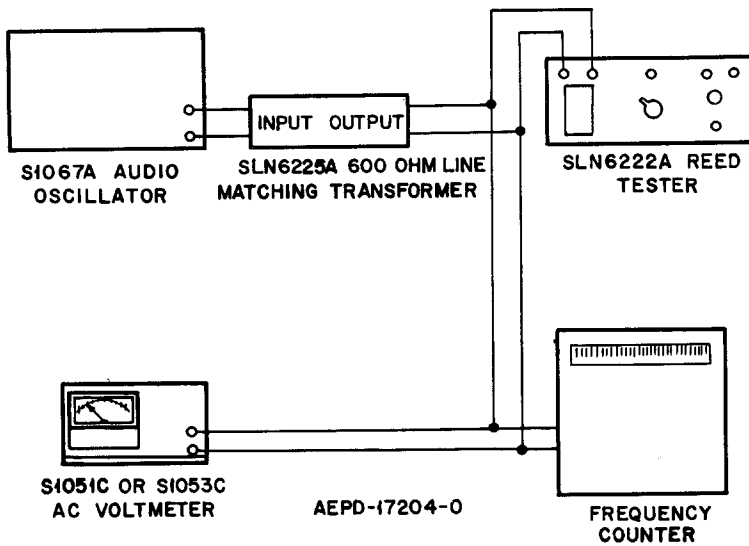


Figure 4. Alternate Test Set Up For Group 2 Reeds

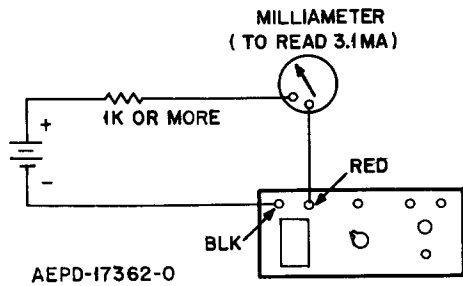


Figure 5. Input Bias Circuit For Testing Model NLN6024A, Group 2 Reeds

- Step 3. Plug the reed into the socket marked 2.
- Step 4. Set the function switch in the TEST position.
- Step 5. Set the audio oscillator (Figure 4) output voltage to the maximum threshold voltage indicated in Table 1. Set the oscillator frequency to the "Vibrasponder" resonant reed frequency by using the frequency counter set to 0.1 Hz resolution or 10 second count.

Step 6. Slowly tune the audio oscillator off frequency but close to the "Vibrasponder" resonant reed frequency until the reed tester indicator lights. Reduce the oscillator output level slowly until the indicator light just goes off. This INPUT voltage is the threshold sensitivity and is measured with an ac voltmeter.

Step 7. Refer to Table 1 for acceptable threshold voltage range.

#### NOTE

The threshold sensitivity is the audio oscillator voltage level required for minimum contact duration (dwell) at the exact resonant reed frequency. The required drive voltage increases with the frequency of the resonant reed.

Table 1. Group 2 Threshold Sensitivity Limits

Reed Frequency Range (In Hz)	Threshold Voltage Range (AC)
82.5-114.8	0.45-0.65
118.8-127.3	0.50-0.70
131.8-141.3	0.52-0.72
146.2-156.7	0.55-0.76
162.2-173.8	0.58-0.80
179.9-192.8	0.61-0.84
206.5	0.65-0.88
229.1	0.70-0.94
254.1	0.74-1.0
281.8-312.6	0.80-1.1
346.7	0.9 -1.2
384.6	1.0 -1.3
426.6	1.1 -1.4
473.2	1.1 -1.5
524	1.2 -1.6
581.1	1.3 -1.7
602.6-645.7	1.5 -1.9
668.3-716.1	1.6 -2.2
741.3-1161.4	1.8 -2.4

## 6. TESTING GROUP 3 REEDS

Group 3 reeds are tested only for contact duration or dwell, as follows:

Step 1. Check reed tester battery to insure proper operation.

Step 2. Connect the test equipment as shown in Figure 6 or Figure 7 (alternate set up). The oscilloscope is used to indicate contact bounce, discontinuity and noise.

Step 3. Set the function switch in position 3.

Step 4. Adjust the reed tester METER ADJ. control for full scale reading on the Motorola Portable Test Set or external microammeter, if used.

Step 5. Plug the reed into the socket marked 3.

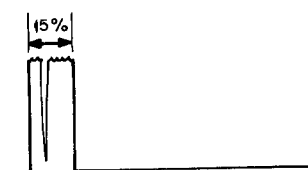
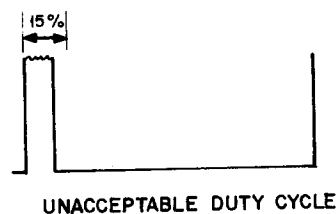
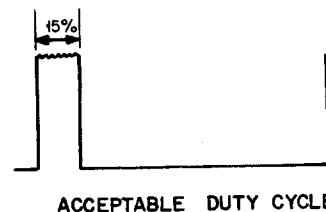
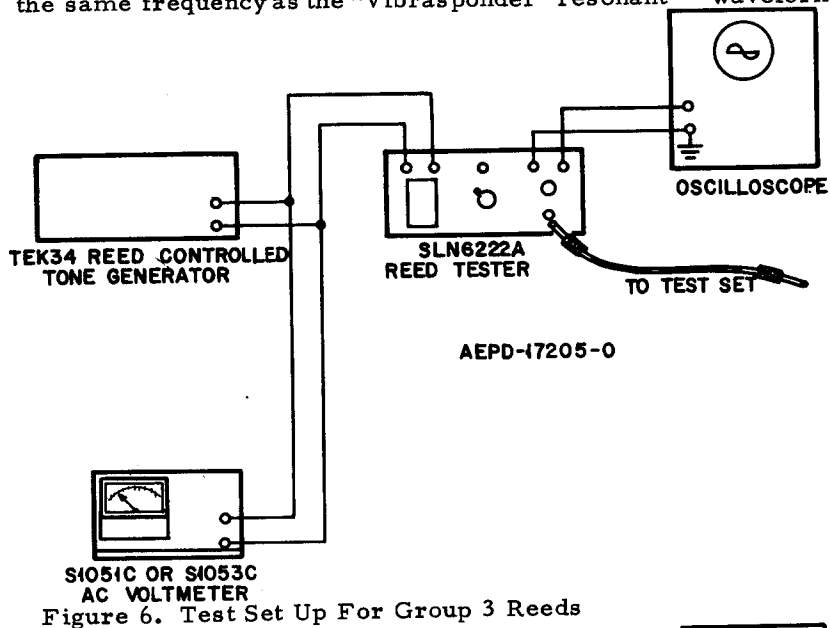
Step 6. Plug the "Vibrasender" resonant reed on the same frequency as the "Vibrasponder" resonant

reed being tested into the tone generator (Figure 6), or set the audio oscillator (Figure 7) to that frequency by using the frequency counter set to 0.1 Hz resolution or 10 second count.

Step 7. Set the output of the tone generator or audio oscillator to minimum. Increase the output level slowly until the reed tester indicator lights.

Step 8. Set the function switch in the TEST position. The indicator should light (indicating that the contact is "making"). The meter reading should be 42.5 uA or less. The contact duration (in per cent) is obtained by subtracting the meter reading obtained from 50.0 (full scale), and multiplying the result by 2. The minimum acceptable value is 15%.

Step 9. If an oscilloscope is used, adjust the sweep for at least a full one-cycle waveform. The most suitable display is obtained with a sweep of 5 cm or 5 divisions per cycle horizontally, so that each cm or division represents 20%. Refer to Figure 8 for waveform interpretation.



AEPD-17200-0

UNACCEPTABLE WAVEFORM  
Figure 8. Contact Duration Waveforms For Group 3 Reed

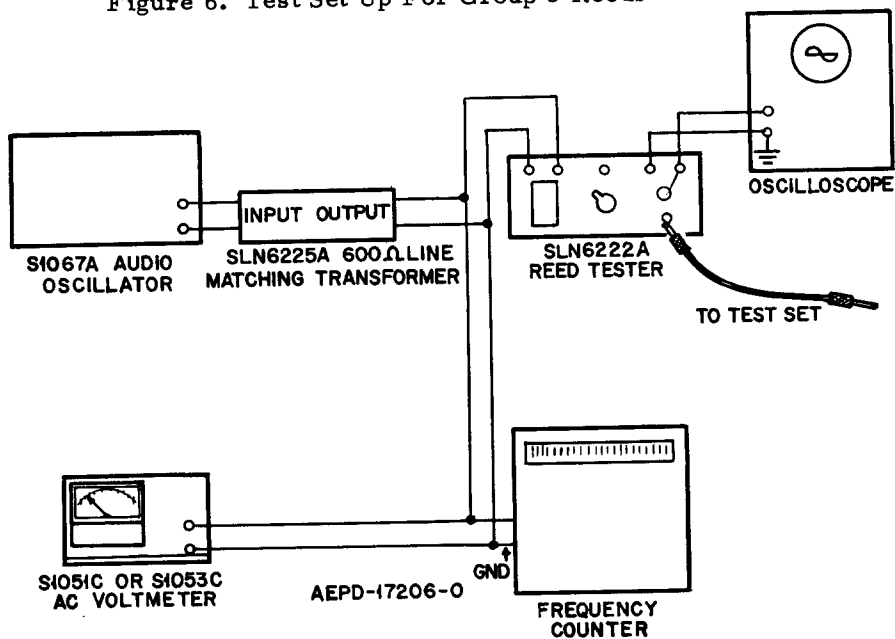


Figure 7. Alternate Test Set Up For Group 3 Reed

## 7. TESTING GROUP 4 REEDS

Both the threshold sensitivity and the contact duration or dwell is measured for Group 4 reeds, as described in the following paragraphs.

### 7.1 THRESHOLD SENSITIVITY TEST

Step 1. Check reed tester battery to insure proper operation.

Step 2. Connect the test equipment as shown in Figure 9 or Figure 10. Use shielded cables to avoid hum pickup.

Step 3. Plug the reed into the socket marked 4.

Step 4. Set the function switch in the TEST position.

Step 5. Set the audio oscillator (Figure 10) output voltage to the maximum threshold voltage indicated in Table 2. Set the oscillator frequency to the "Vibrasponder" resonant reed frequency by using the frequency counter set to 0.1 Hz resolution or 10 second count.

Step 6. Slowly tune the audio oscillator off frequency but close to the "Vibrasponder" resonant reed frequency until the reed tester indicator light just goes off. This INPUT voltage is the threshold sensitivity and is measured with an ac voltmeter.

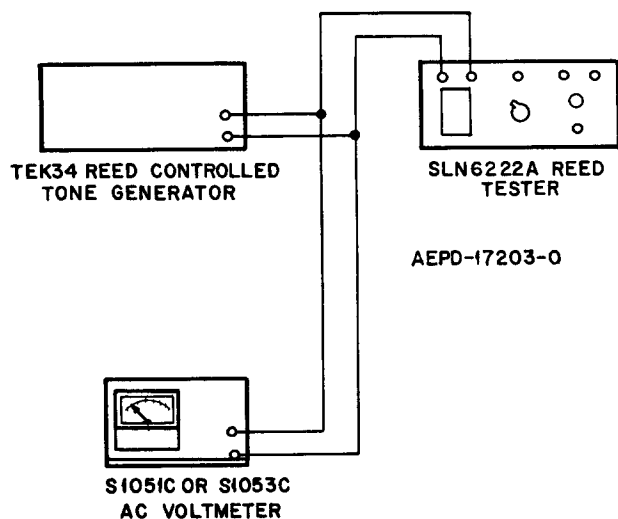


Figure 9. Group 4 Reeds Threshold Sensitivity Test Set Up

Step 7. Refer to Table 2 for acceptable threshold voltage range.

### NOTE

The threshold sensitivity is the audio oscillator voltage level required for minimum contact duration (dwell) at the exact resonant reed frequency. The required drive voltage increases with the frequency of the resonant reed.

Table 2. Group 4 Threshold Sensitivity Limits

Reed Frequency Range (In Hz)	*Threshold Voltage Range (V AC)
82.5-136.5	.45 -.65
141.3	.46 -.66
146.2	.47 -.68
151.4	.485-.695
156.7	.500-.715
162.2	.510-.730
167.9	.530-.750
173.8	.540-.765
179.9	.555-.780
186.2	.570-.800
192.8	.590-.820

\*Values shown are for a rigidly mounted reed. Allow an additional  $\pm 1$  dB since the reed is not held in a clamp or rigid mounting.

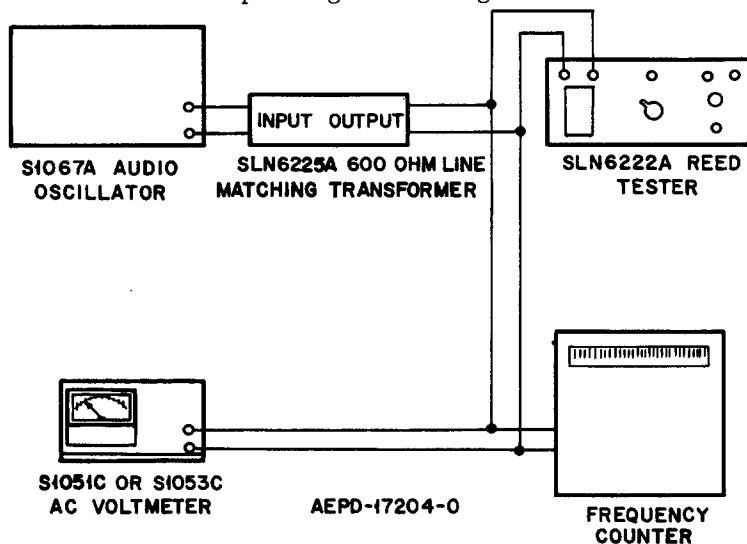


Figure 10. Group 4 Reeds Alternate Threshold Sensitivity Test Set Up

## 7.2 CONTACT DURATION OR DWELL TEST

Step 1. Connect the test equipment as shown in Figure 11 or Figure 12 (alternate set up). The oscilloscope is used to indicate contact bounce, discontinuity and noise.

Step 2. Set the function switch in position 4.

Step 3. Adjust the reed tester METER ADJ. control for full scale reading on the Motorola Portable Test Set or external microammeter, if used.

Step 4. Plug the reed into the socket marked 4.

Step 5. Plug the "Vibrasender" resonant reed on the same frequency as the "Vibrasponder" resonant reed being tested into the tone generator (Figure 11), or set the audio oscillator (Figure 12) to

that frequency by using the frequency counter set to 0.1 Hz resolution or 10 second count.

Step 6. Set the output level of the tone generator or audio oscillator to the value shown in Table 3 for the respective frequency.

Step 7. Set the function switch to the TEST position. The indicator should light (indicating that the contact is "making"). The meter reading should be 42.5 uA or less. The contact duration (in per cent) is obtained by subtracting the meter reading obtained from 50.0 (full scale), and multiplying the result by 2. The minimum acceptable value is 15%.

Step 8. If an oscilloscope is used, adjust the sweep for at least a full one-cycle waveform. The most suitable display is obtained with a sweep of 5 cm or 5 divisions per cycle horizontally so that each cm or division represents 20%. Refer to Figure 13 for waveform interpretation.

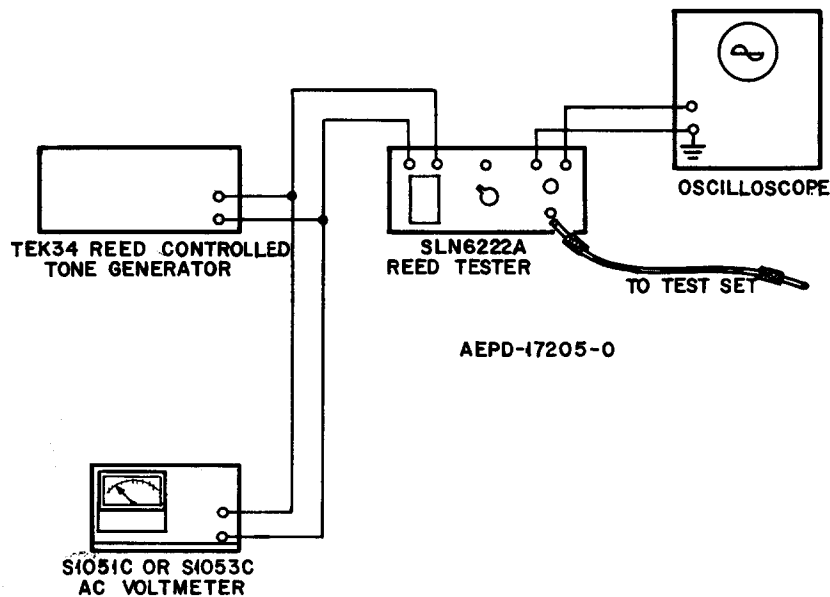


Figure 11. Group 4 Reeds Contact Duration Test Set Up

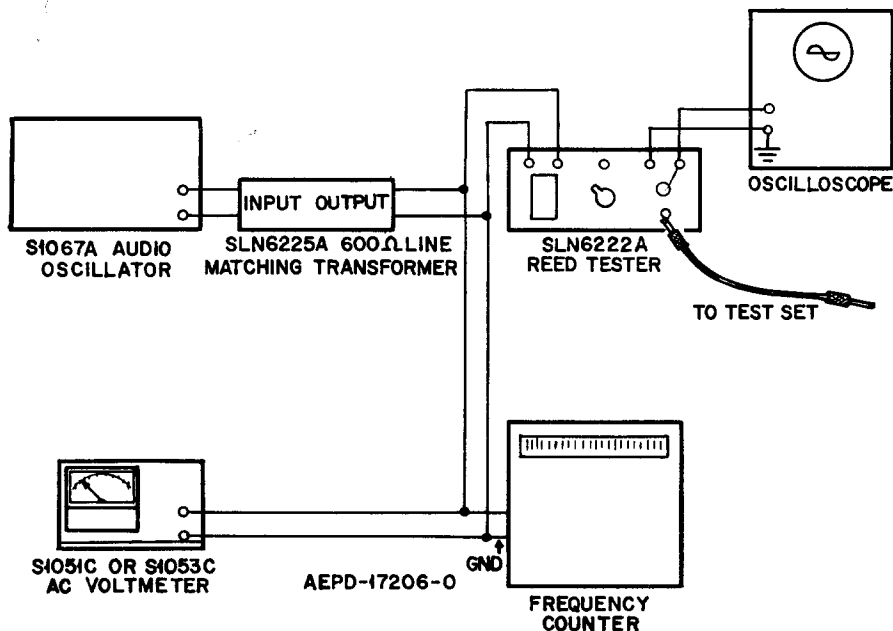
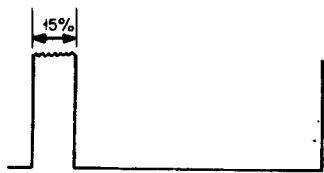


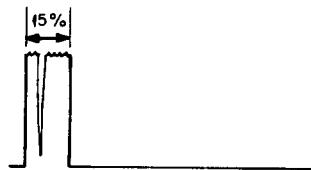
Figure 12. Group 4 Reeds Alternate Contact Duration Test Set Up



ACCEPTABLE DUTY CYCLE



UNACCEPTABLE DUTY CYCLE



UNACCEPTABLE WAVEFORM

AEPD-17200-0

Figure 13. Contact Duration Waveforms For Group 4 Reeds

Table 3. Drive Level For Group 4 Contact Duration Test

Reed Frequency (Hz)	Drive Voltage (VAC)	Reed Frequency (Hz)	Drive Voltage (VAC)	Reed Frequency (Hz)	Drive Voltage (V AC)
82.5	1.25	114.8	1.65	162.2	2.08
85.4	1.28	118.8	1.7	167.9	2.12
88.5	1.34	123.0	1.75	173.8	2.16
91.5	1.37	127.3	1.78	179.9	2.20
94.8	1.42	131.8	1.83	186.2	2.23
97.4	1.47	136.5	1.87	192.8	2.28
100.0	1.49	141.3	1.90		
103.5	1.54	146.2	1.95		
107.2	1.57	151.4	2.0		
110.9	1.61	156.7	2.03		



## 8. CIRCUIT DESCRIPTION

(Refer to the attached schematic diagram.)

The "Vibrasponder" resonant reed sockets are wired in parallel as shown by the socket details. The input side of the sockets are connected to the INPUT binding posts and the output side of the sockets are connected to the OUTPUT binding posts.

Resistors R4, R5 and R8 form a 20 dB attenuator and resistors R6 and R9 form a 36 dB attenuator. Q1 and Q2 form a direct coupled, ac amplifier which feed Schmitt trigger Q3 and Q4. With no signal, Q3 is off and Q4 is on. The collector of Q4 is almost at ground level. When an input signal greater than the threshold level of Q3 is received, Q4 turns off and Q3 turns on. The collector of Q4 approaches the B+ voltage. This positive going voltage is rectified by CR2, and is filtered by R27 and C6. Lamp driver transistors Q5 and Q6 turn on enabling the indicator lamp. In the BAT position, the Schmitt trigger circuit is enabled directly from the battery.

## 9. MAINTENANCE

### 9.1 CALIBRATION

Step 1. Set the function switch in position 1.

Step 2. Apply a 400 Hz at 78 mV signal to the INPUT binding posts.

Step 3. Remove the bottom plate of the reed tester and adjust trimmer R15 so that the indicator just lights.

Step 4. Set the function switch in position 3. Increase the signal level until the indicator just lights.

Step 5. Measure the input signal voltage. It should be approximately 0.5 V ac.

Step 6. Set the function switch in the BAT position. Adjust R18 to turn the indicator lamp off at the battery (or supply) voltage of approximately 5.5 V. Adjust R11 for Q1 collector voltage of 1.8 V dc.

### 9.2 BATTERY REPLACEMENT

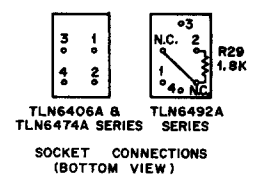
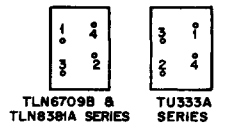
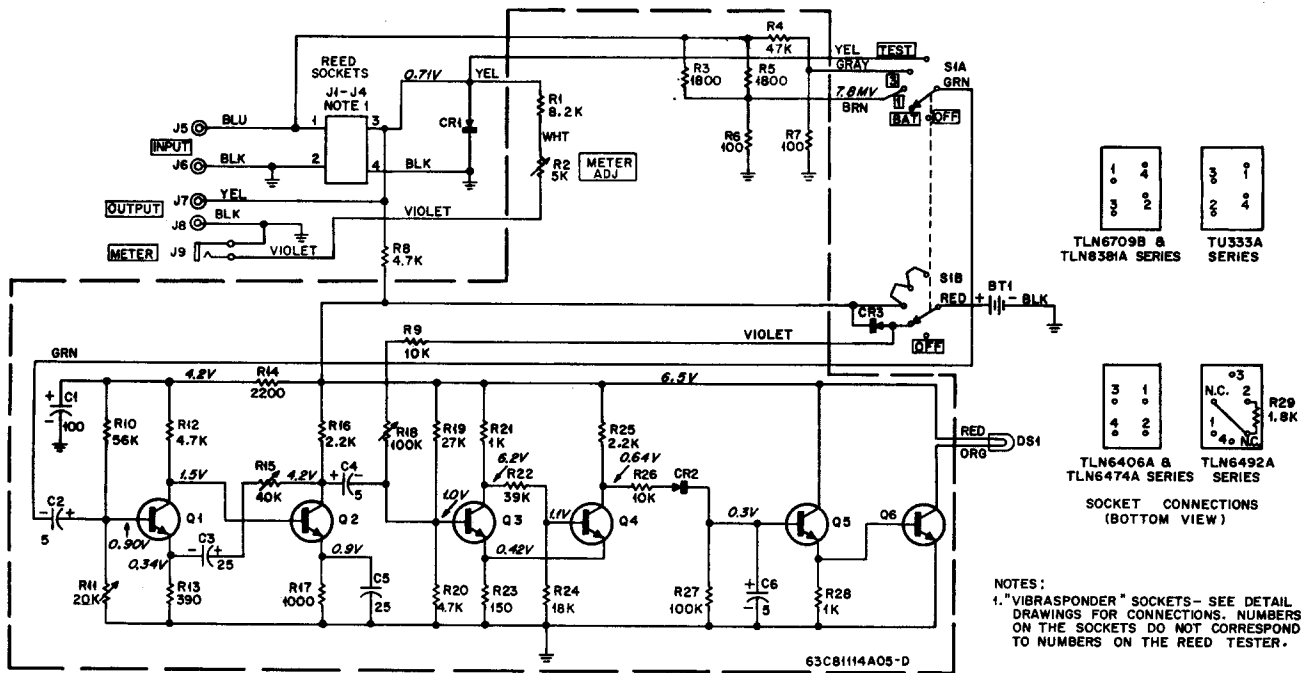
Step 1. Remove the backplate.

Step 2. Remove the old battery and insert new battery. Observe the polarity as marked.

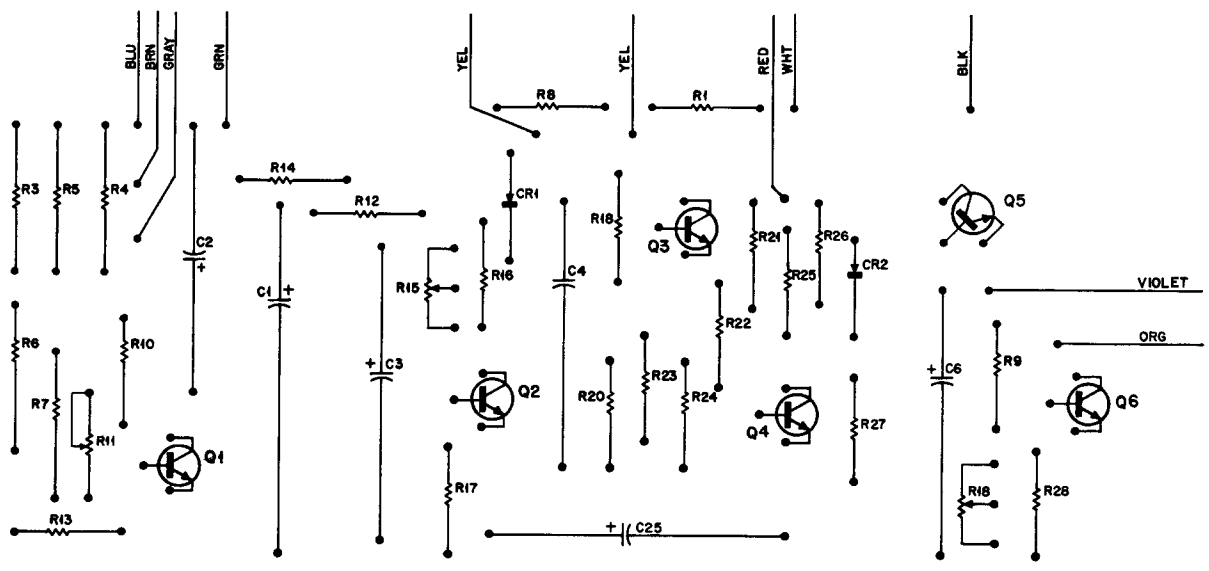
#### **WARNING**

Do not discard mercury batteries so that they may be placed in a fire. Exploding batteries may cause injury.

Step 3. Replace the backplate.



- NOTES:
- "VIBRASPONDER" SOCKETS - SEE DETAIL DRAWINGS FOR CONNECTIONS. NUMBERS ON THE SOCKETS DO NOT CORRESPOND TO NUMBERS ON THE REED TESTER.
  - SEE PARTS LIST FOR RESISTOR WATTAGE RATINGS AND CAPACITOR WORKING VOLTAGE.
  - VOLTAGE READINGS ARE TYPICAL WITHOUT INPUT SIGNAL. (MEASURED WITH MOTOROLA DC MULTIMETER, 11 MEGOHM INPUT RESISTANCE).



OL-CEPD-18167-B

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Models SLN6222A and SLN6222B  
 (Resonant) Reed Tester  
 Schematic Diagram & Circuit Board Detail  
 Motorola No. PEPD-18162-D  
 10/19/76-UP

**REVISIONS** PEPD-18162-D

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	SLN6222A	S1	WAS 40C82830D01	PARTS LIST
		R4	WAS 6S128687, 6.8K	S1A-3
B	SLN6222A-1	R20	WAS 6S129225, 10K	Q3 BASE
		R26	WAS 6S2001, 6.8K	Q4 COLLECTOR
		R19	WAS 6S129242, 56K	Q3 BASE
		R11	WERE 6S127805, 15K	Q1 BASE
		R24		Q4 BASE
C	SLN6222A-2	R1	WAS 6S129255, 10K	S1A-YEL, TEST
		R9	WAS 6S128902, 47K	S1B-VIO, LEAD
		R15	WAS 18C82557D01, 40K	Q2 BASE
D	SLN6222B		ADDED NEW MODEL	

Note: The battery may be one of the following brands and types:

Eveready E135, Mallory TR-135, or Ray-O-Vac T-135

This is a 7 volt 1000 mAh mercury battery that is 0.662" diameter and 3.245" long.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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**PARTS LIST**

SLN6222A and B Teed Tester EPD-18232-D

BT1	60B863919	<u>BATTERY, dry:</u> See Note mercury type; 6.5 V
C1	23D82601A21	<u>CAPACITOR, fixed:</u> 100 uF +100-0%; 10 V
C2, 4, 6	23D82601A11	5 uF +33-10%; 25 V
C3, 5	23D82601A01	25 uF +150-10%; 25 V
		<u>SEMICONDUCTOR DEVICE, diode:</u> (SEE NOTE)
CR1, 2	48C82392B03	silicon
CR3	48C82466H13	silicon
DS1	65B82015D02	<u>LIGHT, indicator:</u> complete assembly; incl. lens and lamp (rated at 6 V; .040 A); must be replaced only as a complete unit
		<u>SOCKET ASSY: "Vibrasponder" Resonant Reed:</u> incl. 4 individual reed sockets
J1	1V80795A93	
J2, 4	46K863925	<u>POST, binding:</u> RED
J3, 5	46B863924	BLK
J6	9K85656	<u>JACK, telephone:</u> single circuit
		<u>TRANSISTOR: (SEE NOTE)</u> NPN; type M9430
		<u>RESISTOR, fixed: ±10%; 1/4 W:</u> unl stated
R1, 9	6-124C71	8.2k
R2	18D82700D01	var: 5k ±20%; 1/2 W
R3, 5	6-125A55	1.8k ±5%; 1/2 W
R4	6-124C89	47k
R6, 7	6-125A25	100 ±5%; 1/2 W
R8, 12, 20	6-124C65	4.7k
R10	6-124C91	56k
R11	18C82567D01	var: 20k ±20%; 1/8 W
R13	6-124C39	390
R14, 16, 25	6-124C57	2.2k
R15	18C82567D02	var: 40k; 1/8 W
R17, 21, 28	6-124C49	1k
R18	18K861480	var: 100k
R19	6-124C83	27k
R22	6-124C87	39k
R23	6-124C29	150
R24	6-124C79	18k
R26	6-124C73	10k
R27	6-124C97	100k
R29	6-124C55	1.8k
S1	40C04936C04	<u>SWITCH, rotary:</u> 2 pole; 6 position
XBT1	1V80795A98	<u>RETAINER, battery:</u> 2 contact
NON-REFERENCED ITEMS		
	36B82630H01	<u>KNOB, control (FUNCTION);</u> A Model
	36C82628H03	<u>KNOB, control: (METER);</u> A Model
	36-84625E02	<u>KNOB; B Model; 2 used</u>
	64B8218F01	<u>FRONT PANEL</u>
	64C82278C07	<u>REAR PANEL</u>
	15B82277C01	<u>HOUSING</u>

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

END OF DOCUMENT