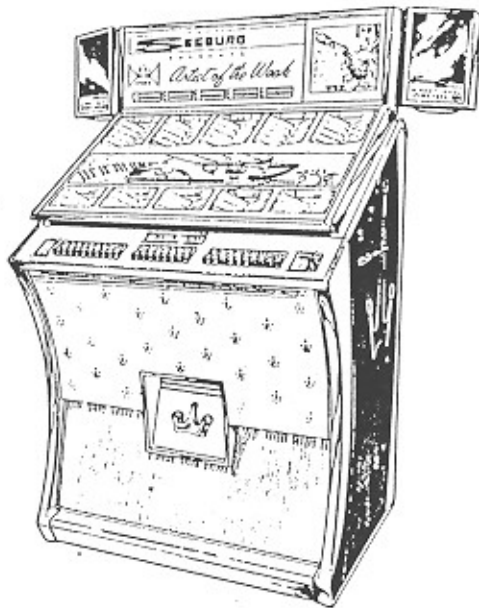
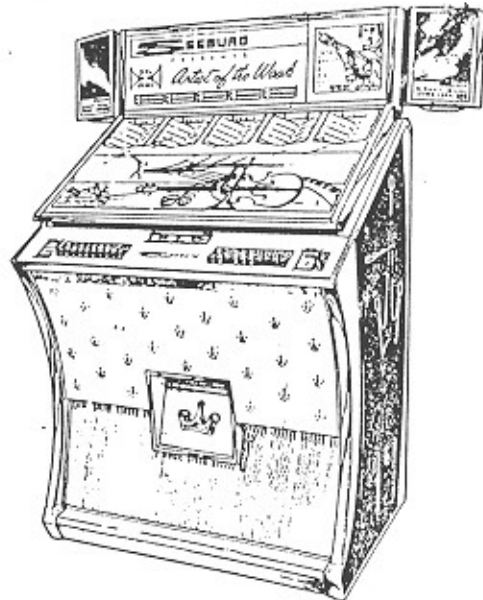


SEEBURG TROUBLE SHOOTING GUIDE

DS160 AND DS100 MODELS



160 SELECTIONS



100 SELECTIONS

Cabinet Lights

25-watt, 28 inch, Cool White Fluorescent
(FS25 Starter)

Mechanism

DS160 Type 160ST7
DS100 Type 145ST9

Tormat Memory Unit

DS160 Type 160TM1
DS100 Type 100TM3

Audio Amplifier Type SHFA5

Electrical Selector

DS160 Type TES168
DS100 Type TES108

Tormat Selector Unit (Selection Receiver)

Type TSU7, with Remote Control Stepper Unit,
Type RCSU3, or Tormat Junction Unit, Type TJU3.

Transistors

2 - 2N591 1 - 2N176
2 - 2N1530 1 - 2N1373
1 - 2N1370

Tubes in Models with Remote Control

4 - 6973 2 - 6EU7
1 - 12AX7 1 - 5U4GB
2 - 7199 2 - 2050
2 - OA2 1 - 6X4

Fuses

Main 5 amp., Type MTH
Wall-O-Matic Circuit 3.2 amp., GMQ 3-2/10
Mechanism Type CJV, 5 amp., Pigtail

TROUBLE SHOOTING



Coins do not work
right -

"Credit" lamps do
not light when
money is deposited.



No Sound -

Poor Sound -



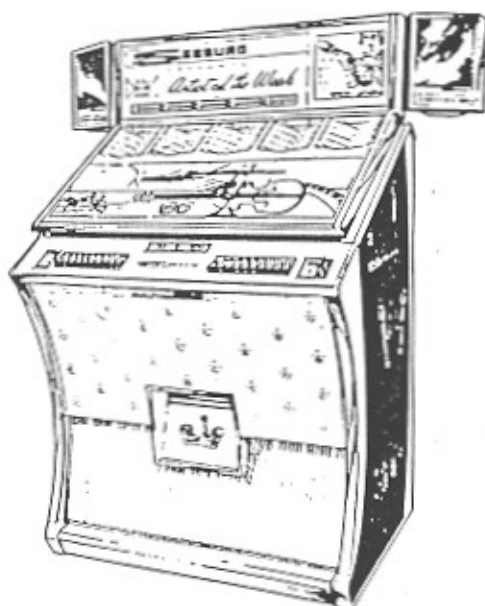
Incorrect record
cycling:



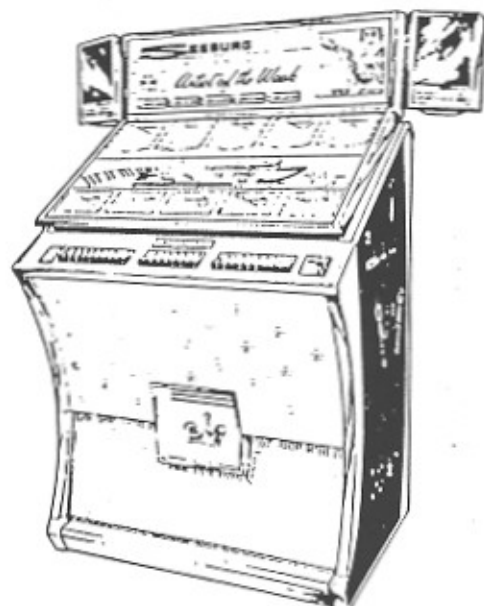
Phonograph is dead.
(Lights are out -
nothing operates)

SEEBURG

SELECT-O-MATIC DS100 AND DS160 MODEL PHONOGRAPHS



DS100



DS160

— SPECIFICATIONS —

POWER REQUIREMENTS

117 volts A.C., 60 cycles

Phonograph with RCSU3

Standby 217 watts

Operating 485 watts

CABINET LIGHTING

25 watt, 28 inch cool white fluorescent lamps
(FS25 starter)

CABINET KEY NUMBER F264

RECORD CAPACITY

DS160H, DS160HR 80 records (160 selections)

DS100H, DS100HR 50 records (100 selections)

RECORD TYPE

45 rpm, 7 inch diameter or 33-1/3 rpm, 7 inch dia.

PICKUP...Seeburg Stereophonic High Fidelity Magnetic

PHONOGRAPH SPEAKERS

Two heavy duty 12 inch speakers

Two 7 X 5 inch directional stereo speakers

FINISH....Metallic charcoal - off-white - metallic blue

REMOTE SPEAKERS

Twin stereo speakers,

Types TW1-8, TR1-8, EBWC1-12

FUSES

1 - 5 amp. Type MTH (Tormat Selector Unit)

1 - 3.2 amp. Type GMQ 3-2/10 (Remote Control
Stepper Unit)

1 - 5 amp. Pigtail Fuse, Type HJV (Select-O-Matic
Mechanism)

1 - 1/2 amp. Slo Blo (Universal Pricing Unit)

1 - 1-6/10 amp. Slo Blo (Universal Pricing Unit)

DIMENSIONS

	DS160	DS100
Height	56½ inches	56½ inches
Width	32½ inches	32½ inches
Depth	24½ inches	24½ inches
Net Weight	325 pounds	312 pounds
Shipping Weight	360 pounds	347 pounds

Introduction



This Trouble Shooting Guide is intended for use by the service mechanic in finding faults in the Seeburg DS160 and DS100 Models even though he may not be familiar with them. It follows a procedure that would be used by someone who is thoroughly familiar with these models and knows their control circuits as well as their sound equipment and mechanisms. The Guide should be used carefully by first associating the reported problem or service call in the left-hand column. Having found the general condition in this column, a test should then be made to determine the symptoms as detailed in the Symptoms Column. This is done by attempting to operate the phonograph and observing the results. After determining the symptoms, the units in which the trouble can be found are listed in the third column. The listed unit or units can be changed to repair the phonograph or the unit can be repaired. If a single unit is involved, for example, an electrical selector only or a credit unit only, the fourth column indicates a reference to the Service Notes in which the actual trouble is pinpointed. These Service Notes are at the back of the Guide. If the Trouble can be in either of the two (or more) units, a Procedure Chart is used to pinpoint the cause. These Procedure Charts are listed in the fourth column and are detailed procedures that must be followed in exactly the sequence in which they are printed. They are the steps that would be taken by the expert service mechanic who is thoroughly familiar with the phonographs and there are no "short cuts" for them. It is of the utmost importance that none of these Procedure Steps are eliminated or bypassed — — — do exactly what the Procedure tells you to do. The following example will illustrate the proper method of using the Guide.

The Phonograph is a DS160.

The Service Call — "Can't make a selection — — — the buttons won't stay down."

Upon arriving at the location, a preliminary check is made and it is found that the selector buttons fail to latch even though the credit lamp is lit but that selection can be made if a letter and a number button are pressed at the same time.

Referring to the index of the Trouble Shooting Guide, on Page 328, the fifth category is the

	Selector operates as soon as ONE Selector button is pressed.	See "D", Page 332.
	Selector buttons stick down or selector buttons fail to latch. Credit light is lighted.	See "E", Page 333.

closest to describing the trouble.

The index directs reference to group "E" on Page 333, there are four symptoms. The third symptom reproduced below best meets the conditions found in the phonograph. Symptoms 1, 2 and 4 do not apply.

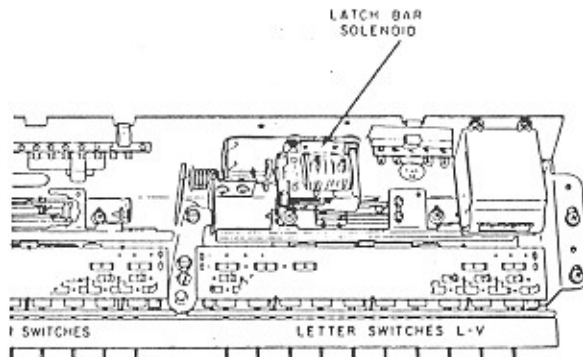
E Selector buttons stick down or selector buttons fail to latch. "Credit" lamp is lighted.	2. Selector buttons stick down and no Selector operation occurs when certain Letter or Number buttons are operated.	1. Electrical Selector	See items 12, 13 and 14 of Electrical Selector (TES100) Service Notes (Page 362)
	3. Selector buttons fail to latch. Selector operations can be made if a Letter and Number button are pressed at the same time.	1. Electrical Selector 2. Pricing Unit	Use Procedure Chart - 12DS (Page 345)
	4. Second Selector button pressed sometimes stays down.	1. Electrical Selector 2. Pricing Unit	Use Procedure Chart - 13DS (Page 343)

"The Trouble Area" column shows that the trouble can be in either the electrical selector or the credit unit. The trouble can be corrected by replacing these two units or Procedure Chart 12DS can be used to determine in which unit the trouble lies.

TROUBLE: SELECTOR BUTTONS FAIL TO LATCH. SELECTOR OPERATIONS CAN BE MADE IF A LETTER AND A NUMBER BUTTON ARE PRESSED AT THE SAME TIME.

CAUSE OF TROUBLE IS IN Electrical Selector or Pricing Unit.

PROCEDURE:



1. Remove the cover from the back of the Electrical Selector and note if the latch bar solenoid is energized when the credit lamp is lighted.

IF SOLENOID IS ENERGIZED see item 6 of Electrical Selector (TES168) Service Notes. (Page 362)

IF SOLENOID IS NOT ENERGIZED proceed as follows:

2. While watching solenoid, press in a letter and a number button at the same time and note if solenoid momentarily energizes.

IF SOLENOID MOMENTARILY ENERGIZES see item 26 of Universal Pricing Unit Service Notes. (Page 364)

IF SOLENOID DOES NOT MOMENTARILY ENERGIZE see 5 or 5a of Electrical Selector (TES168) Service Notes. (Page 362)

It is important that each test indicated in the procedure is carefully followed and that each particular test should be fully completed before proceeding to the next test.

Following the directions as indicated in Chart 12DS, it is noted that after removing the cover from the back of the electrical selector the latch bar solenoid is not energized when the credit lamp is lit. Therefore, the paragraph "IF SOLENOID IS ENERGIZED" does not apply.

The paragraph "IF SOLENOID IS NOT ENERGIZED" does apply and directs that step 2 is to be used.

Proceeding as directed in step 2, it is noted that the solenoid is NOT momentarily energized when a letter and number button are pressed at the same time. Therefore, the paragraph "IF SOLENOID MOMENTARILY ENERGIZES" does not apply.

The paragraph "IF SOLENOID DOES NOT MOMENTARILY ENERGIZE" applies and Item 5


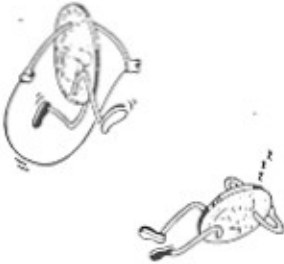





of the Electrical Selector Service Notes is to be used.

5. The latch bar solenoid winding is open.	Selector buttons fail to latch when the credit lamp is on.
5a. Defective manual credit switch.	
6. The latch bar linkage binds and prevents the latch bar from moving.	






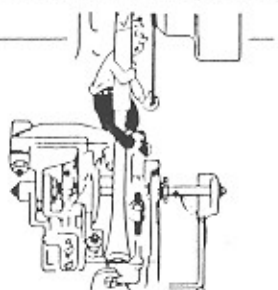

Turning to Item 5 of these notes on Page 362, it pinpoints the trouble as an open winding in the latch bar solenoid. Inspect the solenoid connections for a break, replace the solenoid or replace the entire Electrical Selector.

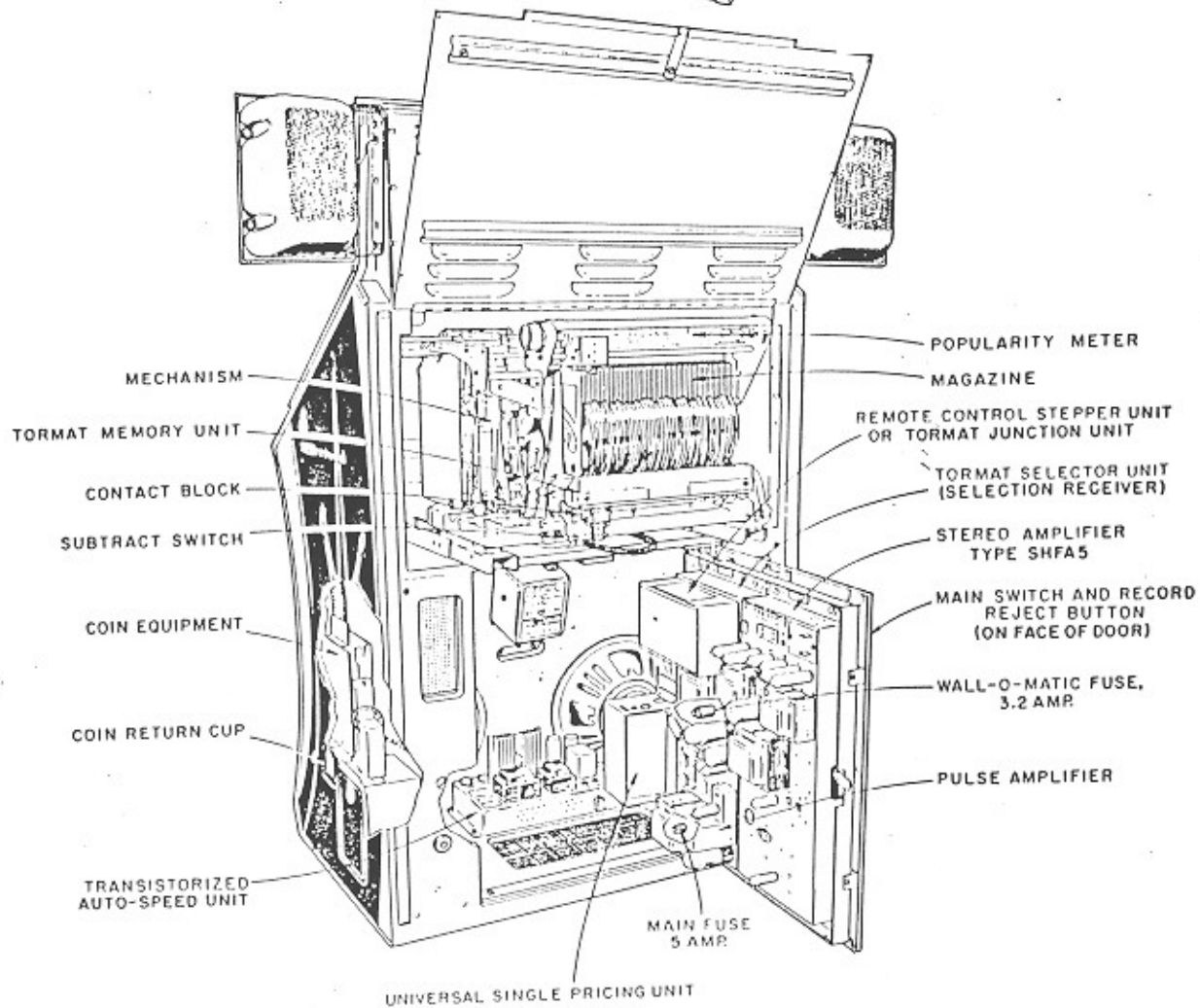
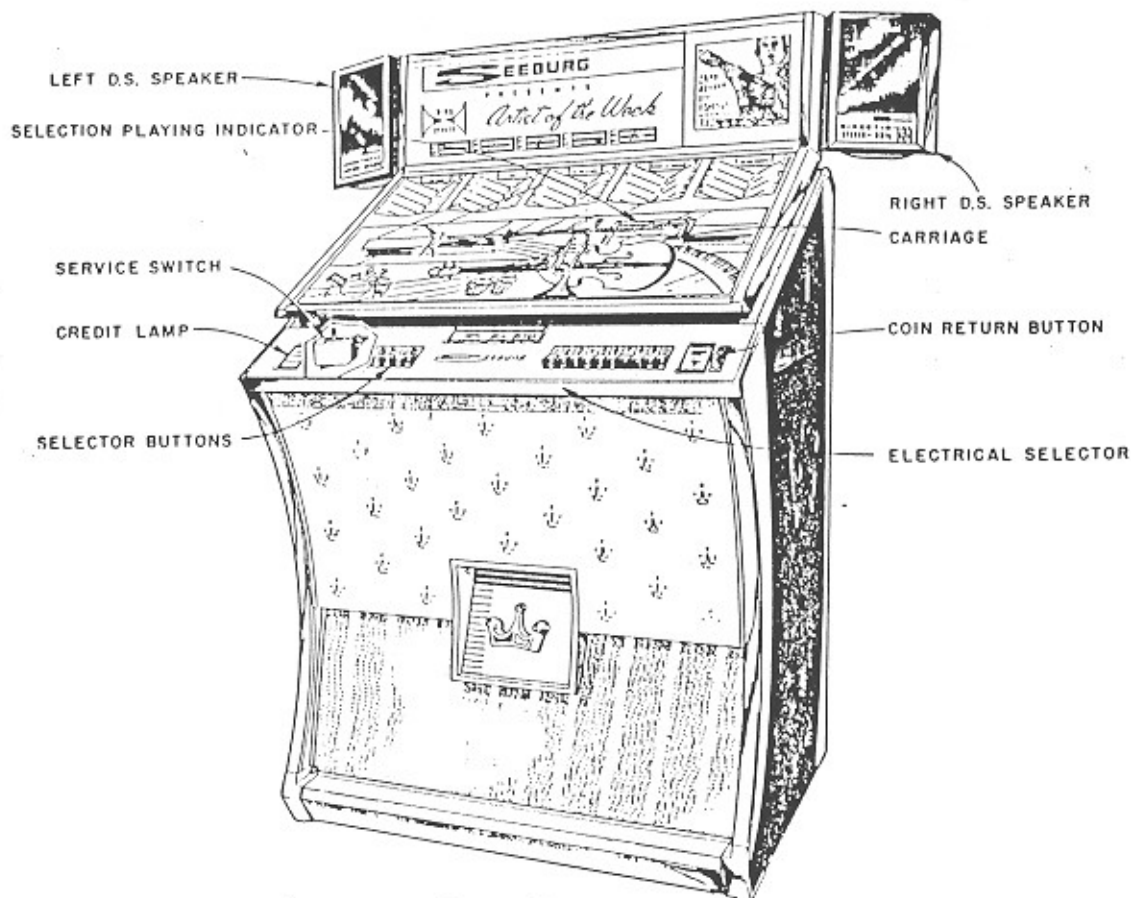
After the trouble is corrected and all plugs, jumpers and switches are returned to their normal position, make a final check of the phonograph by inserting a variety of coins and making a selection when the cabinet is locked up and in position to be played by a customer.


Index


	Phonograph is dead.	See "A", Page 331.
	Coins do not work right. - (Credit light does not light when money is deposited)	See "B", Page 331.
	Able to operate Electrical Selector (select a record) too many or too few times for money.	See "C", Page 332.
	Selector operates as soon as ONE Selector button is pressed.	See "D", Page 332.
	Selector buttons stick down or selector buttons fail to latch. Credit light is lighted.	See "E", Page 333.
	Carriage does not stop scanning.	See "F", Page 333.
	Carriage scans past selected records.	See "G", Page 334.

Index

	<p>Carriage "sits and spins". Will not move or play record.</p>	<p>See "H", Page 334.</p>
	<p>Carriage does not scan after records are selected.</p>	<p>See "J", Page 335.</p>
	<p>Carriage plays wrong record or plays more than selected records.</p>	<p>See "K", Page 335.</p>
	<p>Playing record is rejected or carriage trips to play when Electrical Selector is operated.</p>	<p>See "L", Page 336.</p>
	<p>Incorrect record cycling.</p>	<p>See "M", Page 336.</p>
	<p>Incorrect pickup arm operation.</p>	<p>See "N", Page 337.</p>
	<p>No sound — Poor sound.</p>	<p>See "O", Page 337.</p>



 <p>A Phonograph is dead.</p>	SYMPTOM	TROUBLE AREA	CORRECTION
	1. No Power at house outlet.	1. House wiring or fuses	Locate cause and repair.
	2. Phonograph main fuse is blown.	1. Mechanism 2. Tormat Selector Unit 3. Electrical Selector 4. Pricing Unit 5. Auto Speed Unit	Use Procedure Chart - 25DS (Page 359)

 <p>B Coins do not work right.— "Credit" lamp does not light when money is deposited.</p>	SYMPTOM	TROUBLE AREA	CORRECTION
	1. Coins "hang up" in slug rejector or fall into coin return cup.	1. Coin Equipment	See items 1, 2 and 3 of Coin Equipment Service Notes (Page 361)
	2. Selector operations are normal but "Credit" lamp does not light.	1. "Credit" Lamp 2. Electrical Selector 3. Pricing Unit	Use Procedure Chart - 1DS (Page 339)
	3. One type coin falls through to cash box without giving credit.	1. Coin Equipment 2. Pricing Unit	Use Procedure Chart - 2DS (Page 339)
	4. All coins fall through to cash box without giving credit. Selector buttons will not latch.	1. Pricing Unit 2. Tormat Selector Unit. 3. Electrical Selector	Use Procedure Chart - 5DS (Page 340)
	5. Electrical Selector buttons remain stuck down after the last Selector operation.	1. Electrical Selector	See items 3 and 4 of Electrical Selector (TES168) Service Notes (Page 362)



C

Able to operate Electrical Selector (select a record) too many or too few times for money.

SYMPTOM	TROUBLE AREA	CORRECTION
1. Too many or not enough selector operations for money deposited.	1. Pricing Unit	See item 11, 17, or 18 of Universal Pricing Unit Service Notes (Page 364)
2. Not enough EP or Single Selections, when Dual Pricing is used.	1. Pricing Unit	See item 14 or 15 of Universal Pricing Unit Service Notes (Page 364)
3. Too few Selector operations for a Quarter or a Half Dollar.	1. Pricing Unit	See item 12 or 13 of Universal Pricing Unit Service Notes (Page 364)
4. Selector operates as soon as ONE Selector button is pressed.	1. Electrical Selector 2. Pricing Unit	Use Procedure Chart - 7DS (Page 341)
5. "Credit" lamp is lighted after correct number of Selector operations.	1. Pricing Unit	See items 19 and 20 of Universal Pricing Unit Service Notes (Page 364)
6. Selector operations can be made free (without money).	1. Coin Equipment. 2. Pricing Unit.	Use Procedure Chart - 8DS (Page 341)
7. All credits cancel when first selection is made.	1. Pricing Unit	See item 16 of Universal Pricing Unit Service Notes (Page 364)



D

Selector operates as soon as ONE Selector button is pressed.

SYMPTOM	TROUBLE AREA	CORRECTION
XXXXXXXXXX	1. Electrical Selector 2. Pricing Unit	Use Procedure Chart - 7DS (Page 341)



E

Selector buttons stick down or selector buttons fail to latch.

"Credit" lamp is lighted except in Symptom 7.

When Dual Pricing is used.

SYMPTOM	TROUBLE AREA	CORRECTION
1. Letter and Number Selector buttons stay down and no Selector operation occurs if ANY record is selected.	1. Tormat Selector Unit and Remote Control Stepper. 2. Electrical Selector. 3. Pricing Unit.	Use Procedure Chart - 11DS (Page 342)
2. Selector buttons stay down and no Selector operation occurs when certain Letter or Number buttons are operated.	1. Electrical Selector.	See items 12, 13 and 14 of Electrical Selector (TES168) Service Notes (Page 362).
3. Selector buttons fail to latch. Selector operations can be made if a Letter and Number button are pressed at the same time.	1. Electrical Selector. 2. Pricing Unit.	Use Procedure Chart - 12DS (Page 343).
4. Second Selector button pressed sometimes stays down.	1. Electrical Selector. 2. Pricing Unit.	Use Procedure Chart - 13DS (Page 343).
5. Letter and Number Selector buttons stay down and no Selector action occurs when a "Singles" record is selected. Operation with "EP's" is normal.	1. Pricing Unit. 2. Electrical Selector.	See item 29 of Pricing Unit Service Notes (Page 364) and item 13 of Electrical Selector Service Notes (Page 362).
6. Letter and Number Selector buttons stay down and no Selector action occurs when an "EP" record is selected. Operation is normal with "Singles" records.	1. Pricing Unit. 2. Electrical Selector.	See items 32 and 33 of Pricing Unit Service Notes (Page 364) and item 14 of Electrical Selector Service Notes (Page 362).
7. Selector buttons stay down. "Credit" lamp is NOT lighted.	1. Pricing Unit. 2. Electrical Selector.	See items 2 and 4 of Pricing Unit Service Notes (Page 364) and items 3 and 4 of Electrical Selector Service Notes (Page 362).



F

Carriage does not stop scanning.

SYMPTOM	TROUBLE AREA	CORRECTION
1. Carriage scans continuously. Stops to play selected records and resumes continuous scanning.	1. Pricing Unit 2. Tormat Selector Unit 3. Mechanism 4. Electrical Selector	Use Procedure Chart - 15DS (Page 345)



G

Carriage scans past selected records.


SYMPTOM	TROUBLE AREA	CORRECTION
1. Carriage plays all left sides of selected records but scans past all right sides.	1. Mechanism	See items 2, 3, 4 and 5 of Mechanism (160ST7) Service Notes (Page 367)
2. Carriage plays all right sides of selected records but scans past all left sides.	1. Mechanism	See Items 2, 3, 4 and 5 of Mechanism (160ST7) Service Notes (Page 367)
3. Carriage plays all selected records except a complete Letter or a complete Number group.	1. Electrical Selector 2. Mechanism	See item 15 or 16 of Electrical Selector (TES168) Service Notes (Page 362) and 6A of Mechanism (160ST7) Service Notes (Page 367)
4. Carriage occasionally scans past some selected records.	1. Pricing Unit 2. Mechanism 3. Format Selector Unit and Stepper 4. Electrical Selector	Use Procedure Chart - 16DS (Page 345)
5. Carriage scans twice and stops without playing record when ANY record is selected.	1. Format Selector Unit and Stepper 2. Mechanism 3. Electrical Selector 4. Pricing Unit	Use Procedure Chart - 17DS (Page 346)




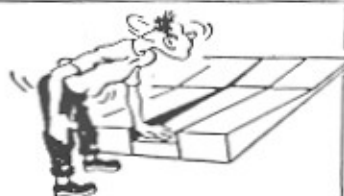
H

Carriage "sits and spins". Will not move or play record.

SYMPTOM	TROUBLE AREA	CORRECTION
1. Turntable spins with no record in play position.	1. Mechanism	Use Procedure Chart - 18DS (Page 350)

	SYMPTOM	TROUBLE AREA	CORRECTION
 <p>J</p> <p>Carriage does not Scan after records are selected.</p>	<p>1. Selector operation seems normal but mechanism carriage does not scan when ANY record is selected.</p>	<p>1. Pricing Unit. 2. Tormat Selector Unit. 3. Mechanism. 4. Electrical Selector. 5. Auto-Speed Unit.</p>	<p>Use Procedure Chart - 14DS (Page 344)</p>

	SYMPTOM	TROUBLE AREA	CORRECTION
 <p>K</p> <p>Carriage plays wrong record or plays more than selected records.</p>	<p>1. Carriage plays wrong record. Carriage trips and plays record one or more spaces past selected record.</p>	<p>1. Mechanism</p>	<p>See items 11, 12 and 13 of Mechanism (160ST7) Service Notes. (Page 367)</p>
	<p>2. Carriage plays an entire Letter group or entire Number group of records when certain Selector buttons are operated.</p>	<p>1. Electrical Selector. 2. Mechanism 3. Tormat Selector Unit and stepper.</p>	<p>Use Procedure Chart - 19DS (Page 351)</p>
	<p>3. Carriage scans ONLY ONCE instead of twice when a record is selected. Occasionally fails to play all selected records then plays "left over" records when another record is selected.</p>	<p>1. Tormat Selector Unit.</p>	<p>See items 11 and 12 of Tormat Selector Unit (TSU7) Service Notes. (Page 366)</p>
	<p>4. Carriage plays, in succession, all records without Selector operation.</p>	<p>1. Memory Unit connection.</p>	<p>Seat Memory Unit output plug in Pulse Amplifier.</p>



L

Playing record is rejected or carriage trips to play when Electrical Selector is operated.

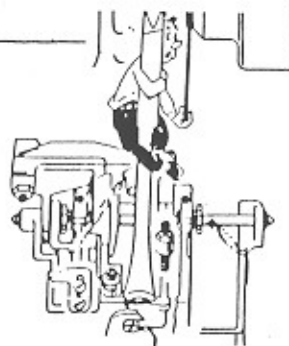
SYMPTOM	TROUBLE AREA	CORRECTION
1. Carriage plays selected record only.	1. Electrical Selector. 2. Pricing Unit. 3. Tormat Selector Unit and stepper.	Use Procedure Chart-26DS (Page 360).
2. Carriage plays an entire Letter group or entire Number group of records when certain Selector buttons are operated.	1. Electrical Selector. 2. Mechanism. 3. Tormat Selector Unit and Stepper.	Use Procedure Chart-19DS (Page 351)



M

Incorrect record cycling.

SYMPTOM	TROUBLE AREA	CORRECTION
1. Carriage repeats record without scanning.	1. Mechanism.	See items 15 and 16 of Mechanism (160ST7) Service Notes (Page 368)
2. Carriage transfers a record in and out of magazine without playing it or scanning.	1. Tormat Selector Unit. 2. Mechanism.	Use Procedure Chart - 20DS (Page 354)
3. Carriage returns 45 and 33-1/3 rpm. record without playing. Scans to next selected record.	1. Mechanism.	See items 11, 12 and 13 of Mechanism (160ST7) Service Notes (Page 367)
4. Turntable stops at the end of a record. Carriage will not scan.	1. Mechanism.	See items 20 and 21 of Mechanism (160ST7) Service Notes (Page 368).
5. Carriage transfers record from magazine but does not clamp it correctly.	1. Mechanism.	See items 22 and 23 of Mechanism (160ST7) Service Notes (Page 368).
6. 33-1/3 rpm. record comes up to play position and motor stops.	1. Auto-Speed Unit.	See item 2 of Auto-Speed Unit Service Notes (Page 372).
7. Record does not cut off at end of play.	1. Mechanism.	See item 31 or 32 of Mechanism (160ST7) Service Notes (Page 368).



N

Incorrect pickup arm operation.

SYMPTOM	TROUBLE AREA	CORRECTION
1. Stylus falls off edge of record or lands in too far.	1. Mechanism.	See items 24, 25 and 26 of Mechanism (160ST7) Service Note (Page 368).
2. Stylus skids across record to repeat record or to trip off or across first few grooves.	1. Mechanism.	See items 27, 28, 29 or 30 of Mechanism (160ST7) Service Notes (Page 368).
3. Record does not cut off at end of play.	1. Mechanism.	See items 31 or 32 of Mechanism (160ST7) Service Notes (Page 368).



O

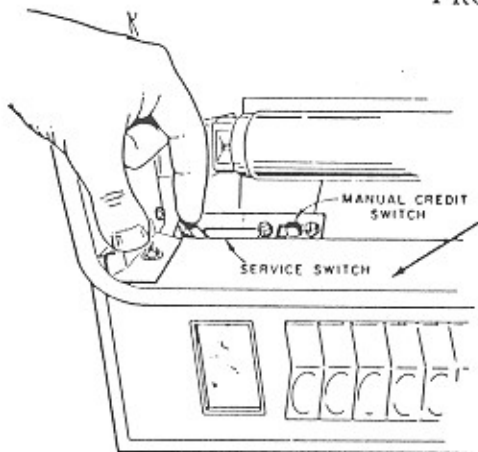
No sound -
Poor sound.

SYMPTOM	TROUBLE AREA	CORRECTION
1. Record in playing position and turning; stylus in record groove but no sound.	1. Amplifier 2. Mechanism	Use Procedure Chart - 21DS (Page 354).
2. No stereo effect. One channel is dead.	1. Amplifier 2. Mechanism 3. Speakers	Use Procedure Chart - 22DS (Page 355).
3. Sound distorted.	1. Amplifier 2. Mechanism 3. Speakers	Use Procedure Chart - 23DS (Page 358).
4. Sound volume is low or varies.	1. Amplifier 2. Mechanism.	Use Procedure Chart - 24DS (Page 358).
5. Music has slow pitch variations. Record speed varies.	1. Mechanism.	See items 40, 41, 42, 43 or 44 of Mechanism (160ST7) Service Notes (Page 369).
6. Music "flutters". Tremolo.	1. Mechanism.	See items 45, 46, 47 and 48 of Mechanism (160ST7) Service Notes (Page 369).
7. Music is low in pitch on 45 and 33-1/3 rpm. records. Record turning slowly.	1. Mechanism.	See items 49, 50 and 51 of Mechanism (160ST7) Service Notes (Page 370).
8. Music is low in pitch on 33-1/3 rpm. records only. 45's OK.	1. Auto-Speed Unit	See items 3 and 4 of Auto-Speed Unit Service Notes (Page 372).
9. Mechanism scans slowly, and 45 rpm. records play too slowly. 33-1/3 rpm records play at normal speed.	1. Mechanism 2. Auto-Speed Unit	See 7 of Auto-Speed Service Notes (Page 372) or 61 of Mechanism Service Notes (Page 370).
10. 33-1/3 rpm. records play too fast.	1. Auto-Speed Unit 2. Mechanism.	See 5 or 6 of Auto-Speed Service Notes (Page 372) or 58, 59 or 60 of Mechanism Service Notes (Page 370).
11. No sound from Directional Speakers.	1. Auto-Speed Unit	See 8 of Auto-Speed Service Notes (Page - 372).

TROUBLE: ALL COINS FALL THROUGH TO THE CASH BOX WITHOUT GIVING CREDIT.

CAUSE OF TROUBLE IS IN: Electrical Selector or Pricing Unit or Tormat Selector Unit.

PROCEDURE:



1. Be sure phonograph is connected for power and main switch is turned on.
2. Operate the service switch to Scan, noting if carriage scans.

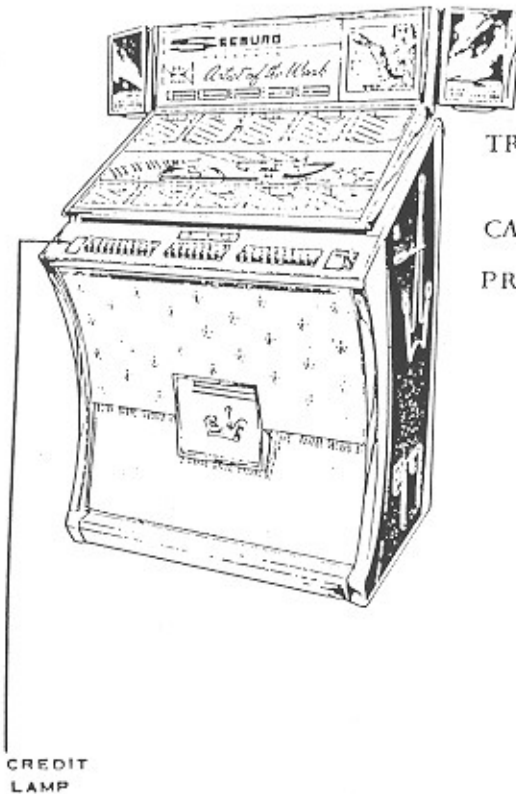
IF CARRIAGE MOTOR DOES NOT RUN see item 1 of Tormat Selector Unit (TSU7) Service Notes. (Page 365)

IF CARRIAGE MOTOR RUNS proceed as follows:

3. Turn off main power switch and turn it on again.
4. Deposit a quarter and note if only one Selector operation can now be made.

IF ONLY ONE SELECTOR OPERATION CAN BE MADE see items 1 and 2 of Electrical Selector (TES168) Service Notes (Page 362).

IF NO SELECTOR OPERATION CAN BE MADE see items 1, 2, 3 and 4 of Universal Pricing Unit Service Notes (Page 363).



TROUBLE: SELECTOR OPERATES AS SOON AS ONE BUTTON IS PRESSED.

CAUSE OF TROUBLE IS IN: Electrical Selector or Pricing Unit.

PROCEDURE:

1. Deposit a quarter and select A1 by pressing in the letter and the number button at the same time. Hold down both buttons for several seconds and then release them.
2. Note if all credits are cancelled while buttons are held down and if credit lamp is not lighted after buttons are released.

IF CREDIT LAMP IS LIGHTED see 8 and 9 of Electrical Selector (TES168) Service Notes. (Page 362)

IF CREDIT LAMP IS NOT LIGHTED see item 16 of Universal Pricing Unit Service Notes (Page 364).

CREDIT
LAMP

TROUBLE: SELECTOR OPERATIONS CAN BE MADE FREE. (WITHOUT DEPOSITING MONEY)

CAUSE OF TROUBLE IS IN: Coin Equipment or Pricing Unit.

PROCEDURE:

1. Check if Selector operation can be made free only if a letter and a number button are pressed in at the same time.

IF SO see item 21 of Universal Pricing Unit Service Notes (Page 364).

IF NOT proceed as follows:

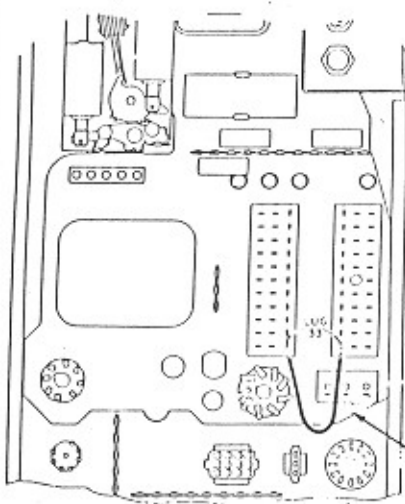
2. Inspect the coin equipment for item 7 of Coin Equipment Service Notes (Page 361).

IF COIN EQUIPMENT IS OK see items 22 and 23 of Universal Pricing Unit Service Notes (Page 364).

TROUBLE: LETTER AND NUMBER BUTTON STAY DOWN AND NO SELECTOR OPERATION OCCURS IF ANY RECORD IS SELECTED.

CAUSE OF TROUBLE IS IN: Tormat Selector Unit and Remote Control Stepper Unit or Electrical Selector or Pricing Unit.

PROCEDURE:



1. Remove the cover from rear of back door and select A1, then **MENTARILY** connect a jumper wire from pin 33 to pin 33 of the two 33-pin sockets. Note if Selector operates when connection is made.

IF SELECTOR OPERATES see 2 and 3 of Tormat Selector Unit (TSU7) Service Notes. (Page 365)

IF SELECTOR DOES NOT OPERATE proceed as follows:

3. Remove the cover from the back of the Electrical Selector.

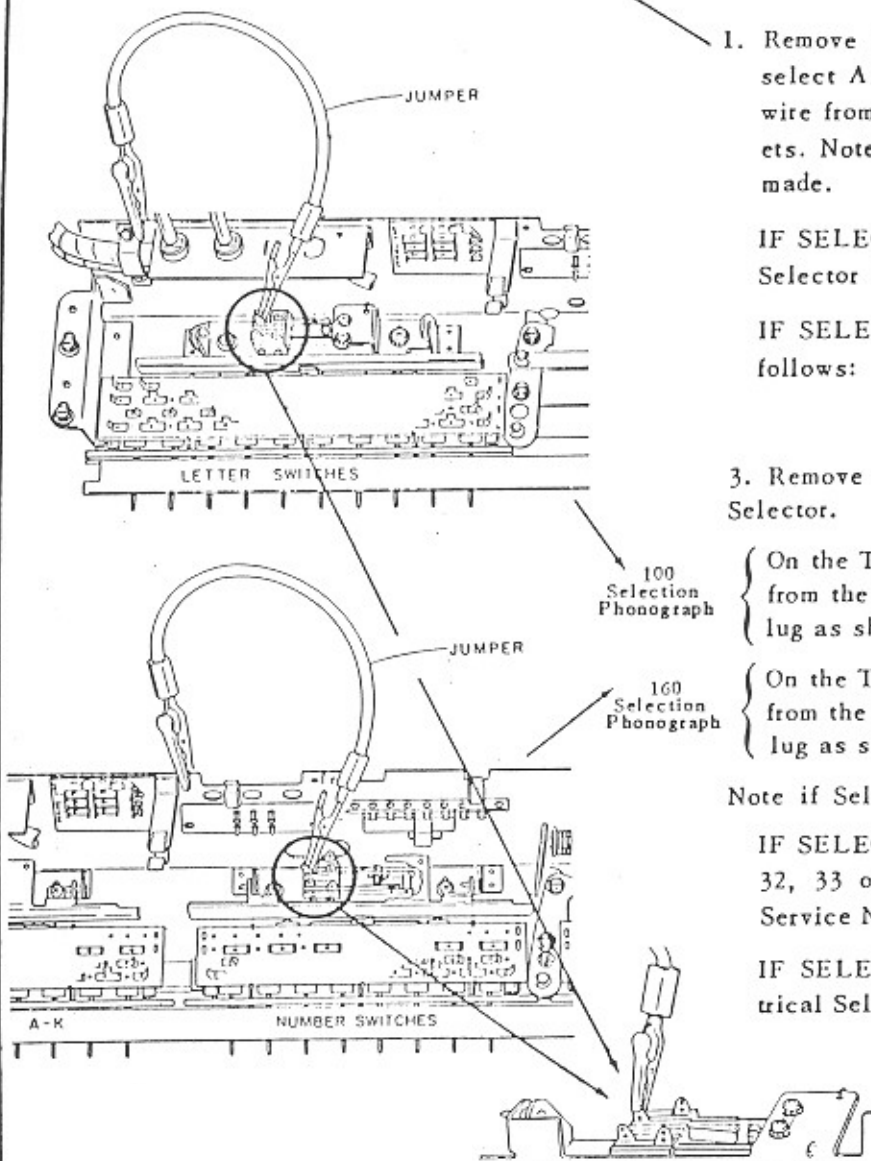
On the TES108 momentarily connect a jumper wire from the Selector frame to the Letter Start Switch lug as shown.

On the TES168 momentarily connect a jumper wire from the Selector frame to the Number Start Switch lug as shown.

Note if Selector operates when connection is made.

IF SELECTOR DOES NOT OPERATE see 29, 30, 32, 33 or 34 of Universal Pricing Unit (USPU1) Service Notes. (Page 364)

IF SELECTOR OPERATES see item 11 of Electrical Selector (TES168) Service Notes. (Page 362)



TRUBLE: SELECTOR BUTTONS FAIL TO LATCH.

TRUBLE: SELECTOR BUTTONS FAIL TO LATCH. SELECTOR OPERATIONS CAN BE MADE IF A LETTER AND A NUMBER BUTTON ARE PRESSED AT THE SAME TIME.

CAUSE OF TROUBLE IS IN Electrical Selector or Pricing Unit.

PROCEDURE:

1. Remove the cover from the back of the Electrical Selector and note if the latch bar solenoid is energized when the credit lamp is lighted.

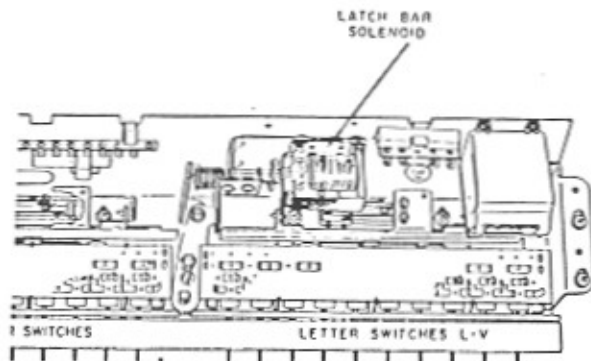
IF SOLENOID IS ENERGIZED see item 6 of Electrical Selector (TES168) Service Notes (Page 362).

IF SOLENOID IS NOT ENERGIZED proceed as follows:

2. While watching solenoid, press in a letter and a number button at the same time and note if solenoid momentarily energizes.

IF SOLENOID MOMENTARILY ENERGIZES see item 28 of Universal Pricing Unit Service Notes (Page 364).

IF SOLENOID DOES NOT MOMENTARILY ENERGIZE see 5 or 5a of Electrical Selector (TES168) Service Notes (Page 362).



TRUBLE: IN SELECTOR OPERATION, SECOND BUTTON PRESSED SOMETIMES STAYS DOWN.

CAUSE OF TROUBLE IS IN: Electrical Selector or Pricing Unit.

PROCEDURE:

1. Deposit a quarter and select A1 by pressing both buttons at the same time. Hold in both buttons a few seconds before releasing.

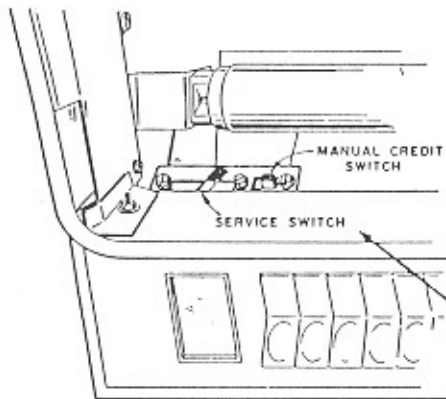
Note if credit lamp is still lighted after buttons are released.

IF CREDIT LAMP IS LIGHTED see item 7 of Electrical Selector (TES168) Service Notes (Page 362).

IF CREDIT LAMP IS NOT LIGHTED see item 31 of Universal Pricing Unit (USPUI) Service Notes (Page 364).



CREDIT LAMP

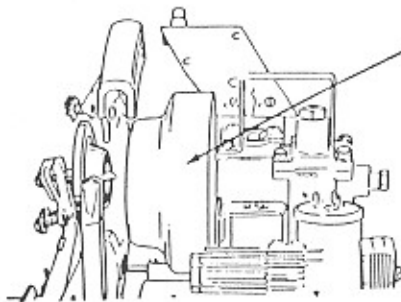


TROUBLE: SELECTOR OPERATIONS SEEM NORMAL BUT CARRIAGE DOES NOT SCAN WHEN ANY RECORD IS SELECTED.

CAUSE OF TROUBLE IS IN: Pricing Unit or Tormat Selector Unit or Mechanism or Electrical Selector or Auto Speed Unit.

PROCEDURE:

1. Make sure Service Switch is in PLAY position. Note if carriage TURNTABLE moves SLIGHTLY when Selector is operated.



IF SO see item 5 of Tormat Selector Unit (TSU7) Service Notes (Page 366).

IF NOT proceed as follows:

2. Check if counter operates when Selector operates. IF COUNTER DOES NOT OPERATE see item 27 of Universal Pricing Unit (USPU1) Service Notes. (Page 364)

IF COUNTER OPERATES proceed as follows:

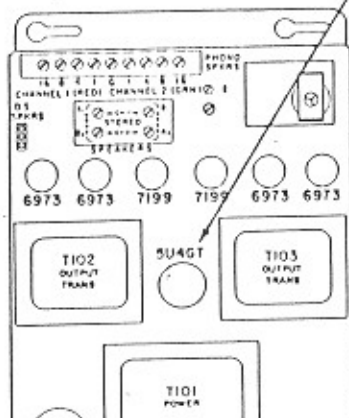
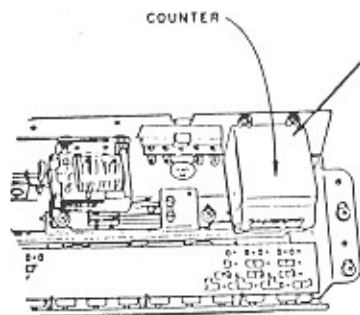
3. Open back door of phonograph and note if amplifier 5U4 tube is lighted.

IF 5U4 TUBE IS LIGHTED see items 52 to 56 of Mechanism (160ST7) Service Notes (Page 370), and item 1 of Auto-Speed Unit Service Notes, (Page 372).

IF 5U4 TUBE IS NOT LIGHTED proceed as follows:

4. Remove cover from rear of back door and check items 4 and 6 of the Tormat Selector Unit (TSU7) Service Notes (Page 366).

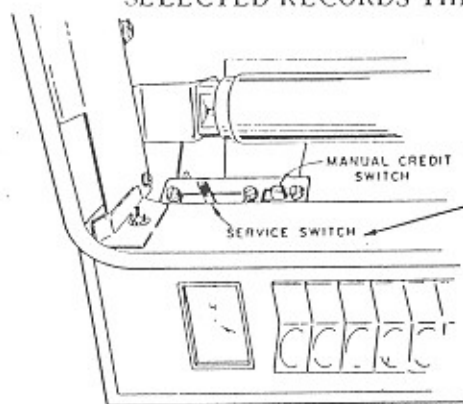
IF NO TROUBLE IS FOUND see items 20 and 21 of Electrical Selector (TES168) Service Notes (Page 362).



TROUBLE: CARRIAGE SCANS CONTINUOUSLY. STOPS TO PLAY SELECTED RECORDS THEN RESUMES SCANNING.

**PROCEDURE
CHART**

15DS



CAUSE OF TROUBLE IS IN: Pricing Unit or Tormat Selector or Mechanism or Electrical Selector.

PROCEDURE: 1. Turn the Service Switch to OFF position and press the service-credit button twice. Note if carriage stops.

IF CARRIAGE STOPS see item 1 of Mechanism (160ST7) Service Notes (Page 367).

IF CARRIAGE DOES NOT STOP proceed as follows:

2. Remove the 12-pin Credit Unit plug from the Tormat Selector Unit and note if carriage scans two more cycles and stops.

IF CARRIAGE STOPS see item 26 of Universal Pricing Unit (USPU1) Service Notes (Page 364).

IF CARRIAGE DOES NOT STOP proceed as follows:

3. Remove the Service Switch plug from the Tormat Selector Unit and note if carriage scans two more cycles and stops.

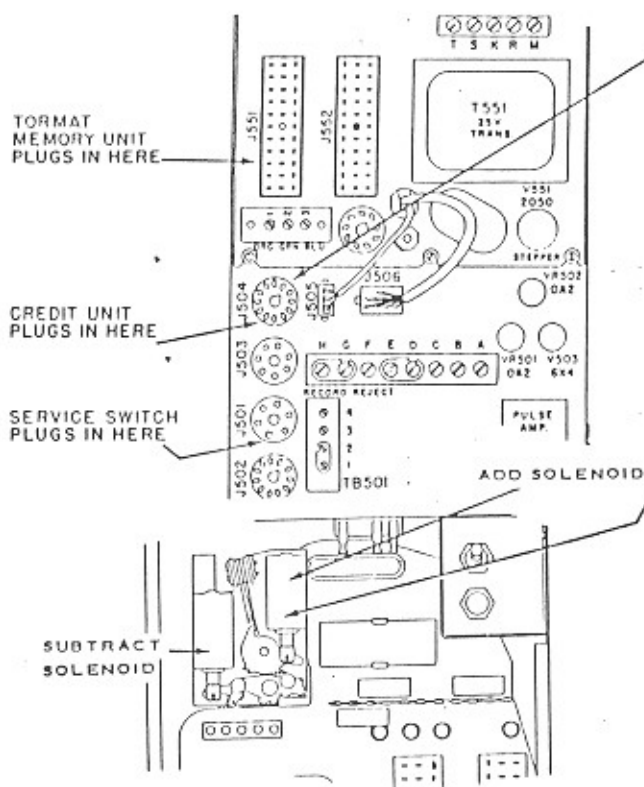
IF CARRIAGE STOPS see item 22 of Electrical Selector (TES168) Service Notes (Page 362).

IF CARRIAGE DOES NOT STOP proceed as follows:

4. Remove the cover from the rear of the back door and check if the Play Control Subtract Solenoid is continuously energized.

IF ENERGIZED see item 1 of Mechanism (160ST7) Service Notes (Page 367).

IF NOT ENERGIZED see items 7 and 8 of Tormat Selector Unit (TSU7) Service Notes (Page 366).



TROUBLE: CARRIAGE OCCASIONALLY SCANS PAST SOME SELECTED RECORDS.

**PROCEDURE
CHART**

16DS

CAUSE OF TROUBLE IS IN: Pricing Unit or Tormat Selector Unit or Mechanism or Electrical Selector.

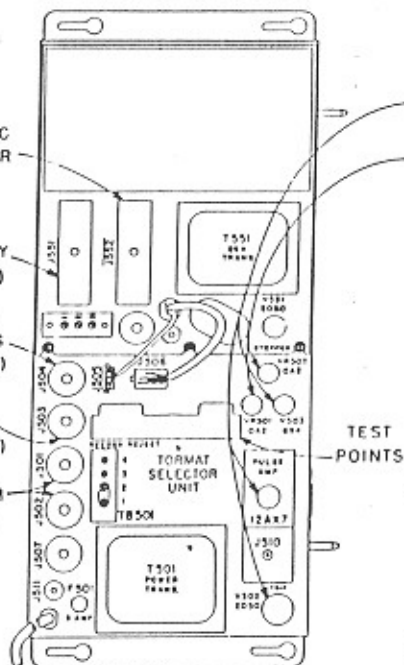
PROCEDURE:

1. Check Credit Unit for trigger switch leakage. Universal Pricing Unit (USPU1) Service Notes, item 25 (Page 364).
2. Check mechanism read-out timing. Mechanism (160ST7) Service Notes, items 2 through 5 (Page 367).
3. Check pulse amplifier. Tormat Selector Unit (TSU7) Service Notes item 17. (Page 366)
4. Electrical Selector (TES168) Service Notes item 18. (Page 362)
5. If none of the above (through 4) correct the trouble, there is a break in the mechanism cable.

TROUBLE: CARRIAGE SCANS TWICE AND STOPS WITHOUT PLAYING RECORD WHEN ANY RECORD IS SELECTED.

CAUSE OF TROUBLE IS IN: Format Selector Unit and Stepper Mechanism
Pricing Unit
Electrical Selector

PROCEDURE: PERFORM FOLLOWING TESTS IN SEQUENCE TO LOCATE TROUBLE.



-A TEST-

1. Check that all plugs are properly seated.
2. Check that all tubes are lighted.
3. Check for purple glow inside both OA2 tubes.
(no glow can be caused by a weak 6X4 tube)

IF A LOOSE PLUG OR BAD TUBE IS FOUND AND CORRECTED, CHECK NORMAL OPERATION OF THE PHONOGRAPH.

IF NO TROUBLE IS FOUND, ESTABLISH SEVERAL FREE CREDITS ON THE PHONOGRAPH AND PERFORM B TEST. *(Be sure the service switch is in the play position for all tests)*

(NOTE) After any trouble is located and repaired, remove jumpers, connect links to normal, replace all plugs and check the phonograph for normal operation.

-B TEST-

1. Remove cover from the test terminals.
2. Remove the memory unit output plug from the pulse amplifier.
3. Connect one end of a jumper wire to "C", leaving other end free.
4. Make any selection and while mechanism is scanning, momentarily connect the free end of the jumper wire to the input of the pulse amplifier. *(Make connection down inside socket)* Mechanism should immediately trip.

IF MECHANISM TRIPS: Reject record, allow mechanism to scan to stop. PERFORM C TEST.

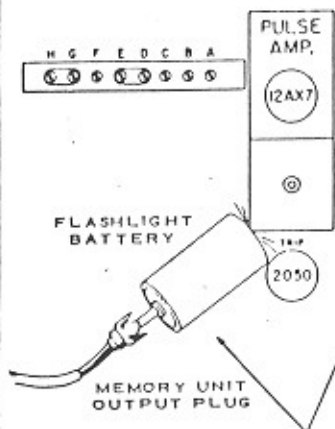
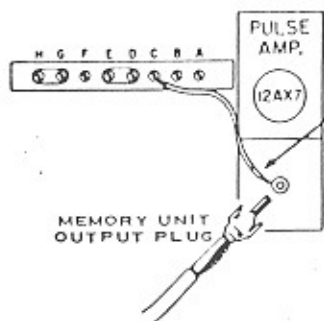
IF MECHANISM DOES NOT TRIP: Use L TEST to pinpoint trouble.

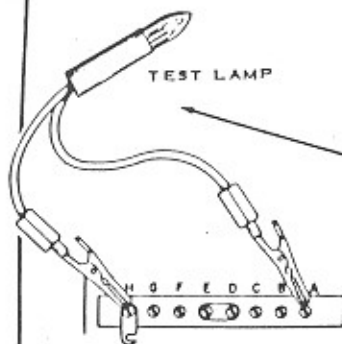
-C TEST-

1. Remove jumper wire from "C".
2. Momentarily connect the tip of the memory unit output plug to the tip of a good flashlight battery with the case of the battery held against the corner of the pulse amplifier. *(This is the same as making all selections on the format).*
3. Replace memory unit output plug into pulse amplifier.
4. Make any selection. When selection is made, mechanism should immediately trip and play.
5. Reject record and note if next record plays. *(If desired, all records could be played)*

IF MECHANISM TRIPS ON AT LEAST TWO RECORDS: Pull out memory unit output plug, reject record, allow mechanism to scan to stop and replace plug. Use G TEST to pinpoint trouble.

IF MECHANISM SCANS OR PLAYS ONLY ONE RECORD: Use D TEST to pinpoint trouble.



-D TEST- (Read Out)

(Be sure service switch is play position for all tests)

1. Remove mechanism access door on rear of phonograph.
2. Open link between "G and H". (Turn off power while moving links)
3. Connect the Seeburg Test Lamp between "H" and "A". Lamp should glow brightly. (Be sure power is on)

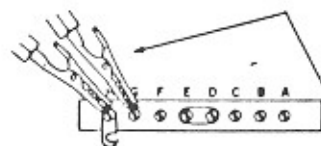
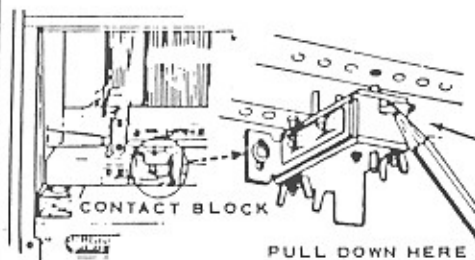
IF LAMP GLOWS BRIGHTLY: PERFORM E TEST.

IF LAMP IS DIM OR DOES NOT LIGHT: Proceed as follows,

4. Pull out service switch plug from selector unit and note lamp.

IF LAMP NOW GLOWS BRIGHTLY: See item 17 of Electrical Selector (TES168) Service Notes (Page 362).

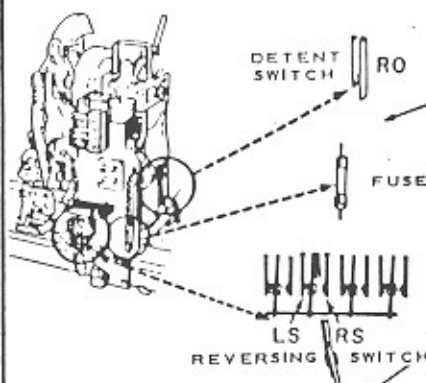
IF LAMP IS DIM OR DOES NOT LIGHT: See item 21 of Tormat Selector Unit (TSU7) Service Notes (Page 366).

**-E TEST- (Read Out)**

1. Connect the test lamp between "G" and "H".
2. Make any selection and note that lamp flashes as mechanism scans past each record space.
3. As mechanism scans back away from A1, pull down on outside plunger of contact block. Lamp should go out or flash very dimly while plunger is held down.

IF LAMP FLASHES AT EACH RECORD SPACE AND GOES OUT WHILE PLUNGER IS HELD DOWN: PERFORM F TEST.

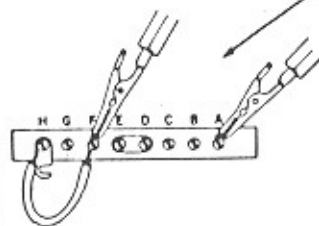
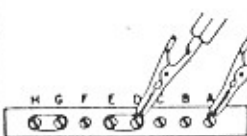
IF LAMP DOES NOT FLASH AT EACH RECORD SPACE OR STAYS ON WHILE PLUNGER IS HELD DOWN: Check for defective carriage RO circuit.

**-F TEST- (Read Out)**

1. With "G" and "H" open, connect test lamp between "F" and "A".
2. Momentarily connect a jumper wire between "H" and "F". Lamp should flash when connection is made.

IF LAMP FLASHES - REPLACE TORMAT MEMORY UNIT
(Output cable is open or shorted)

IF LAMP DOES NOT FLASH: See item 21 of Tormat Selector Unit (TSU7) Service Notes (Page 366).

**-G TEST- (Write In)**

1. Connect a Seeburg Test Lamp between "D" and "A". Lamp should not glow. If lamp glows, PERFORM J TEST.
2. While watching lamp, make any selection. Lamp should not flash.

IF LAMP FLASHES: PERFORM H TEST.

IF LAMP DOES NOT FLASH: PERFORM J TEST.

-H TEST- (Write In)

1. Connect the test lamp between "K" and "A".
2. While watching lamp, make any selection.

IF LAMP FLASHES: PERFORM TEST #1A BELOW.

IF LAMP DOES NOT FLASH: PERFORM TEST #1C BELOW

TEST #1A Connect test lamp between "R" and "A".
Make any selection while watching lamp.

IF LAMP FLASHES: PERFORM TEST #1B BELOW

IF LAMP DOES NOT FLASH: CLEAN "R" CONTACT TIMING RELAY #2.

TEST #1B Connect test lamp between "M" and "A".
Select V8 (160 models) or K10 (100 models)
while watching lamp.

IF LAMP FLASHES REPLACE TORMAT MEMORY UNIT (Open ground)

IF LAMP DOES NOT FLASH: See item 15 and 16 of Electrical Selector (TES168) Service Notes (Page 362).

TEST #1C Connect test lamp between "S" and "A".
Select V8 (160 models) or K10 (100 models)
while watching lamp.

IF LAMP FLASHES: REPLACE TORMAT MEMORY UNIT
(Open circuit pin #31)

IF LAMP DOES NOT FLASH: PERFORM TEST #1D BELOW

TEST #1D Connect test lamp between "T" and "A".
Make any selection while watching lamp.

IF LAMP FLASHES: See item 15 and 16 of Electrical Selector (TES168) Service Notes (Page 362).

IF LAMP DOES NOT FLASH CLEAN "N" CONTACT-TIMING RELAY #2.

-J TEST- (Write In)

1. Open link between "D" and "E".
2. Connect test lamp between "D" and "E". Lamp should show a dim glow or not glow at all.
3. IF LAMP IS LIGHTED BRIGHTLY: Pull out pricing unit plug from selection unit while watching lamp.

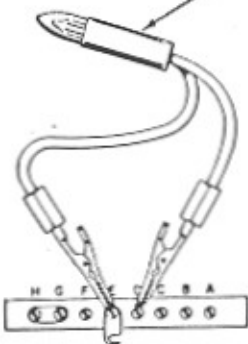
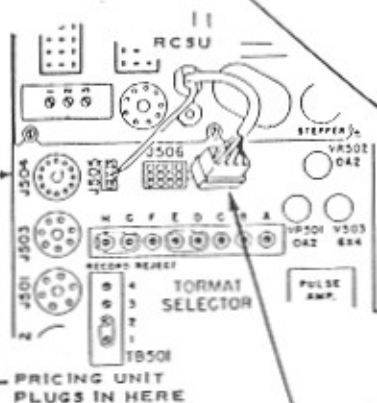
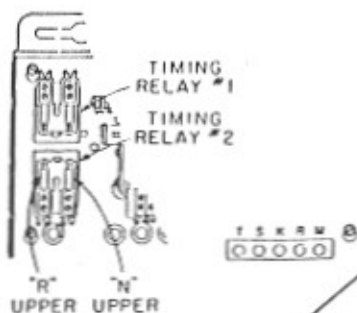
IF LAMP DIMS OR GOES OUT when pricing unit plug is pulled; see item 25 of Universal Pricing Unit (USPU1), Service Notes (Page 364).

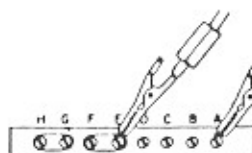
IF LAMP REMAINS BRIGHT after pulling pricing unit plug, reinsert pricing unit plug in selection unit socket.

1. Pull out stepper plug from selection unit. If lamp dims, check for shorted "P" contact.

2. If lamp does not dim when stepper plug is pulled, see item 20 or 23 of Tormat Selector Unit (TSU7) Service Notes (Page 366).

IF LAMP GLOWS DIMLY OR IS NOT LIGHTED, PERFORM K TEST.



-K- TEST (Write In)

1. Connect link between "E" and "F".
2. Connect test lamp between "E" and "A".
3. While watching lamp, make any selection. Lamp should flash.

IF LAMP FLASHES: Repeat all tests. (*Be sure you have not skipped part of the tests*)

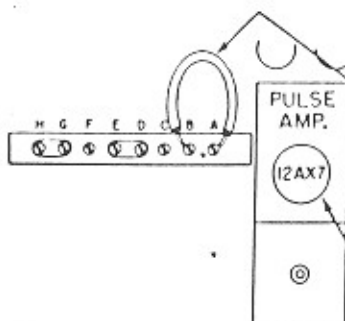
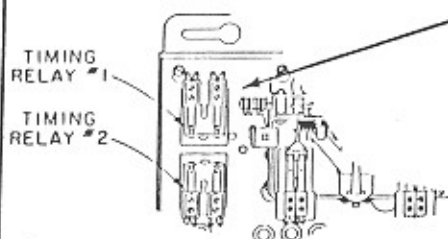
IF LAMP DOES NOT FLASH: Proceed as follows,

4. While watching lamp, press and release timing relay #1. Lamp should flash.

IF LAMP FLASHES: See item 24 of Universal Pricing Unit (USPU1), Service Notes (Page 364).

IF NO STEPPER: See item 24 of Universal Pricing Unit (USPU1), Service Notes (Page 364).

IF LAMP DOES NOT FLASH: Replace Tormat Selector Unit (*Defective write in electronics*).

**-L- TEST - (Trip)**

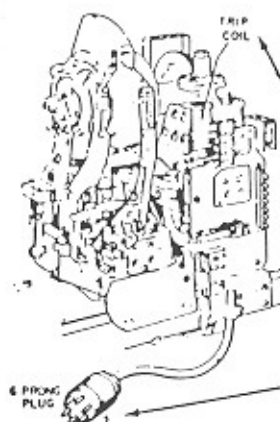
1. Remove jumper wire from "C" and connect to "A".
2. Make any selection. While mechanism is scanning, momentarily connect free end of jumper wire to "B". Mechanism should trip.

IF MECHANISM TRIPS:

1. Install new 12AX7 tube in pulse amplifier.
2. Replace memory unit output plug into pulse amplifier and check normal operation of the phonograph.
3. If phonograph does not select, see item 17 or 22 of Tormat Selector Unit (TSU7) Service Notes (Page 366).

IF MECHANISM DOES NOT TRIP:

1. Install new 2050 tube in selection unit.
2. Repeat trip test. If mechanism does not now trip, check mechanism trip coil and circuit.



TROUBLE: CARRIAGE "SITS AND SPINS". WILL NOT MOVE ON TO PLAY SELECTED RECORDS.

CAUSE OF TROUBLE IS IN: Mechanism.

PROCEDURE:

1. Note if carriage clamp arm is in open or clamped position while "spinning".

IF CLAMPED see item 10 of Mechanism (160ST7) Service Notes (Page 367).

(Be sure there are records in all magazine spaces.)

IF NOT CLAMPED proceed as follows:

2. Give carriage slight push to left and to right.
Note if record is then brought out and played.

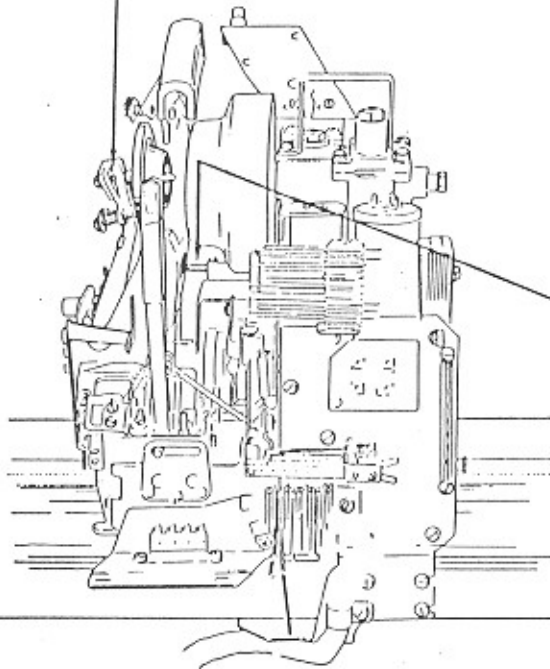
IF RECORD COMES OUT see item 7 of Mechanism (160ST7) Service Notes (Page 367).

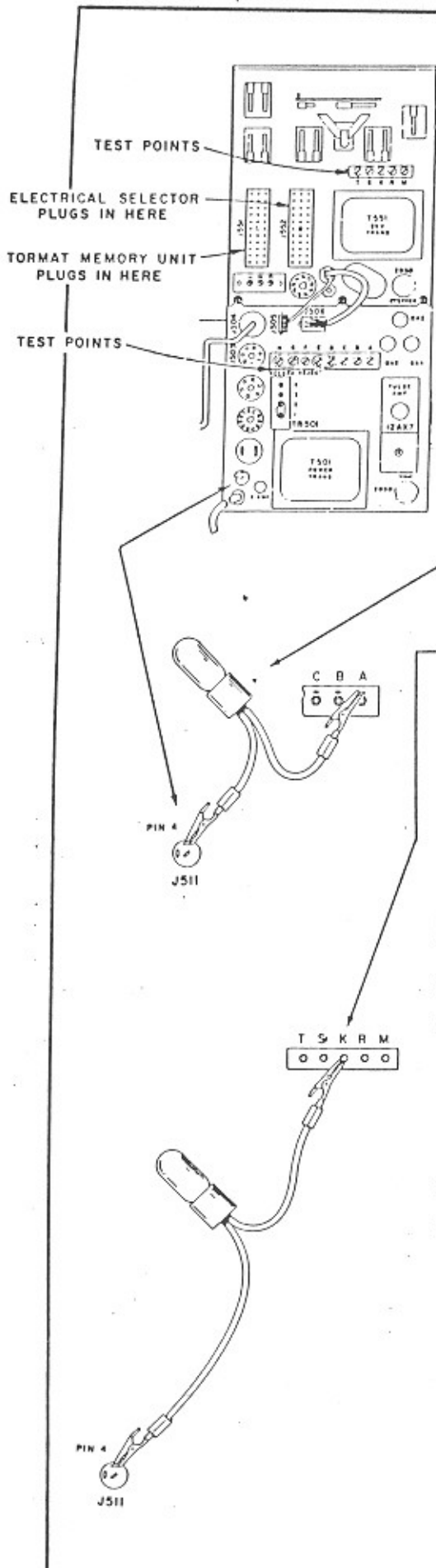
IF RECORD DOES NOT COME OUT proceed as follows:

3. Note if the safety plunger is touching the stripper plate.

IF SO see item 8 of Mechanism (160ST7) Service Notes (Page 367).

IF NOT see item 9 of Mechanism (160ST7) Service Notes (Page 367).





TROUBLE: PLAYS AN ENTIRE LETTER OR NUMBER GROUP OF RECORDS EACH TIME CERTAIN BUTTONS ARE OPERATED.

CAUSE OF TROUBLE IS IN: Electrical Selector or Tormat Selector Unit or Mechanism Memory Unit.

PROCEDURE: Perform the following tests to locate trouble.

- A - TEST

1. "Take off" all credits (if any.)
2. Connect one wire of a 28V lamp (e.g. GE1829) to terminal 4 of socket J511 and the other wire of the test lamp to Test Point A on the Tormat Selector Unit. Lamp should light to full (normal) brightness. Note brightness for reference in following tests.
3. Move test lamp connection from Test Point A to Test Point K on the Stepper or Junction Unit and note if lamp is lighted.

IF LIGHTED: PERFORM B TEST TO LOCATE SHORT.

IF NOT LIGHTED PROCEED AS FOLLOWS:

4. Press in selector buttons A and 1 at the same time. While buttons are held down, note if test lamp lights to full brightness as in 2 above.

IF BRIGHTLY LIGHTED (as in 2): PERFORM E TEST TO LOCATE SHORT.

IF DIMLY LIGHTED: Remove test lamp; use Procedure Chart 26, Items 1 to 6, to locate trouble.

- B - TEST

1. Remove the Tormat Memory Unit 33-pin plug from the Stepper or Junction Unit. Note if test lamp is lighted.

IF LIGHTED: PERFORM C TEST TO LOCATE SHORT.

IF NOT LIGHTED: PERFORM D TEST TO LOCATE SHORT.

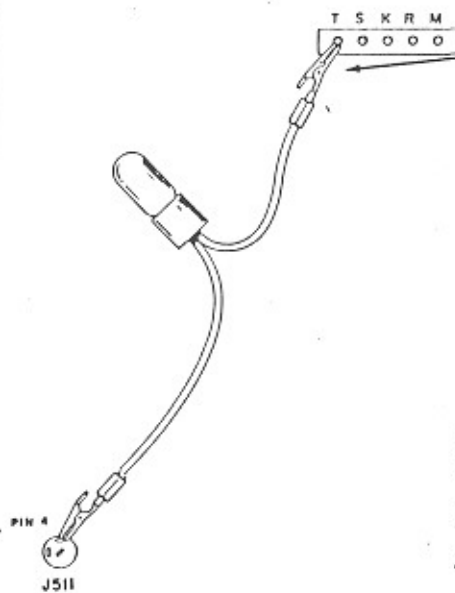
- C - TEST

1. Remove the Electrical Selector 33-pin plug from the Stepper or Junction Unit. Note if test lamp is lighted.

IF LIGHTED: The circuit between the number 31 pins of the 33-pin sockets is grounded. Repair or change Tormat Selector Unit, Stepper or Tormat Junction Unit.

IF NOT LIGHTED: The circuit connected to pin 31 of the Electrical Selector plug is grounded. Repair or change Electrical Selector.

- D - TEST



1. Move the test lamp connection from Test Point K to Test Point T.

2. *FOR 160-SELECTION MODELS:* While watching the test lamp, press in each of the number buttons one at a time, noting if lamp lights while any one of the number buttons is pressed.

FOR 100-SELECTION MODELS: While watching the test lamp, press in each of the letter buttons one at a time, noting if lamp lights while any one of the letter buttons is pressed.

IF LAMP LIGHTS: The circuit connected to the button is grounded in the Electrical Selector or in the Stepper or Junction Unit. **PERFORM F TEST.**

IF LAMP DOES NOT LIGHT: Replace Tormat Memory Unit. (A circuit is grounded.)

- E - TEST

1. Remove the Tormat Memory Unit 33-pin plug from the Stepper or Junction Unit.

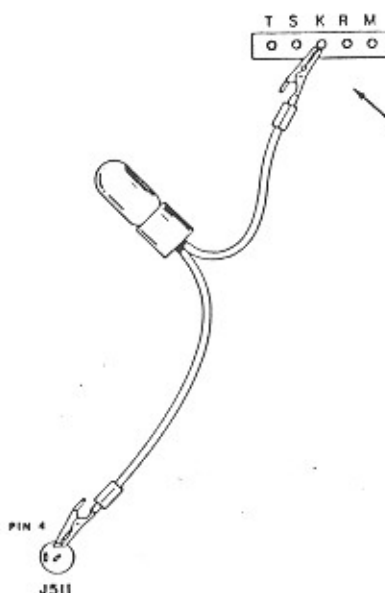
2. *FOR 160-SELECTION MODELS:* While watching the test lamp, press in each of the letter buttons, one at a time, noting if lamp lights while any one of the letter buttons is pressed.

FOR 100-SELECTION MODELS: While watching the test lamp, hold down selector button A and press in each of the number buttons one at a time, then hold down selector button B and again press in each of the number buttons one at a time. Note if the test lamp lights while A or B and any one of the number buttons is pressed.

IF LAMP LIGHTS: The circuit connected to the button is grounded in the Electrical Selector or in the Stepper or Junction Unit. **PERFORM G TEST.**

IF LAMP DOES NOT LIGHT: Replace Tormat Memory Unit. (A circuit is grounded.)

- F - TEST



1. Move test lamp connection from Test Point T to Test Point K.

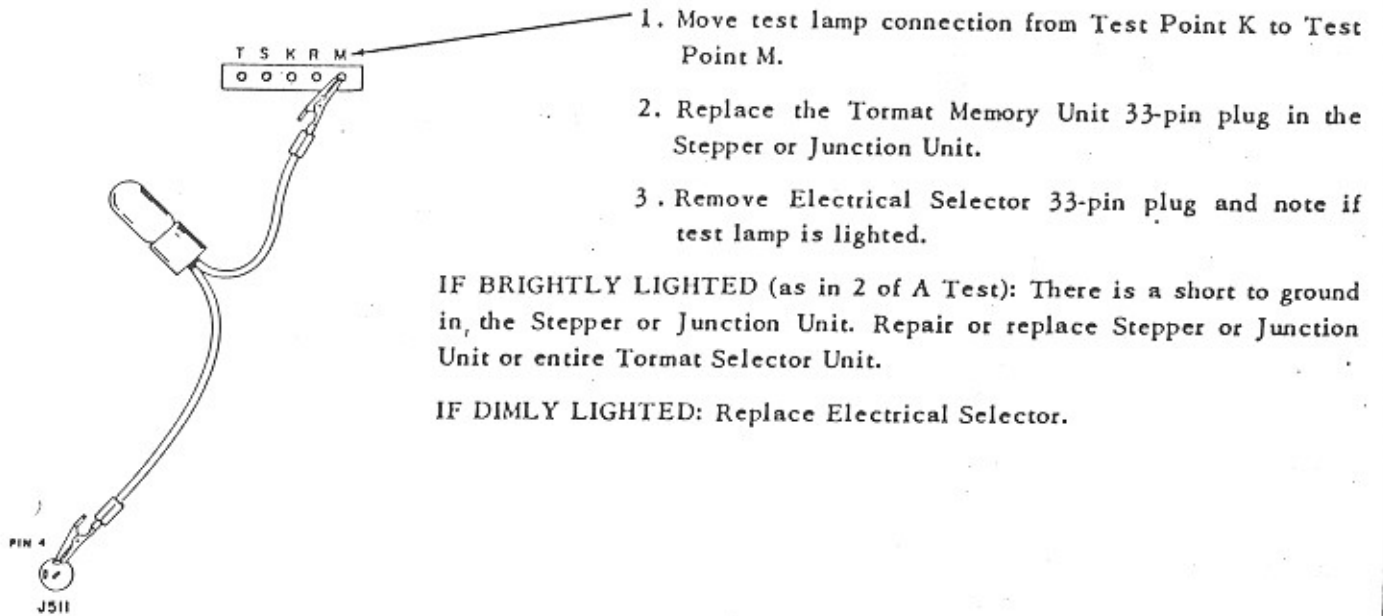
2. Replace the Tormat Memory Unit 33-pin plug in the Stepper or Junction Unit.

3. Remove Electrical Selector 33-pin plug and note if test lamp is lighted.

IF LIGHTED: There is a short to ground in the Stepper or Junction Unit. Repair or replace Stepper or Junction Unit or entire Tormat Selector Unit.

IF NOT LIGHTED: There is a short to ground in the Electrical Selector. Repair or replace.

- G - TEST



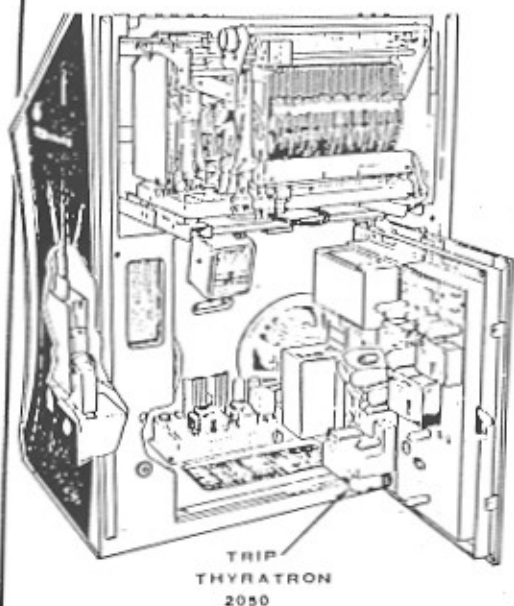
1. Move test lamp connection from Test Point K to Test Point M.
2. Replace the Tormat Memory Unit 33-pin plug in the Stepper or Junction Unit.
3. Remove Electrical Selector 33-pin plug and note if test lamp is lighted.

IF BRIGHTLY LIGHTED (as in 2 of A Test): There is a short to ground in, the Stepper or Junction Unit. Repair or replace Stepper or Junction Unit or entire Tormat Selector Unit.

IF DIMLY LIGHTED: Replace Electrical Selector.

PROCEDURE
CHART

20DS



TROUBLE: CARRIAGE TRANSFERS A RECORD OUT OF AND BACK INTO MAGAZINE WITHOUT PLAYING IT OR SCANNING.

CAUSE OF TROUBLE IS IN: Tormat Selector Unit or Mechanism.

PROCEDURE:

1. Pull out the Trip 2050 tube from the Tormat Selector Unit and note if carriage now plays record or scans.

IF CARRIAGE SCANS OR PLAYS RECORD see 9 and 10 of Tormat Selector Unit (TSU7) Service Notes (Page 366).

IF CARRIAGE CONTINUES CYCLING RECORD see 17, 18 and 19 of Mechanism (160ST7) Service Notes (Page 368).

PROCEDURE
CHART

21DS

TROUBLE: RECORD IN PLAYING POSITION AND TURNING; STYLUS IN RECORD GROOVE BUT NO SOUND.

CAUSE OF TROUBLE IS IN: Amplifier or Mechanism.

PROCEDURE:

1. While record is turning, pull out the mute-squelch plug from the amplifier.

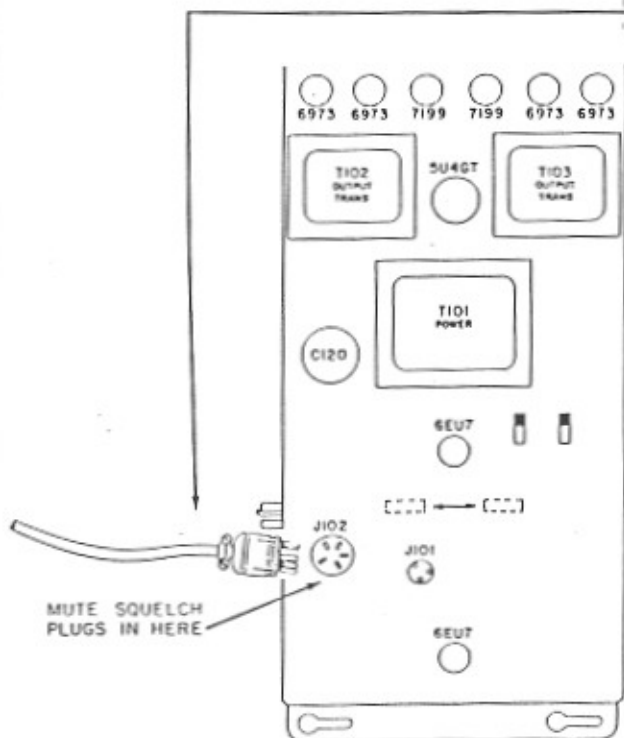
IF SOUND NOW COMES THROUGH see item 33 of Mechanism (160ST7) Service Notes (Page 369).

IF NO SOUND COMES THROUGH replace plug and proceed as follows:

2. While record is turning, open the back door and check if the 5U4 tube is lighted.

IF THE 5U4 TUBE IS LIGHTED see 2 and 3 of Amplifier (SHFA5) Service Notes (Page 371).

IF THE 5U4 IS NOT LIGHTED see 1 and 2 of the Amplifier (SHFA5) Service Notes (Page 371).



TROUBLE: NO STEREO AFFECT, ONE CHANNEL IS DEAD.

PROCEDURE: PERFORM FOLLOWING TESTS TO LOCATE TROUBLE.

- A - TEST

1. Set volume control to $\frac{3}{4}$ position and the balance control to mid position. Select several monaural (Standard) records. With the phonograph playing, remove 7199 tube from channel 1 noting if the sound is dead.

IF SOUND IS WEAK OR DEAD: Perform B test. Perform C test if no remote speakers are used. (Channel 2 is defective).

IF SOUND CONTINUES IN CHANNEL 2: Perform E test.

- B - TEST

1. Remove one wire from channel 2 speaker terminals. With phonograph playing remove 7199 tube from channel 1 noting if sound is dead.

IF SOUND IS WEAK OR DEAD: Reconnect speaker wire and perform C test.

IF SOUND CONTINUES IN CHANNEL 2: Locate and repair short in channel 2 remote speaker wiring. After repairing, balance amplifiers.

- C - TEST

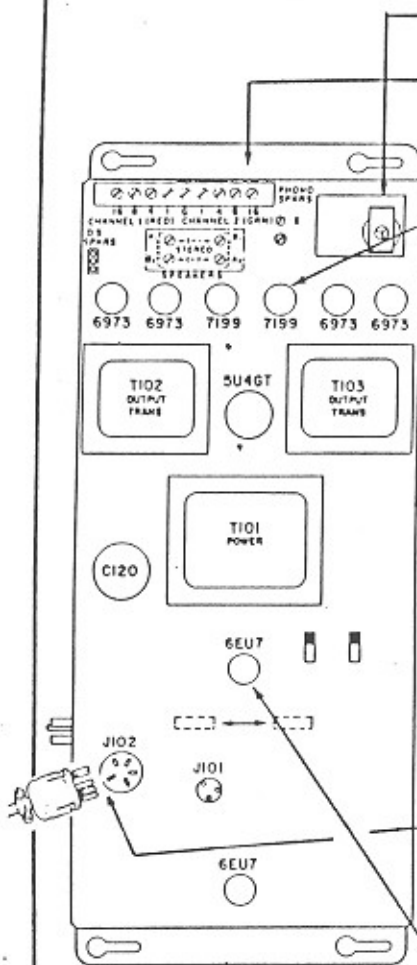
1. With the phonograph playing, remove the mute-squelch plug from the amplifier.
2. Remove 7199 tube from channel 1 noting if sound is dead.

IF SOUND IS WEAK OR DEAD: Replace mute-squelch plug and perform D test.

IF SOUND CONTINUES IN CHANNEL 2: Adjust the mute switches on the mechanism. See Mechanism Service Notes, Item 33, (Page 321). After adjusting switches, replace mute-squelch plug and balance amplifiers.

-D- TEST

1. Remove the 7199 tube from Channel 1.
2. While the record is turning, substitute a new 6EU7 in the amplifier. Allow time for tube to warm up.
3. If phonograph starts playing, put the 7199 tube back in channel 1 and balance the amplifier.



- D - TEST cont.

4. If the phonograph does not play substitute the 7199 in channel 2 with the good 7199 tube removed from channel 1. Allow time for tube to warm up.
5. If the phonograph starts playing after replacing the 7199 tube, install a new 7199 tube in channel 1 and balance the amplifiers.
6. If the phonograph does not play after trying the 7199 and 6EU7 tube, turn off power, remove the 6973 tubes from channel 1 and install in channel 2. Turn on power.

IF THE PHONOGRAPH PLAYS: Install new 6973 tubes in channel 1, replace the 7199 tube in channel 1, and balance the amplifiers.

IF THE PHONOGRAPH DOES NOT PLAY: Replace the amplifier. Balance the new amplifier.

-E- TEST

1. With a record playing, remove 7199 tube from channel 2, noting if the sound is dead.

IF SOUND IS WEAK OR DEAD: Perform F test. Perform G test if no remote speakers are used. (Channel 1 is defective).

IF SOUND CONTINUES IN CHANNEL 1: Recheck previous tests made.

-F- TEST

1. Remove one wire from channel 1 speaker terminals.
2. With phonograph playing, remove 7199 tube from channel 2, noting if sound is dead.

IF SOUND IS WEAK OR DEAD: Replace speaker wire and perform G test.

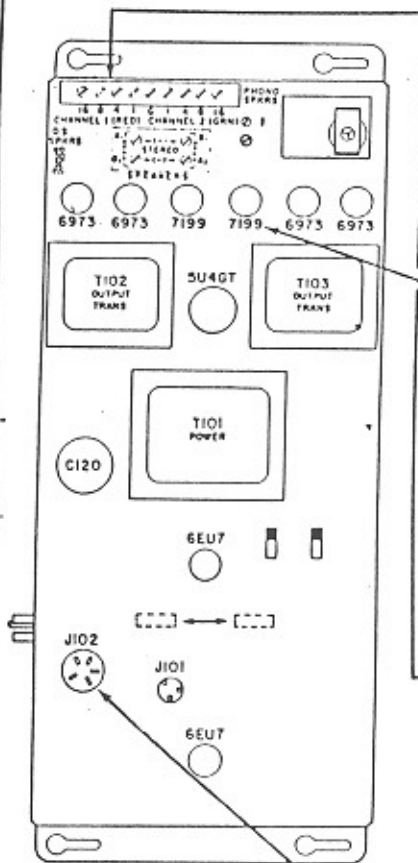
IF SOUND CONTINUES IN CHANNEL 1: Locate and repair short in channel 1 remote speaker wires. After repairing, balance amplifiers.

-G- TEST

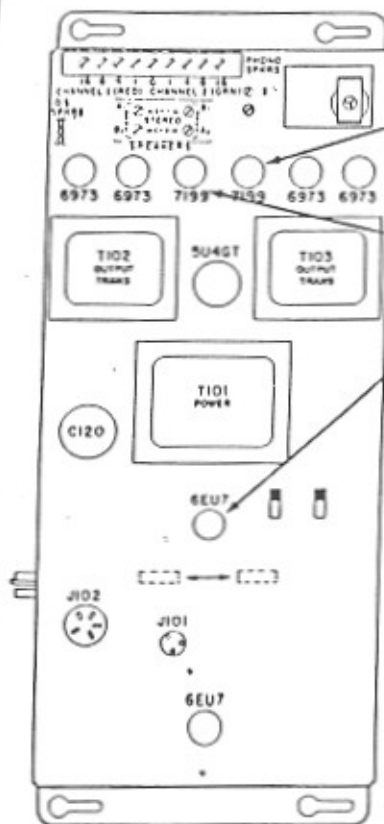
1. With phonograph playing, remove the mute-squelch plug from the amplifier.
2. Remove 7199 tube from channel 2, noting if sound is dead.

IF SOUND IS WEAK OR DEAD: Replace the mute-squelch plug. Perform H test.

IF SOUND CONTINUES IN CHANNEL 1: Adjust the mute switches on the mechanism. See Mechanism Service Notes, Item 33, (Page 369). After adjusting switches, replace the mute-squelch plug and balance the amplifiers.



- H - TEST



1. Remove 7199 tube from channel 2.
2. While a record is turning substitute a new 6EU7 in the amplifier. Allow time for tube to warm up.
3. If the phonograph starts playing, put the 7199 tube back in channel 2 and balance the amplifiers.
4. If the phonograph does not play substitute the 7199 tube in channel 1 with the good 7199 tube removed from channel 2. Allow time for warm up.
5. If the phonograph starts playing after replacing the 7199 tube, install a new 7199 tube in channel 2 and balance the amplifiers.
6. If the phonograph does not play after trying the 7199 and 6EU7 tubes turn off power, remove the 6973 tubes from channel 2 and install in channel 1. Turn on power.

IF THE PHONOGRAPH PLAYS: Install new 6973 tubes in channel 2, replace the 7199 tube in channel 2, and balance the amplifiers.

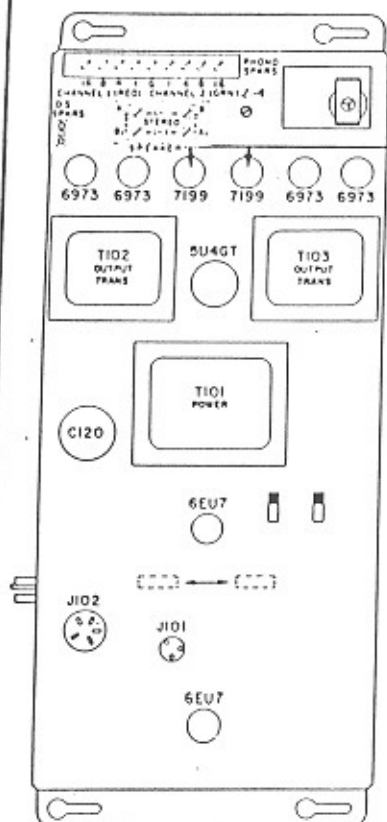
IF THE PHONOGRAPH DOES NOT PLAY: Replace the amplifier. Balance the new amplifier.

TROUBLE: SOUND IS DISTORTED
CAUSE OF TROUBLE IS IN: Mechanism
 or Amplifier.

**PROCEDURE
 CHART**

23DS

PROCEDURE:



1. Install new styluses in the pickup, being sure they are fully seated in the slots. If sound is still distorted, proceed as follows:
2. While distortion is occurring, gently apply side pressure to the pickup so the stylus rides against one wall and the other of the record groove. Note if sound improves while side pressure is applied.

IF SOUND IMPROVES see 36, 37 and 38 of Mechanism (160ST7) Service Notes (Page 369).

IF SOUND DOES NOT IMPROVE proceed to step 3.

3. While distortion occurs, mute one channel and then the other by alternately removing the 7199, first from channel 1 and then from channel 2.

Note which channel has distortion.

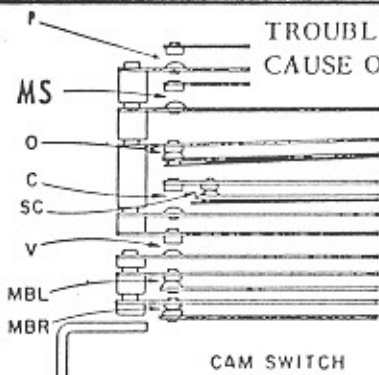
4. Replace the tubes in the channel with distortion. **IF REPLACING TUBES DOES NOT CLEAR DISTORTION** see 13 and 15 of the Amplifier (SHFA5) Service Notes (Page 371).

TROUBLE: SOUND VOLUME IS LOW OR VARIES.
CAUSE OF TROUBLE IS IN: Mechanism or Amplifier.

**PROCEDURE
 CHART**

24DS

PROCEDURE:



1. Remove the cover from the mechanism carriage and check that the MS contacts are properly closed and the MBL, MBR contacts are open in play position.

IF CONTACTS ARE PROPERLY ADJUSTED proceed to step 2.

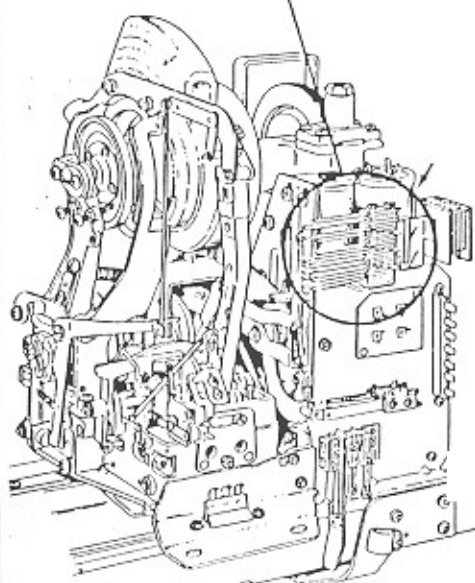
2. While playing a monaural record, remove the 7199 tube in channel 1 of the amplifier, then remove the 6E7 (V109) in the AVC circuit of the amplifier. Volume of channel 2 should increase when the tube is removed. Repeat this test for channel 1 by restoring 7199 and 6E7, then remove the 7199 tube in channel 2 of the amplifier and again, remove the 6E7 (V109) in the AVC circuit of the amplifier. Volume of channel 1 should increase.

IF VOLUME DOES NOT INCREASE see item 16 of the Amplifier (SHFA5) Service Notes (Page 371).

IF VOLUME INCREASES restore the tubes and proceed as follows:

3. With a record playing, remove the pickup plug from the amplifier. Gently tap each of the tubes in each channel. **IF A LOUD NOISE IS HEARD WHEN A TUBE IS TAPPED** replace it with a new one.

IF A LOUD NOISE IS NOT HEARD WHEN THE TUBES ARE TAPPED see item 17 of Amplifier (SHFA5) Service Notes (Page 371).



TROUBLE: PHONOGRAPH MAIN FUSE IS BLOWN.

CAUSE OF TROUBLE IS IN: Mechanism, Tormat Selector Unit, Electrical Selector, Pricing Unit or Auto-Speed Unit.

PROCEDURE:

1. Note the exact position of the mechanism carriage with relation to the magazine. Note if carriage is stopped with the selection playing indicator to the extreme right or left (past the record numbers on the strip).

IF CARRIAGE IS EXTREME RIGHT OR LEFT see item 57 of Mechanism (160ST7) Service Notes (Page 370).

IF CARRIAGE IS NOT EXTREME RIGHT OR LEFT proceed as follows:

2. Replace the fuse.

IF FUSE BLOWS perform step 4 below, ignoring step 3.

IF FUSE DOES NOT BLOW proceed as follows:

3. Deposit money (all combinations), select several records and check that phonograph is working properly. If not, use Trouble Shooting Guide, A to O, to locate trouble.
4. Remove all of the plugs from the Tormat Selector Unit, replace fuse, and replace plugs, one at a time, until fuse blows.

IF FUSE BLOWS WITH ALL PLUGS OUT locate short in Tormat Selector Unit.

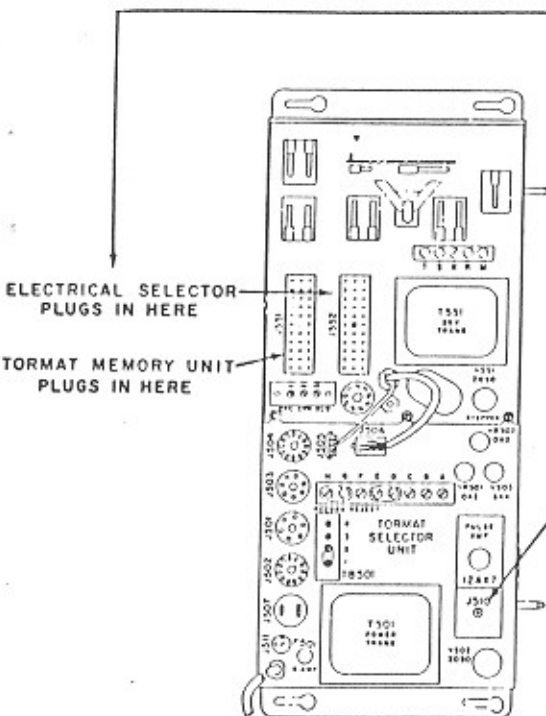
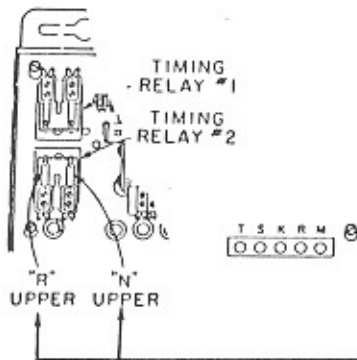
IF FUSE BLOWS WHEN A PLUG IS REPLACED trace short in associated unit.

TROUBLE: PLAYING RECORD REJECTS. CARRIAGE THEN PLAYS SELECTED RECORD ONLY.

CAUSE OF TROUBLE IS IN: Electrical Selector or Pricing Unit or Tormat Selector Unit and Stepper.

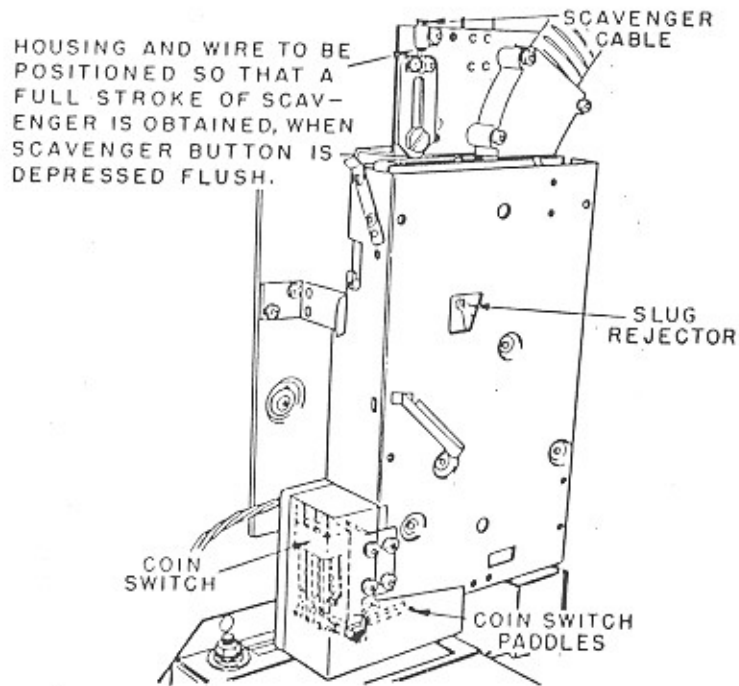
PROCEDURE:

1. Install a known good 12AX7 tube in the Pulse Amplifier.
2. Clean the Pricing Unit trigger switches. Universal Pricing Unit Service Notes item 25 (Page 364).
3. Clean N and R contacts of timing relay No. 2 in the Remote Control Stepper Unit if so equipped.
4. To insure good contact, of the Electrical Selector and Tormat Memory unit 33-pin plugs, remove both and replace them, making sure they are properly seated.
5. Check the Electrical Selector start switches for proper operation. Electrical Selector (TES168) Service Notes item 9 (Page 362).
6. To insure good contact of the Tormat Memory Unit output, remove the plug from the pulse amplifier and replace, making sure it is fully seated.



SERVICE NOTES

DS160 AND DS100 MODEL COIN EQUIPMENT SERVICE

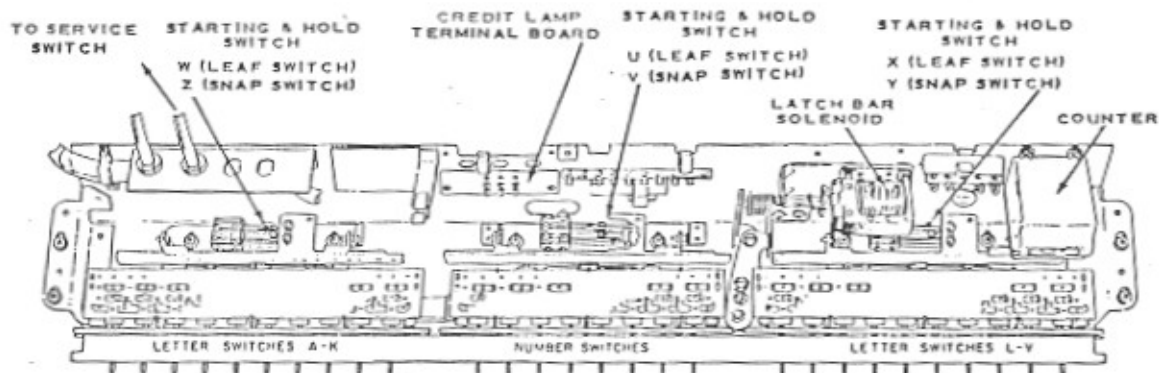


IF	THEN
<ol style="list-style-type: none"> 1. Slug rejector requires cleaning. 2. Slug rejector is not level. (level entire phonograph) 3. Scavenger cable binds. 	<p>Coins will "hang up" or fall through to the coin return cup.</p>
<ol style="list-style-type: none"> 4. A coin switch paddle is out of alignment with the slug rejector coin exit. 5. Slug rejector is not properly seated in the mounting bracket. 6. One of the coin switches is not making proper contact when operated by a coin. 	<p>Coins will fall through to the cash box without giving proper credit.</p>
<ol style="list-style-type: none"> 7. A coin hangs on a coin switch paddle, keeping the coin switch closed. 	<p>Records can be selected free or the fuse blows in the Universal Pricing Unit.</p>

Use these notes only with Coin Equipment Units. Do not use them for trouble shooting a COMPLETE phonograph.

SERVICE NOTES

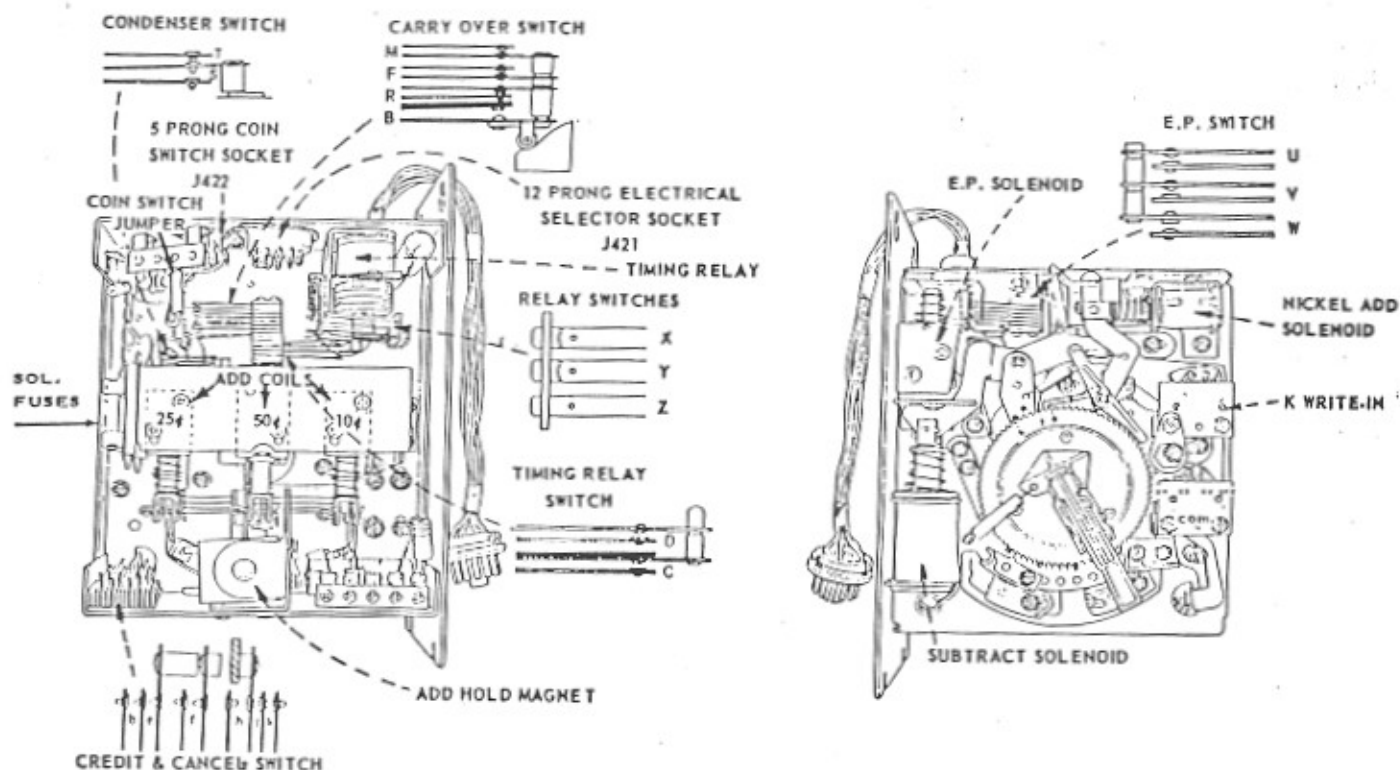
ELECTRICAL SELECTOR, TYPES TES168 AND TES108



IF	THEN	IF	THEN
<p>1. One or more Selector buttons bind and do not fully return.</p> <p>2. A selector switch treadle bar binds, keeping leaf switch closed.</p>	<p>All coins fall through to the cash box without giving credit.</p>	<p>11. A snap switch (V, Y, Z) fails to close when a button is pressed.</p>	<p>Letter and number buttons remain down while attempting to select a record.</p>
<p>3. The latch bar solenoid becomes residual and fails to release.</p> <p>4. The latch bar linkage binds and prevents the latch bar from moving.</p>	<p>Selector buttons remain down after Selector operation.</p>	<p>12. Treadle bar position incorrect.</p> <p>13. "S" contact fails to close.</p> <p>14. "T" contact fails to close.</p>	<p>Letter and number buttons remain down when some selections are attempted.</p>
<p>5. The latch bar solenoid winding is open.</p> <p>5a. Defective manual credit switch.</p> <p>6. The latch bar linkage binds and prevents the latch bar from moving.</p>	<p>Selector buttons fail to latch when the credit lamp is on.</p>	<p>15. A number switch circuit is open.</p> <p>16. A letter switch circuit is open.</p> <p>17. A wire to the service switch is grounded.</p> <p>18. A snap switch (V, Y, Z) closes too soon.</p>	<p>Carriage scans past selected records without playing them.</p>
<p>7. A leaf switch (U, W, X) fails to close when a button is pressed.</p>	<p>Last button pressed while selecting some times remains down.</p>	<p>19. A wire to the number or letter Selector switches is grounded.</p>	<p>Carriage plays more than selected records.</p>
<p>8. A leaf switch (U, W, X) fails to close when a button is pressed.</p> <p>9. A snap switch (V, Y, Z) fails to open with Selector buttons released.</p>	<p>Selector operates as soon as one button is pressed.</p>	<p>20. A contact of the Service Switch Does not properly close.</p> <p>21. A wire to the Service Switch is grounded.</p>	<p>Carriage does not scan when selections are made.</p>
<p>10. The credit lamp resistor is open.</p>	<p>Selector operations are normal but credit lamp does not light.</p>	<p>22. A wire to the Service Switch is grounded.</p>	<p>Carriage scans continuously.</p>

Use these notes only with Electrical Selectors. Do not use them for trouble shooting a COMPLETE phonograph.

SERVICE NOTES
UNIVERSAL PRICING UNIT, TYPES USPU1 AND UDPU1



CONTACT DATA

CONTACT	GAP	PRESSURE	NORMAL POSITION	CONTACT	GAP	PRESSURE	NORMAL POSITION
B	.025 .035	25 GRAM	NORM OPEN	"a" AND "d"	—	15 GRAM AGAINST SEGMENT	NORM OPEN
R	.015 .030	25 GRAM	NORM CLOSED	"b"	.020 AT 2 .015 CREDIT	20 GRAM	CLOSED AT 3 OR MORE CREDITS
F	.010 MIN.	25 GRAM	NORM OPEN	"e"	.020 AT 1 CREDIT	25 GRAM	CLOSED AT 2 OR MORE CREDITS
M	.010 MIN.	25 GRAM	NORM OPEN	"f"	.015 AT 1 .020 CREDIT	20 GRAM	CLOSED AT 2 OR MORE CREDITS
C	.015 .030	30 GRAM	NORM OPEN	"h"	.010 AT 2 .015 CREDIT	20 GRAM	CLOSED AT 3 OR MORE CREDITS
D	.015 .030	30 GRAM	NORM OPEN	"j"	.010 AT 3 .015 CREDIT	20 GRAM	OPENS AT 3 OR MORE CREDITS
T	.015	20 GRAM	NORM CLOSED	"k"	.010 AT 2 .020 CREDIT	20 GRAM WITH ONE CREDIT	OPENS AT 2 OR MORE CREDITS
S	.015	20 GRAM	NORM OPEN	U	.015	25 GRAM	NORM OPEN
X	.015 .025	45 GRAM	NORM CLOSED	V	.025 MIN.	25 GRAM	NORM OPEN
Y	.015 .025	45 GRAM	NORM CLOSED	W	.015	25 GRAM	NORM OPEN
Z	.015 .025	45 GRAM	NORM OPEN				
K	—	15 GRAM AGAINST SEGMENT	NORM OPEN				

IF	THEN
<ol style="list-style-type: none"> Add solenoid fuse is blown. (Check coin equipment service notes Item 7.) "Y" contact of timing relay fails to close. Timing relay is continuously energized. (Check "C" contact.) Subtract solenoid fuse is blown. 	All coins drop through to the cash box without giving credit.

IF	THEN
<ol style="list-style-type: none"> Detent lever fails to disengage from the Credit Ratchet Wheel. A defective Add Solenoid. 	One type coin drops through to the cash box without giving credit.
<ol style="list-style-type: none"> "e" contact fails to close. "b" contact fails to close. 	Selector operations are normal but credit lamp does not light.

Use these notes only with Universal Pricing Units. Do not use them for trouble shooting a COMPLETE phonograph.

IF	THEN
9. "a" contact fails to close (when Dual Pricing is used.)	Selector operations are normal but 5¢ lamp does not light.
10. "d" contact fails to close (when Dual Pricing is used.)	Selector operations normal but 10¢ lamp does not light.
11. One or more incorrect mechanical adjustments.	Not enough selector operations for money deposited.
12. "S" or "T" contacts fail to close. 13. Defective Add Hold Magnet or its associated circuit.	Not enough selector operation for a quarter or a half dollar.
14. Guide plate incorrectly adjusted. (when Dual Pricing is used.)	Proper number of single selections for money deposited but not enough E.P. selections.
15. E. P. Assembly incorrectly adjusted. (when Dual Pricing is used.)	Proper number of E.P. selections for money deposited but not enough single selections.
16. "Z" contact of timing relay fails to properly close when relay is energized.	Selector operates as soon as one button is pressed, or all credits cancel when first selection is made.
17. "F" or "B" contacts fail to close properly on subtract operation. 18. One or more mechanical adjustments incorrect.	Too many selector operations for money deposited.

IF	THEN
19. One or more incorrect mechanical adjustments. 20. "F" or "B" contacts fail to close properly on subtract operation	Credit Lamp is lighted after correct number of selector operations.
21. "F" or "e" fails to open properly. 22. Detent fails to engage Credit Ratchet Wheel. 23. Subtract pawl fails to engage Credit Ratchet Wheel	Selector operations can be made free.
24. "K" contact fails to close properly on subtract operation. 25. Current leaking through dirt at "K" contact.	Carriage scans past selected record. (Carriage trips when selection is made.)
26. "D" contact fails to open. (when Subtract Solenoid is not energized).	Carriage scans continuously.
27. "D" contact fails to close. (when Subtract Solenoid is energized.)	Carriage does not scan when records are selected.
28. "f" contact fails to close. (check "X" contact of timing relay.)	Selector buttons will not latch.
29. "e" contact fails to close. 30. Subtract solenoid is open. 31. "Z" contact of timing relay fails to close properly when the relay is energized. 32. "b" contact fails to close. 33. "h" contact fails to close. 34. "V" contact fails to close.	Selector buttons remain in latched position. (when Dual Pricing is used.)

Use these notes only with Universal Pricing Units. Do not use them for trouble shooting a COMPLETE phonograph.

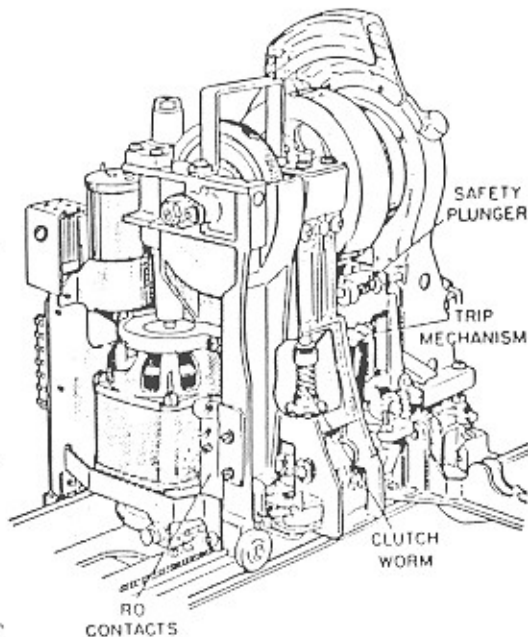
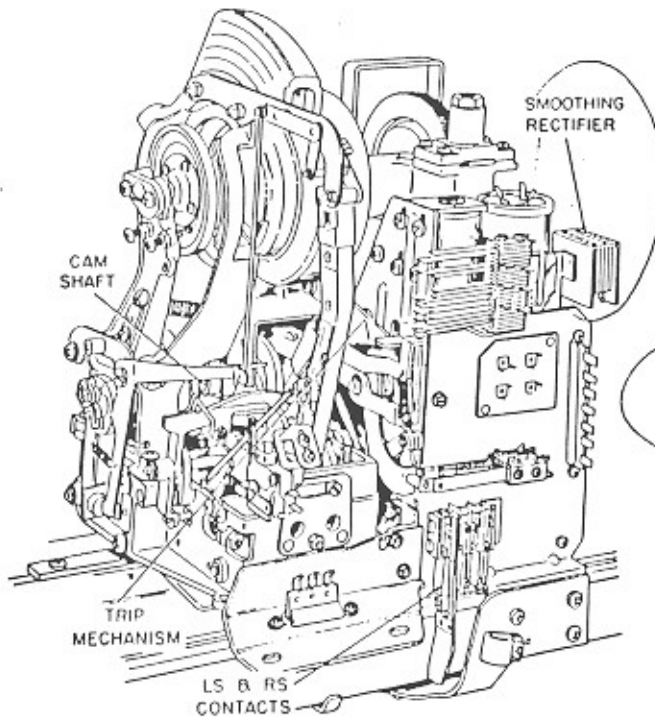
IF	THEN
<p>4. Open winding in play control add solenoid.</p> <p>5. Play control add pawl binds.</p> <p>6. Play control switch does not close properly.</p>	<p>Carriage does not scan when records are selected.</p>
<p>7. Open winding in play control subtract solenoid.</p> <p>8. Play control switch does not open.</p>	<p>Carriage scans continuously.</p>
<p>9. No 30 volts DC from selenium rectifier.</p> <p>10. Defective Trip 2050 bias electronics or 2050 or 12AX7 is defective.</p>	<p>Carriage repeatedly transfers a record into and out of magazine.</p>
<p>11. Bind in play control subtract pawl.</p> <p>12. Play control switch out of adjustment.</p>	<p>Carriage scans once instead of twice.</p>

IF	THEN
<p>13. Defective write-in clipping electronics.</p> <p>14. Wiring through Electric Selector and Memory Unit connectors in Tormat Junction Unit or Remote Control Stepper Unit is grounded.</p>	<p>Carriage plays more than selected records.</p>
<p>15. Open 155 volt winding of power transformer.</p> <p>16. Weak 6X4 tube.</p> <p>17. Weak 12AX7 tube in Pulse Amplifier.</p> <p>18. Weak Trip 2050 tube.</p> <p>19. Defective OA2 tube.</p> <p>20. Defective write-in electronics.</p> <p>21. Defective read-out electronics.</p> <p>22. Defective Pulse Amplifier.</p> <p>23. Shorted stepper write-in trigger wiring.</p>	<p>Carriage scans past selected records.</p>

Use these notes only with Selector Units and Stepper Units. Do not use them for trouble shooting a COMPLETE phonograph.

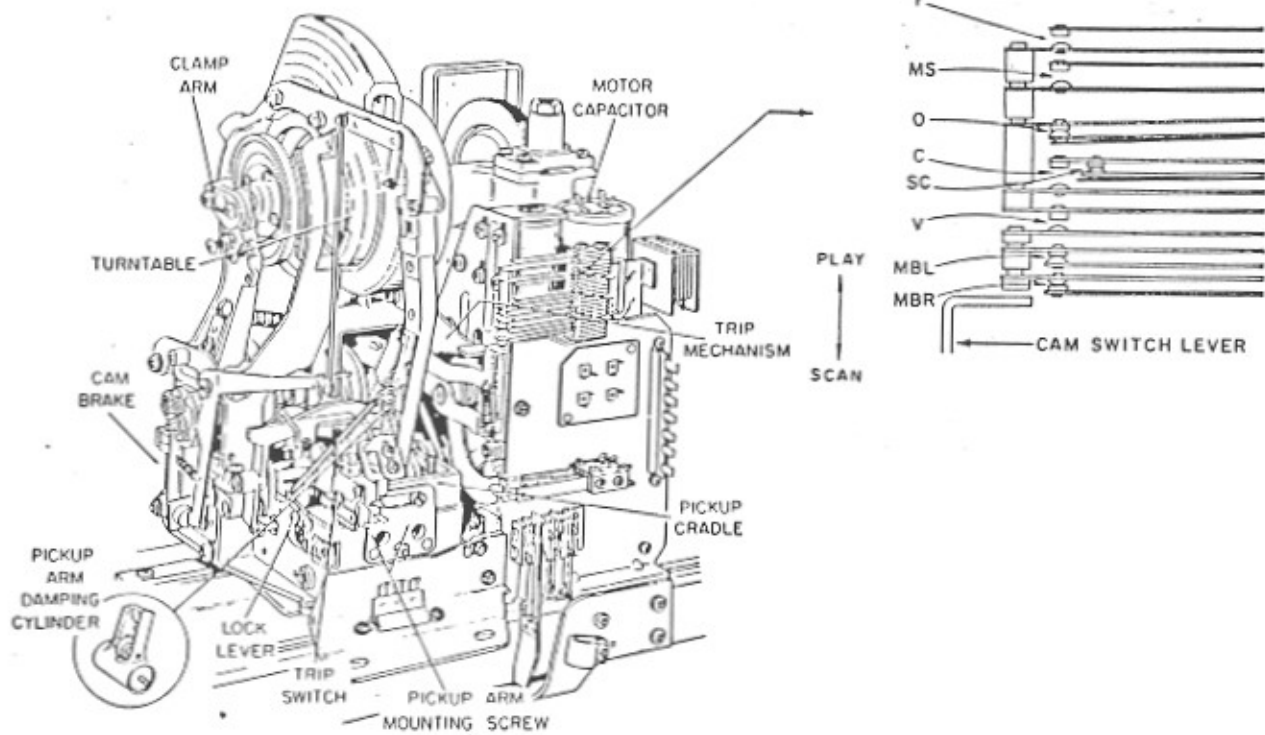
SERVICE NOTES

SELECT-O-MATIC MECHANISM, TYPES TYPES 160ST7 AND 145ST9



IF	THEN
1. Subtract switch fails to close or fails to open.	Carriage does not stop scanning.
2. Tormat Memory Unit misaligned with magazine. 3. LS or RS contacts of reversing switch do not properly close. 4. One of the wires to a plunger in the contact block is broken. 5. RO contacts have too little or too great contact gap. 6. A wire in the Tormat Memory Unit is open or grounded. 6A. Wire broken in mechanism cable.	Carriage will scan past selected records.
7. Carriage cable incorrectly positioned or popularity meter slides dragging. 8. Bind in cam shaft. 9. Bind in safety plunger. 10. Magazine or transfer arm out of alignment with the turntable.	Carriage "sits and spins".
11. Clutch worm binds on clutch shaft. 12. Bind in Trip mechanism. 13. Smoothing rectifier resistor open.	Carriage plays wrong record or returns record to magazine without playing.
14. A wire in Tormat Memory Unit is grounded.	Carriage plays more than selected records.

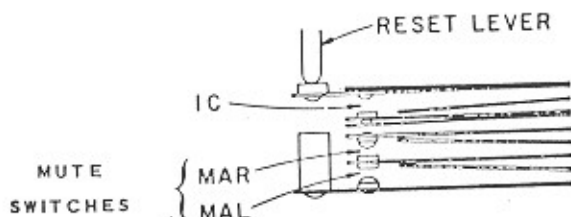
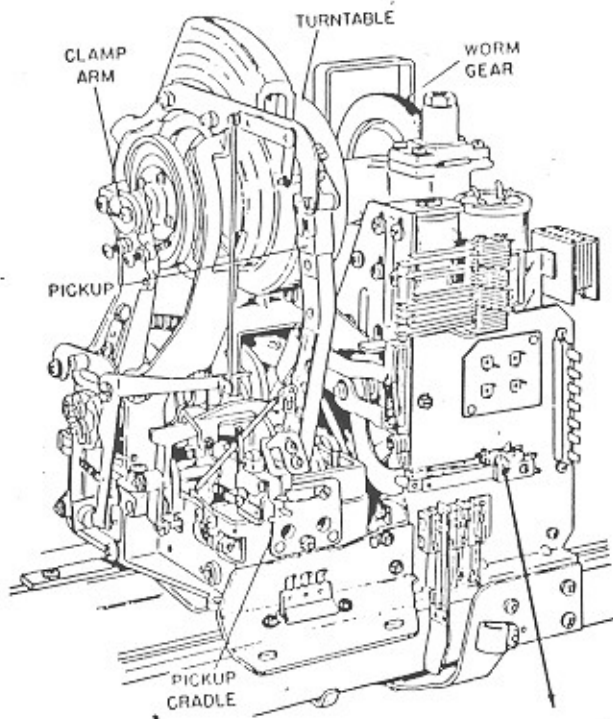
Use these notes only with Select-O-Matic Mechanism. Do not use them for trouble shooting a COMPLETE phonograph.



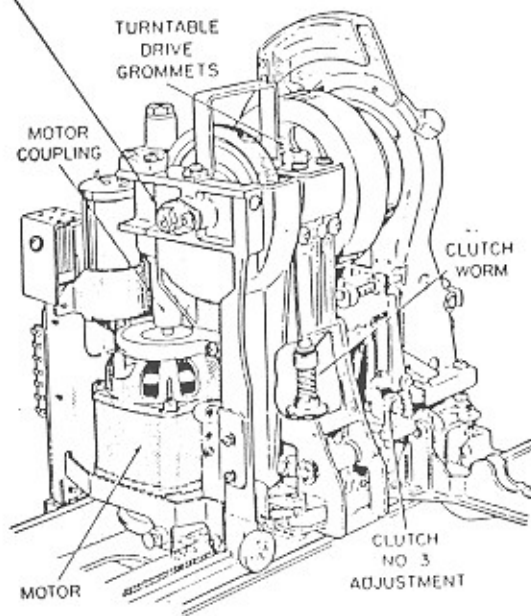
IF	THEN
15. Badly warped record in the magazine. 16. Bind in Trip Mechanism.	Carriage plays record over without scanning.
17. Clutch worm binds on clutch shaft. 18. Bind in Trip mechanism. 19. Trip switch fails to reset.	Carriage repeatedly transfers record into and out of magazine.
20. O contact does not close properly. 21. Motor capacitor defective.	Turntable stalls at end of record.
22. Transfer Arm out of alignment with turntable 23. Dirt in clamp arm pivot pin hole in turntable prevents proper clamping of record or clamp disc incorrectly adjusted.	Records do not clamp properly.

IF	THEN
24. Cam brake not braking cam shaft. 25. Bind in pickup arm damping cylinder. 26. Pickup arm mounting screw loose.	Stylus falls off edge of record or starts in playing grooves.
27. Pickup cradle out of balance or styluses worn, dirt packed. 28. Bind in pickup cradle pivots. 29. Pickup cradle does not fully shift. 30. Pickup lock lever does not fully release.	Stylus drags across record grooves or repeats grooves.
31. V contact fails to close in play position. 32. Trip switch does not close or defective record cutoff grooves.	Record does not cut off at end of play.

Use these notes only with Select-O-Matic Mechanism. Do not use them for trouble shooting a COMPLETE phonograph.

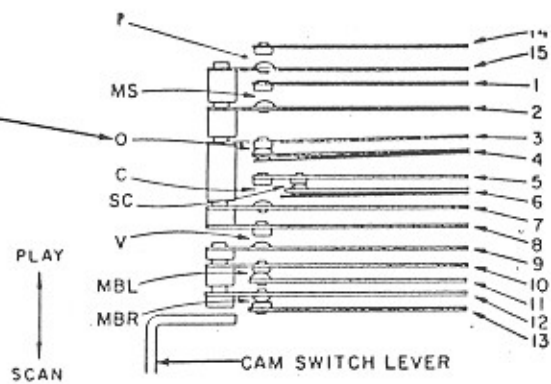
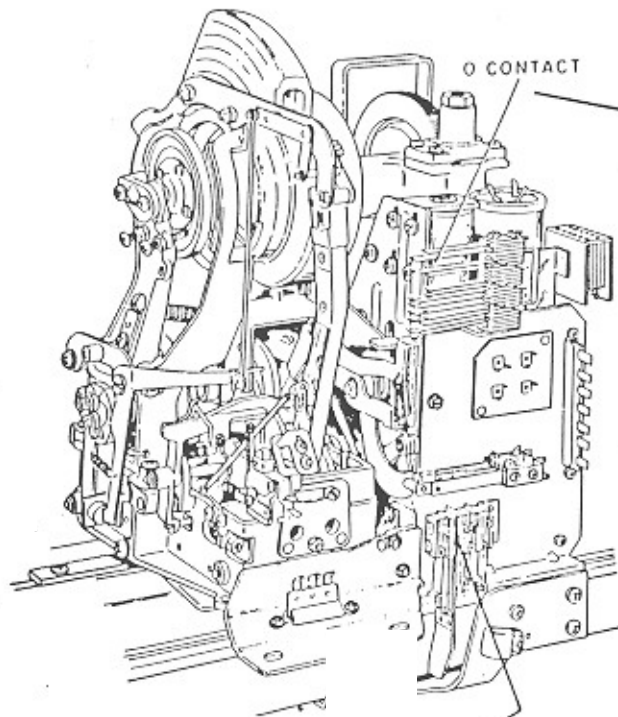


TURNTABLE SHAFT
ADJUSTMENT SCREW

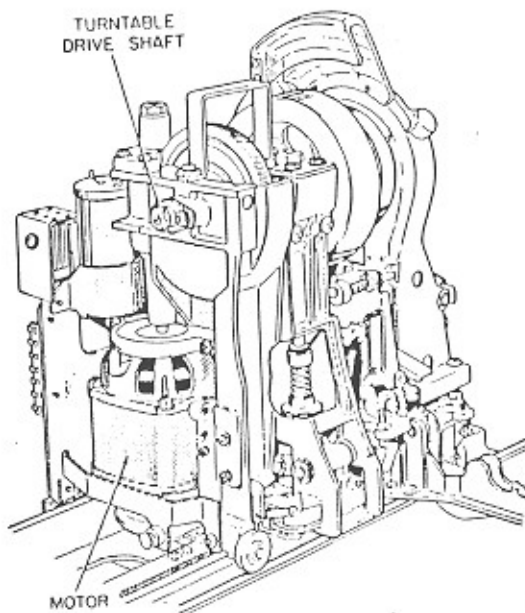
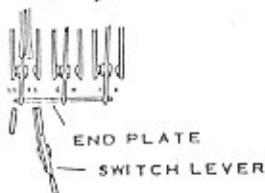


IF	THEN
<p>33. One or more mute switches do not open in play position.</p> <p>34. Poor connection in pickup socket or broken pickup lead.</p> <p>35. One winding of pickup is open.</p>	<p>No sound with record turning or no Stereo. One channel dead.</p>
<p>36. Pickup cradle out of balance.</p> <p>37. Bind in pickup arm damping cylinder.</p> <p>38. Pickup cradle pivots binding.</p>	<p>Sound is distorted.</p>
<p>39. MS contact fails to close properly.</p>	<p>Sound volume is low or varies.</p>
<p>40. Magazine out of alignment with turntable causing record to drag.</p> <p>41. Clutch No. 3 adjustment too loose.</p> <p>42. Badly warped record in magazine.</p> <p>43. Dirt in clamp arm pivot pin hole in turntable prevents proper clamping of record.</p> <p>44. Excessive turntable shaft end play.</p>	<p>Sound has pitch variation.</p>
<p>45. Motor or motor coupling out of balance.</p> <p>46. Turntable drive grommets do not have sufficient resilience.</p> <p>47. Badly worn worm gear.</p> <p>48. Dirt in clamp arm pivot pin hole in turntable prevents proper clamping of record.</p>	<p>Sound has "flutter" (tremolo).</p>

Use these notes only with Select-O-Matic Mechanism. Do not use them for trouble shooting a COMPLETE phonograph.



REVERSING SWITCH

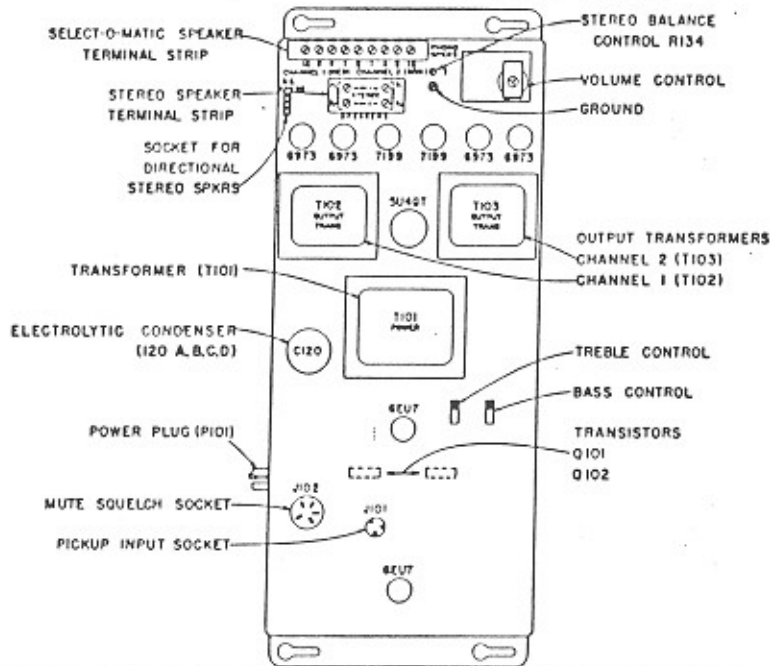


IF	THEN
49. Open motor winding. 50. Turntable drive shaft binding. 51. O contact fails to properly open.	Sound is low in pitch.
52. Open motor winding. 53. Turntable drive shafts binding. 54. O contact fails to properly close. 55. Open motor capacitor. 56. G, H, J, K contacts of reversing switch do not properly close.	Carriage does not scan when records are selected.
57. G, H, J, K contacts of reversing switch incorrectly adjusted.	Fuse blows when motor reverses.
58. Clamp Arm switch fails to close. 59. "P" contact fails to close. 60. Reset lever switch "IC" fails to close.	33-1/3 rpm. record plays too fast.
61. Clamp Arm switch closes with 45 rpm. record in play position.	45 rpm. record plays too slowly.

Use these notes only with Select-O-Matic Mechanism. Do not use them for trouble shooting a COMPLETE phonograph.

SERVICE NOTES

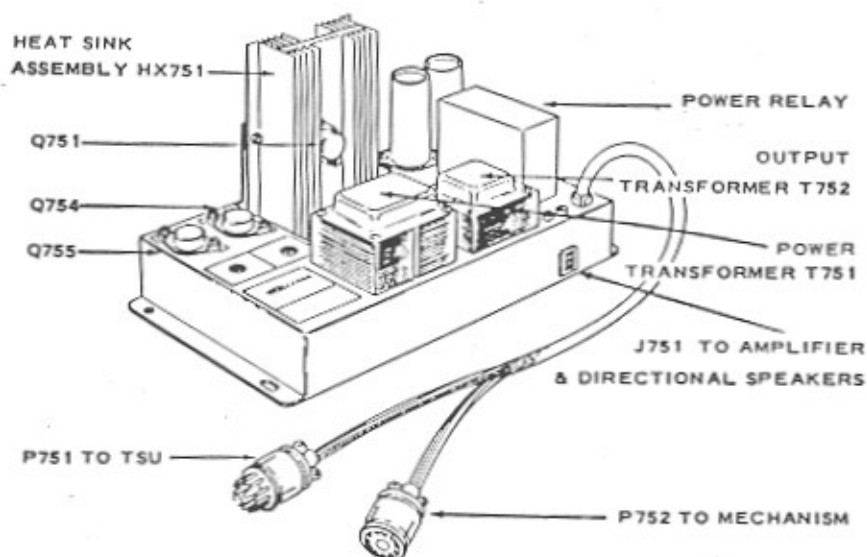
STEREO AMPLIFIER, TYPE SHFA5



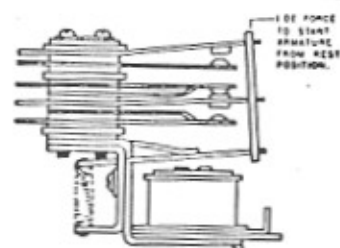
IF	THEN	IF	THEN
1. Bad 5U4 tube. 2. Shorted or open high voltage supply. 3. Shorted or open low voltage supply.	No sound	9. Channel 2 output transformer open or shorted. 10. Bad tube in Channel 2. 11. Defective coupling electronics in Channel 2.	(continued) Channel 2 sound is dead.
4. Channel 1 remote speaker line shorted. 5. Channel 1 output transformer open or shorted. 6. Bad tube in Channel 1. 7. Defective coupling electronics in Channel 1.	Channel 1 sound is dead.	12. Bad tube in Channel 1. 13. Defective coupling electronics in Channel 1.	Channel 1 sound distorted.
8. Channel 2 remote speaker line shorted.	Channel 2 sound is dead.	14. Bad tube in Channel 2. 15. Defective coupling electronics in Channel 2.	Channel 2 sound distorted.
		16. Bad tube in one of the channels. 17. Defective coupling electronics in one of the channels.	Volume low or varies.

Use these notes only with Amplifiers. Do not use them for trouble shooting sound in a COMPLETE phonograph.

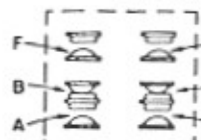
TRANSISTORIZED AUTO-SPEED UNIT SERVICE NOTES



POWER RELAY ADJUSTMENTS



COIL RESISTANCE
24 OHMS



"E" CONTACT GAP 1/32"
CONTACTS "D & B" TO BE
1/32" MIN. WHEN "C & A"
ARE CLOSED.

IF	THEN
1. D or B contact fails to close.	Carriage does not scan when any record is selected.
2. C or A contact fails to close.	33-1/3 rpm. record comes up to play position and stops.
3. Speed control set wrong.	33-1/3 rpm. record plays too slowly.
4. Drive control set wrong.	

IF	THEN
5. Speed control set wrong.	33-1/3 rpm. record plays too fast.
6. Open Power Relay coil.	
7. Power Relay stays in energized position due to residual magnetism or dirt on pole face.	Mechanism scans slowly and 45 rpm. records play too slowly. 33-1/3 rpm. records play at normal speed.
8. E or F contact fails to close.	No sound from directional speakers.

Use these notes only with Transistorized Auto-Speed Unit. Do not use them for trouble shooting a COMPLETE phonograph.