SECTION 4 · ISOLATING TROUBLE TO MAJOR COMPONENTS

INTRODUCTION

The phonograph incorporates several mini modules which plug in for rapid service. The troubleshooting procedures provided will isolate the trouble to one of these plug in components. The module circuitry is highly reliable; however, if a failure is traced to a module, the unit should be returned to the factory for repair. Field repair of modules should be attempted only by a qualified electronics technician. The following is a listing of the mini modules:

PART NO.	DESCRIPTION
401-06905	Mechanism Control Unit
301-07855	Memory Unit with Auto Play
601-07674	Credit Computer
601-08060	Selector Logic
401-07139	Selection Computer

TROUBLESHOOTING LAMPS

Red indicator lamps on the memory unit, mechanism control unit and main power supply show the presence of voltages and signals. The operation of these lamps is as follows:

POWER SUPPLY

LAMP	FUNCTION
-7VDC, -27VDC +28VDC, 28VAC	Indicate that power sources are operational. These lamps should be on at all times.

MEMORY UNIT

LAMP	FUNCTION
DATA, CLOCK	Light after a selection is made; go off after all selections have played.
-17V	Indicates presence of voltage. -17V is derived from -27V within the memory unit. Lamp should be on at all times.

MECHANISM CONTROL UNIT

LAMP	FUNCTION
TRANSFER MOTOR	Indicates presence of voltage from main power supply. Monitors control of transfer motor. Lights at all times except when transfer motor is energized. Indicates 28VAC to mechanism when lit.
START TRANSFER	Lights during first half of record transfer cycle.
SCAN	Lights when mechanism begins to scan. Goes out when all selections have been played and mechanism scans out.
TOGGLE SHIFT	Lights when toggle shift coil is energized; right side selection only (first digit = 2). Goes out when record is placed on turntable.

HARNESS CONTINUITY

The troubleshooting lamps can be used to check harness connections. This is done by shorting the lines at the point furthest from the power supply. A paper clip will do. A direct short will cause the power supply lamp for the circuit under test to go out. A high resistance short in the line under test will cause the associated lamp to be dimmer than the others. Limiting circuits in the power supply prevent damage, even if the short is left connected for an extended period.

The tests which follow check all wiring in the main harness and all logic common wiring except to the rear access door and to the two credit lamps. Also, power common wiring is checked except to the rear access door and wallbox power supply position.

If the power supply lamp does not go out when the line is shorted at the furthest point, move to the next connector closer to the power supply. If the lamp goes out when the line is shorted out at this point, it means that the defect is in the section of the harness that was just bypassed. Refer to the wiring diagram on page 2-26.

PRELIMINARY

Turn on phonograph power and check that the four LED indicator lamps on the power supply are lit. Also check the -17 volt lamp on the memory unit.

-17 VOLT WIRING

CONNECT SHORT

FROM	TO
Selector Logic J503, Pin 4 Violet Wire	Selector Logic J503, Pin 2 Black/White Wire

Check that the -17 V lamp on the memory unit goes out.

-27 VOLT DC WIRING

CONNECT SHORT

FROM	TO
Credit Computer J601, Pin 17 Blue Wire	Credit Computer J601, Pin 10 Black/White Wire
Memory Unit J704, Pin 2 Blue Wire	Memory Unit J704, Pin 7 Black/White Wire

Check that the -27 VDC lamp on the power supply goes out.

-7 VOLT DC WIRING

CONNECT SHORT

FROM	TO
Credit Computer J601, Pin 14 Brown Wire	Credit Computer J601, Pin 10 Black/White Wire
Selector Logic J503, Pin 3 Brown Wire	Selector Logic J503, Pin 2 Black/White Wire
Memory Unit J704, Pin 1 Brown Wire	Memory Unit J704, Pin 7 Black/White Wire

Check that the -7 VDC lamp on the power supply goes out.

+28 VOLT DC WIRING

CONNECT SHORT

FROM	TO
Mechanism Control Unit J801, Pin 5 Red Wire	Mechanism Control Unit J801, Pin 15 Black Wire

Check that the +28 VDC lamp on the power supply goes out.

28 VOLT AC WIRING

Check that the TRANSFER MOTOR LAMP is lit when the mechanism is scanned out. This indicates that the 28 volt ac wiring is OK.

CONTINUOUS AND FREE PLAY OPERATION

Set the phonograph to free play by positioning the TEST-NORM switch on the selector logic module to the TEST position. Using this method, the credit computer is bypassed and may be removed from the phonograph. This is a convenient way of maintaining operation if the credit computer is defective and a spare is not readily available. Don't forget to set the TEST-NORM switch back to NORM position after the replacement computer in installed.

Continuous free play may be desirable if the selector logic module is defective and a replacement is not available. Simply set the auto play switch to CONT. position. The phonograph will continuously play flip side selections at random.

Continuous free play may also be desirable when the selector logic and memory modules are defective and a replacement is not available. The procedure is as follows:

1. Remove the mechanism control module from the record changer and disconnect one end of diode CR802. Reinstall module in phonograph and connect to harness.

2. Short pin 5 (red wire) and pin 9 (white/green wire) of mechanism control module plug J801 with a paper clip.

3. Short pin 3 (orange) and pin 13 (white/violet) of J801 using a second paper clip.

With this arrangement the phonograph will play approximately every seventh record, front side only (100 side). The display will show the flip side only (200 side).

MODULAR TROUBLESHOOTING CHARTS

It is important to troubleshoot logically so that effort is not wasted in removing and replacing the wrong parts. Most failures are caused by minor defects, such as loose connections or dirty contacts. Check the following before replacing any parts:

1. Check that all plugs are firmly seated.
2. Check that connector pins are not bent, broken or pushed through the back of the connector when mated.
3. Check that wires are not broken at connector pins.

The modular design of the phonograph requires troubleshooting in a logical sequence to isolate a faulty module. Each module is a link in the chain and must be eliminated in turn as a trouble source. Perform the ACTION's in the order specified. If the EXPECTED RESULT is not achieved, check the POSSIBLE PROBLEM and REMEDY columns.

NOTE: WHEN USING THIS CHART, SWITCH AUTO PLAY MODE SWITCH TO "OFF".

ACTION	EXPECTED RESULT	POSSIBLE PROBLEM	REMEDY
Turn power switch ON (located on rear of cabinet)	Fluorescent lamps light	Lamps do not light	1. Check circuit breakers on main power supply 2 Check for power at wall receptacle. 3. Check power cord. 4. Check wiring to lamps, starters and ballasts.
	Four red light emitting diode (LED) lamps on main power supply light	One or more LED's fail to light	1. Check circuit breakers on main power supply. 2. Unplug main harness from power supply. 3. If LED(s) do not light, replace main power supply. 4. If LED(s) light, replug harness and unplug following connectors in turn: J601 - Credit Computer J502 - Selector Logic Unit J704 - Memory Unit J702 - Memory Unit J801 - Mechanism Control Unit J1401 - Selection Computer Mute Plug on amplifier If LED(s) light, replace last unit unplugged and retest. 5. If LED(s) do not light, unplug main harness connector to mechanism. If LED(s) light, the short is in mechanism wiring. Repair and retest. 6. If LED(s) do not light, the short is in main harness wiring.

NOTE: In this chart, "Retest" means go back to the beginning of the chart and start over.

ACTION	EXPECTED RESULT	POSSIBLE PROBLEM	REMEDY
Turn power switch ON (continued)	-17 volt LED in Memory unit lights.	-17 volt LED does not light	1. Check for open circuit in -27 volt line. (See continuity check procedure on previous page). 2. Unplug J502 to selector logic unit. If LED lights, replace selector logic module. 3. If LED does not light, replace memory unit. Retest. 4. If LED does not light, check for short in main harness (violet wire).
	Magazine rotates 1 to 1-1/2 turns and stops at record 27 or 77	Magazine begins to turn but stops and a record transfers to turntable	1. This is a normal result if selections were left in memory. Press 'Memory Clear' button on memory unit and 'Cancel' button on mechanism. Continue test. If a record transfers again, replace memory unit.
		Magazine does not rotate	1. Check "Scan" and "Transfer Motor" LED(s). If both are on check detent solenoid. If it is pulled in, short pins 18 (Y/B) to 17 (G/B) at J801 with a paper clip. If magazine turns,the trouble is in the detent switch or its wiring. If magazine does not turn, short pin 18 to pin 15 (B). If magazine turns now replace mech. control. If mag. does not turn, trouble is in mag motor or its wiring. 2. If "Transfer Motor" LED is off, check 28VAC wiring. 3. If detent coil is not pulled in short pin 12 (W/BL) to pin 5 (R). If coil pulls in, replace mech control. If coil does not pull in, trouble is defective coil or wiring. 4. If "Scan" LED is out, trouble is defective mech. control unit or defective memory unit.
		Magazine rotates but does not stop	1. Check 'Scan' LED on mechanism control unit. The LED should be on for 1-1/2 turns of magazine, then off for 1/2 turn and repeat. This indicates memory unit and encoder are O.K. Trouble is in mech. control or a short in service switch or wiring. 2. If 'Scan' LED is on all the time, trouble is a bad memory unit or encoder.
		Magazine does not rotate record on turntable plays for record immediately transfers to turntable and plays)	1. This is normal if phonograph was turned off with record on turntable or during first part of transfer cycle. Press 'Cancel' button on mechanism and continue test.
		Transfer motor runs continuously (or runs continuously except when a record is on the turntable)	1. If 'Transfer' LED on mech. control unit is on, replace memory unit and retest. 2. If 'Transfer' LED is off, replace the mech. control unit and retest. 3. If trouble persists, check for short in wiring to transfer motor.

NOTE: In this chart, "Retest" means go back to the beginning of the chart and start over.

ACTION	EXPECTED RESULT	POSSIBLE PROBLEM	REMEDY
Turn power switch ON (continued)	'Record Playing' lamp is lit and display shows correct mag. position as it rotates.	'Record Playing' lamp fails to light and dispiay is blank	1. Check 'clock' line (R/B) wire between selector logic and memory for open or short. 2. If 'clock' LED is on all the time a clock transistor in selector logic or memory is shorted. Replace unit one at a time.
		Digital display shows "200" during scan	1. Check 'Data' line (R/G) for open or short. 2. If 'Data' LED is on all the time, a data transistor in selector logic or memory is shorted. Replace units one at a time.
	Both 'Make Standard Selection' and 'Make Any Selection' Lamps off. Pressing selector buttons has no effect	Either or both lamps on and/or selections can be made.	1. Check 'Test' switch on selector logic unit. It should be in 'Normal' mode. 2. If trouble persists unplug credit computer and retest. If OK, replace credit computer. 3. If trouble persists, replace selector logic unit. Retest 4. If trouble persists, check for short in harness between credit computer and selector logic unit.
Deposit exact amount for Standard Play (See Price Card)	'Make Standard Selection' lamp lights	Lamp fails to light	1. Check coin switches for stuck coin, stuck switches, open or shorted wires . Check coin return cup (one or more coins may be rejected). Check rejector. 2. Switch 'Test' switch on selector logic to TEST. If lamps light, lamps are good. If lamp(s) fail to light, replace and retest. 3. If 1 and 2 do not correct problem,check program switches on credit computer. Ensure correct setting for price program shown on price card. 4. Replace credit computer.
		Both lamps light at the same time.	1. This is normal for certain price programs: for example, 2 for 25¢.(Price of Play same as first bonus level. 2. Could also be caused by defective credit computer, defective selector logic unit or short in harness between 'Standard' Credit' and 'Premium Credit' wires. Repair and retest.
Press selector button 1	First digit of display shows '1'	Display fails to light ('Your Selection'lamp lights)	1. Check harness from digital display to selector logic unit, and plug J501.
	'Your Selection' lights	'Your Selection' fails to light	1. Check harness from lamps to selector logic and plug J505 2. Replace lamp. 3. If trouble persists, replace selector logic. Retest.
		Both 'Your Selection' lamp and display fail to light.	1. Check keyboard and harness from keyboard to selector logic unit. Check plug J506. 2. Replace selector logic unit and retest.
Press selector button 2	Second digit of display shows '2'- first digit still shows '1'	Display fails to show '2'	1. Open switch or wiring to keyboard 2. Open wiring to display 3. Defective selector logic unit. Replace and retest.

NOTE: In this chart, "Retest" means go back to the beginning of the chart and start over.

ACTION	EXPECTED RESULT	POSSIBLE PROBLEM	REMEDY
Press selector button 3	Third digit of display shows '3' - first and second still show '12'	Display fails to show '3'	1. Same as above.
	Magazine begins to rotate immediately	Magazine does not rotate	1. Watch 'Data' and 'Clock' LED's on memory unit. They should flash as the third digit is pushed. If they do not flash, replace selector logic unit and retest. If trouble persists check for open or short in clock line (R/B) 2. If clock LED does flash, replace memory unit and retest. 3. If trouble persists, go back to start of this chart.
	'Make Standard Selection' lamp goes out (Credit is cancelled)	Credit is not cancelled	1. Ensure that 'Test' switch is in Normal' position. 2. Replace credit computer and retest. 3. If trouble persists, replace selector logic unit and retest. 4. If trouble persists, check for short in harness on credit wires.
	After a few seconds both digital display and 'Your Selection' lamp go out. (about 4 seconds)	Display and/or 'Your Selection' lamp do not not go out.	1. Replace selector logic unit and retest.
	After about one second the display comes back on and shows magazine location. 'Record Playing' lamp lights	Display and/or 'Record Playing' lamps do not light.	1. If 'Clock' and 'Data' LED's are blinking replace selector logic unit. 2. If 'Clock' and 'Data' LED's are out, replace memory unit. 3. If trouble persists, check encoder, encoder harness and clock and data wires in main harness.
		Display same '200' all the time	1. Check for open or shorted 'Data' line (R/G) 2. Replace selector logic unit or memory unit.
	Magazine rotates to position 23 and stops. Record transfers to turntable and left side plays	Magazine rotates 1 to 1-1/2 turns and stops but does not play a record.	1. Check encoder and encoder harness 2. Replace memory unit. Retest. 3. Replace mechanism control unit. Retest
		Phono plays record '200' when any selection is made	1. Check for open or shorted 'Data' line (R/G) 2. If trouble persists, replace selector logic or memory.
		Magazine turns and stops but plays wrong record	1. Check encoder adjustments 2. Check encoder harness. 3. Check detent linkage adjustment. 4. Replace memory unit.
		Record transfers but is immediately replaced in magazine without playing	1. Check cam switch CS5, auto cancel, record cancel, tone arm cutoff and rear door record cancel switches. 2. Check for short in record cancel circuit wiring. 3. If trouble persists, replace mechanism control unit.

NOTE: In this chart, "Retest" means go back to the beginning of the chart and start over.

ACTION	EXPECTED RESULT	POSSIBLE PROBLEM	REMEDY
Press selector button 3 (continued)	Magazine rotates to position 23 and stops. Record transfers to turntable and left side plays. (continued)	Wrong side of record is played.	1. If 'Toggle' LED on mechanism control unit is on, replace memory unit. 2. If 'Toggle' LED is off, replace mech. control unit. Retest. 3. If trouble persists, check toggle coil, wiring and linkage.
		Magazine stops at correct record but record is not transferred.	1. Replace mechanism control unit. Retest. 2. If trouble persists, check for open transfer motor or wiring or jammed transfer linkage.
		Turntable does not rotate.	1. Check cam switch CS1. 2. Check for open turntable motor or wiring to motor.
		No sound	1. Disconnect mute plug from amplifier. 2. Replace mute relay. 3. Follow 'Sound System Quik Chek'.
		Stylus sets down in wrong place.	1. Adjust per manual
		Record plays but cuts off too soon.	1. Adjust tone arm cutoff per manual
		Record plays but does not return to magazine when finished (stays on turntable).	1. Adjust tone arm cutoff per manual.
		Record plays, begins to return to magazine but stops part way.	1. Check cam switch CS4 adjustment and wiring. 2. Replace mechanism control unit.
	Record ends, returns to magazine. Magazine rotates 1 to 1-1/2 turns and stops at 27 or 77	Magazine begins to rotate but stops and a record transfers to turntable.	1. This is a normal result if selections were left in memory. Press 'Memory Clear' button on memory unit and 'Cancel' button on mechanism. Continue test. If a record transfers again replace memory unit.
Deposit exact amount for Standard Play(See Price Card). Press buttons for selection 223.	Same sequence as above except right side of record is played.	Left side of record plays	1. If 'Toggle' LED on mech.control unit is on, replace mech. control unit. Retest. 2. If trouble persists, check toggle coil. wiring and linkage. 3. If 'Toggle' LED is out, replace memory unit.
Deposit exact amount for Standard Play and press selector button 3	'Reset and Reselect' lamps flash	'Reset and Reselect' lamps do not flash	1. Check lamps. 2. Check wiring to lamps 3. Replace selector logic unit.
Press 'Reset' button	'Reset and Reselect' goes out.	'Reset and Reselect' does not go out.	1. Check keyboard switches and wiring 2. Replace selector logic unit.
Phonograph now has standard credit. If it is programmed for premium selections, try to make a premium selection.	'Reset and Reselect' lamps flash.	'Reset and Reselect' does not flash.	1. Check lamps 2. Check wiring to lamps 3. Replace selector logic unit.
Press 'Reset'button	See Press 'Reset' button, step above	See Press 'Reset' button step above	See Press 'Reset button step above

NOTE: In this chart, "Retest" means go back to the beginning of the chart and start over.

ACTION	EXPECTED RESULT	POSSIBLE PROBLEM	REMEDY
Turn power switch off, then back on.	See first five steps in this chart. (All credit is erased.)	See first five steps in this chart.	See first five steps in this chart.
Deposit exact amount for Premium Play (See Price Card)	Both 'Make Standard Selection' and 'Make Any Selection' lamps	'Make Standard Selection' and/or 'Make Any Selection' lamps fail to light.	1. Check coin switches for stuck coin, stuck switches, open or shorted wires. Check coin return cup (one or more coins may be rejected). Check rejector. 2. Switch 'Test' switch on selector logic unit to test position. If lamps light, lamps are good. If lamp(s) fail to light, replace lamp(s) and retest. 3. If 1 and 2 do not correct problem, check program switches on credit computer. Ensure that they are set correctly for price program shown on price card. 4. Replace credit computer.
Make a Premium Selection	Same sequence as above 'Press selector button 1' to 'Press selector button 3' except digits displayed will show premium selection.	Same sequence as above 'Press selector button 1' to 'Press selector button 3'	Same sequence as above from 'Press selector button 1' to 'Press selector button 3'
Slide 'Test' switch on selector logic unit to 'Test' position.	Both credit lights will light	Lamp(s) fail to light.	1. Check lamp bulbs if not checked before. 2. Replace selector logic unit.
Make selections 100, 111, 122, 133, 144. 255, 266, 277, 288, 299. Watch to ensure that correct numbers are displayed and played.	Magazine begins to rotate as first selection is made. All selections played. Mechanism scans out and stops.	Wrong selections played	1. Check encoder alignment per manual.
		Same bar of all digits on display lights all the time	1. Replace selector logic unit.
		Same bar of all digits on display fails to light.	1. Check for open wire in harness to digital display. 2. Replace selector logic unit.
		One digit shows false numerals.	1. Replace selector logic unit.
		One digit fails to light	1. Check for open wire in harness. 2. Replace selector logic unit.
Return 'Test' switch to 'Normal' position.	Test procedure is complete.		

NOTE: In this chart, "Retest" means go back to the beginning of the chart and start over.

SELECTION COMPUTER

Except for possible shorting of clock, data or power supply lines, the selection computer has no effect on the operation of the rest of the phonograph.

FAULT	POSSIBLE CAUSE	REMEDY
Selection Computer fails to record selections or records wrong selections.	Bad connection	Check harness and connectors.
	Clock oscillator in Selection Computer, Memory Unit or Selector Logic unit at wrong frequency.	Adjust or replace defective unit(s).*
Selection Computer fails to search or display when phono service switch is Off.	–27V not applied to filament of display or Pin 10 of Z1402.	Check service switch and wiring.
		Replace Selection Computer.

* Measure clock frequency with a good scope at Pin 25 of Z501 and Pin 7 of Z704. Frequency should be 1.5 KHz (Period = 5.9 to 7.7 ms.). Adjust C501 or C705 (C701 on R-81) if required. Capacitors are sensitive to tool pressure. Recheck frequency after tool is removed. Measure at Z1402 Pin 16 of Selection Computer. Frequency should be 85 ±3 KHz. Adjust R1402 if required.