

Seeburg 200S4-L6 Select-O-Matic Home Library, Sequence of Operations

1. This document describes the sequence of operations of the Seeburg Select-O-Matic 78rpm Home Library, model 200S4-L6, serial number 1283. These operations and the references to parts noted herein should be the same for all units above serial number 1101. It is presumed that the model 200S3-L6 is similar. Units with lower serial numbers have slightly different electrical switches and wiring, but the sequence should be similar. The factory service manual displays a time line for the sequence of loading and playback of the left side of a record. But it does not describe the operations related to playing the right side nor to the playback of both sides of the record. These operations require additional features of the mechanism to be utilized, and they are the subject of the following sections. References will be given to page numbers in the Seeburg "Service School Manual, Number One" for the type 200S3-L6. Capitalized names are those used in the Service Manual and should be used to identify the parts.

Right to Left Scan

2. When the carriage is scanning from the right side to the left, the Reversing Switch (toggle switch on the bottom of the carriage) opens the circuit to the Trip Relay. (The other pole of the Reversing Switch holds the Reversing Relay coil energized so that the motor turns in the required direction for R-L scanning.) So even though contacts may be made between the Selector Contact Block and some Selector Levers during this scan, the Trip Relay will not be activated and the scan will continue until the Reversing Switch hits the Reversing Switch Stop Bracket on the far left side of the scan (p. 60-42). This throws the Reversing Switch to the other position which drops out the Reversing Relay and enables the Trip Relay circuit. The motor reverses, and the carriage scans left to right in preparation for encountering one of the following conditions based on the position of the Selector Levers.

Play Left Side of Record

3. Carriage is scanning left to right. Flywheel is turning counter-clockwise (CCW) as viewed from its open end. When the Selector Lever is set for Left side play, the L contact on the Selector Contact Block makes contact with the Selector Lever first. This energizes the Trip Relay through contact W of the Clutch Switch which is still in the Scan position (p. 60-24). This initiates the Transfer (record loading) sequence.

4. As the transmission shifts into the Transfer mode, the scanning drive pinion is stopped and the sprocket is cammed into the locked mode which positions the carriage directly adjacent to the record bin. As this is happening, the Selector Contact Block shifts the L contact away from the Selector Lever (p. 60-38). This breaks the circuit to the Trip Relay. However, the Trip Relay has already been momentarily energized which is what initiated the Transfer mode. No other circuits are made at either the R or the L-R contact.
5. Refer to the time line drawing shown in the Seeburg manual (p. 60-7) for a detailed timing chart of the mechanical operations of the cams and the cam follower mechanisms involved in going from the Scan mode, through the Transfer mode for loading the record, into the Play mode, into the Transfer mode again for unloading the record, and back into the Scan mode. Note that if the tonearm assembly begins in the Right side position, it is flopped into position for Left side play.
6. At the end of the record unloading Transfer sequence, the motor is still turning in the proper direction for left to right scanning. The Scan mode is engaged as the sliding collar (Clutch Member) in the transmission drops onto the drive pin on the sprocket, and the carriage begins moving left to right. None of the circuits is made at the Selector Contact Block, so the carriage continues to scan until the next Selector Lever is encountered.

Play Right Side of Record

7. Carriage is scanning left to right. When the Selector Lever is set for Right side play, the L contact on the Selector Contact Block makes contact with the Selector Lever first. This initiates the Transfer (record loading) sequence in the same manner as described for Left side play.
8. However, the sequence changes very quickly: As the transmission shifts into the Transfer mode, the scanning drive pinion is stopped and the sprocket is cammed into the locked mode which positions the carriage directly adjacent to the record bin. As this is happening, the Selector Contact Block shifts the L contact away from the Selector Lever and presents the R contact AND the L-R contact to the Selector Lever (p. 60-38).
9. At this moment the Reversing Relay is energized. This circuit is made as the 26vac power is applied from pin 5 of plug P1, through the coil of the Reversing Relay, and through the L-R position of the Reversing Switch (schematic diagram on p. 60-27). It continues through contact C of the Clutch Switch which has just closed when the Transfer function started. The Cycling Switch remains open, but the circuit continues through the F contact of the Cam Follower Switch. This contact is still closed as this switch has not yet moved from the Scan position. The circuit continues through contact U of the Control Lever Switch which has not yet moved from the Scan position. The circuit is completed at the R contact of the Selector Contact Block which goes to ground through the Selector Lever.
10. When the Reversing Relay energizes, it is mechanically latched because the Latch Lever (p. 60-56) has been enabled by the movement of the Clutch Shifting Lever (p. 60-60) which initiated the Transfer mode.

11. The motor now turns in the direction that makes the Flywheel turn clockwise (CW). The cam shaft now turns back past the point at which the Transfer mode was initiated and continues turning. It does not stop at that normal stopping point since the Relay Trip Lever (p. 60-14) has not yet been returned to the reset position. The cam shaft is made in a symmetrical manner that causes it to produce almost exactly the same sequence of motions as it does when it turns CCW (see Item 19 for the one exception). The Transfer cam sequences take place just as they do when playing the Left side of a record except that the Pickup Arm Shift cam (p. 60-13) now moves the Shift Cam Lever and Bell Crank Assembly (p. 60-12) to the R side position which shifts the tonearm mechanism to the position for Right side play. The record is loaded onto the Flywheel and the Right side is played.
12. At the end of play of the Right side, the tonearm trips the Trip Relay and the Transfer mode is entered. The record is transferred back into the magazine in the same manner as after Left side play. The tonearm remains flopped over in the R side position. At the end of the Transfer cycle, the Clutch Shifting Lever (p. 60-60) drops into the detent on the Clutch Cam (p. 60-13). This lifts the Latch Lever (p. 60-56) which mechanically unlatches the Reversing Relay. This relay drops out because the coil is no longer energized. The mechanism is now just entering the Scan mode, so the contact F on the Cam Follower Switch is made (p. 60-27), but the circuit is broken at contact C of the Clutch Switch which has just dropped out of Transfer mode immediately before the Clutch Shifting Lever has fully detented as described above. This causes the motor to change direction. The Flywheel now turns CCW, and the carriage begins moving Left to Right in the Scan mode. None of the circuits is made at the Selector Contact Block, so the carriage continues to scan until the next Selector Lever is encountered.
13. **MECHANICAL NOTE:** As the mechanism is coming out of transfer mode after R side play, the motor must reverse to allow L-R scanning. If the transmission shifts immediately into Scan mode before the motor has reversed, the carriage will go backwards (right to left) slightly. This can cause the L contact of the Selector Contact Block to contact the Selector Lever of the record that has just been played. If this happens, playback of that record will repeat. This should NOT happen. The carriage should NEVER move backwards at the end of R side play.

The mechanism has provisions to prevent this. Since the transmission, camshaft, and scan drive pinion operations are gear driven, they are timed by the gearing and are repeatable, regardless of when the Trip Relay is activated. In the case of three out of four record bin locations, the transmission Clutch Member (the sliding collar, p. 60-14) will not have its detent aligned with the pin (Engaging Member) sticking up out of the sprocket at the time that the collar drops down. In these cases the sprocket will not be driven immediately, and the collar will slide over the pin for a partial revolution during the time that the motor is reversing. By the time that the collar engages the pin, the motor will have reversed and the scan will engage properly in the L-R direction. However, in the case of every fourth record bin location, the collar could drop immediately into engagement with the pin, resulting in the backwards scan problem.

To prevent this, the mechanism contains a small collar which is located between the sliding collar and the sprocket. **This small collar is not described in the Seeburg service manual, so it does not have a name or a part number, and it is not called out in any of the diagrams.** It has a pair of bosses which can hold up the sliding collar and prevent the

immediate engagement of the sliding collar with the sprocket pin when the bosses and sprocket pin are not in alignment. This small collar must be free to rotate over the few degrees of revolution that it is constrained to by the small cutouts in it that straddle the pin in the transmission drive shaft. Although this small collar is not described, there is a hairpin shaped Spring that couples it to the sprocket pin, part #A250532 which is shown on page 60-14. This hairpin functions as a friction clutch which forces the collar to try to follow the rotation of the sprocket rather than the drive shaft or the sliding collar. During Right side play, the drive shaft pin forces the small collar to rotate such that its bosses are out of alignment with the sprocket pin, thus preventing the sliding collar from falling into engagement with the sprocket when the drive shaft is turning in the direction coming out of Right side play. After the motor has reversed, the drive shaft pin rotates the small collar into alignment with the sprocket pin, thus allowing the sliding collar to engage the sprocket and drive the scan pinion.

Play Left and Right Sides of Record

14. Carriage is scanning left to right. When the Selector Lever is set for Left and Right side play, the L contact on the Selector Contact Block makes contact with the Selector Lever first. This initiates the Transfer (record loading) sequence in the same manner as described for Left side play.
15. As the transmission shifts into the Transfer mode to load the record, the scanning drive pinion is stopped and the sprocket is cammed into the locked mode which positions the carriage directly adjacent to the record bin. As this is happening, the Selector Contact Block shifts the L contact away from the Selector Lever and presents the L-R contact to the Selector Lever (p. 60-38).
16. Unlike the case with the Right side play described above, the circuit is not completed at the L-R contact at this time. The circuit is open at contact E of the Cycling Switch, so the Reversing Relay is not energized.
17. The motor is not reversed from the Scan mode and continues in the direction for Left side play, so the sequence continues in the same manner as for Left side play. During the early part of the Transfer mode, if the tonearm is positioned for Right side play, it is flopped into position for Left side play.
18. At the end of the Left side of the record, the tonearm trips the Trip Relay, and the record unloading Transfer mode is entered in the same manner as for Left side play.
19. At the end of the Transfer mode but before the Scan mode is initiated, the contact E is closed momentarily at the Cycling Switch (p. 60-27). **This is the only asymmetrical part of the camshaft** – the cam detent which operates contact E of the Cycling Switch is encountered ONLY at the end of the Transfer mode coming out of Left side play (turntable turning CCW). This detent is NOT PRESENT on the cam and so is not encountered in the Transfer mode when coming out of Right side play (turntable turning CW). Contact C is also closed at the Clutch Switch which is still in the Transfer mode. This now completes the circuit through the L-R contact at the Selector Contact Block and energizes the Reversing Relay. The Clutch

Shifting Lever (p. 60-60) is not in the detent on the Clutch Cam (p. 60-13). This allows the Latch Lever (p. 60-56) to engage the Latch Bar which mechanically latches the Reversing Relay in the activated position. This reverses the motor and holds it in the reverse direction.

20. The transmission has not fully completed the record unloading Transfer mode at this time when the motor is reversed. Since the camshaft has now also reversed, the record is reloaded back to the Flywheel as the record loading Transfer mode continues. The tonearm mechanism is flopped into position for Right side play.
21. At the end of play of the Right side, the tonearm trips the Trip Relay and the Transfer mode is entered. The record is transferred back into the magazine in the same manner as after Left side play. The tonearm remains flopped over in the R side position. Unlike the case described in Item 19, the cam detent which operates contact E of the Cycling Switch is NOT PRESENT when the camshaft is turning in this direction coming out of Right side play. Contact E is not made which would otherwise complete the circuit through the L-R contact at the Selector Contact Block, and the Reversing Relay is NOT ENERGIZED. So, at the end of the Transfer cycle, the Clutch Shifting Lever (p. 60-60) drops into the detent on the Clutch Cam (p. 60-13). This lifts the Latch Lever (p. 60-56) which mechanically unlatches the Reversing Relay. The mechanism is now just entering the Scan mode, so the contact F on the Cam Follower Switch is made (p. 60-27), but the circuit is broken at contact C of the Clutch Switch which has just dropped out of Transfer mode immediately before the Clutch Shifting Lever has fully detented as described above. Since the Selector Lever is in the L-R position, the R contact is also not closed. Therefore, the Reversing Relay drops out because the coil is not energized. This causes the motor to change direction. The Flywheel now turns CCW, and the carriage begins moving Left to Right in the Scan mode. None of the circuits is made at the Selector Contact Block, so the carriage continues to scan until the next Selector Lever is encountered.