

Title:	LDR SHV	ID:	
		0299	
Date in:	Response:	Model:	Author:
1998-12-27	1998-12-27	LDR	CMa

Instrument	LDR HandlerCarrousel
Procedure	Shovel Re-Adjustment
Id.-Number	
Version	V0.0 preliminary
Predecessor	None
Related Procedures	LDR Lift Adjustment
Date	23.12.98
Author	CMa

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Picture

Purpose

It was found that the adjustment of the Shovel Assembly needs to be checked after transport and – if necessary - re-adjusted. This procedure explains how to re-adjust the shovel assembly in the pre-mounted LDR-HandlerCarrousel System. It is assumed that all subsystems are installed and functional and that the LDR HandlerCarrousel is functional.

Warnings

Note that the procedure may only be executed by trained personnel.

Prior opening the Electronics Cover or prior any electrical work turn system power OFF and disconnect the LDR-HandlerCarrousel System form the power supply. Never disconnect Communication Cable when Power Cable is connected.

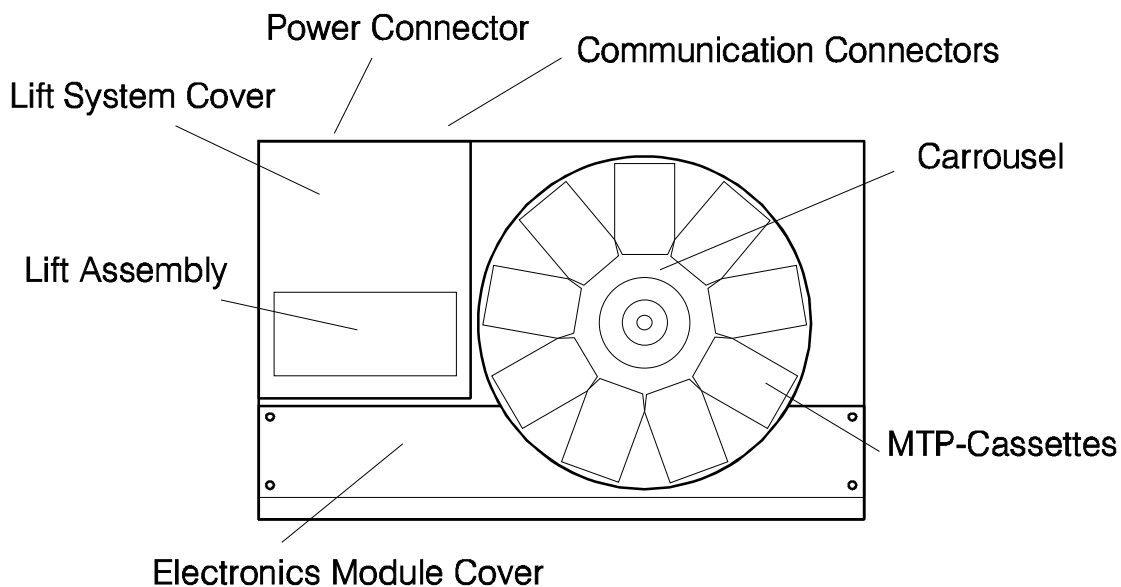
Note that the lift system of the LDR-HandlerCarrousel has an open gear drive. Do not touch open gears while moving.

Requirements

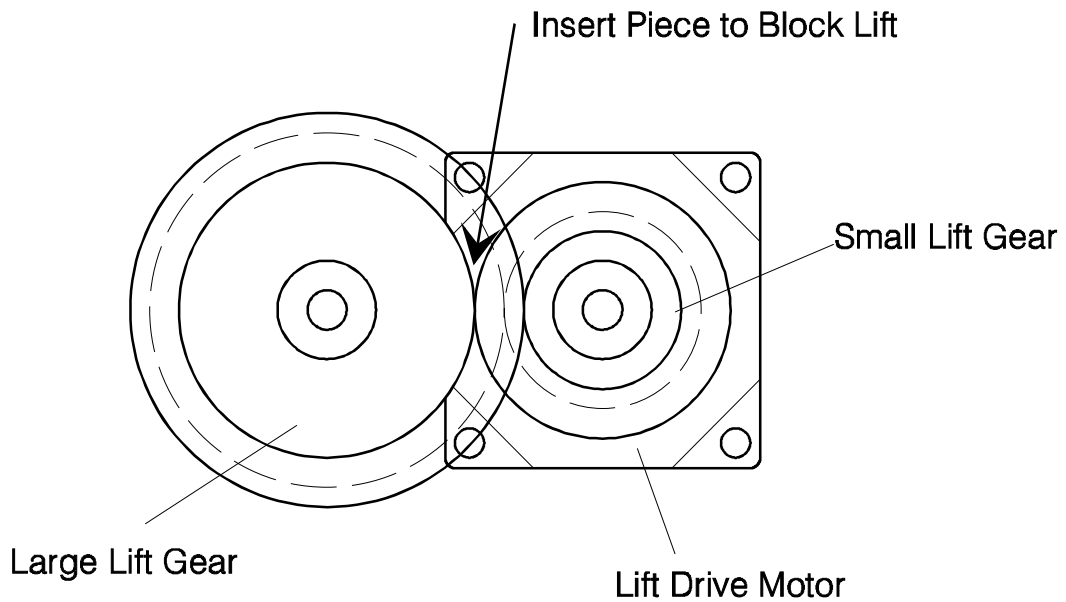
LDR-HandlerCarrousel pre-mounted and functional
Philips Nr.1 size screwdriver
Imbus Nr. 1.5 size Imbus
Imbus Nr.2 size Imbus
Locketide Nr 243 Screw Secure Adhesive

Procedure

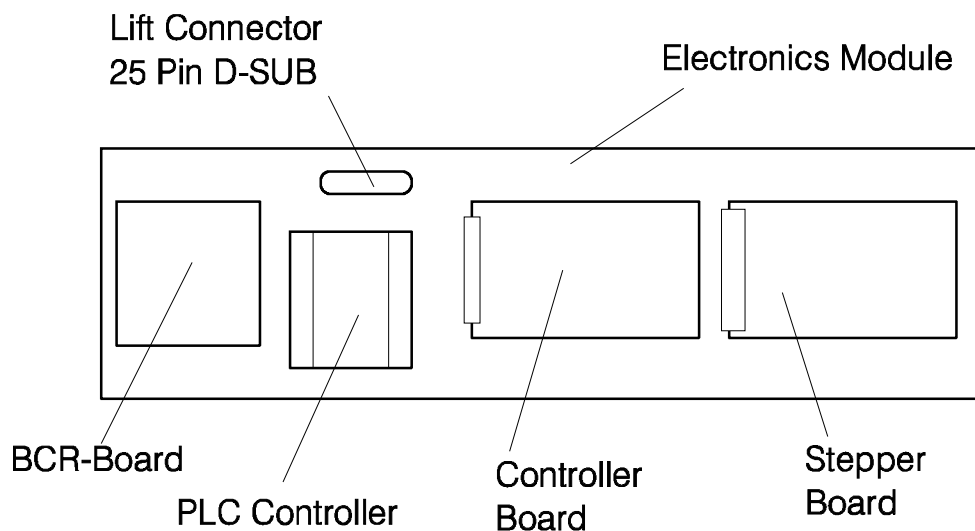
1. Turn System Power OFF
2. Disconnect Serial Communication Cables



3. Disconnect Power Cable Position Carrousel and mark Carrousel position. You later should be able to position Carrousel manually.
4. Remove Cassettes from Carrousel.
5. Carefully move lift to a level where you can reach the Shovel arm. The lift can be blocked in position by putting a piece of tape or plastic between the gears of the open gear of the Lift system.

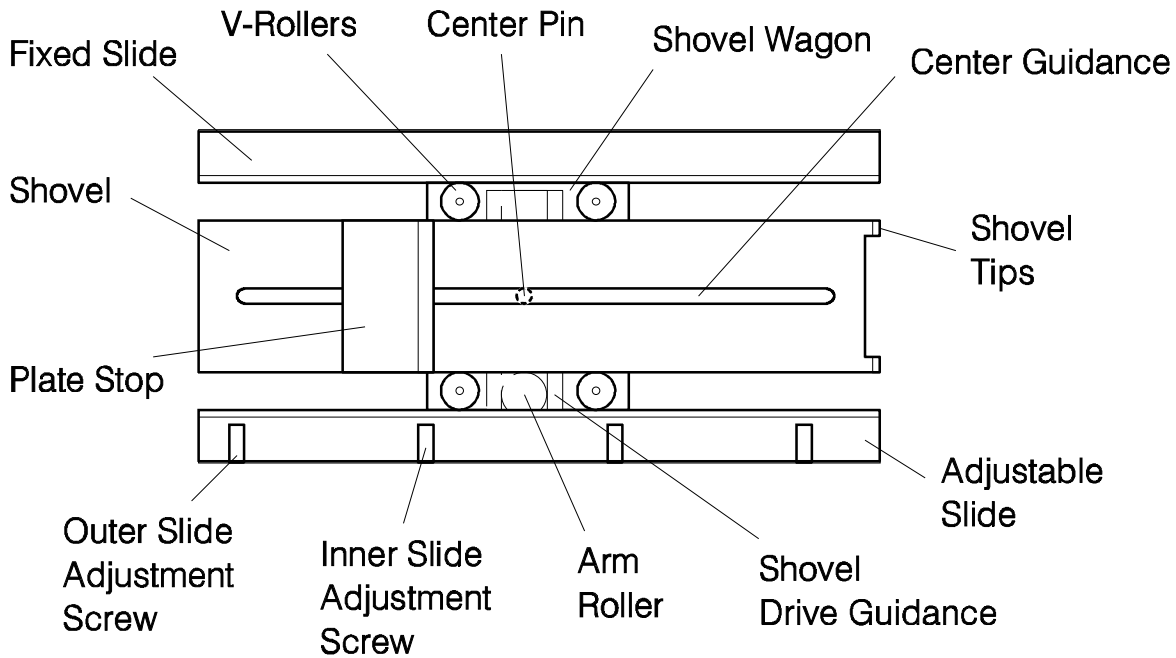


6. Check Shovel, V-Rollers and Slides for particles and wear. The surfaces should be clean and show no grooves nor other irregularities. Clean above parts using benzene or alcohol if necessary. Make sure that there are no particles on the guidance surfaces. When re-adjustment work is found to be necessary it is recommended to remove the Lift System Cover for better access. However, check adjustment of Shovel Assembly first (step 5-10).
7. Remove controller module cover by loosening four Philips screws.
8. After removing the Module Cover you have access to the LDR-Electronics Module. Identify Lift Connector mounted horizontally next to the PLC.



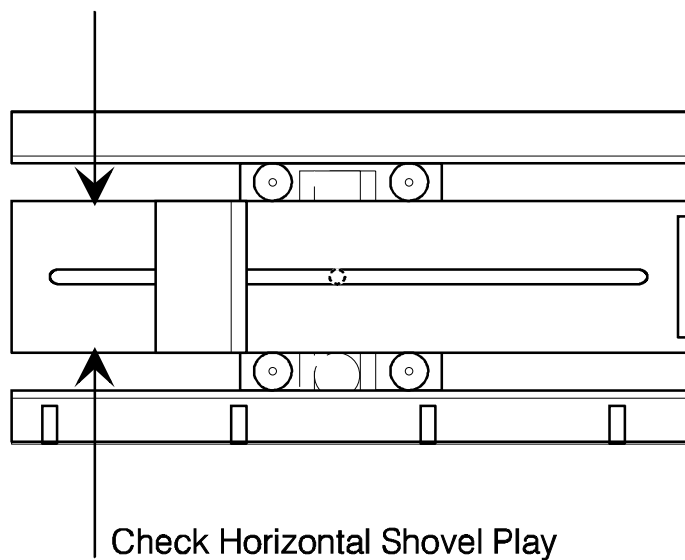
9. Carefully disconnect Lift Connector located on the Module board.

10. Identify the following parts on the Lift Assembly for better understanding the following



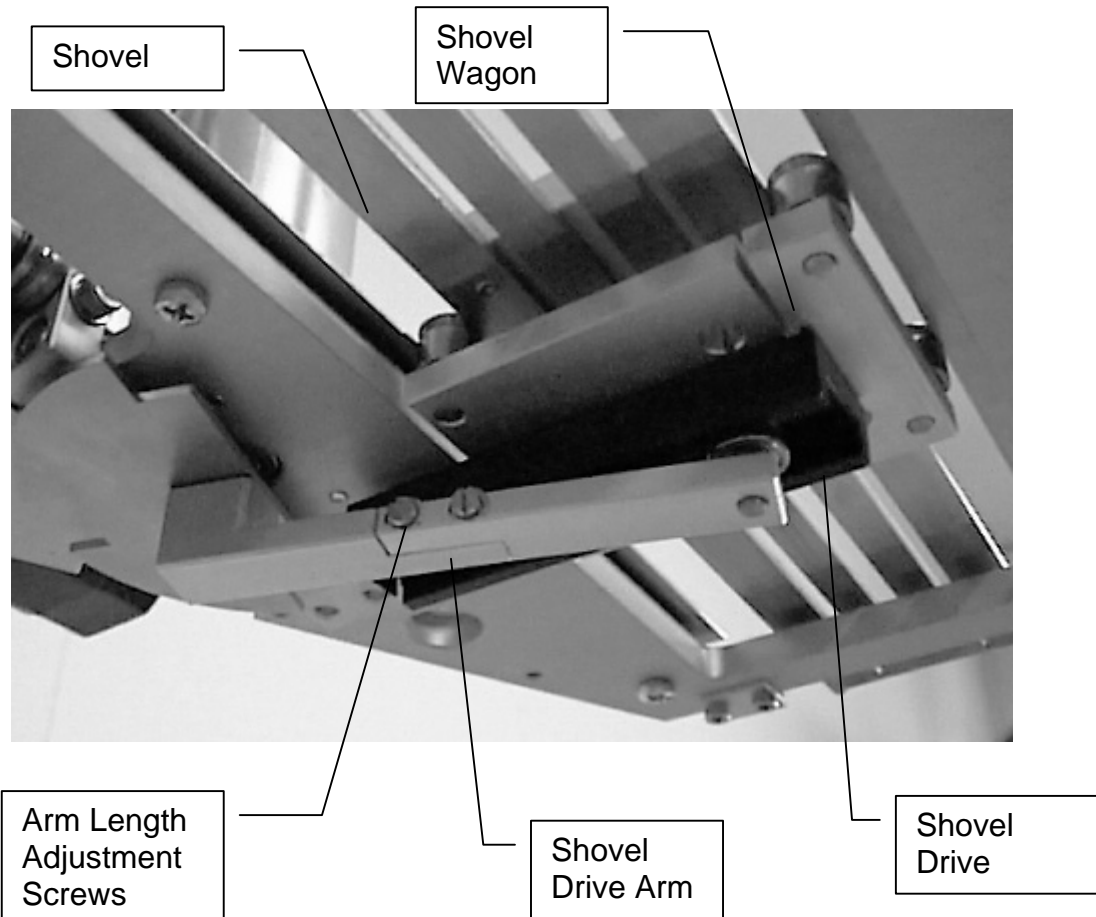
instructions.

11. Loosen four Slide Adjustment Screws of the Adjustable Slide. Simultaneously Check

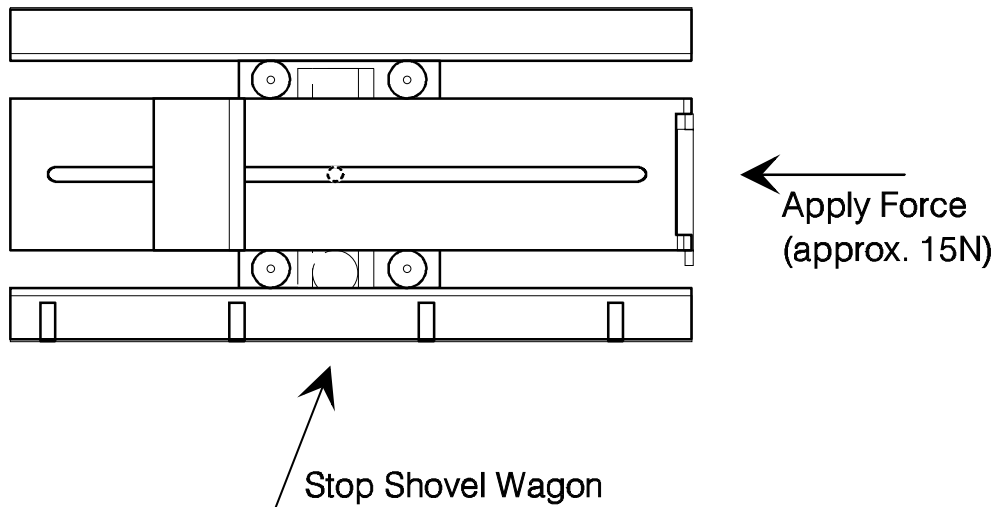


horizontal play of the Shovel. Loosen Slide Adjustment Screws until the Shovel has play.

12. If Slide Adjustment Screws show low friction (<50cNm) remove Slide Adjustment Screws and apply Screw Secure Adhesive (Loctite 243 or similar). Loosen one Adjustment Screw after the other. Do not remove more than one Slide Adjustment Screw at a time.
13. Move Shovel to center position and tighten the two inner Slide Adjustment Screws until

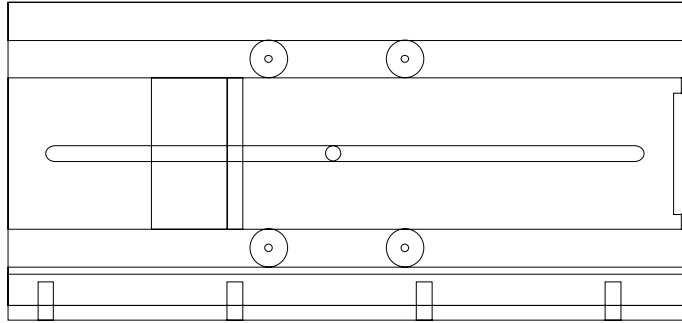


14. there is no horizontal play of the Shovel. Do not tighten Slide Adjustment Screws more than necessary. Over-tightening of the Slide Adjustment Screws will cause an unnecessary amount of friction and will limit lifetime of Shovel Drive.
15. Move Shovel to left (Load) position. Tighten left Outer Slide Adjustment Screw until there is no more horizontal play of the Shovel.
16. Move Shovel to right (Cassette) position. Tighten right Outer Slide Adjustment Screw until there is no more horizontal play of the Shovel.



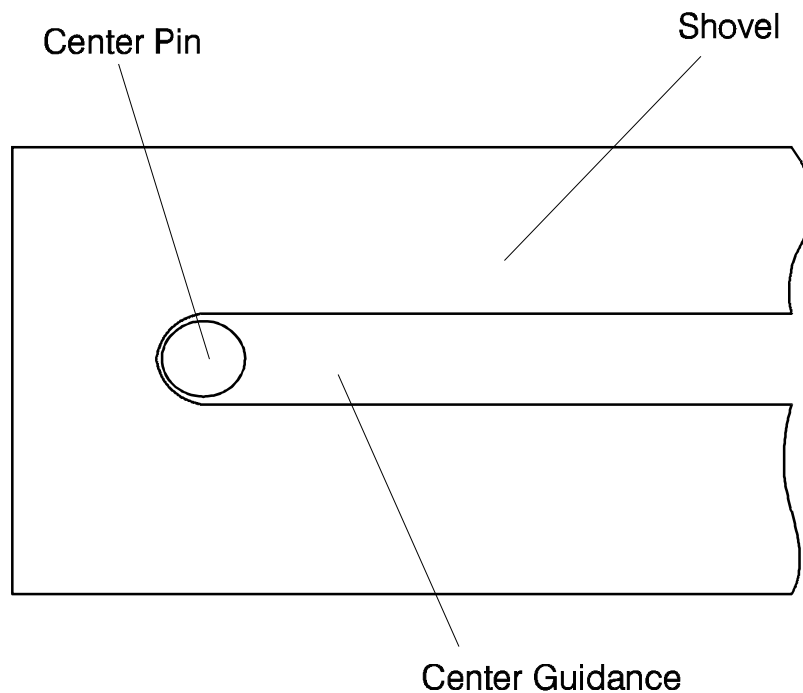
Check friction of the Shovel. Apply force (approx. 15N) on the Shovel along its travel direction while holding the Shovel Wagon in its position. The Shovel should not move in the V-Rollers when applying above force. Check friction along the entire travel length of the Shovel.

17. Check Shovel movement by rotation Shovel Drive Arm. The Shovel should move easily and steadily. There should be no abrupt movements over the entire travel path of the Shovel.
18. Check Shovel Adjustment. The Shovel should have *no horizontal side-play* in its center, its left- and rightmost position. The Shovel should *not slip in the V-Rollers* when applying force (approx. 15N) in the Shovel travel direction while stopping the Wagon. When moving the Shovel by slowly rotating the Shovel Drive Arm the Shovel should *move easily and steadily* over its entire travel path. *The Center Pin should move freely* and should not touch the edges of the Center Arm Guidance.
19. Adjust Shovel friction at the Shovel end-positions. Move Shovel at its leftmost (load) position. Apply force (approx. 15N) on the Shovel in its travel direction while loosening left Outer Slide Adjustment Screw until Shovel slides in the V-Rollers. Note that only little adjustment is required (1/8 turn) on the Outer Slide Adjustment Screw for this adjustment step.
20. Move Shovel at its rightmost (cassette) position. Apply force (approx. 15N) on the Shovel in its travel direction while loosening right Outer Slide Adjustment Screw until Shovel slides in the V-Rollers. Note that only little adjustment is required (1/8 turn) on the Outer Slide Adjustment Screw for this adjustment step.
21. Check travel path of Shovel. The travel path of the Shovel is limited by the Center Shovel Guidance and the Center Pin.



In order to check the Shovel travel path move the Shovel to the leftmost (load) position by slowly rotating the Shovel Drive Arm to the left. The Shovel has reached its end-position when the Center Pin touched the end of the Center Shovel Guidance. Note that the Shovel may slip in the V-Rollers when reaching its end-position. If the Center Pin does not reaches the end of the Center Shovel Guidance pull Shovel while stopping the Wagon by holding the Shovel Drive Arm.

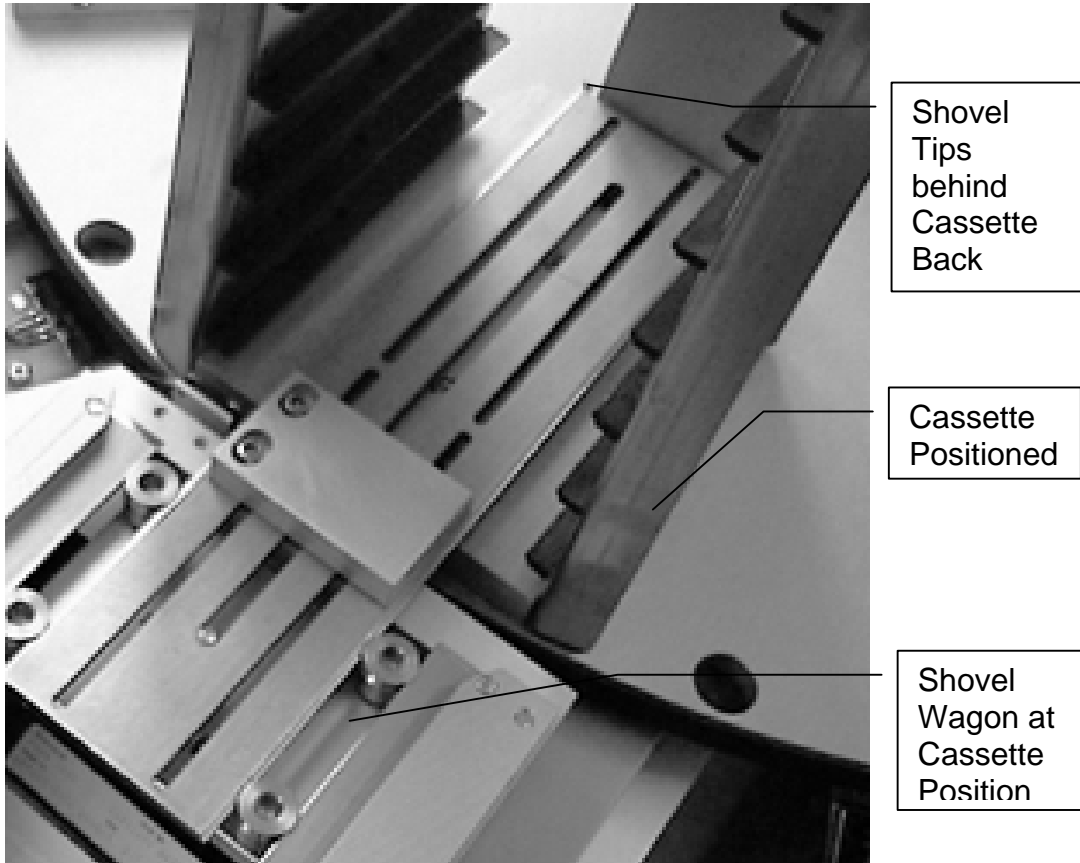
22. Move Shovel to its rightmost (cassette) position by slowly rotating the Shovel Drive Arm to the right. Check Pin Position against Center Shovel Guidance when Shovel reaches



right end-position. If Center Pin does not reach the end of the Center Shovel Guidance the Shovel Drive Arm is too short. If the Shovel slips excessively (more than 2mm) the Shovel Drive Arm is too long.

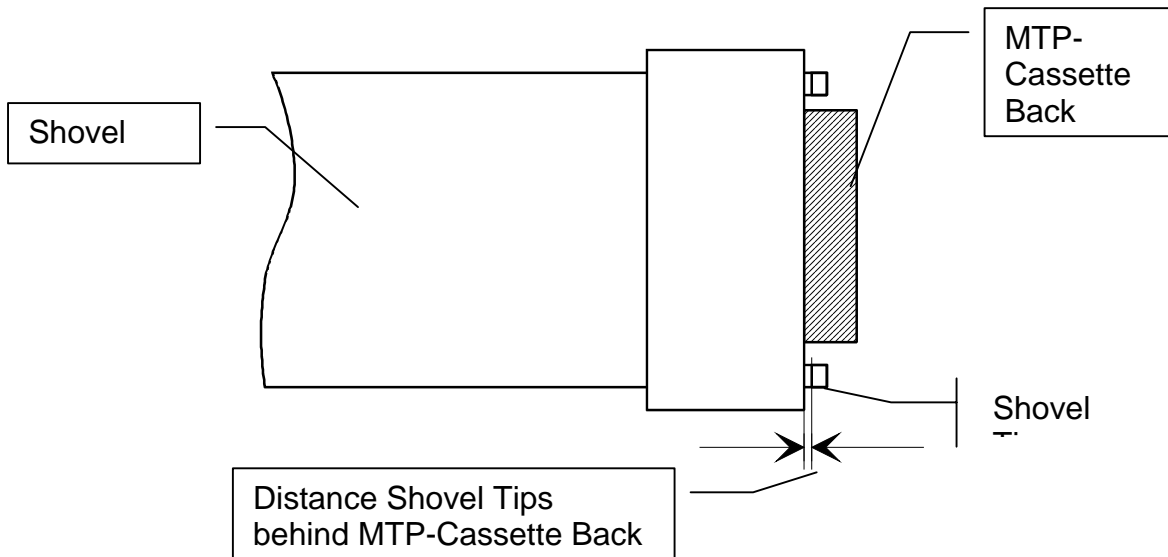
23. The Shovel Drive Arm length is adjusted by loosening the two screws on the Shovel Arm and pulling or pushing the two pieces of the Shovel Drive Arm. If Shovel Drive Arm is too short pull the parts otherwise push the two parts. Note that the change of the total Shovel travel range is four times the change Shovel Drive Arm length. Take care that after tightening the two screws of the Shovel Drive Arm its two parts of the Shovel Drive Arm remain in-line.
24. Continue adjusting the Shovel travel path as described above. The Shovel travel path is set when the V-Rollers slip approximately 0.5-1mm prior Shovel Drive Arm reaches its end-position.

25. Apply grease on the guidance surface on the Shovel and Shovel Slides. Put only a small amount of grease. The grease should form a homogeneous thin layer over the entire



guidance surfaces.

26. Put one MTP-Cassette on the Carrousel and position Carrousel manually.
27. In order to check the Shovel Cassette Position move Lift System to a low level and block Lift Gear. Move Shovel to its right (cassette) position by slowly rotation the Shovel Drive Arm to the right.
28. The Tips of the Shovel should reach *approximately 0.5-1mm behind the Back of the MTP-Cassettes*. For measuring the Tips position a flat object with a sharp edge is placed on the



Shovel and then pressed against the Back of the MTP-Cassette. If the Tips of the Shovel do not reach behind the Back of the MTP-Cassette the lift position has to be adjusted. The lift position adjustment procedure is not subject of this note, for details refer to

29. Carefully move Lift System to a high level and block Lift Gear. Move Shovel to its right (cassette) position by slowly rotation the Shovel Drive Arm to the right.
30. The Tips of the Shovel should reach approximately 0.5-1mm behind the Back of the MTP-Cassettes. For measuring the Tips position do as described above. If the Tips of the Shovel do not reach behind the Back of the MTP-Cassette the lift tilt has to be adjusted. The lift tilt adjustment procedure is not subject of this note, for details refer to
31. Re-connect Lift Connector on the Electronics Module and re-connect the power cable and the communication cables on the back side of the LDR HandlerCarrousel. Prior re-connecting unit make sure that the main unit is turned OFF.
32. Start-up system and start test software.
33. Adjust Shovel Force and Speed. Adjust settings during continuous handling operation. Do not stop Shovel too long. LDR-system will go into time-out.
34. Close Module Cover
35. Test LDR HandlerCarrousel by starting Handler Test.

Functionality Tests

Run system 2-12 hours..