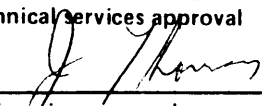



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engineering approval 	date 8/8/79		

NOTE:

A solenoid consists of a coil or wire wrapped around a sleeve which magnetically attracts a ferrous core when electrical energy is applied to the coil of wire. One of the undesirable results (for the PIANOCORDER Reproducing System) of passing an electric current through a coil of wire is HEAT. Because of this problem the PIANOCORDER Reproducing System contains digital circuitry which automatically protects the key and pedal solenoids from heat damage when the system is in operation. If excessive heat builds up during the operation of the pedal solenoids, even though the system cannot be damaged because of built-in safety features the pedal solenoids may bind (metal expands with heat) or may not function at all after a period of play (solenoids decrease in force slightly as they heat up). It is mandatory that the technician in aligning the system to the piano make adjustments so that the pedal solenoids operate with as little heat build up as possible so as to insure continuous operation.

The digitally encoded cassette tape contains that signal which activates the Sustain and the Soft Pedals of the piano along with the signals which activates the key solenoids. The signal for the pedal solenoids can be adjusted to control the pulse width of the voltage to the solenoid. The pedal signal from the tape enters the Playback Logic Board, travels from the Playback Logic Board to the Power Supply then on to the pedal solenoids. Since it takes more energy to lift the dampers for sustain pedal actuation and lift the hammer rail (or shift the keybed in a grand) for soft pedal actuation than to hold the dampers off the strings or hold the hammer rail, (or hold the action in a shifted position in a grand) the pulse width to the pedal solenoids is changed automatically by the Playback Logic Board (less power) after the initial lift is accomplished. This decrease in power can be evidenced by observing the LED'S (red lights) on the Power Supply which glow brightly when the pedal signal begins and dim if the pedal is held on for a period of time. The amount of lift power is controllable by the Sustain Lift Pot. and the Soft Lift Pot. on the Playback Logic Board; but, the amount of hold power is automatically set by the Playback Logic Board.



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	engineering approval <i>TD</i>	date 8/8/79

Below are some suggestions to help in aligning the Pedal Solenoids to function properly and run with minimum heat buildup. Notes after each paragraph let you know the probability of this cause.

1. Playback Logic Board (Infrequent)

Occasionally, the hold-in (decreased) power to the Pedal Solenoids may not be enough to hold the dampers off the strings. This is evidenced by the dampers lifting properly, but slowly dropping to the strings when the power is decreased to the solenoid by the Playback Logic Board. If this occurs, turn off and plug on a new Playback Logic Board from the DP-100 Maintenance Kit out of the piano. Turn power on and observe if the dampers are held off the strings. If so, replace the Playback Logic Board in the piano. If not, turn off power and plug on the original Playback Logic Board.

2. Power Supply (Infrequent)

Occasionally, if pedal solenoids do not operate properly (as above) the Power Supply Voltage or pulse width to the solenoids may be improper. Turn power off and plug on a new Power Supply from the DP-100 Maintenance Kit outside of the piano. Turn power on and observe if the Pedal Solenoids function with more force. If so, turn power off and replace the Power Supply in the piano. If not, turn power off and plug on the original Power Supply.


3. Pedal Solenoids (Very Infrequent)

Occasionally a Pedal Solenoid may not exert enough force to lift the dampers because it may be electronically less efficient than another solenoid. If the sustain is at fault, turn power off. Remove the Sustain Solenoid from the piano and substitute the Soft Solenoid for the Sustain. Align the Solenoid to the piano and turn the power on. If the substitute solenoid is more efficient after prolonged operation (all solenoids have more force when cool) turn power off and install and align the original Sustain Solenoid to operate the Soft mechanism, (which is easier).

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4. Helper Spring/Damper Lifter Rod Extension

Occasionally the Sustain Solenoid does not have enough mechanical efficiency to lift the dampers on a particular piano model. See Section 9, ALIGNMENT, in the Installation and Field Service Manual and following instructions, install a helper spring in the Dash Pot or a Damper Lifter Rod Extension or both. Both the Helper Spring and the Damper Lifter Rod Extension give the solenoid more mechanical advantage. (In installations in a grand piano, some technicians use a vorsetzer pedal solenoid to shift the keybed).

5. Solenoid Throw (Very common)

Adjust the throw of the Sustain Pedal solenoid so that the dampers clear the strings. (The dampers must be regulated to lift simultaneously for ideal Sustain Pedal operation). The more throw, the less efficient the solenoid. It is recommended that the dampers lift no more than 1/16" not only because more lift creates more throw on the solenoid making it less efficient, but because in pre-recorded tapes with fast sustain pedaling, all of the sustains will run together ruining the performance.

6. Spacer Pads (Common)

When a permanent magnet attracts a piece of iron, the closer the iron to the magnet, the more attraction. The same is true with an electro magnet. (Solenoid) When an energized coil or wire magnetically attracts the ferrous slug, the closer the slug to the coil, the more attraction. Included as part of the Pedal Solenoid assembly are a thin Spacer Pad and a thick Spacer Pad. The Spacer Pads are used to prevent the metal solenoid core from contacting the metal solenoid sleeve when the coil is energized, thus clicking internally. The Spacer Pads do indeed prevent metallic clicking, but will make the solenoid less efficient if the felt is too thick. If the Pedal Solenoid does not have enough power to lift the dampers off the strings or hold the dampers off the strings when the power is decreased for hold in by the Playback Logic Board, turn power off. Remove the thin

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Spacer Pad, adjust the solenoid for proper throw and retest. The solenoid will be more efficient because there is now more core in the coil. If after playing for a time (the felt will compress) internal clicking results, split the thin felt and with power off install it underneath the thick felt in the solenoid.


7. Dash Pot Air Valves (Common)

When a Pedal Solenoid is energized, the solenoid moves from an at-rest position to a closed position immediately. When a pianist uses the pedals, they are pushed down gradually. In order to make the solenoids activate the sustain or soft mechanisms like a pianist does, the Pedal Solenoid assemblies contain a Dash Pot which can be compared to a shock absorber on an automobile or the device installed on a door which prevents the door from slamming shut. When a Pedal Solenoid is de-energized, the solenoid without the Dash Pot engaged has a tendency to slam down on the stop pad much like a door with a spring slamming shut. If the Air Valves are adjusted allowing too much air in and out, the solenoid will slam on and off. If the Air Valves are adjusted too tight, the solenoid will be sluggish because much of the mechanical advantage will be removed. See Section 9, ALIGNMENT, in the Installation and Field Service manual for proper alignment of the Dash Pot Air Valves.

8. "O" Rings (Common)

Included as part of the Pedal Solenoid Dash Pot assembly is a rubber "O" Ring which creates the air seal between the Dash Pot Cylinder and the Piston. If the "O" Ring is worn, replace it with a new one from the DP-100 Maintenance Kit and relubricate it with powdered graphite. We recommend as an alternative lubricating the "O" Ring with Silicone Lubricant. If Silicone Lubricant is used, the Dash Pot must be thoroughly cleaned of all graphite and a small amount of Silicone Lubricant should be applied to the "O" Ring. A recommended Silicone Lubricant manufactured especially for "O" Rings is "Super O Lube" manufactured by Parker Hannifin Corporation, O-Ring Division, 2360 Palumbo Drive, Lexington, Kentucky 40509, (609) 269-2351. (A list of

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national distributors is attached).


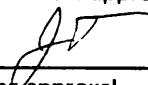


9. Side Loading (Common)

If the Pedal Solenoids are installed with the dowels tilted to too great a degree (other than perpendicular) a situation may be created causing the shaft (core into coil) or the "O" Ring (piston in cylinder) to bind. Make sure that the dowel from the hole in the trap lever to the hole in the Damper Lifter Rod or Hammer Rail is parallel to the side of the piano case. If the dowels are straight up and down, no side loading should occur and the Pedal Solenoids will not bind because they are pushing straight up and down. Visually inspect the solenoid to see if the shaft (slug into coil) or the Dash Pot is out of round. If binding occurs because the shaft or the Dash Pot is out of round, replace the solenoid with a new one from the DP-100 Maintenance Kit.

10. Over Heating (Infrequent)

When the mechanical advantage of a Pedal Solenoid is aided, the energy to the solenoid can be decreased allowing it to run cool. The energy to the solenoids is controlled by the Sustain Pull in (lift) Pot. and the Soft Pull-in (lift) on the Playback Logic Board. If all of the suggestions are followed and the solenoid is operating adequately, turn the Sustain Pull-in (lift) Pot and the soft Pull-in (lift) Pot. to the lowest (counterclockwise) setting where the solenoid functions properly with the least amount of energy. If the mechanical advantage of the solenoid is great, the power to energize the solenoid can be decreased which will enable the solenoids to run cool. If full clockwise setting on the Playback Logic Board is necessary for the solenoids to operate, mechanical advantage aid is indicated. When the PIANOCORDER Reproducing System is used continuously such as in a restaurant or a cocktail lounge, it is recommended that a Cooling System be installed to cool the solenoids. The PA-105 Cooling System can be purchased thru the PIANOCORDER DIVISION or Sales Reps. In order to insure an even flow of cool air through the system in the piano, it is strongly recommended that vent holes be drilled in the floor of the piano which will



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allow cool air to replace the heated air escaping through the top of the instrument.

11. Stabilizing Cable too Tight (Infrequent)

It is necessary to check that the cables are slack during all operations of solenoids or manual pedal operation. The purpose of these cables is not to hold the solenoid or action in place (up and down motion). This must be done by adjustment of trapwork not by use of these cables. When the solenoid operates, a small amount of flex is natural in the trapwork action mechanism. This should not be limited by the use of these cables. Their only purpose is to keep the solenoid from rotating during operation. The cable stiffness provides all the control that is needed or necessary.

