Starting a Flooded RX-7

Symptoms:

- Engine cranks (turns over) but does not fire, or fires briefly and dies immediately. After several attempts, gasoline fumes may threaten to overwhelm operator.

Solution: "Clear" engine of excess gasoline.

Tools Necessary: In extreme cases, you'll need

- Spark-plug wrench and socket
- 20W-50 Motor Oil

Background:

This is one of those things which seems to happen very rarely, except on high-mileage cars or other cars which (for some other reason) have low compression.

It also seems to happen only when you're either showing your car to a friend, or in a hurry to get somewhere.

It's happened to my car exactly twice. The first time, I was on the way to the airport to drop someone off. I don't think he was overly impressed with the way my car blew gas fumes everywhere, and refused to start. After I got back from the airport (2 hours later), the car started fine.

The second time, I was about to go out and get some food, the car completely refused to start. It sat for 2 days, unmoving, and with an increasingly dead battery as I got more and more frustrated with it. It was under these circumstances that I was forced to use Method 3, detailed below.

By the way, dealers have been known to charge more than $200 (plus your inconvenience, and potential towing fees for performing the procedures given below. Hopefully, you can avoid this fate.)

This situation is generally caused by one of two things, either starting a cold engine, running for a brief period (less than a minute or so), and then shutting it off, or leaky fuel injectors (the pressure in the fuel line forces gas past the injector, into the rotor chambers, and washing away the oil which forms the actual seal between the rotor chambers, thus no compression). The fix for the first situation is easy...don't do that. The fix for the second situation is not so easy, you either have to replace the injectors (mega-$$$$), or get a little 'hack'

from Mazdatrix which is a H-pipe between the two fuel rails. This allows the fuel pressure to leak back from the feed line to the return line SLOWLY, reducing the leakage into the chambers. (Of course, for you performance nuts, note that this solution **does** decrease your overall fuel pressure.)

Alternatively, it's been suggested on the list (and specifically mentioned to me by Scott of Maztech in Florida), that it's possible to install an inline-switch controlling the fuel pump. This switch will then serve two functions, that of allowing you to turn off the fuel pump when the car floods, so that you don't have to get out and pull the EGI fuse. In addition, if the switch is well hidden, it can serve as an anti-theft device as well (just turn the switch off when away from the car, and unless the thief finds the switch, they won't be able to drive the car anywhere.

Keep in mind that if you try these different techniques in order, you'll be slowly running down your battery. It's suggested that you keep a healthy car around while doing these, otherwise you may end up with a flooded car with a dead battery. This document is written primarily with second generation cars in mind, however the same techniques are applicable to fuel-injected first generation cars, and third generation cars, as well. Most third generation cars will not have enough miles on them to develop these sorts of problems yet, though.

In all cases listed below, the car is likely to run very poorly and blow a **LOT** of smoke when you get it started. When it coughs and sputters to life, you'll probably need to 'do a little dance' on the accelerator to keep it from dying.

Check your spark plugs if your car floods often...they tend to get fouled, which can also help to make your engine unhappy, making the problem happen even more frequently.

The various Methods listed below are in order of inconvenience, and increasing efficacy. Hopefully, you won't need more than Method 3.

Method 1: Wait and see...

If you're not in a particular hurry to get anywhere (and your car does not make a regular habit of flooding you out), waiting an hour or two before trying to crank the car will sometimes do the trick. The reason this works is that this gives enough time for some of the gasoline to drain or evaporate away. Unfortunately, if your car is **seriously** flooded, this method will probably not work, or take so long as to make you think your car's permanently dead. Which brings us to...

Method 2: Step on it!

Although somewhat counterintuitive, the RX-7's ECU (Engine Control Unit) includes a bit of logic which actually **cuts** fuel flow when the accelerator is depressed all the way down while the engine is being cranked. (This is definitely the case in 88.5 and greater versions of the ECU. It's not clear that this 'feature' exists in older cars, however I have been able to start my 1987 car using this

method, however, to err on the side of conservatism, you may want to skip directly to Step 3 if you own an 86-88.5 car, as if this feature **doesn't** exist, you'll end up flooding the car worse!). However, if this doesn't work, you'll then want to try...

Method 3: Pull the fuse

Under the hood, on the driver's side of the car (assuming you have a U.S.-spec or other LHD car), you'll find an oblong fusebox, labeled with its contents. The one you're interested in is labeled "EGI Pump" or "EGI Inj". (These are not the same fuses, but either will work) Pull this fuse out, and crank the car for a few seconds (probably 4-5 times at 4 or 5 seconds each time.) Then, get back in the car and try to start it. It's probably worth trying this procedure a few times (like 4 or 5) before moving on to Method 4.

Note: If you get the car started after using this process, the tachometer likes to behave particularly dead. Shutting the car off (after it's run for a while to clear all the gas from the combustion chambers, and then restarting it will bring it back to life.)

Second note: LK Swift has mentioned to me that 1st generation fuel-injected cars have a 'jumper wire' (or fusible link) which performs the same function as does the EGI Pump fuse. Pulling this fuse, and then cranking the engine will perform the same function as the above procedure.

Method 4: Pull the spark plugs

If the preceding methods don't work in getting your car started, then you probably have a low-compression condition in your engine. You'll need to pull the spark plugs out (you can probably get away with just pulling the leading ones), stuffing rags in the holes, and then cranking the engine for a bit. (The rags are simply to catch the gasoline, to avoid flinging it all over the engine compartment. Don't stuff them **too** far in the holes, just enough to hold the rags to crank the engine. Of course, take the proper precautions when working around exposed gasoline!) When this is finished, put them back in, and try to fire the engine up again.

If the car still resists starting at this point, you're going to break out the heavy guns, which is...

Method 5: Put oil in the engine

The objective of this part of the exercise is to get a viscous liquid into the engine. First generation cars may simply pour either Automatic Transmission Fluid (ATF) or 20W-50 motor oil into the carburetor, while owners of subsequent cars may need to get a bit more creative. On 2nd generation cars, there are 2 capped lines atop the engine housing which lead directly into each chamber. (See below for Felix Miata's description of these ports). These may be used for introducing fluid into the engine. Alternately, you can remove the spark plugs again, and get the liquid into the chambers through these openings.

Either way, you may want to crank the engine a bit with the EGI fuse (or fuel pump fusible link pulled) to spread the liquid around a bit, before trying to start the car. Then, stand back to avoid huge clouds of blue smoke.

(The theory here is to use the relatively heavy motor oil to help the seals make compression against the rotor housings.) Other Rotary acolytes advocate the use of Automatic Transmission Fluid for this process. The theory here is that this thick fluid also has caustic properties, allowing it to 'eat away' at carbon deposits which may accumulate on the apex seals, allowing them to move more freely, and possibly free stuck seals (Marvel's Mystery Oil has also been reported to be a good oil to use for both of these purposes). Your mileage may vary. However, I've heard of more than one engine which made a miraculous recovery after this (relatively harsh) treatment. It's worth mentioning, though, that I believe that motor oil seems to be a better choice than ATF, as motor oil is **supposed** to be in the combustion chambers, and is probably easier on the exhaust system (read: catalytic converter) then burning ATF.

Felix Miata, a fellow rotorhead, recommends using ATF, suggesting that the relatively light oil is easier to purge from the system once the engine is started. In addition, he mentions that:

"On non-turbo 2 gen the intake has two plugged vacuum ports pointed up, one to front rotor & one to rear. Connect squirt oiler to these with hose to more easily inject oil into intake manifold (I suspect this is one of their intended uses). Works just as good as injecting into plug holes & much easier, almost as easy as on 12A, which has carb throats to pour into."

Method 6: Push/Pull Starting

Warning: This method is to be considered only as a last resort. Not only is push-starting the car specifically forbidden by the owner's manual, but this procedure could be considered highly dangerous, as well. I'm listing this method primarily for completeness' sake, after Steve Warner (a fellow RX-7 owner) sent me a great story on what he did to get his car started on a cold day in January.

The premise to getting the car started under these conditions is basically, get the car up to speed, putting the car in gear, and then dropping the clutch, forcing the motor to turn far faster than it normally would from the starter motor. People have had good experience by pulling the car behind a (working) car, or letting the car roll down a hill to get the car moving at a high enough velocity.

Again, if you have to resort to this method, **please** be careful! The potential for damage (to your car, your body, the tree, someone else's car...) is quite high. I don't recommend using this method unless you really know what you're doing. (I take no responsibility for what might happen to you if you decide to try this method and blow up your car, run over your cat, etc., etc., blah blah...)

Felix Miata has some useful input on this method:

"Required vehicle speed in most cases is surprisingly low. Use 2nd gear, not 1st. When it starts, depress clutch & go back to 1st if necessary. If it happens to you in a parking lot with a little slope, one can often get sufficient speed with only two feet (without additional help) to get it to start. #6 applies to any flooded rotary. Pull starting is considerably more dangerous than push starting. A lurch when it starts can quickly use up the tow slack & damage both cars."

If you have to resort to methods four, five or six, it may make sense for you to consider getting the aforementioned H-pipe, or the fuel-pump cutoff switch. At the very least, you should probably have the compression in your motor tested, to see how close you are to needing a rebuild. (For reference, 100 lb/sq.in is considered good compression, 80 lb/sq.in is considered marginal. The equivalent bar measurements would be approximately 7 bar being good, 6 being marginal).

Contents from: http://www.lemmings.com/mark/rx7flood.htm