Isetta Restoration for the Mechanically Challenged

by Carl Jensen in Austin, Texas (1994)

Introduction

I worked for Honda as a factory car sales rep for a number of years and saw my first Isetta in 1986 on one of my dealer visits in Washington state. I remember thinking how cool the car looked, but I figured that getting parts for a restoration would be impossible. Then a couple of years ago I came across a restored Isetta at a car meet of the Classic Chassis Car Club in Austin, Texas. The Isetta was absolutely the star of the meet, so I talked with the owner who had rescued his Isetta from being partly submerged in mud for a number of years. At this point, I had to get my own Isetta.

After much searching throughout Texas and asking every one of my 17 Honda dealers where I might find an Isetta (a what?), I finally bought my 1957 Isetta 300 in June 1993 for $5500 from a delightful man named Ed Carey in Waco, Texas. The Honda dealer in Waco told me about Ed, who had earlier brought one of his Isettas to the dealership for repairs. Ed is about as nice a guy you could meet, but don't make the mistake of trespassing on his land in the country or you will quickly become ventilated with his full-sized cannon. I'm not kidding.

Ed owned two Isetta 300s at the time along with a treasure trove of spare parts, and he agreed to sell me his red Isetta. Ed had already completed the body work and painting and had reupholstered the seat and door panels with a very rich deep red fabric. Ed had also replaced the original broken crankshaft/aluminum rod assembly with a more durable steel assembly. I could tell later that it was steel by putting a magnet next to the rod -- if it was aluminum the magnet would not have been attracted to the metal as it was to the steel.

Being a fumbling shade-tree mechanic without the tree, I planned to go the easy way and get by with a brake job and maybe some minor tinkering. I then got my first big lesson -- "Once you start tearing into an Isetta you will find it makes sense to go deeper and deeper since you already have all that other stuff taken off anyway." And so my two week job quickly evolved into an intense year-long odessy.

Although my red Isetta was good cosmetically, many of the 37 year old parts inside had deteriorated, including every rubber piece inside and outside the car. Lets face it, although the car is very endearing, BMW did not lavish a whole lot of money in producing each Isetta, which is now a very old car. However, I decided that I didn't want to undergo the great expense of restoring the car to show quality, since I wanted to drive the car and be a show-off without having to worry about disturbing the car's pristine quality. But it seemed obvious that the car would not be reliable even for in-town driving unless it was thoroughly inspected, repaired and

restored. To me there is nothing more humiliating than showing off a car and then needing to have it towed back home.

I discovered that with the right resources and tools (and the right tool can make a long, hard job much faster and easier), even a mechanical dummy like me can do a pretty good job restoring an Isetta. It can get expensive, so I will try to let you know how much the different parts of the restoration cost and which suppliers were used. You will be amazed at how fast the nickels and dimes and dollars add up in your restoration. My total parts cost was about $4500, and this was not a show-quality restoration! I will also tell you about some procedures I used that may save you a lot of time. But be sure to take my recommendations with a grain of salt, since I am no expert at this kind of work.

One frustrating thing is that it can take a long time to locate and receive the parts you need. I often found myself getting most of the way into a section of the car and ordering whatever parts were needed. Two months later when the parts arrived and I got back into repairing that area I would then find that even more parts were needed and I would have to wait another two months! It really helps to completely disassemble whatever you are working on and find out exactly what you need before you order.

The good news is that during the past year I have found that more and better parts are becoming available. There is even competition between some of the suppliers, which results in better prices for us consumers. But even with the best suppliers there will be a wait. And although prices seem to be improving, this stuff can cost a lot since reproduction parts are made in limited and expensive runs. It makes sense that suppliers need to make their legitimate profit given their great investment of time and money.

Be aware that since most parts are reproduction and not original parts, you may have to tinker with them by grinding, sanding, shaping, etc. to make some of them fit correctly. I also learned my second great lesson -- "Always send a money order for parts or your wait will double while your personal check clears." It was hard for me at first to send money to complete strangers who cannot accept credit cards, but I never got burned by any of the suppliers.

Tools

The nuts and bolts on an Isetta are metric, so get a metric socket set and a set of metric combination wrenches (one end of the wrench is open and the other end is closed to completely encircle the bolt or nut.) You will also find that a metric tap and die set is invaluable for cleaning up threads on your rusted nuts and bolts.

An incandescent shop light will help you see what you are doing, but it will get really hot and will burn you if you rub against it. This will happen more often than you may think. Some people

use a fluorescent shop light which will not burn, but the light does not seem as bright as the incandescent type. I have both types and mostly use the incandescent.

I found that a Dremel tool is helpful. This is a hand-held electric drill-type gadget that has various fittings you can attach to cut bolts off, polish and grind things, etc. It is really handy, and you will be amazed at how often you use it for your restoration and other jobs. I believe my Dremel tool cost about $60 including the various attachments.

A propane torch will be a necessity for your restoration. It is inexpensive and will help when removing rusted nuts and bolts, installing and removing bearings, etc.

I got a lot of use from my Sears air compressor that cost about $300. I used it extensively on the Isetta to blow parts clean, when using an air impact wrench to remove and replace stubborn nuts and bolts, and to cut metal parts such as muffler pipes with the air cutting tool . The compressor and its various attachments aren't essential, but they will shave countless hours off your restoration.

I also got many hours of use out of the wire wheel attached to my bench grinder, which cleaned the grunge from numerous parts. And the grinding wheel itself got a lot of use to grind and smooth rough metal surfaces.

I bought four sturdy car stands so that the car could be completely raised off the garage floor. Be careful when your Isetta is on the stands since it won't weigh much, especially when the drivetrain has been removed. A floor jack is also helpful, but be sure that it is low enough to fit under everything on your Isetta that needs lifting. Even with my low-profile floor jack I still have to back the car over some pieces of 2 x 6 wood to get enough clearance under the chaincase.

Literature

The essential book you will need is titled "Isetta Restoration" by John Jensen (see his listing under "book" in the back of Minutia.) Everyone should get this book, which includes seven pages of assembly drawings that show how each part goes together. It took me a while to figure out that when the text of the book refers to a number like 2-28 it means that you should go to plate #2 and look at part #28.

Although John Jensen's book is wonderful, don't take everything that he says for gospel. Good luck trying to find some of the parts he suggests by using his parts numbers! John also refers to a few small items that don't seem to exist, but it's no big deal. I truly think that John has an unconscious need to share his pain after years of suffering through restoring Isettas without the help of a book such as his own.

I was also pleased with the articles from earlier issues of Minutia, and also bought sets of the back issues of Bubble Notes and M & M Rapper, which were publications of past micro and

minicar clubs. These will often have technical articles that amplify what John Jensen's book talks about and will even cover things that are not in John's book. These issues also have many articles on Messerschmitts. Back issues of these three publications can be ordered from our club store which has a listing in each issue of Minutia.

I assume that you are probably already a member of the US. Microcar and Minicar club, which is a terrific resource through its most excellent publication Minutia. You might also consider joining the English club (see listing under "clubs" in Minutia). The English club has a very extensive new parts list and also carries used parts, but there are a couple of things to be aware of.

Since the dollar/pound relationship is not in our favor, having to buy all parts in pounds can get expensive. Just buying an international money order costs $15 in Austin. Also there are certain types of parts they cannot send to the U.S., even though these parts are listed on the parts list. I guess that due to insurance problems, items such as suspension and brake components cannot be shipped here. Also be sure to figure on the cost of import taxes (which I think are up to 50%) and the cost of air freight. However, despite all these costs the club is well worth joining for their excellent parts availability. Maybe in future years we will have enough parts available in the U.S. so that the English club will not be so valuable. There is also a German club, but I think they would be harder to deal with unless you understand German.

Parts Suppliers

Larry Guerin, "Isetta USA", (215) 626-4220. Larry has really led the way with reproduction parts and is now becoming more competitive in his pricing. Larry's parts have been lifesavers for me, and are usually of good quality. Be sure to mention how much luck you have had with the other suppliers and he will get upset and lower your price to undercut his competitors.

The parts Larry has sold me include decals for the gear pattern/choke/heater ($3). However, don't make my mistake of spraying clear coat on top of these decals, since it will take the lettering off. I also purchased a spark advance puller ($10), wheel trim rings ($75), engine mounts ($50), rubber trim set ($70), emergency brake/clutch/accelerator/heater cables ($183), transmission rubber boot ($55), gear linkage bushings ($15), front body to chassis seal ($15), nylon steering column bushings ($15), and piston ($125). You may find that some of these prices have now been reduced. Larry also rebuilds shocks, but expect a wait. Larry is good with parts, but his expertise is not in giving technical advice.

John Wetzel, "Isetta Johns", (201) 939-2208. Good quality parts, great reputation, and I hear that he is very good with technical advice. I have tried not to bug John by asking for advice since I figure that he has a life and probably doesn't want to spend all his time giving free advice to dummies like me. John has supplied my engine gaskets at $20 a set (oil pump and carburetor gaskets not included), ignition points cover ($40 -- you need to paint this to prevent rust), glass carburetor fuel bowl assembly ($50), reproduction battery box ($30), carburetor

rebuild kit including jets, float, etc. ($50), front and rear window rubber moldings with chrome lockstrip ($38), and other miscellaneous items. John also went out of his way to try to locate the elusive and mysterious 13mm cylinder base nuts that John Jensen refers to in his restoration book.

John Malcom, "JLM Enterprises", (10630 Riggs Hill Rd. Unit C, Jessup, MD 20794.) Very good quality parts, but expect to wait. Complete engine gasket set ($40), set of rubber drive shaft couplings ($59), carbon brush set ($12), set of brake hoses ($45), taillight rims ($40), rear bumper reproduction ($185 -- very good quality), and other miscellaneous parts.

Bill Darland, (503) 344-2518. Nice guy, good technical advice. Reconditioned my clutch assembly ($220 -- good quality work), front door seal ($40). I believe that Bill is quite active in the parts area and carries quality parts, but this is all I needed from him.

Tom McAlpin, (712) 826-8189, 102 N. 4th Avenue, Villisca, Iowa 50864. Exhaust system (muffler $75, header pipe $25, shipping $7.50). Super guy who wrote to let me know of another Isetta owner in my area. I had to cut a little off the end of the header pipe that goes into the cylinder head, but otherwise the assembly is fine.

Capital Cycle Corp., (800) 642-5100. Rebuilt my cylinder head including valve seats for unleaded gas, exhaust valve, guides, springs ($273). Good work, but be sure to call often to see how things are progressing. After they had my cylinder head for 3 months I found that intake valves had been backordered for the previous nine months, but they never called to let me know of the delay. I immediately told them to use my original valve, which was still serviceable. Be sure to let them know that the work is for an Isetta and not a regular BMW engine.

L.A. Sleeve Company, (800) 822-6005. Resleeved my worn cylinder to fit a standard size piston ($198). The work was good.

Isetta Owners Club of Great Britain, Graham Jackson, 111 Heronscroft, Covingham, Swindon, Wiltshire SN45AW, Great Britain. Prices are in approximate U.S. dollars and do not include air freight and any import duties. Speedometer cable ($24), dynastart extractor bolt ($4), gray floor carpet ($18), engine cover panel key ($3), chrome door hinges ($72), owner's handbook for British Isetta ($11), a nifty Isetta key ring ($4) and other miscellaneous seals and nuts that are otherwise hard to find. Don't forget that you must be a member of the club to purchase new and used parts. An alternative might be to locate a member of their club (not me!) and order through them. Probably many of the Isetta suppliers are members.

Pep Boys. I'm not sure if this is a national chain of car parts stores, but they are in many parts of Texas. Good source for metric o-rings and various generic stuff.

J.C. Whitney. I haven't had much luck with these people. Poor customer service and no toll-free number. When your order is (inevitably) late, back-ordered, or incorrect you must make numerous calls at your cost to rectify the problem. Sorry that I don't have a telephone number for them, but I finally threw away their catalog in disgust after a couple of bungled orders. It's amazing they are still in business.

Local Suppliers Most of the seals and bearings were available locally, although the shop I dealt with got tired of the hassle of getting the transmission needle bearings so I had to go to Houston to get them (Sepco Industries, Inc., 409 233-4491). Total cost for all bearings and seals from various suppliers for the entire car totaled $162.

Radial tires came from Discount Tire Company, and cost $36 each plus balancing, environmental fee, and chrome valves. I have had very good luck dealing with this chain.

Local suppliers provided so many of the other miscellaneous parts and supplies that it would take too long to list them all. The cost of these items wasn't so bad, but the time needed to locate certain items was unbelievable. This is why I don't mind paying a little extra to some of the Isetta suppliers to provide parts that may be available locally but would take forever to find.

Restoration

Lesson number three may sound dumb, but it always seems to work -- "If a repair is really tough and just doesn't seem to be working, stop and come back to it in a day or two." It absolutely amazed me that after an hour or two of fiddling with something that wouldn't come off or go back together right that it became really easy to do when I got back to it the next day. I guess that when I came back later I wasn't as frustrated and had some time to think about how to do that repair a better way.

Although a complete frame-off restoration would probably have made it easier to reach and remove all of the car's components, I didn't go that far due to lack of room in the garage to store the body. If you have the room, a frame-off restoration is the way to go since it's apparently not that big a deal to remove the body.

Most mechanics won't admit this to their customers, but it is sometimes necessary to really bang and pound on things to break them loose or to take them apart. I mean really bang and pound. Mechanics just don't do this in front of the customer. It seemed that on my car almost every bolt and nut and fitting was rusted together, and it can really take some banging and mauling to get things apart. A propane torch and/or "Liquid Wrench" penetrating oil can also really help sometimes.

I found that restoration can be an unbelievably dirty and unpleasant job when you are first cleaning everything up or removing parts for the first time. The worst thing for me was cleaning the underside of the body, with its years of dirt and oil embedded onto the metal. I often used a

wire brush attachment on my cordless drill to scrub off this gunk, which tended to cover me with heaps of grime and dirt. Here I learned my fourth great lesson -- "Be sure to imbibe quantities of beer and/or have a long smoke when facing a dirty job, and then you won't give a damn!" I'm afraid my neighbors may have sometimes thought my garage was on fire, but it worked for me.

Now lets look at some specific areas of the car and things that may help your job go easier.

Engine

My engine came out most easily by unbolting it from the transmission first, removing the engine, and then taking the transmission out later. Otherwise the whole assembly was just too unwieldy. Once I had the engine removed I fortunately didn't have to take it completely apart, since the crankshaft/rod assembly had already been replaced. But whoever had previously removed the cylinder apparently had trouble separating it from the engine block and had used a screwdriver to pry it loose. This didn't damage the iron cylinder base, but it badly gouged the aluminum engine block. I filed down the gouges on the engine as best I could, and have had no leaks from it since then (see John Jensen's book for a good recommendation on removing a stuck cylinder base.) Also be very careful not to damage the cooling fins on the cylinder since they can bend easily.

The existing piston in my engine was 1mm oversize, and I could have had the cylinder rebored once more at 1.5mm oversize and then used an oversize piston and rings. However, I was concerned about leaving the cylinder strong enough after taking out so much metal, so I decided to have the cylinder resleeved to fit a standard size piston. Unfortunately, once I got everything back together with the new standard piston installed I could hardly turn the engine over.

After a lot of searching I found that the end gap on one of the piston rings was not large enough (in fact there was no gap at all!), and so the piston would not move freely in the cylinder. Here I learned lesson number five -- "Always check the piston ring end-gap on a new piston, but don't break any of the rings when you take them off to be checked". There must be a special tool to remove rings so you don't break one like I did. Fortunately our local outrageously priced BMW motorcycle dealer had an old set of .5mm oversize rings available, so I used one of these rings as a replacement after filing down its ends to give the correct ring gap for a standard size piston. John Jensen's book will tell you how to check the end gap, etc.

I'm sure that you will find that one or two of the 14mm nuts that hold your cylinder base to the engine block are hard to get at by using a standard 14mm wrench. There just doesn't seem to be enough room to get the wrench around all of the nuts. Forget about finding the special 13mm case-hardened nuts that John Jensen talks about, unless the English Isetta club has them. I did find that grinding down the sides of my open-ended 14mm wrench gave me the room I needed to reach them all. Just be sure not to grind so much off the wrench that it is weakened too much.

I had a disaster when I tried to extract one of the bolts that had broken off where the coil attaches to the aluminum engine. I was able to drill into the remains of the bolt, and then used a bolt extractor to remove the remains of the bolt. Unfortunately the bolt extractor somehow got jammed inside, and somehow jammed in the hole so that the engine case cracked a little in that area.

After all the work I had done on the car this was the ultimate disappointment. A friend then recommended using a product called J.B. Weld, which comes in two tubes that you mix together like epoxy and is available in most auto parts stores. This hardens much stronger than the original aluminum, and so I covered the crack with it and have had no problems with it since then. And since the bolt extractor was securely jammed into the engine case, I left about 1/2" protruding out of the case and threaded it. This seems to work fine as one of the two bolts that hold the coil onto the engine case.

Another oil leak occurred when I got the engine installed into the car and started it for the first time. After ten minutes oil was spewing everywhere. It turned out that oil was coming from where the pushrod tubes go into the cylinder head and into the engine block, so I had to remove my freshly rebuilt engine. Fortunately the engine comes off a lot easier the second time after everything has been cleaned, but it still is a disappointing thing to have to do after spending so much time rebuilding the engine.

When I removed the cylinder I found that the push-rod tubes can be driven out of the cylinder by using a punch and hammer from the top. There is just enough metal on the tube inside the hole in the cylinder head to grab onto in order to tap these tubes out. I then smeared some high-temperature gasket maker on the tubes and pushed them back into the cylinder. I also smeared some of this stuff onto where the tubes fit into the rubber seals at the base of the tubes, but be sure not to get any globs of the gasket maker on the inside of the tubes. This fix worked fine, and I have had no problems since. Just try to do this the first time instead of having to take the engine back out like I did.

I used my impact wrench to remove the main bolt #7-5 which holds the fan and spark advance on the crankshaft. This saved me a lot of hassle by not having to rig something to the flywheel to keep it from turning while the bolt was being removed. But one thing that set me back about a month was the lack of a spark advance puller. Somehow I thought I could find one locally, since it is really just a bolt. Big mistake, since it has really weird threads for the bolt size. Larry Guerin was kind enough to supply a puller for me on a rush basis, since by that time I was getting pretty frustrated and was eager to get the restoration finished.

My fan had a few fins that were broken part way off and the base had a small 1 1/2" crack, but I thought it was no big deal. Fortunately a friend laid the fan on a piece of glass, which showed that the fan was badly warped and was unusable. It took a while to find a suitable used fan

from a supplier, and even that one had a few nicks and scrapes but was at least serviceable. Hopefully your fan is OK, but be sure to lay it on a flat surface to check for warps.

Once I had my rebuilt engine back in the car for the second time, I thought it would be best to slowly idle the engine for a long time to ease the break-in. However, an article I later read recommended keeping it at a higher speed than idle to help the oil splash around more to lubricate the parts. Not a super-fast revving, but higher than the normal idle speed.

One final note on the engine. Be sure you have a little rubber plug or something to cover the hole around the spark plug wire where it enters the cooling shroud on top of the engine. This will help to keep valuable cooling air from escaping out that hole. I would also recommend changing the engine oil at about 100 miles following rebuilding. My oil had a lot of very tiny metal particles that I didn't want being circulated for even 300 miles. And the particles will definitely circulate since there is no oil filter. I also found that a 30w break-in oil is too thin for the hot days we have in Texas and have switched to a 40w oil for now. I'll switch soon to a 20w-50 oil when the break-in has gotten a little further along. I have happily found that as my engine breaks in it has become more powerful as the tight parts seat in. With 13 horsepower I am grateful for whatever extra power I can get.

Clutch

I tried to have my clutch pressure plate #1-188 turned at a local shop, but they couldn't do it. Apparently the plate first has to be taken apart by removing some kind of steel rivets and then turned and later reassembled. I talked with Bill Darland and he was kind enough to completely rebuild the assembly at a cost of $220. The work was very well done, and I haven't had any problems with the new unit.

Carburetor

This simple little thing gave me no end of problems after I had rebuilt it with new jets, float, etc. I finally had to take it to a local shop for a $90 repair, since it would not run without the choke on and would die at the worst of times. You really haven't lived until your little Isetta breaks down on a busy street in rush hour.

The carburetor shop recommended that in the future I not use silicone gasket sealer on the unit, since apparently many silicones are not compatible with gas. They also found that my carburetor did not work well using the settings recommended by John Jensen's restoration book. I didn't find out exactly what the shop did differently from the book's recommended settings, but if you are having problems you may want to experiment some. I think that if I have any more problems with the carburetor (which is running fine now) I will somehow fit a modern motorcycle carburetor that is sized for about a 300cc engine and that should be the end of my misery. I know that the purists wouldn't approve, but at least the carburetor would be reliable and would probably work better than the original unit.

I also found that it was really hard to attach the end of the accelerator cable to where it goes onto the carburetor slide #1-137. With the spring pressure working against you, there just isn't enough cable to reach into the slide. I finally learned a neat trick, which was to grab the cable end with needle-nosed pliers and then pull the cable through the pliers while pushing up against the spring. When you have a few inches of cable coming out the end of the pliers you can then easily put the cable end into the slide. Then remove the pliers. I hope that I am explaining this correctly, and that I didn't damage the cable by doing this. At least it worked for me.

Transmission

No great problems here, except when I tried to remove the group of three gear shaft assemblies. Two of us repeatedly banged and heated the shaft assemblies to get them to budge out of the case, and then all of a sudden they shot out. When they fell out they missed the wooden work bench underneath and slammed onto the concrete garage floor. Really scary, but unbelievably nothing got chipped or broken. Just be more careful than I was or you could have a major expense replacing the gear clusters.

Some of the new transmission bearings took a while to receive, like the needle bearings. To save time you may want to order and receive all of the bearings and seals before breaking the unit down. You may also want to order two each of the seals. They don't cost much and are easy to ruin if you don't install them just right. It's not much fun to mess up one little seal and then have to wait a month for a new one. I was able to order the weird little seals #2-32 and 2-27 from the English club. They are inexpensive, so get a couple each.

One final recommendation on the transmission concerns the type of oil to use. I found that even on warm Texas days the transmission is a little balky and grinds a bit before the engine heats up. I have been using a straight 40w oil, but on the next oil change I will switch to a 10w-40 oil which should be a little thinner when the car is cold. I would also recommend that you change the transmission oil when it is warm after maybe a hundred miles following rebuilding to flush out any grit that may have gotten in during rebuilding. Do this also for the chaincase oil if you restored that component.

Chaincase and Leaf Springs

On my chaincase the seals #4-30 and #4-37 were the same size, which is not what John Jensen has listed on page 187 where he lists bearing and seal sizes. Maybe it was a typo or maybe my chaincase was somehow different, or maybe I'm just nuts, but the size he listed for the left rear wheel hub oil seal was not correct for my Isetta.

I had the leaf springs re-arched per John Jensen's recommendation. Cost was $ 42 and they work fine.

Driveshaft

One of the three mounting arms on one end of my drive shaft was badly bent and I tried to bend it back, but there was no budging it. I finally took it to a buddy who is Service Manager at a Honda dealership, and he was able to heat it and bend it back. This kind of thing was way beyond my expertise, since I think he also had to re harden it after it was bent back the right way. If you have the same problem, you may want to have a professional fix it for you.

Once I hooked up the drive shaft and couplings to the car, they really seemed to be out of line, as John Jensen describes in his book. I don't see how the things keep from wearing out after just a few hundred miles, but I guess I installed everything correctly. I did find that the metal bands which were on the outside of my rubber couplings came right off, but I guess they weren't intended to be kept on the couplings. It does seem weird that they would have been on there in the first place.

I used an impact wrench to be extra sure that I got the bolts back onto the coupling flanges that attach them to the transmission and to the chaincase. This also helped since I didn't have to secure the transmission or chaincase so they wouldn't turn while I installed the bolts. I never was able to find a lock-tab washer like #2-74, or for that matter any of the other lock-tab washers that go elsewhere on the car. Instead I usually went with regular lock washers and used lots of Loctite which I think is outrageously expensive for the tiny amount that you get, but it does seem to be good insurance. I would have preferred lock-tab washers, but I didn't know where to get them.

John Jensen's recommendation to make protective plates for where the coupling flanges may rub against the transmission and drivechain cases was good. I bought a 12" x 12" sheet of 16 ga. stainless steel for $15 and had the pieces cut for $30. It seems to be very good insurance for a common problem that can tear up these cases.

Muffler

My muffler assembly came from Tom McAlpin, and it was fine except for one thing. When I tried to bolt the header pipe onto the cylinder head it apparently didn't go into the head all the way. When I later had to remove the engine due to an oil leak, I saw that the header pipe/cylinder head joint had been leaking, since there were some black sooty exhaust deposits on the outside of the joint. With the cylinder head off I then found that the end of the header pipe that fits into the head was too long and so I could not clamp the header pipe onto the head all the way to form a good seal. Cutting a bit of the end off the header pipe solved the problem. So here is lesson number six -- "If you bought a new header pipe for your exhaust system, check that it fits properly into the cylinder head before you install the pipe". I don't think I ever would have discovered this problem if I hadn't needed to remove my engine to fix the oil leak.

There are a couple of joints near the bottom of my header pipe assembly where the header pipe joins a curved piece of pipe and also where the curved pipe clamps onto the pipe coming out of the muffler. Muffler clamps were included with the muffler assembly I purchased, but I just couldn't seem to get the clamps tight enough to prevent leaks. Later, once I was sure that the engine was mounted correctly in its final position, I drove the car to a local muffler shop and had them weld the joints at a cost of $30. The shop manager was so impressed with the Isetta that he bought a disposable camera to take pictures!

I also used John Jensen's recommendation to install a muffler heat shield. This really helps in the hot Texas weather to keep the car cooler. I bought a sheet of .063" thick 12" x 24" aluminum sheet for $9, which can be cut using metal shears. My piece wasn't quite long enough, but I was able to rig some clamps onto the rear muffler bracket to make it work.

I was able to buy inexpensive rubber muffler straps from the English club. An alternative that Tom McAlpin recommended is to cut pieces out of a tire and use them. At first I wondered about this, but I guess that tires are specially made to withstand high heat. The trick is to be able to cut through a tough tire, which often has steel belts. Just for the heck of it I tried doing this and was able to cut into a tire using a cutting tool attached to my air compressor. I cut the pieces out of the tire's sidewall, and they worked fine.

Front Suspension

Oil leaking out of the o-ring seals between the suspension casting and the swing arms seems to be a common problem, even after rebuilding the units with new o-rings. I decided that rather than having a perpetual oil leak I would drill holes through the casting and through to the inner bushings, install four grease fittings and then grease the units periodically (see picture). I don't put any oil into the reservoirs -- just grease the fittings. I'm not sure how this will work over time, but it sure beats having puddles of oil under the front end. The purists may not like this, but they can go to hell.

Once the car was running I found that when my 195 pound housemate was a passenger the right tire seemed to rub on the outside lip of the wheel well on some turns. Of course my 185 pound weight didn't help the problem. I figured that the front springs had lost some of their strength and considered having the springs lengthened a bit. However, I was concerned that this might not leave enough clearance between the top of the shock tower and the upper wheel well when I reinstalled the shock tower assembly. Instead I purchased some bushings at a local hardware store and used three at the bottom of each spring and three at the top. These bushings are about 2 1/4" OD, 1 1/2" ID, and 1/16" thick. This has helped a lot, as long as my housemate and I don't put on any more weight.

One thing that John Jensen doesn't address involves reinstalling the shock tower assembly back onto the car. I had a great problem getting the threaded top end of the shock absorber to push through the top of the shock tower so that the two nuts can be screwed onto the shock

absorber. I will now recommend something that may be the absolutely wrong thing to do and that may permanently mess up your shock absorber, but it worked for me with no apparent ill results.

I first used my homemade spring compressor (description is in John Jensen's book) on just the shock tower/spring/shock absorber assembly while they were off the car. This compressed the assembly while I watched to see that the threaded top end of the shock absorber was poking through the hole in the top of the shock tower as the assembly was being compressed. Once there were enough threads showing I screwed the nut on the end of the shock absorber (I had to make the hole in the top of the homemade compressor a bit larger to give me more latitude). I then released the compressor and quickly put the bottom of the shock absorber onto its spindle on the front suspension. I then fitted the compressor onto the whole unit and tightened it until bolts could go through the bottom of the shock tower assembly.

Here I learned lesson number seven -- "Install the two bolts that go through the bottom of the shock tower assembly so that the bolt heads face the inside of the car." This way if you ever have to remove just the shock tower assembly like I did you will not also have to remove the brake assembly, etc. to get those two bolts out. As it turned out, I initially took my incorrectly-installed bolts out as far as they could go and had to cut them off part way by using my air compressor's cutting tool, and then was able to slip out the remains of the bolts. Actually I initially had correctly installed the bolts per the parts drawings, but I think this method will work better if later repairs to the shock assembly are needed.

Wheels

My Isetta came with two split rims and two solid rims. I was able to swap the split rims for solid rims since I was going to use tubeless tires. I thought it was going to be easy to get the tires off the old split rims by just taking the rims apart, but guess again! The tires were really stuck onto the rims. One tire I had to cut off by using my cutting tool, and the other tire and rim I took to a tire store to be removed. I also needed to have two rims sandblasted. The cost to sandblast the rims and my cylinder head was $40.

John Jensen recommends using spacers between the brake drum and the wheel if you are using radial tires to keep the tires from rubbing on the shock towers. I didn't feel too comfortable using washers for this, since they didn't seem to give enough area for the wheel to seat against. Instead I had round 6 inch diameter spacers made out of 1/2" aluminum. The metal (1/2" x 6" x 13") cost $18 and the labor to cut them cost $27. I also had to buy longer studs and had these studs pressed into the front brake drums.

I bought some really nice trim rings for the wheels from Larry Guerin, but I got them after the tires had been balanced and wheel weights installed. The trim rings will not fit over the weights, so if you do buy trim rings be sure to have the tires balanced after you put on the trim rings.

I also remember overhearing Bill Darland tell someone how to keep hubcaps securely on the split rims. I think he recommended something about putting some plastic tubing over the tabs that hold the hubcaps on. You might try this if your hubcaps won't stay on.

Brakes

My brake system initially was a mess. Not only were the wheel cylinders pretty well frozen, but there was a non-standard master cylinder along with a lot of extra brake lines here and there to make the master cylinder work. One of the bleeder valves had broken off in its wheel cylinder and when I tried to use a bolt extractor to remove it I really messed things up. I then had to buy an entire new cylinder rather than being able to rebuild the old one more cheaply. I guess I just don't have the knack for using these extractors.
I took the brake linings and brake drums to a local shop to have the linings replaced and the drums lightly turned. For some reason the shop was not able to replace the linings since they were too small or something. I had been concerned that even though there was plenty of lining left, they had been soaked in some areas by leaking break fluid. Fortunately the shop was able to lightly shave the linings, and they now work fine.

Steering Wheel

I rigged a nifty steering wheel puller by using some muffler clamps along with a standard gear puller (see picture). I put some duct tape on the bottom of the steering wheel where the muffler clamp goes against it, but still a little paint got chipped off. No big deal since I was going to repaint the wheel anyway.

There were some hairline cracks where the three spokes of the steering wheel meet the outer ring of the steering wheel. I widened the cracks somewhat by using the tiny cutting wheel on my Dremel tool, and then filled the widened cracks with J.B. Weld, which I later sanded. It worked fine.

The painting of the wheel went perfectly by using John Jensen's instructions. However, there were a few tiny places where the paint didn't adhere. I was able to find some touch-up paint in the same color and dabbed a little on these spots. Now you can't even tell where these areas were touched up unless you really know what you are looking for.

Body

My battery box was badly corroded, which is a common problem. I hadn't gotten the cutting tool for my air compressor yet, so I ended up using the tiny cutting wheel on my Dremel tool to cut off the old box. Fifty little cutting wheels later I figured that this wasn't so bright an idea. In hindsight I would have used the air compressor's cutting wheel to zip that corroded box right off. There may even be an easier way, but I don't know what it is. Just don't go through a zillion little cutting wheels like I did.

I learned some lessons when working on the front door. I purchased a really nice front door seal from Bill Darland, but I messed up putting it on and had to buy another. On the first seal I had stretched the seal when installing it, so later the tension made the seal come loose in some areas. I also used a weatherstrip cement that was a yellow color rather than clear, so there was yellow wherever the cement came out the sides of the weatherstrip. This was pretty ugly. The second time went a lot better, but it was a $40-plus lesson that I hope you don't have to learn.

John Jensen talks about adding a spring booster to the door to help keep the door open. I bought a little gas strut for this, but it had just too much pressure. I was at a minicar meet in New Jersey some time ago and heard Bill Darland recommend a much easier and less expensive way around this, which is to put a little piece of wood inside the door cylinder on one end to compress the spring a little more. I found that one of the circular wood pieces I previously had cut out using a circular hole saw when I made my wood transmission alignment template was just the right diameter for this, and the door now stays open when I want it to.

Be careful when reassembling the door cylinder, since the spring is <u>really</u> strong. I am a pretty big guy and my 195-pound housemate is no weenie, but both of us together had a hell of a time pushing the two ends of the cylinder together so that they could be screwed together. I ended up putting a huge screwdriver through the eyelet at one end of the cylinder and pushing down on that against the floor to compress the assembly while my housemate screwed the two pieces together. This was a really tough job and must be impossible for just one person to complete.

I also saw a little something on an Isetta at the New Jersey meet that I would have completely missed on my car. As you are looking at the engine compartment with the engine cover removed, look at the lower left at the bottom where the body shell bolts onto a part of the frame. The Isetta I saw had a little piece of rubber here between the body shell and the frame. I guess this is to reduce stress on that part of the body shell, and it seems like a good idea.

I bought new rubber moldings for the front and rear windows and had them installed locally for $70 total. I asked if the front windshield could be polished where the wiper had scraped on the windshield, but they felt that it was almost impossible to do right and would cost a fortune.

I purchased a roll of black 1/4" adhesive-backed weather-stripping from a car parts store for use on the sunroof. I put this around the sunroof channel and also put a strip on the underside of the front of the sunroof. I'm not sure how this will stand up over time, but it seems to work so far to keep water out.

I was also able to find a 3-foot wide roll of sound deadening material (about 3/8" thick) which I cut to line the interior of the car under the door panels and on top of most of the floor pan under the seat. This came from an auto upholstery shop and is apparently used under the carpet on some cars. I used some fast-tack trim adhesive from an auto parts store to affix this deadener. It was all pretty inexpensive, and I it helps to keep noise levels down.

You can really dress up your Isetta by purchasing the various rubber trim pieces from John Wetzel or Larry Guerin. These rubber pieces along with front and rear rubber window moldings, new chromed door hinges from the English club, new front turn signal lenses, a new rear bumper and new taillight chrome trim rings have made my Isetta look like new.

Electrical

I didn't want to take any chances, so I bought a new voltage regulator. Along with a new battery this really gives me more peace of mind. Probably a false peace of mind, but I'm happy in my ignorance.

I thought I had a problem with my turn signal flasher unit since the dashboard light that flashes when the signals are activated did not seem to work when the right signal was on. All the exterior lights worked, although one front light seemed brighter than the other. I bought a new flasher unit for $10 from an international car parts store, where they told me that some of the German flasher units are similar to the Isetta's unit. I installed this new unit (part #V-W-111-953-227-D, but I'm not sure if this is a Bosch number) after figuring out which wires went to which terminals. But this unit was defective just like the old one!

It turned out that the original flasher unit was fine, but I had one of the front turn-signal bulbs in wrong so that the less-bright light bulb filament incorrectly worked with the turn signal and the brighter filament worked with the parking lights. Turning the bulb around and reinstalling it cured the problem. So here is lesson number eight -- "If your flasher unit doesn't seem to work right, first check to see that your bulbs are all working and are installed correctly".

My final electrical recommendation concerns the condenser that attaches to the coil. If you are replacing this you will probably have to solder the wire onto its end. Be sure that you don't heat this too much when you are soldering it so that the capacitor isn't damaged.

Heater

My Isetta has the old type of heater which does not have the special heater box surrounding the horizontal length of the exhaust pipe. Mine has a big rubber tube that goes from the end of the cooling shroud to an opening in the lower firewall. This rubber tube seems to be impossible to get as a reproduction part, so I salvaged my old one by using Bondo Black Flexible Part & Bumper Repair, which is a two-part mixture that you mix together like epoxy and then put onto the cracked areas. This came from a local auto parts store. It is flexible and seems to work fine and I will see how it lasts over time.

I also disassembled the black heater box that is inside the car on the floorpan, brushed the rust off, and painted the interior and exterior of the box with black high-temp spray paint. Since this heater box is made out of a cardboard-type material, it was hard to get rivets to hold when

clamping the box back together. A good solution for me was to take a 1" wide thin strip of aluminum and bend it lengthwise over the sides of the heater box, drill a few holes through it, and put the rivets through all this to hold the heater box together (see picture). The aluminum plate kept the rivets from popping through the cardboard.

Epilogue

The final weeks of the restoration got especially frustrating, like when I had to take the engine back out to fix the oil leak coming out of the push-rod tubes. It really got me down at times and I wondered if this was all just a cruel, expensive hoax that I never should have gotten involved in. I seriously doubted that I was smart enough to get even a simple car like my Isetta running correctly.

Even when the car finally was running, I was very slow to venture far from home for fear that something might break down. Many things did have to be adjusted, like the gear shift linkages so that the car would shift correctly. And I do continue to do a lot of little things to make my Isetta run better and to redo certain things that I hadn't put together right. But as I drive the car more and more, I have become more comfortable driving it all over Austin. I'm sure you will find how fun your Isetta is to drive following your restoration.

I also experienced a big payoff that makes almost everything worthwhile. If you like to show off, your Isetta will really turn people's heads. In this age where our society seems to be pulling apart, it is very heartening to see so many people smile and wave and be happy when they see you drive by. It doesn't matter if the people are burly construction workers or drag queens -- almost everyone will smile and be friendly when they see your Isetta. Children especially seem to love the car, since it is small just like they are.

The only bad thing to happen to me was pretty unusual. I had parked my newly-restored Isetta on a street near our local university where a lot of people hang out. I walked up a block to get a soft drink and as I was returning it looked like there was a big fuzzy blanket on top of the car. As I got even closer I saw that a person was lying on top of the car like he was sunning himself ! I ran up and threw him off the car. This wasn't too smart since as he was tumbling down the side it looked as though he might take off the outside rear-view mirror or the headlight. Can you imagine the nerve of that son-of-a-bitch? Fortunately nothing really got hurt except maybe that idiot's pride.

I have just a couple of final recommendations. I carry a fire extinguisher in the car, which I think is essential for any old car. A tiny little fire can quickly destroy your beautiful Isetta if you don't have an extinguisher to stop the flames. Also, your state may be similar to Texas in allowing you to use antique license plates. In Texas these plates only have to be renewed every five years and don't require that you get a yearly vehicle safety inspection. For insurance you may want to use a company like J.C. Taylor (800 345-8290) which provides inexpensive insurance for

antique cars. With this insurance you are supposed to use your car "mostly" for car club functions, but there seems to be a little bit of latitude.

I hope this article has been of help and will save you some time in your restoration. Please just be sure not to take everything I have written as the absolute truth, since as I drive my Isetta more it may turn out that some of the repairs could have been done a better way. Have fun -- it will all be worthwhile when your restoration is complete.