

## FERRARI PRE-PURCHASE EVALUATION PART 2

### Drivetrain, Chassis and Suspension

by Tom Meadows

With the inspection of the interior, bodywork and paint completed it is time to continue the inspection process to include the chassis, suspension and drivetrain. The thoroughness of this portion of the inspection should be every bit as good as the prior inspection work, and in some ways much more so. Missing a problem in the drivetrain or chassis can result in repairs that can easily reach half the car's value. Just as with the inspection of the interior and bodywork, this part of the inspection begins with a careful reading of the paper work of all maintenance records and related mechanical services.

The easiest way to understand the importance of proper maintenance on any Ferrari is to understand that the factory approaches service intervals exactly as if their cars were commercial aircraft. In some cases, at a major service, the motors are completely removed from the car for service and in most cases, parts are routinely replaced, regardless of condition at predetermined service intervals. The cost of disassembly and re-assembly to adjust the valves, reseal the motor and inspect the various components is so great that to try to save a few dollars by not replacing all the various hoses and the like during reassembly is false economy and courts mechanical disaster.

There are many little visual triggers that give the experienced evaluator a sense of how the car has been maintained that will either reinforce the paperwork, or raise flags for a second review of the service records. This is very similar to the process that experienced concours judges go through when evaluating a particular class of fully restored cars. They will walk through the cars and to their trained eye, subtle details stand out. They know from years of experience which details get left to the last minute, and if these were not addressed before the show, then they have a good idea which other areas were not addressed as well.

In the area of proper service the devil is always to be found in the details. A major service on any 308 that doesn't include a new water pump is time wasted for all parties concerned. If you see a full service billing that is about \$400 dollars less than you would expect, check to see if the water pump replacement was neglected. They have done many upgrades to this part over the years and I have a small pile of leaky factory experiments in my shop to prove it. It is these little flags that point out poor service, and by the same token there are certain indicators that highlighted an attention to detail above and beyond the norm.

For the mechanical inspection there is a definite minimum of tools required to do the job properly. The basic tools I use for an evaluation are a high grade aluminum floor jack, four top quality jack stands, and two tool kits designed for travel. One has all the electrical basics for analysis and repair, and the other carries standard mechanic's tool and some specialized measuring equipment. Mechanics are particular about their tools and I trust only my own floor jack and stands as they impact my personal safety. The stands in particular are all identical as this becomes critical to setting up the vehicle as level as possible for chassis measurements. My timing light has to be absolutely reliable and predictable in performance as it has been for the last 20 years. The same applies to my compression tester. An unknown compression tester may give you false readings either way, and you might find yourself condemning a good motor or approving a bad motor because of it. You are only as good as your tools and you must have absolute faith in their accuracy and repeatability.

With the paperwork fully reviewed and a good sense of how the car has been maintained, the next step is the first test drive. The test drive provides you with a performance baseline to verify what the service records have told you. A proper mechanical test drive in no way resembles a good rip through the mountains or ten minutes on the track. The car will tell you everything you need to know

about it at very low speeds and under minimal loads. Many of these inputs are auditory whether they be suspension creaks, brake drag, worn shock mounts, minor engine noises or wind whistle through loose rubber seals. Low speed testing can be very revealing, but it is also no substitute for a proper romp at speed.

The first thing you are looking for is good cold starting performance, particularly with carburetted cars. A car that starts and performs poorly when cold will also not perform up to spec when warm. With the car cold, bring the fuel system up to pressure, pump the throttle fully three times and the motor should light and idle smoothly.

Note that I left out any application of the choke system because in California where I live, there is no need for it. Anytime the choke is used it should be immediately returned to the off position once the engine starts. More damage to Ferrari motors has been done through misapplication of the choke than any other means. The raw fuel that is dumped into the motor rinses the oil off the rings creating a dry starting situation. This can also allow the fuel to enter the crankcase and dilute the engine oil. This excess gasoline fouls the plugs causing a misfire, which continues the cycle.

It is generally considered normal for the carburetted motors to spit or pop back through the carburetors for the first minute or two of cold running. This is usually due to a lean idle mixture, but it can also be caused by one or more tight intake valves. Once the motor is warm there should be no hesitation or spit back of any kind. The gas pedal travel should be smooth with light linear pressure requirements and no binding anywhere in its travel.

Once warmed the car should pull smoothly from idle with no hesitation, roughness, or lag anywhere throughout the full RPM range. Any of these indicators can mean the need for minor tuning or full service work on the carburetion and ignition. Properly tuned and with a good clutch, these cars will pull from a standstill with no ap-

plication of the gas at all. The car should pull top gear smoothly from 40 mph although a significant level of performance is not to be expected with this particular test.

The clutch should engage smoothly when the pedal is approximately two inches off the floor and be fully engaged within four inches of pedal travel from the floor. If the clutch releases very near the top of the pedal travel it indicates a worn clutch or serious misadjustment.

Most of the transaxle cars will not shift well into second when cold. This is normal and smooth shifts should be easily accomplished into second gear once the gearbox oil is warmed up. There should be no audible noises in any gear when warm, nor any audible final drive noises. Any crunching or need for heavy shift lever pressure when shifting up or down indicates worn synchronizers and should be noted.

Once the low speed testing is done the car should be driven for a period of time between 4000 rpm and its red line through the gears. This will fully bring it up to temperature and you should feel a noticeable increase in performance and a marked willingness to run well.

The brakes should stop the car well with medium pressure when cold and with the required pedal pressure decreasing as the brakes are warmed up. There should be absolutely no pull to the left or right when warm or cold. Any pulling under braking is an indication of a brake shoe, pad or hydraulic problem. If the pedal vibrates or seems to pulse it is indicative of out of true or worn brake rotors. The car should then be run up to 60 or 70 mph and with the hands just off the steering wheel, full braking force should be applied. The car should stop fully square with no judder, squeal, or pulling and should not require your hands on the wheel to notice this. Obviously this is quite dangerous and should be approached with caution. This test is valid only if you have chosen a flat road with no road crowning to give you false results.

The majority of older Ferraris have very little self-centering action of the steering wheel and should not cause alarm. This is the nature of their design geometry and it requires that you actively hold the car on a straight course. The car should, however, effortlessly follow small steering inputs and maintain a straight line once the wheel is lightly held in the center position. The car should have no discernible play in the center

position, and there should be no binding or stiffness anywhere throughout the full range of steering input.

Worn ball joints, kingpins, suspension bushings or transaxle mounts will show up as a tendency to wander off line at constant speed in a corner. Worn transaxle mounts in particular can be clearly felt as the transaxle shifts about under cornering loads with the throttle applied. Occasionally the internal treads in older tires will shift slightly which can also cause the car to wander. This causes the car to perform as if it has a worn suspension or poor alignment.

All of your observations about the road test should be carefully noted as the next part of the inspection will seek to find the causes of the problems.

Now the chassis inspection begins. To properly begin the chassis inspection you will need a very level concrete floor and unobstructed access twenty feet both to the front and rear of the car. Check and note the tire pressures. The car should now be placed on four jack stands with full access to the undercarriage. If the floor is reasonably level the car should touch all four jack stands equally. It should not rock or move under a fair amount of pressure. If it rocks at all it is due to it not being in contact with one of the jack stands and is indicative of some degree of frame damage. Anything over 1/8 inch is significant and is a serious flag. Take measurements from the bottom of each tire to the floor. The fronts should be equal to each other and the same with the rears.

Although it is quite painstaking to do properly, frame squareness can be tested by using a plumb bob to mark points on the floor corresponding to suspension pick up points. Measurements taken from these points, if accurately done, provide an excellent indication of the squareness of the frame.

Lie down on the floor twenty feet to the rear of the car and visually examine the frame for linearity or twist. Do the same from the front of the car. This is also a good time to check for proper mirroring of the bodywork and its panels. Some of the older Ferraris can have some serious discrepancies in this area which is normal, but any post 1977 Ferrari should be quite symmetrical in this respect. Remove the tires and perform the same inspection.

Inspect all the wheels for mechanical damage and any uneven wear on the tires. Note all the tires sizes, speed rating and the tire brand and compare them with the factory recommendations. Use a rubber durometer to measure the hardness of each tire. They

should be within two points on the scale across all four tires. Excessive hardness indicates tires that are five years old or older, which is the maximum safe lifespan for high performance tires.

Now that the car is up and off the ground with full access to the undercarriage, it is ready for its mechanical inspection. Just as with the bodywork inspection, take half an hour and position yourself in various places around the undercarriage, and just look at all the parts and pieces without noting anything or touching anything. You are trying to absorb the details of close to 400 individual mechanical parts and it takes time to get a good sense of the physical whole and the condition of the parts, and most important, those little flags indicating proper maintenance and repairs.

The first things you are looking for at this point are floor jack damage to the frame tubes or suspension members from improper jacking procedure and physical damage to the under bodywork or chassis from crashes or impacts with parking stops and the like. The importance of this part of the inspection is that in some cases, this type of damage is simply not repairable and becomes a part of the car's permanent provenance.

If you are looking at a Ferrari for investment, the provenance for a vintage Ferrari covers the car's racing history, ownership records, and critical details in its mechanical history to support its historical claims. A big dent in the frame tubes of a 250 Tour de France can be a real drawback to its value. By the same token, this type of damage may prove to be a critical identifying mark that proves the car was in a particular race or event.

Then subject of provenance should affect the inspection of every vintage Ferrari. Everything you find should be carefully documented, as the small details that surface may become critical details that can affect the car's value later on.

Much of the provenance of many Ferraris has been lost due to overzealous restoration work. Several years ago at Pebble Beach I spoke with Charles Knill-Jones regarding his work on the restoration of Nick Mason's 250 GTO, and he commented on some of the things they found when they were polishing the paint off the car in order to restore it. Their restoration team understood that each layer of paint contained critical indicators of the car's provenance and the only way to properly evaluate its history was to polish the paint off layer by layer, rather than chemically strip it. It is this kind of attention to de-

tail that should be applied to the inspection process as well.

When the visual inspection of the undercarriage is complete, using a pry bar of about two feet long, gently pry at all of the suspension pickup points, ball joints, and tie rod ends and constant velocity joints to test for wear or play. By hand, check all accessible universal joints or drivetrain parts for wear or movement. Inspect the exhaust system thoroughly for dents, rust through and quality of fit. Check the shock absorbers for leakage, worn mounting bushings and general condition. Check the engine and gearbox for gas, oil and water leaks and also general condition of fuel lines, water hoses and the like. Inspect the brake drums or rotors for wear and also assess the brake lining materials for percentage of wear remaining.

I believe the single best way to test a Ferrari's motor for mechanical condition is to have a smog test done. If the car can pass its smog test it is almost always in very sound mechanical condition. If it fails the test, it can cost quite a bit of money to bring it into compliance, particularly if any of the smog equipment is missing or damaged. A smog test on the early models, while not required, can often give you some useful indicators of engine condition and tune. For the majority of the cars I also recommend a compression test with known reliable equipment. Some mechanics prefer a leak down test but these can be very hard to do on many of the twelves with repeatable and reliable

results.

Refit the wheels, and lower the car back onto the ground. Using the factory jack, raise and lower the car to verify the condition of the jacking points. Oftentimes they will be damaged and will not allow the jack to be properly mounted, or they will be rusted to where they are not serviceable. Telltale signs for this part of the inspection are crinkling noises or jack point movement when raising or lowering the car. You should be very cautious here, because if there is existing hidden rust damage to the jack points you will damage them further with an improper inspection procedure.

You may at this point opt for a second test drive to verify performance against some of the mechanical issues you have noted. Finish up the inspection with a test of all the interior switchgear, in particular. Lighting switches and controls and you are finished.

Now that you have completed the general inspection of the drivetrain, chassis and suspension, it is now time to summarize all of your notes into a final report. This report can easily take several hours to compile and should integrate a formal check sheet with all of the written notes you made. You should also have a digital photo record of the car and any of the details that you feel are noteworthy. A complete set of digital photos is very easy to compile and a CD of these photos should go along with the written report. One nice trick with digital cameras is that you can reach under the dash or similar

areas and document the condition of these inaccessible spaces.

The final decision to buy or not should be based on an economic summary of needed repairs and balancing the overall physical condition against current market values and the scarcity of similar models. If you are inspecting for your own purchase I always recommend to take a day or two to think on all the issues involved. If you are working for a customer you may not have the luxury of that amount of time and may have to make an on-the-spot decision, particularly if an auction is involved.

If you have done the inspection correctly you will have all the information you need to make a decision. Once the final decision is made you will have that incredible experience of going out to the garage the next morning and finding a clean, sound and strong running Ferrari waiting for your driving pleasure. It is always worth the wait, and there is no better time than right now to make the purchase.

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## GIORNALE

### BONHAMS GSTAAD AUCTION

Over the years Bonhams' annual December auction at the prestigious Palace Hotel in Gstaad, Switzerland has evolved. Originally limited to Ferraris, as the supply of top-notch Ferraris became limited it was expanded, first to include Maseratis, then to its present format of "Ferrari et les Prestigieuses Italiennes."

This year's offering, on December 20th, featured 28 Ferraris among the 37 lots, and included several prestigious examples. While the top three Ferraris up for bids did not sell at the auction and originally the overall result saw just under half of the automotive lots selling, post-auction sales may improve the picture considerably. Some suggest this was a result of the current economic crunch, but in actuality all three cars had issues that kept potential buyers unwilling to pay top dollar.

The consensus of opinion among most observers of the current exotic car market

is that there is now, and will continue to be, an influx of cars becoming available. While there are still buyers out there, they want top-notch cars with good provenance at a realistic price.

Among the main attractions at Bonhams Gstaad were two Ferraris from the collection of the late French collector Antoine Midy, both of which had been in his ownership for many years.

One of these was S/N 0558 LM, a very rare example of a Tipo 121 LM (also known as Tipo 446 or Tipo 735 LM), with a 4.4-liter in-line six-cylinder engine.



The model was not one of Ferrari's most successful race cars. As a factory race car 0558 LM was driven by Eugenio Castellotti, Umberto Maglioli and Phil Hill without achieving any distinction. It was subsequently sold to Luigi Chinetti and driven by Carroll Shelby, in whose hands it scored some success in America racing before being passed along to John Kilborn.

It later passed through the collection of Pierre Bardinon, from whom Antoine Midy acquired it in 1986. He then used the car in numerous vintage events in Europe.

The auction estimate for 0558 LM was CHF4,700,000--6,600,000 (approximately US\$4,300,000--6,000,000). There was some concern about the originality of the engine. Among other factors, although the car had raced at Le Mans in 1955 there were no scrutineering stamps on the engine. This may have been a deciding factor among the bidders and the car did not sell at the auction. However, interest was such that it allegedly sold post-auction for CHF4,246,590