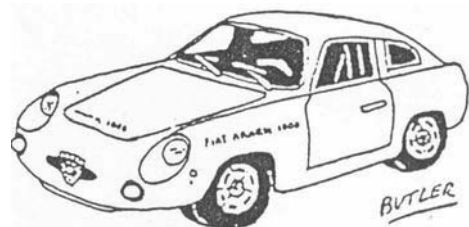
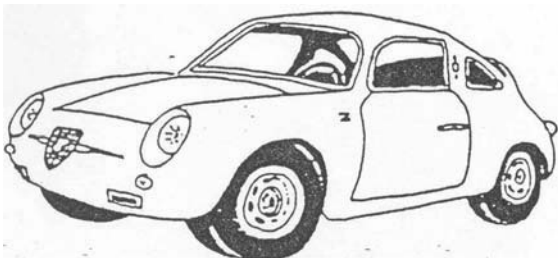
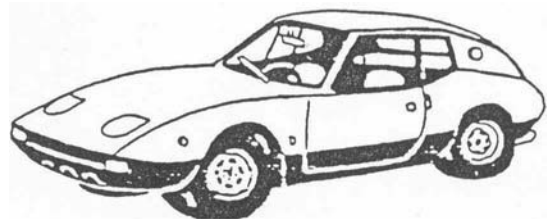
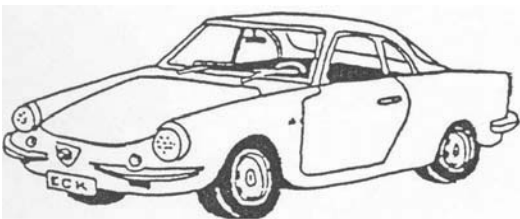


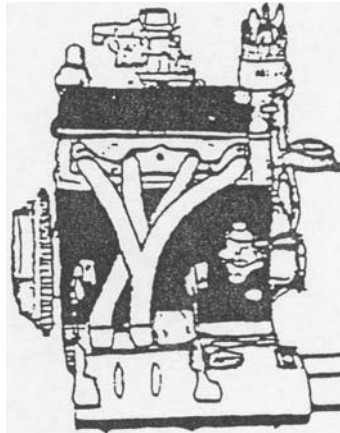
Fiat & ABARTH tricks

by GREG SCHMIDT



FIAT and ABARTH TRICKS

by Greg Schmidt



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Revised 5th

produced by Greg Schmidt with thanks to: Adrienne, Trudi, June, and Roy for production support; to Maurice Dhoore for "investigation"; to Chris Butler for the cover page; and Doc Sekito for "Good vibrations".

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Enthusiasts will also want a copy of ABARTH by Pat Braden and Greg .Schmidt, 160 pages, with 220 illustrations, Osprey Publishing Ltd., England 1983. ABARTH is distributed in the USA by Classic Motorbooks (see above & use order #F770A). ABARTH was reviewed in the September 184 issue of Road & Track Magazine on page 28. Note that about 80% of engine rebuilding, conversions & part numbers are contained in ABARTH.

From time to time, new/revised materials are produced for this book. If you would like updated pages forwarded to you, please send a post card with your name, address, and the number of the book that you have (noted in red on page 1) to: FIAT and ABARTH TRICKS 1512 E. 5th Street #94 Ontario, Calif. 91764 USA
(There is no charge for this service)

FIAT & ABARTH Tricks

I hope the information contained in this book will prove valuable to you. New material, corrections and comments are always welcome. Questions and new materials will be accepted when accompanied by a self-addressed and stamped return envelope. "MORE ABARTH TRICKS" may be forthcoming (see page 82).

With the Sporting intent,

PURPOSE

The purpose of this book is to provide a comprehensible source of technical information for owners and enthusiasts of Fiat-Abarth and other make sport cars which were derived from the Fiat 600 and Fiat 850. Special emphasis is placed on returning more of these vehicles to every day use and maintaining them with reasonable efficiency and a minimum of misspent time or frustration. So it is hoped that a few owners who have heretofore not had the opportunity and pleasure of experiencing their neat little cars in action (or on a regular basis) will be provided with enough "first-hand experienced" information (which with time might otherwise have been lost) and provided the incentive to restore them to original or updated "drivers car" condition. Because, when these cars work right they can be as entertaining as any production sports car yet offered to the driving public. And that full song high-revving engine and cat-like agility (from a vehicle of such humble specifications yet) is usually more than enough to quickly remind the owner that this is "his kind of automotive plaything"..!

The best use of F.I.A.T. and ABARTH

For conveyance and protection, it is recommended that the pages of this booklet be put in a hard cover loose-leaf binder. For heavy workshop use, clear plastic sleeve page covers can be used to protect those pages removed as reference for the job at hand. Both ABARTH (see bottom of facing page) and FIAT and ABARTH TRICKS are designed to complement each other. You should have both so they can be used hand -In -hand. Best results will be obtained by first reading (or rereading) chapters: 3, 6, 7, 11, 12, 13, and skimming the appendix of ABARTH. Then read all of FIAT and ABARTH TRICKS.

Make reference notations in the margins of ABARTH about the locations of updated, new and related information in FIAT and ABARTH TRICKS. Lastly, I suggest that you not loan this book to anyone, as even with the best of intentions, one-of-a-kind publications like this one are frequently not returned to the lender. Protect your copy and encourage your friend to purchase his own copy by giving him the ordering information on the facing page. That way I can continue to make FIAT and ABARTH TRICKS and ABARTH available to those who really enjoy these purposeful, efficient, and fulfilling conveyance devices.

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Note: Part numbers not found in these illustrations are located in "Abarth" parts interchange, or drawings in chapters 12 & 13.

Cover page:

Berlina Corsa TC
750 Double Bubble
850 Scorpione
750 Record Monza

1000" Bialbero

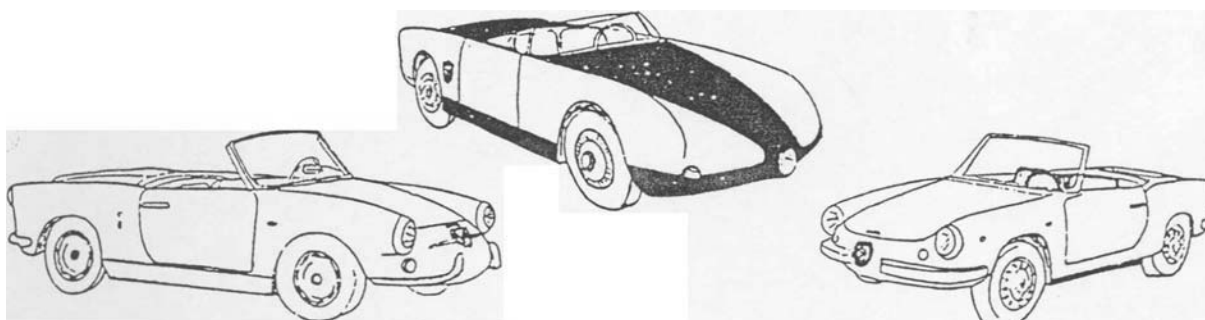
OT1000 Spider
1300/124- OT
Scorpione 1300 SS

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CHAPTER 1: OLD BUSINESS FROM "ABARTH" MISSING PHOTO

We were unable to locate representative photos of: the Spider single headlight Fiat-Abarth 210A which was the first special-bodied 600-based Abarth (See page 50 of "ABARTH"), the "ugly ducking" Allanano 750 Spider in street configuration (pages 55-56), and the handsome Allanano 850 Spider "Riviera" which was an Allemano coupe with the roof chopped off (pages 56, 58). Below are drawings of these models. Photos and information on the or 2000 coupe (850 coupe body and 2000cc Abarth twin cam with modified chassis similar to the or 1600 Sedan) should have appeared on page 84 of "ABARTH" and can be found on page 77 of this booklet.



"The Duck"

210A

Riviera

Why Are FIAT-ABARTH Cars Desirable?

What is an everyday road-going "sports car?" Perhaps a vehicle that possesses everything the sporting driver could wish for. Like: responsive performance from the engine, suspension, steering, and brakes plus lightweight, aerodynamic good looks, reasonable driver comfort and a certain "aggressive emotional flavor". Along with these forms of efficiency, I am going to add fuel economy, ease of maintenance and repair, and simplicity of design for a given purpose. Brute power (and attendant bulk) may have its place for racing or "weekend fun" but as everyday sporting transportation it leans heavily into the areas of ego gratification and over-use/abuse of resources necessary for the desired result. A true sports car gets the most it can from what it needs. Fiat-Abarths embody all of these qualities. Add to all this the fact that these cars are for the most part quite inexpensive to purchase (as classic sports cars go no.,; days), and there *is* not a lot more an enthusiast could ask for in sporting transportation....

In the case of the Fiat and Abarth sports cars, which this booklet is about, the only real issues that might be considered "flaws in the mold" would be: (1) noise and vibration levels for extended highway use, (2) relatively short-lived and fragile power unit components and accessories, and (3) poor braking efficiency on early 600-based cars. In the first case, other than using a quieter muffler, more sound insulation and higher final drive gearing, there *is* not much that can be done about it. The second is really net an issue (especially if you are a mechanical hobbyist) in that hardly a car in existence has an engine or related hardware *easier* to remove and simpler to rework. And on the third point ; it is a small matter to convert to the front disk brakes from a later model Fiat.

"ABARTH" CORRECTIONS (Sure, we made mistakes) Listed by page and location, corrected copy underlined

page

##

26 Right column middle first paragraph: described in detail in Chapter 11.

27 Middle of left column : a modern Fiat 127 cam can be used in the 850 block to change engine rotation for use in 600-00.500 Abarth conversions (see Chapter 13).

27 Second paragraph: complete cylinder head with side draft Weber two barrel carburetor, or 850 style downdraft Weber and special valves and springs for the standard head, olus high-performance camshaft and exhaust Systems.

27 Last paragraph : As to 127 aftermarket engine parts appropriate to Fiat 850 and Abarth OT1000. there is only a set of heavy-duty valve springs (There is a cog-belt camshaft drive conversion kit suitable for 600/850 based motors but it is different from a 127 kit) . The high performance 127 camshafts, while good for 850/903 conversion engines going into a 600-based car, are of no use in an 850-based car unless you have the direct drive camshaft gears to overcome reverse rotation. Likewise, the special 127 combination valve cover and intake manifold with 32/32 Weber barrel carburetor may be unusable as delivered because the float bowl will sit sideways in 600 and 850 based cars (also at a 5 degree angle in the 850-based cars). In addition, the ail filler cap is on the opposite end of the valve cover which makes adding oil difficult.

48 The last paragraph in the left column was insert here by mistake (it also appears in the right column). The following text should have been in its place: The Fiat 600 handling and heating sins proved negligible for the stock car, but critical for the Abarth-modified cars. The tendencies to roll over or over-heat were magnified when the available power was increased. They were characteristics of the Fiat 600 which Abarth never completely conquered. In view of the unqualified success of his cars as racers, he obviously solved then well enough to suit his purposes. One other design limitation that nagged Abarth was the marginal brakes of the 600. This was finally dealt with by fitting disk brakes up front on the street cars and disk all around on the racing oriented machinery.

50 Middle of the left column: Outer springs were - available in 34, 43 or 50 kg. strengths(measured at 1.25" compressed. length) or inner springs of 29 kg. could be used with the standard 24 kg. 600/750 outer spring giving a total spring pressure of 53 kg.

53 Photo caption and "Spider. Zagato" paragraph: The Zagato brothers cut off the roof and redesigned the rear body sections of their coupes to create two Fiat-Abarth spiders. The upper photo shows a 56 "topless Double Bubble", and below it a '58 "topless Record Monza". Both models used pushrod engines (no rear-engine DOHC spider street cars were made).

58 Photo caption: Perhaps the most pleasantly proportioned, available, 600-based road-going Abarth and certainly the most conformable tourer, the Allemano-bodied Scorpione Coupe came with an 850 cc., or on rare occasions, the one liter pushrod engine.

59 First paragraph: Brakes were improved by increasing the wheel cylinder diameter and replacing the hinged brake shoes with self-centering type.

60 Bottom of the third paragraph: The engine-driven fan (not the rear radiator) was removed on this model, and a short water pump was used

60 Replace the last sentence before "850 Sports Prototype" with: This car has the non-covered headlights and non-removable rear body/motor mount panel and no starter motor access panel. Front disk brakes were fitted, but nearly all other details remained identical to the original Record Monza 750 twin cam model.

63 Middle of the last paragraph: The cars which came before were simply unknown and most which came after were either too mundane (warmed over Fiat look-alikes) or too exotic and expensive.

pp.72 The third and fourth sentences should read: The 817cc U.S. smog exempt version of the 850 engine that Fiat Obtained by decreasing the cylinder bore by one millimeter (to 64mm) in 1968 to 1971 sedan models was used along with a 32mm one-barrel Weber and special : intake manifold, exhaust system, cam and finned alloy five quart sump by Giannini .

pp. 106 #8 should read: 17mm heads on high-tensile steel cylinder head bolts marked ABARTH & C" (Fiat 600 has 13mm bolt heads & Fiat 850 has 14 or 17 mm heads on semi-hardened iron bolts which are labeled "Fiat")

pp. 107-110 regarding the current value of the various Fiat-Abarth models : The prices listed are now quite low especially with the recent upsurge in classic car collecting & racing. Also, when "Abarth" was being written (1981-2), my experience had been more with the "low dollar fixer" type of car & this was reflected in my value estimates along with the fact that "being in the business" allowed me to meet many enthusiasts & hear of the base deals. Keep in mind though that a nice complete & running car can take as much time & money to restore to original as "rough basket-case" because a "nice" car will still require stripping totally to make it 100%. The only Car worth a lot of money is one that's nearly perfect....

Corrections & Supplemental. Materials for "Abarth" Technical Chapters

pp. 109 Fiat-Abarth 1300/124 OT item #3. : Reclined to 3/4 upright front radiator ; mounted & shrouded on left side of original spare tire well with Abarth grille & electric fan etc...

pp. 109 regarding engine number on cylinder block: 1300/12h number is located on right side of block near fuel pump.

PP. 109 info regarding Fiat-Abarth Scorpione 1300 S/SS : with pop-up head lights and a 1300cc pushrod version of the Fiat 124 engine. Top of pp.

110 : Was modified by Lombardi to fit the Fiat 850 chassis. The true Scorpione SS has special suspension and 4-wheel disc brakes (the Scorpione S and the 1300/124 previously listed has 850-type.....

pp.107, 113, 120, 122 all these pages mention a non existant Chapter 14. You probably realized we meant to say chapter 13 On pp.135 at end of first paragraph we meant to say: refer to chapter 12 (pp 120).

pp 113 regarding those "Larger engines for Early Abarths", GOOD NEWS : Maurice Dhoore in Belgium has investigated for me the possibilities of using currently produced readily available fiat 127/Autobianchi A112 engines of tram 903 to 1050cc in early Abarths.

These engines are closely related to the Fiat 850 but rotate in the desired clockwise direction. There are some outer accessories that need to be replaced or modified ("see pp. 59-61 of this booklet), but the engine itself would Ot require disassembly or internal modification as with the conversion outlined in chapter 13 of "Abarth". Of particular interest is the Autobianchi A.112 Abarth 1050cc engine which produces around 70 horsepower (compared to about 42 hp for Abarth 750)

pp. 113 right column 5th line should read : cylinder boring and an oversize head gasket are required for sizes over about 67mm.

pp. 114:special 9.8 to 1 pistons (altered piston pin height with full floating pin design) and rings (thin width)

pp. 114 add to bottom of page : Special Abarth Muffler - with chrome tipped twin large diameter outlet pipes -

p. 116 add to the list of "Updating for Daily Use"

- « Available battery » conversion
- Drive-line movement bar
- Clutch cable locator/center support strengthening bracket
- 850/OT 1000 diaphragm clutch conversion
- 850/OT1000 stvle cooling system thermostat conversion

pp. 118 just above "Condition of the Crankshaft", should have appeared the paragraph in the middle of the right column of page 133 (Henceforth. When referring ... etc) which is also applicable for this booklet too.

Then the following additional information : Engine rebuilding and assembly procedures are easier to accomplish if you mount front (flywheel end) of cylinder block to an engine stand that allows motor to be rotated to varying positions (especially to flip block over and back during piston insertion and rod-cap installation). Take care when mounting block to leave enough room for front crankshaft seal-housing installation.

Pp 118 and of first paragraph under "condition of the Crankshaft" : Note also that oversize Abarth bearings do not come in standard U.S. sizes (.010", .020" etc)" So double check Abarth bearings before crankshaft grinding. Finally as a general rule, most Abarth 850, 1000 and OT1000 engines use special Abarth large main bearings while nearly all pushrod motors use standard Fiat rod bearings.

pp. 119 under "The Cylinder Block" at end of first paragraph : Fiat no-longer supplies late 903 center main bearings with oil delivery hole and grooves. Therefore using Fiat bearings will negate the desirable pressurized center main bearing; so bearings made by other suppliers (like A.E.) should be used in this situation.

Note also that bearings for pressurized center mains can be used on all other 850 engines even though oil holes will ho of no functional value.

While on the subject of 903 cylinder blocks (identified by 4 bolt water pump mounting flange) note that they are about 5mm taller than 843/OT1000 blocks to compensate for increased crankshaft stroke and longer connecting rods (which allow same pistons

to be used in both 843 and 903 motors). In addition 903 cylinder head thickness is different and pushrod and distributor drive shaft lengths are longer than 843 /OT1000 pieces. Note also that 843's can be made into "903's by substituting 903 crank with 843 rods special made pistons. 817's can be bored out 1mm (or larger if desired) to make an 843 as well.

pp. 119 and 120 regarding align-honing block main-bearing saddles and connecting rod. big-ends : In this process, a very small amount of metal is ground away from mating surface of bearing cap and block or rod saddle resulting in a smaller diameter hole which is then honed or bored-out to original size specifications after cap is torqued in place.

pp. 119 just before last paragraph in left column : After good "dry" measurements are obtained remove crankshaft and lubricate bearings/thrust washers before refitting and torquing main caps. Now "flip" crank over using only your fingers on the counterweights. If it won't "spin" freely at least one-half turn, something is wrong. Loosen one main cap at a time to locate a "tight" bearing and determine the problem.

pp. 119 regarding crankshaft and end-play at bottom of left column : Proper procedure for measuring is 1. insert large screwdriver tip at one side of center main-cap and lever crankshaft away from center bearing. 2. Measure clearance at one of the end main-bearings (between main-cap end machined edge of crank journal). 3. Move screwdriver to other side of center main and lever crank in opposite direction. Take second measurement at same end main-bearing as before. 4. subtract smaller figure from larger. End-play should be .010" maximum.

pp. 119 right column 2nd paragraph 2nd sentence, (600/750 camshaft bearings are not pressed into block but held by locator bolts like the rear cam bearings).

pp. 119 middle of right column : After boring/honing cylinder, do not use solvent to clean them. Use water and detergent and then clean, oiled rags.

pp. 120 under "Pistons and connecting Rods", after first sentence : when rebuilding, .6mm (about .024") "over" your bore-diameter is usually a good safe piston size to order as it leaves room to bore again but is normally sufficient to remove grooves in cylinders caused by broken piston rings. Remember that size stated on piston box and stamped on piston crown is not piston diameter but rather the appropriate finished bore diameter.

pp. 120 figure-A should have looked more like figure-1 of this booklet (pp.84)

pp. 120 bottom of left column end top of right column OT/1000 piston pins are "full floating" and not press fit into connecting-rod as stated.

pp. 120 right. Column starting at 13th line clown should read: Most original pistons have at least a slightly stepped top- except 600, 600D, and OT1000 (sec figure-1 of this booklet) making it obvious which direction pistons must face when taking note of combustion chamber shape in cylinder head.

Note: piston or rod weights should not vary more than 1 gram.

pp 121 the end of first paragraph : If you find that piston and rod assemblies are quite difficult to install in block because piston ring installation chamber at too of cylinder bore is not exaggerated enough, use a self round-file to accomplish the desired effect your self (rather than returning to machine shop again.) Be sure to stuff rags in cylinder bores to catch motel dust. Light tapping with a hammer handle on piston crown (and some patience) is all that should be required to insert piston in bore. Incidentally, if you should ever hear a definite “snap” when installing a piston, always remove ring compressor and purchase a new ring to replace the one you just broke... As a precaution, crankshaft should be turned so that rod journal for cylinder you ere working on is in the down position. This helps avoid contact between connecting rod and freshly machined crank journal during installation. Use cheap and simple flat-cast-iron piston rings. Exotic design or alloys may break or fail to seat thus spoiling Your engine job. Ring end-gap should be .0081” to .012”.

pp.121 right column, at end of 1 st paragraph : Keep in mind that using a high performance reground cam sometimes necessitates machining off material (maybe .045" or so) from the undersides of rocker arm stands to cancel side-effects (geometry and adjustment problem). Also note that Abarth racing cams with rear roller-bearing can be installed in any block.

pp.124 the end of 1st paragraph: (600 20mm/.80"and 850 25"/1" pump gears). 600D/850 style pumps require oil-delivery tube blanking-plate to be fitted over hole in pump cover-lid/pickup when used in a 600/750 motor.

pp.124 under : "Timing Chain and Gears" see additional timing gear installation and alignment details on pp. 41 and figure 2 of this booklet.

pp.128 first paragraph: same style keepers : springs, & locator/retainer CupS

pp. 128 Second paragraph see new info pp. 6 of. this booklet regarding pp.106 #8 of "Abarth" for information about Fiat 600 and Abarth 750/OT1000headbolts. Note that 850/903 bolts are 9mm fine tread, 750/OT1000 are 100mm course thread and 600/600D use smaller 8mm bolts. Also it should be mentioned, that Fiat made special offset “crows foot” wrenches in both 14mm and 17mm sizes, thus negating the need for one oddsize (14mm) bolt head to fitted behind thermostat housing on 903 engines. Finally, when Abarth bolts are fitted with two washers, the thin brass one goes against the cylinder head surface and thick hardened steel type between bolt head and brass washer. Don' t use oil on head-bolt threads or washers as torque values will be effected.

pp.128 right column, middle of paragraph just before “The distributor should read (especially the left front cover).

Figure 7 will side in identifying and dealing with cooling system parts as described on pp 130, pp.132#11, and pp.155-136 of “ABARTH” as well as its parts interchange (pp.149,) and new materials in this booklet.

pp.131 #8 1 Note that cylinder head locator dowels are only fitted to 850/903/OT1000 engines.

pp.132 first two paragraphs Note that valve adjustment, distributor installation and timing adjustment procedures are explained in detail on pp:29 #3 and 42 of this booklet. Also note that about two three healthy squirts of motor oil from a lever-operated oil can is sufficient to aid piston ring lubrication with tight new engines.

pp.132 #10 regarding installation and adjustment of carburettor linkage : On 850/OT1000 models and conversion engines, grease linkage pivot pin on top of valve cover and install pivot arm (with cable attaching-sleeve or stud fitted), spacer/retainer washer, and clip or cotter. Fit return spring to arm and valve cover bracket. Grease linkage pivot ball on carburettor and snap on plastic socket with threaded rod and (loose) jam nut fitted. Adjust length of treated rod so that when inserted in arm hole, stop "foot" on valve cover 1/8" from touching pivot arm. Install rod retainer clip. Rock plastic socket back and forth on linkage ball and hold in position at center of travel while tightening jam nut (8mm open-end wrench). Original 600/750 engines have similar but non-adjustable throttle control linkage (see figure F pp. 138 for parts identification).

- pp.134 end of #3 should read: Maybe noisy for a street car.
- pp.134 middle of right column regarding distributor/oil pump shaft length headaches : Its possible to cure shaft length problems without disassembly of engine if motor has been put together with the wrong shaft length. If shaft is too long for your block, you can fit brass spacer washers between head and distributor housing. If your engine should ever "jump" distributor timing when you bit a pronounced clip or bump in the road, you knew shaft length is too short. Machining the base of distributor housing or making a "splined adapter" from an old distributor shaft-end end drive-shaft-end brazed together) to fit between drive shaft and distributor shaft can help take care of this little inequity,
- pp.135 first sentence of "Cooling System" has two comma's missing : three-bolt water pump_ fan_ and shroud.
- pp.136 10th line clown misspelling : or utilize a small filler/ header tank.
- pp.136 second paragraph 7th line: will require a 1" section of the 600/750 hose .
- pp.136 regarding thermostat housing and fittings for conversion engines:
see figure 7 of this booklet.
- pp.137 "Exhaust System" : See figure 8, pp, 108 drawingg, & pp. 46 of this booklet for more details.
- pp. 139 after third sentence in 2nd paragraph: see figure 5 of this booklet .
- pp.141 right column should be all-one-paragraph.
- pp.142 right column end of 1st paragraph : see pp 22. of this booklet for cable-adjustment and adapter-sleeve info .
- pp.142 right column 2nd paragraph, end of first sentence add: (note that 850 disk is a slightly larger outside diameter but will usually clear inside of 600/750 pressure plate mounting flange.)
- pp 142 1st paragraph of "Clutch" : see pp 66 and figure 9 of this booklet for diaphragm clutch conversion .

"ABARTH" Interchangeable Parts Lists : Corrections & Updates

"ABARTH"

Page	Part Description	Columns	Correction/Update
146	.. Carburetor Base Gasket	600 Notes	for Weber 26 IM
146	.. Engine Gasket Set.....	Fiat 600.....	907945 \$5.80
148	.. Tappet-std.....	Fiat 850.....	SAME(8req)
*149	.. Thermostat	A750/F600	4045626 \$16.30
149	.. Thermostat.....	OT1000/F850	4154313 \$3.30
149	.. Fan & Pu11ey Key	750&600 Notes...	delete-NLA
149	.. Hub for Plastic Fans	600 Notes ...	late 600D same as 850
149	.. Fan Cooling Shroud.....	750&600 Notes ..	delete information
151	.. Input/Clutch-Pilot Shaft ..	750&600 Notes..	late type(early NLA)
151	.. 3rd Gear.....	A750/F600	NLA(old# 875487)
151	.. seal for Inner Boot	750&600 Notes..	600D seal-40001150
*152	.. Axle Shaft	A750/F600	early 23mm axle-NLA
*152	.. Axle Shaft	A750/F600 ...	24.34m axle-4009303
*152	.. Axle Shaft	750&600 Notes..	600D axle-4061138
*152	.. Sp1ined Ax1e-Attaehing Sleeve..	A.750/F600	for 23mm-878272
*152	.. Sp1ined Ax1e-Attaehing Sleeve..	A.750/F600..	for 24.34mm-4095427
152	.. Snap Ring to Retain Axle ..	750&600 Notes..	for 24.34:mn axle only
152	.. Tie Rod Ends	750&600 Notes..	early type(late NLA)
152	.. King Pin Set	750/600/OT1000/850..	1900637 \$16.60

*152 .. Leaf Spring (Lower)Bushing..A750/F600.....	4007967	\$3.50
152 .. Leaf Spring (Lower)Bushi_g..OT1000/F850	4140008	\$6.20
152 .. Inner Front Bearing Seal ...OT1000/F850.....	SAME(2req.)	
*153 .. Collapsible Bearing Spacer..A750/F600	986842	\$1.55
153 .. Wheel Cylinder- Front	750&600 Notes..600D-4394465	\$18.20
153 .. Wheel Cylinder- Front.OT1000/850 Notes.850 Sedan-4379471		\$11.00
155 .. Fuse Box.....	F600	SAME
155 .. Wiper Rheostst	OTIOOo/850 Notes ..67-72 Spyder	

156 Revised Spark Plug Recommendation Chart:

Brand Name	Abarth 750 Pushrod	Fiat 600/600D	Abarth OT/OTS 1000,1300/124	Fiat 850 Sport A112Abarth	Fiat 127 A112
Champion	L-5, L-4J	L-7J	N-6Y	N-7Y	N-9Y
NGK	B-7HS	B-6HS	BP -8ES	BP-7ES	BP-6ES
Lodge	2HN	HN	3HLNY	25HUIT	HLNY
Bosch	W225T1	W175T1	W260T30	W200T30	W175T30
Marelli	CW-7N	CW-6N	CW-8LP	CW-78LP	CW-7LP
Abarth	AB200	AB175	AB260LY	AB230LY	AB200LY

158 .. Fiat 600 Front Grille with Emblem .. 889868 \$4.55, Upper & Lower Grille Whiskers .. 884321(4req.) \$2..90, Center Wiskers .. NLA(2req.) 158 .. Fiat 600D Hubcap. .411722?(4req#) \$12.90 159 .. Motorsport Imports .. Note: 600/850 & 127 cog-belt kits differ.

. Denotes a major error :in. "ABARTH" Interchangeable Parts List.

New Listings for "ABARTH" Parts Interchange

Page #	Part Description	A750/F600	OT1000/F850	Notes
147 ..	Connecting Rod...	88822(4req.) \$7.25	425683 \$13.5 427731 \$23.5	843 903
147 ..	Conn Rod Bolt.....	884067(8req) \$0.30	4187674 \$1.45
147 ..	Rod Bolt Nut.....	12566220(8req) \$0.55
148 ..	Replacement Pistons. 66-5765 Borgo-600D.. 66-6210 Borgo-817cc (62mm ... oversize) ... (64mm + oversize)			
148 ..	Exhaust Valve	4064702(4req) 54.15-600D(23.5mm)		<u>may</u> fit 750
148 ..	Valve Spring	898327(8req) \$1.20		..use A12/127 Abarth to OTI000(16req)
148 ..	Valve Spring- Outer.....		4208869(8req)	\$2.15
148 ..	Valve Spr_ - Inner.....		4183703(8req)	\$0.95
148 ..	Rocker Arm	991327(4req) \$5.90	4189130(.4req)	\$4.30
		991328(4req) \$3.65	4189131(4req)	\$4.30
148 ..	Push Rod	880904(8req) \$2.00	4130697	\$7.00 843
		4109429	\$2.10..903	
149 ..	Fan Shroud Clamp Ring.....		4109842	\$1.65
149 ..	T .Stat. Housing Lid/Water Outlet	4100580 \$9.05		. to mid 68
		4187098 \$6.55		.. 69-73
150 ..	Intake Manifold... _ . NLA(use aftermarket) ...	4226436		\$28.00
150 ..	Flywheel Ring Gear .. NLA(use 4113558 fly- ..)	4109024		\$15.55
	wheel complete			\$86.75)
151 ..	Speedometer Cable ... see.pp.91. of FAT		4136084	\$9.40
155 ..	Combination Light/Wiper Switches(3-inch)..	4204126		\$13.00-coupe
155 ..	Heater Fan Switch		4294181	\$2.75

160 Vandervell, Clevite, AE, Repco, & Glacier are good alternate sources .to try for Fiat engine bearings. - 160 other Abarth clubs are located in : England, Germany, France, Sweden, Japan.

159-160 ADS & PES are out of the Fiat business and most of the other listed sources no longer supply much for the early cars. See pp. 81-82 of this booklet for good new sources....

Fiat-Abarth "Bialbero" Engine

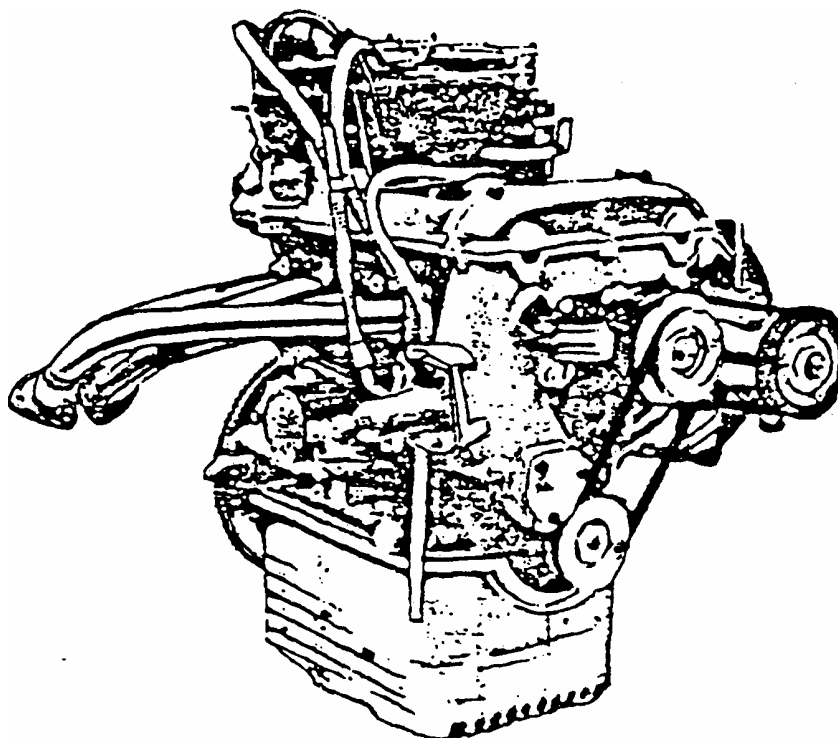
"Bee al bier o" Means 'two shaft'

In the beginning there was a dual over-head-cam Fiat-Abarth engine which utilized the basic Fiat 600 cylinder block and very few other original Fiat pieces (see figure 22 and photograph on page 12 of ABARTH). Bore and stroke specifications were altered to produce either 750 or 850 cc. This engine had dual two-barrel downdraft Weber carburettor cocked half - sideways atop short manifolds between the cams. It used the standard Fiat "long water-pump" and engine-driven fan. Next came the cross-ram manifolds, still feeding between the cams, but using dual twin choke sidedraft racing style Webers (see photographs on pages 56 and 57 of ABARTH). Finally, the side drafts were attached to short manifolds on the right side of the head to achieve a more conventional "cross-flw" style intake/exhaust tract. This engine looks quite similar in layout to an Abarth Simca 1300 (see page 80 of ABARTH). A short Water-pump without an engine driven fan was fitted for use with a front mounted radiator and electric fan. Along the way, 700 and 1000 cc displacements were adopted to suit various racing classes. Fiat cast special books for for the twin-cam and push-rod 1000 cc engines which would allow a larger cylinder bore of 65 mm. Early-on, these exotic "mini-rotors" came in the Zagato bodied Record Monza and later they were fitted to the front radiator equipped Abarth-made Bialberos and a group of small bore "sports racers".

Twin earn engine parts are very difficult t to get. I don't think any DOHC pieces have been made for about fifteen years. Some early motors use standard 600 : train and rod bearings, connecting rods, piston pins, timing chain and gears for the jack earn, water-pump and pulley, fan and shroud, generator, oil pump, front crankshaft seal rousing, oil filter canister, rotor mount, and Sate of the nuts, bolts, washers, bushings, gaskets and seals. A 600 cylinder block, flywheel, clutch, fuel pump, and oil pan could probably be made to work on the early twin cams with slight modifications. Late "cammers" use nothing that would qualify as a standard Fiat part except perhaps the oil pan gasket. Unless you can get parts "special made" (see page 82), you nay have to settle for a pushrod engine conversion....

* 1960 750 Tubolare
1962 1000 Tubolare
1965 1000SP Barchet ta
1969 1000'Millino

750 rev limit: 7000rpm
1000 rev limit: 7800rpm



750 DOHCMotor

CHAPTER 2

POWER UNIT REMOVAL, INSTALLATION, STARTING, ADJUSTMENTS, AND BREAK-IN PROCEDURES

Power Unit Removal

One of the nicest features of most rear engine Fiat and Abarth models is the ease with which the motor can be removed and handled. The removable rear body/engine mount panel allows the job to be accomplished by one person with the aid of only a small floor jack. In addition, the number one cylinder exhaust header pipe and water pump housing serve as a perfect set of handles to jockey the lightweight engine around making these vehicles ideal "hobby cars." Allemano Coupe and some Record Monza/Bialbero Models though, have a non-removable rear panel thus requiring that the motor be dropped out the bottom like a Volkswagen Bug or 356 Porsche (have you noticed that the Record Monza is almost a 3/4 scale look-alike for the old Porsche coupes) or lifted out the top. The late model Monza also has a one piece non-removable firewall panel which requires removal of bellhousing-to-engine and starter motor bolts from under the car.

For all models I recommend placing the car on a level cement surface to allow the floor jack wheels to move better when the engine is rolled out the back. Also, it is an excellent idea to remove the engine compartment lid (or at least insert a safety prop). Besides providing improved access, you eliminate the change of a poorly supported lid falling on your head. The parking brake (if operational) should also be securely set.

The following sequences are designed to be quicker and more precise than repair manual procedures ; especially if a friend reads the steps as the mechanic works.

For Pushrod Engine Fiat 600-Based Vehicles with Removable Rear Body Panels:

***Under Front Hood:**

1. Remove battery cover thumb screws. t cover (if cover is still in place). Disconnect and isolate negative cable and from battery. Remove fuel line hose (will stop tank from siphoning later) from gas tank outlet pipe and plug (a wooden golf 'T' works well) pipe and hose to avoid contamination.

***At Sides of Car:**

2. Place blocks in front of and behind left front tire. Jack car up from a point beneath right door sill and just in front of right rear tire and support chassis with a safety stand.

***From Beneath Car:**

Remove flywheel and clutch lower dust shield (10mm heads on 3 Bolts) and lower cooling /engine compartment shroud (see Figure-11, or for cars with auxiliary or front radiators, Figure-D. Page 136 of "Abarth" book),

if these tin pieces are not already missing (7mm head sheet metal screws).

Loosen oil drain plug a little (17mm socket and large breaker bar) but do not remove at this time. Disconnect bottom hose at radiator and drain engine coolant into a large pan. If an auxiliary or front radiator is fitted, remove water pump hose from car.

***From Above and Behind Car:**

On Berlina models, remove rear bumper and support brackets and/or deck lid props when fitted. Remove one lower bolt/nut/washer and then two upper attaching nuts and special serrated flat washers from studs on right side rear body/engine mount panel (power unit ground strap should be fitted to top stud as well). Unbolt muffler unit at exhaust header flange(s) and sump support bracket(s). After unscrewing exhaust trim panels (see Figure- 11), muffler is withdrawn from beneath (many muffler shroud panels have been cut away to facilitate installation of a non-standard exhaust system). After stuffing a rag in water pump inlet, removing pan & lowering car may be necessary to momentarily jack up left side of car if muffler could not be jockeyed out with right side raised. Remove sheet metal screws (7mm heads) which attach lower rear portion of muffler shroud panel (if intact) to left side of removable rear body panel. Reach under sump and remove plug to drain engine oil into a pan. Replace plug hand tight.

***In Engine Compartment:**

3. Detach distributor vacuum, crankcase breather hoses, air cleaner support strap(s) and loosen clamp ring before removing cleaner assembly from carburettor intake. Loosen both top water hose clamps and slide hose back off radiator inlet pipe. Remove large rear motor mount nut (17mm socket), washers, and upper rubber doughnut. Support engine from center of oil sump with floor jack. Remove two attaching nuts and washers and one lower bolt/nut/washer from left side of removable rear body panel. Disconnect license plate light wire (except some Berlina). Jack engine up until contact is made with body (at transaxle bellhousing) and maneuver rear body panel out of car. Immediately wrap rear panel with a blanket and store it in a safe place so it's not damaged. Lower engine to normal position, place a small jack beneath rear portion of transaxle and raise it slightly to relieve some weight from floor jack (this is important:

***Continuing in Engine Compartment:**

4. Disconnect fuel supply hose as it enters fuel pump and allow to drain into small can. Plug hose (wooden golf 'T') to avoid contamination. Detach accelerator and choke control cables, temperature sensor wire, two generator wires, distributor primary wire and high tension cable and tuck them out-of-the-way to avoid entanglement. Disconnect low oil pressure wire at sensor (600) or oil pressure gauge supply hose fitting (Abarth) at steel tubing.

Some Berlina Corsa competition models have a half dozen or so oil lines relating to remote oil filter/ cooler/pressure regulator and crankcase breathers to disconnect and plug.

***Within Passenger Compartment:**

5. Tilt rear seat forward (Berlina) or remove rear cargo area trim panels (Coupe and Spider) and then remove floor mats, carpet, and insulation padding from behind. Remove five sheet metal screws (7mm heads) securing transaxle/starter cover and carefully pry off cover (frequently stuck to body). Remove two starter attaching nuts and pull starter forward (wiring, and operating cable can remain attached if starter requires no attention) and wrap a rag around it before locating it in a secure position atop transaxle case. Remove four large (19mm heads) engine-to-bellhousing attaching bolts with lock washers.

***4-At Rear Again:**

6. Using gloves or rags to protect your hands, grasp exhaust header with left hand (palm up) and underside of water pump housing with right. Lift slightly and pull toward rear while rolling engine backwards on floor jack. Balance engine on jack before lowering and removing from jack. Run a piece of mechanics wire through an upper bellhousing-to-engine mounting hole and an available hole in firewall to hold up rear of transaxle before removing small support jack (letting transaxle hang unsupported will ruin shift linkage coupler and transmission mounts).

For Fiat 850 Spider and Coupé Based Vehicles with 850-Based

Engines (Sedan models and 'radiale' engined cars differ slightly) :

*Under Front Hood :

1. Remove battery cover plate (two plastic thumb nuts) and disconnect and isolate negative cable from battery. If optional large capacity Abarth fuel tank is mounted in front, fuel outlet pipe/hose should be disconnected and plugged.

*At Sides of Car:

2. Place blocks in front of and behind left front tire.

Place floor jack in front of right rear tire (under suspension mounting bracket), lift car until tire is almost ready to loose contact with ground, and support , chassis with safety stand.

*From Beneath Car:

Use 10mm socket with long extension to remove flywheel and clutch lower dust shield bolts (3 bolts, if intact. Note that right bolt also attaches power unit ground strap).

Remove lower cooling/engine compartment shroud (7mm head sheet metal screws) if intact. Loosen oil drain plug (17mm) a little but do not remove at this time.

Drain coolant into a pan by disconnecting bottom hose at radiator. Radiator cap should be removed after most of the coolant has drained_out. Leave the drain pan in' place for now. Water pump drain plug can removed to evacuate trapped fluid.



*At Sides of Car:

On pre-1972 Spider based models, remove bumper tip securing bolt located inside right rear wheel well (13mm socket). Remove safety stand, lower car, switch blocks to right front tire, jack up left side of car in front of rear tire and support with safety stand. Remove left bumper tip bolt.

*From Beneath:

Remove muffler heat shield bolts (7mm head sheet metal screws) if intact. Some jockeying around may be necessary to remove heat shield from car as muffler and body interfere. Lower car.

*From Rear (or sides) of Car:

On 72-73 Spider based models access to bumper tip bolts is provided within engine compartment by removing coolant recovery tank on right and access plate/windshield washer bag-holder bracket on left. With a Coupé simply loosen bumper tip retainer bolts a couple of turns with 13mm open- end wrench from within bumper tip bracket itself.

3. Detach small direct-crankcase-vent hose and larger valve cover vent tube from underside of air cleaner. Remove air cleaner lid, 3 (10mm socket) lock nuts with retainer plate, and then air cleaner housing from carburetor intake (Sedan differs). Loosen top hose end slide *it* back off of radiator inlet tube. Carefully remove fragile heater hose from thermostat housing tube (two very large well-placed screwdrivers will help to lever it off a-little-at-a-time). Remove fan shroud clamp ring (10mm socket & 10mm wrench) & peel back rubber bellows. Use white adhesive tape (especially on 70-73 Spiders and all Racers) to label wires for: stop, tail, turn, license, and backup (early 68-on) lights before detaching. Remove bumper mounting strap bolts (straps

project forward through rear body panel and are attached to sides of rear engine compartment by two special serrated locking type bolts on each side). A Coupe or Sedan bumper may now be removed by merely sliding it rearward. On Spiders, remove large nut, bolt, washers and upper rubber doughnut from rear motor mount (lower bolt head must be held with a vice grip pliers or 17mm box-end wrench to facilitate removal of top nut with half-inch drive 17mm socket /extension/ ratchet. With a Coupe or Sedan* first detach engine mount torque strut (see Figure-12) from left side of rear body panel and then remove 17mm lower spring mount retainer nut (do not remove top spring mount nut unless you plan to replace inner rubber doughnuts, spring or center stand parts). Now with all cars, support engine lightly from center of oil sump with floor jack. Remove six rear body panel attaching nuts, and special serrated flat washers (on Spiders a special ratcheting 13mm box-end wrench works well on the top nut on either side, while others can be removed with thin-wall 3/8" drive deep socket and ratchet). Jack engine up just enough for motor mount to clear rear body panel mount perch. On Spiders, wrap rags around bumper tips at sides of both rear fenders to keep from scratching paint.

* Sedans have a removable upper-rear-access-panel to unbolt first (10mm socket for 2 nuts & 2 bolts).

Now pull body panel rearward with your hands (tap with rubber mallet if necessary) and remove from car. Cover it with a blanket and store in a safe location.

*From Within Engine Compartment:

4. Disconnect fuel pump inlet hose and insert a wooden golf 'T' in hose to stop leakage. 1970 and later models with closed fuel vapor system should have gas cap removed momentarily to relieve pressure before removing fuel line. Also, fuel line usually needs to be tied or wired to left side of inner body to preclude interference on engine removal. Disconnect accelerator and choke control cables and tuck them out of the way. Drain motor oil into a pan & replace plug hand tight.

Detach two generator wires (cars equipped with alternators have 3 connections). Remove two nuts (17mm socket) and four large flat washers and pull generator or alternator rearward while slipping belts from crankshaft and water pump pulleys. Now use a 3/8" ratchet, deep 13mm socket and long extension to detach one heavy black cable and one or two heavy brown or grey wires from starter solenoid post. Use same setup (about 24" of extensions J, to remove three starter mounting nuts (a flashlight may be helpful to locate nuts). Unplug push on connector to remove red wire from starter solenoid. Three lock washers will fall on ground as you pull starter out of car. Detach temperature sensor and oil sensor(s) (Spider = 2, Coupe/Sedan = 1) wires, distributor primary wire and high tension cable (at the coil). Pull generator and temperature sensor (coil wire from ignition switch also Before 90) wiring harness forward and to the right to locate it behind radiator filler neck so that it's out-of-the-way.

5. Lower engine as far as floor jack will allow. Use 19mm box end wrench with suitable length of pipe slid onto end to increase leverage while removing two upper engine-to-bellhousing mounting bolts. Jack engine back up near its normal installed position. stuff a rag into water pump inlet & remove coolant drain pan.

*From Beneath Car:

Use 1/2" drive ratchet and leverage pipe, 19mm socket, and short extension to remove remaining two (lower) engine mounting bolts. On right side you will need just the right length extension and proper leverage to remove bolt as radiator cowling is in your way. Now support transaxle at rear with small jack and lift slightly to remove some of weight from floor jack (important).

***At rear:**

6.Using gloves or rags to protect your hands, grasp number one cylinder header Pipe with left hand (palm up) and underside of water pump housing with your right. Lift slightly and pull rearward as you roll the power unit backwards out of the engine compartment. Balance engine on jack before lowering and removing motor. Tie a piece of mechanics wire through upper left bellhousing bolt hole and fuel sensor access hole to support transaxle before removing support jack.

Next time try it for speed. About 30 minutes is an excellent time. . .

Power Unit Installation

These procedures are suitable for a fully assembled and "prepared" rebuilt (original or conversion) engine (see Chapter 12 or 13 or "Abarth" book). The preceding engine removal sequence should be consulted if uncertainty regarding installation steps is encountered.

When the motor is being installed there is a natural excitement about getting the car running for the first test drive. For this reason and as a matter of convenience, I recommend checking several items before starting the installation. In this way, you will not become rushed near the end and overlook details which might spoil or delay your job.....

Check brake fluid level, and if low, the presence of fluid leakage at master or wheel cylinders. Pump brake pedal a few times to make sure the system is holding pressure. Check battery condition (water level, charge, clean battery posts and cable connections. See pp. 56). Especially on 600-based models, use a flashlight to check inside of gas tank for rust, excessive sediment, or water. You might want to remove fuel gauge sensor, float and fuel pickup pipe/screen assembly which is sometimes clogged with rust and debris. Be very careful with fragile sensor attaching studs which are easy to snap off (use penetrating oil on them before removing nuts). If rust is apparent, it will be necessary to remove tank and have it filled .with an acid bath solution to remove scale that might later clog fuel lines and carburetor jets. (Note: Some radiator repair shops have facilities to clean fuel tanks). Sometimes a rust clogged fuel pickup screen will need to be replaced or discarded and an inline fuel filter installed to take its place. 850 based cars do not suffer these maladies as often, but it's still a good idea to check because gas tank access on these models requires that power unit and transaxle be removed first. Also make sure that you have at least 3 or 4 gallons of fresh premium fuel in the tank for initial starting and test drives (you might want to drain tank first if car has been setting a long time and fuel has "gone bad"). Radiators should nearly always have their tanks. removed and cores rodded out* at a radiator shop. Check throw-out-bearing condition by applying forward pressure while rotating bearing. Dry, rough, or sloppy bearings will require replacement. As a matter of fact, it is a good policy to always replace this inexpensive piece as a noisy bearing will require engine removal later. Grease should be applied to the surface that bearing collar slides on when in use. Check to see that operating fork-to-collar retainer clip is in good condition and properly fitted & greased. This is good time to add or change transaxle gearlube (gearbox must be level). Axles, sleeves, couplings, and axle boots should also be checked and if necessary replaced now. (See pp. 49 for axle checking and replacement procedures). Check that two transaxle-to-engine locator dowels are in place in lower engine block mounting bolt holes and use duct tape to hold upper flywheel dust shield (see Figure M, pp. 143 of "Abarth") to rear of block during engine installation.

* Note. Some radiators came from the factory with excessive amounts of solder present within their cores which restricts flow & later hastens premature clogging. "Boiling out" doesn't dissolve it!

Also: External fins are often packed With grease which blocks air flow.

If you haven't already, now is the time to fill the engine with motor oil (see pp. 37 for recommendations and procedure), Unscrew carburetor lid and lift it high enough to allow float bowl to be 1/2 filled with fuel (unnecessary if electric fuel pump is being used). Replace lid, tighten screws and wipe away any spillage. Slide new top water hose and clamps onto cylinder head outlet pipe (or thermostat housing lid) but do not tighten. Remember that car should be on a level cement surface.

Installation Procedures for 600 Based Cars with Pushrod Engines and Removable Rear Body Panels:

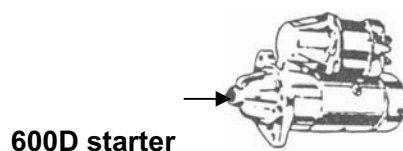
1. Block front wheels and set handbrake.

***At rear:**

Support transaxle in level position with a small jack and remove your bellhousing support wire. Place engine on floor jack and balance it with middle of its sump resting on jack. Roll engine into back of car jacking it up as necessary for clearance and finally reaching a height and level position that will allow transaxle input shaft, to enter greased crankshaft pilot bushing. Using gloves or rags for your hands, lift motor slightly by exhaust header and water pump while pushing forward and rocking engine side to side as input shaft and then locator dowels enter their final positions. (Hopefully, if taped-on, flywheel dust shield will not fall off a few times while trying to accomplish this). Frequently, input shaft splines will not be in alignment (especially course-spline Models) with clutch disc splines which causes engine to stop moving forward before locator dowels are engaged. Either moving input shaft just slightly or rocking engine from side to side while pushing forward (with transmission in gear) should solve this little problem. Care should be taken not to "hang" or rest engine heavily on pilot shaft and throw-out-bearing contact-ring (held onto clutch pressure-plate) during installation. Contact ring attachment is somewhat delicate.

***From Inside Car:**

2. Install and tighten four large bellhousing-to-engine attachment bolts (19mm) with lock washers (2 longer bolts go in bottom holes). Replace starter motor dust shield plate and then starter itself (2 nuts and lock washers). If starter was removed completely you will need to attach two electrical cables (large black battery cable and heavy brown wire: also rubber protector boot) to threaded brass post near starter control lever arm. Also control cable must be attached to the arm. Select adjustment hole in cable bracket that allows starter lever a small amount of play before starter engagement. On those cars that have been converted to a 600D starter, a conventional solenoid has replaced mechanical lever arm and an electrical wire with plug-in "bullet" connector replaces control cable and is run from a late model combination ignition, and starter switch. Lever on floor is then relegated to the role of "a trim item."



Also from inside car, check visible condition of clutch cable (broken inner cable strands or damaged outer cable housing) and watch for smoothness of operation and flexing of center support/locator plate (see Figure-10) as someone operates clutch pedal for you (initial cable adjustment may be necessary for checking purposes).

I nearly always replace old clutch cable with latest 600D improved type and beef up center support/locator plate (see Figure.10 and pp.66). Check that clutch return spring is properly fitted and in good condition. You cannot get along without this spring because it also helps to hold special cable-attachment-pin and retainer bracket (see Figure-10).

Install transaxle/starter motor access-cover-panel(five-7mm head sheet metal screws and special serrated flat washers. Larger screws necessary if Clips are stripped out). Perfect contact of cover panel rubber-sealing-gasket is essential if engine heat, fumes, and noise are kept from entering the passenger compartment. Replace all insulation padding, floor mats, and rear cargo area trim panels (4 Pivot rear seat-back into normal position on a Berlina).

*** From Beneath:**

Remove jack from beneath transaxle, leaving floor jack under engine.

***In Engine Compartment:**

3. Although on 600-based cars, generator and drive belts could have been fitted before engine installation, now is also a convenient time to do this job. When you are seated on a suitable stool, motor if located in perfect position while rear panel is not yet in place. Fit water pump belt into forward-most generator pulley groove and crankshaft pulley belt in rear-most generator pulley groove. With belts "hanging" in pulley grooves, slide assembled generator and mount bracket in position to rest upon water pump housing. Tilt pulley end of generator down to allow belts to be slipped over crankshaft and water pump pulleys. Now slide generator forward and onto bracket mounting studs. If you already have correct belts for your setup this is an easy job. See pp. 35 for proper belt adjustment procedures. Attach two generator wires (posts end connectors are different sizes to assure correct connection.) with protector boots, distributor primary wire (from D, CB, or negative post on ignition coil to distributor plastic terminal with threaded stud), and coolant temperature sensor wire with protector boot. Install new fuel pump supply hose between delivery pipe (exiting firewall) and engine. Allow enough slack in hose to accommodate engine movement. Plug-in coil high-tension wire and use tie-wraps or plastic wire loom clips to neatly route and retain spark plug wires in a manner that will avoid fouling or chafing against other components. With 600's, attach low oil pressure sensor wire with protector boot. On original Abarth, connect a new oil pressure gauge supply hose, and on conversion engines (see pp. 141 and Figure I of "Abarth") attach appropriate wires or high pressure hoses as necessary.

4. Jack engine up until bellhousing contacts body at firewall. Slide engine mount stand and large lower rubber doughnut onto rear body panel stud (see figure K, PP.141 and 143 or , "Abarth") and manoeuvre panel and mount into installed position. Fit four special serrated flat washers onto panel mounting studs, taking care not to forget ground strap attachment between top right stud and upper fan shroud mounting bolt on water pump, and pull up and tighten nuts a little at a time. Now install two lower bolts/nuts/washers attaching panel and body at each bottom corner. Lower engine and remove floor jack. Install upper rubber doughnut, large flat washer, lock-washer, and tighten nut with 17mm socket. You may want to touch up any scratches that occurred on bottom of a tin oil pan with some black spray paint.

***Note:** never allow generator wires (#67 & #51) to reversed. Immediate damage will occur....

Make sure 850-based carburetor linkage rod length is properly adjusted (bottom pp.9 for procedure). Remembering that, depending on valve cover style, some conversion engines will require shortening of throttle cable steel tube as it exits the firewall and a longer inner cable wire (see pp. 138-139 of "Abarth"). Check, straighten, or replace and lubricate accelerator cable wire (for 850-based cars see procedure.-PP.47). With rubber dust boot fitted to cable wire, slide outer cable housing-end into retainer bracket register on valve cover while threading inner wire through hole in pivot stud or sleeve (see. pp. 139 of "Abarth"). Secure outer housing-end by metal screw and plate clip (750/600) or snap ring clip (850-based and conversion). Force rubber dust boot over end of outer cable housing. When tightening pinch bolt, see that there is at least 1/8" of slack in wire between pivot stud or sleeve and pinch bolt (wire must be pulled to rear and then released to remove excess slack in cable and associated linkage). This is necessary to allow for engine movement during acceleration and shifting. As an added touch, I like to remove about 3/4" of insulation from a piece of 16 gauge electrical wire and slide it over bare cable wire end (saves you from being stabbed when working in engine compartment. Check, straighten, or replace and lubricate choke control wire keeping in mind that cable will be too short on conversion engines (see pp. 139 and Figure G of "Abarth"). Also, lubricate all carburetor mounted linkages, and inside the car; choke and throttle control pedal/pivot housings. Now slide outer choke cable into register or bracket attached to carburetor assembly while threading inner wire through choke pivot arm pinch bolt hole. After tightening outer cable retainer bolt, provide "pre-load" by lifting driver operated handle about 1/4" off of its stop. Now while holding carburetor-mounted choke pivot-arm in fully open position, tighten choke wire pinch bolt (pliers and 7mm wrench). In this way you can be sure that when you want the choke off it is off. Test the operation to see that it works fully and smoothly (see pp. 130 of "Abarth" for linkage & spring details).

Attach license plate light wire (except some Berlina models). Then slide top hose onto radiator inlet pipe (for conversion engines see pp. 136 of "Abarth" regarding top hose to radiator inlet reducer sleeve) and tighten clamps. On motors with vacuum distributor advance, install a new hose between carburetor and distributor fittings.

5. Jack car up from in front of right rear tire and support with a safety stand.

* From Beneath:

Check condition of rubber shift linkage coupler (see Figure.14 and pp. 48) and transaxle mounts (Figure-11), Watch coupler and mounts along with clutch cable center support/ locator(fig.10) as someone operates shift lever and clutch pedal from inside car. Oil soaked, softened, cracking, or split rubber parts, damaged mount brackets/crossmember, or excessive movement of drive-line(pp.68&Fig13) or cable support(pp.66) should be attended to now. Also, it's a good time to adjust handbrake (see pp. 54 and Figure-16) *if* driver operated control lever moves more than 5 or 6 clicks before locking rear wheels, adjustment is not optimum.

Install new lower and front or auxiliary radiator (if fitted) hoses and while you're at it check condition of water pipe hangers (if fitted). Fit lower flywheel/clutch dust shield (3 bolts with 10mm heads - frequently necessary to retap stripped threads and install 1/4"x20 American bolts). Install sheet metal screws that hold muffler heat shroud panel (if intact) to rear body panel.

***In and Beneath Engine Compartment:**

Using new exhaust flange gasket(s) and bolts with brass nuts and lock washers, attach muffler to exhaust header (may be necessary to raise left side of car to position muffler properly). ,Fit muffler support strap to rear bracket on original tin oil pan(or on conversions with cast sumps, attach to special made bracket - see pp. 137 and Figure E of "Abarth") and then to attachment ear at right rear corner of muffler. Install exhaust trim panels with sheet metal screws where exhaust pipes poke through the muffler shroud panel (see Figure- 11). I'd think twice about using the asbestos trim plate gaskets, as asbestos could conceivably flake off and be transmitted by original 600 style heater ducts into passenger compartment. Remove support stand and lower car (except for cars with front radiator). Make sure water pump and radiator drain taps are closed before filling cooling system with plain water (temporary). If your car has a front radiator it will necessary to either open the bleeder fitting (if provided) at top surface of front radiator or jack rear end of car up high to facilitate partial release of air bubbles from system. Do not fit radiator cap or lower cooling and engine compartment shroud (see Figure- 11) as yet.

***In Front:**

6.Connect fuel supply hose to gas tank (if removed). Check to see that all electrical switches are in 'off' position and attach ground cable to "prepared" battery (see pp. 56 and 70 regarding battery preparation and conversion). Now in engine compartment, remove distributor cap and with ignition points closed and ignition switch 'on' flip points open a few times with small screwdriver tip while watching to be sure that you have "fire" to the points.

*** In Front:**

Jack up car from center of front leaf spring and place safety stands under chassis behind each front wheel. Remove suspension splash shield (if intact) and adjust clutch pedal free-play by loosening jam nut and turning adjuster sleeve-nut until about 1 inch (or to suit your driving preference) of free pedal movement before clutch starts to disengage. If you have used a particularly thick clutch disc lining material, it may be necessary to fit a spacer sleeve onto cable-end before installing adjuster sleeve-nut and jam-nut (see Figure-10 for parts identification). Look for brake master cylinder leakage before refitting suspension splash shield and lowering car.

Installation Procedure for Fiat 850 Spider and Coupe Based Cars with 850-Based Pushrod Engines(Radiale engines differ in some details).

First read introductory installation paragraphs on *pages 18-19*. Then check condition of: 3 starter Mounting studs on transaxle bellhousing, clutch cable and return spring, transmission mount brackets (I recommend strengthening modifications - see pp. 67 and Figure-12), and engine mount perch on rear body panel (frequently Spider models will require rear panel/mount perch repair. See pp. 67 and Figure-12). Remove throw-out-bearing pivot arm and grease pivot-ball and arm socket. Late U.S. models ('70-'73) with pollution control equipment can conveniently have all smog hardware removed if a '68 or '69 model engine has been fitted to the car (see details on pp44). Fit all new fuel line (6mm fabric-braided hose) and clamps between gas tank and fuel pump supply pipe as it exits left firewall. These seldom-replaced hoses are frequently rotten and can be difficult to change with engine installed.

Installation Step #1 is same as for 600 based cars (See pp. 19).

***Reaching Forward From Behind and Below Engine:**

2. Install two (long). lower engine-to-bellhousing mounting bolts (19mm socket and extension) with lockwashers. Then remove transaxle support jack.

***From Behind and Above:**

Lower engine as far as floor jack will allow and install upper (short) mounting bolts (19mm box or open-end wrench). This is a very good time to check or replace clutch cable and/or return spring and to pre-loosen cable jam nut for later adjusting (10mm open-end wrenches) as poor access will make these jobs more difficult later. Also, cable-end threads can be sprayed with WD-40 to aid in adjustment sleeve movement. Raise engine back to level position. Install starter being sure to fit lockwashers. 13mm deep socket and very long extension(s) can be used to insert, start, and tighten the three nuts. Plug in red solenoid wire and then attach large black cable and large brown wire (or 2 grey or brown wires with an alternator) with protector boot to threaded post on solenoid.

3. Follow Step #3 - pp. 20 of procedure for 600-based cars as well as the following supplementary information. For late model cars with alternators there are four wires to attach rather than two (2 thick grey wires fitted to threaded post-also with radio suppression condenser ,wire-and protector boot j yellow w/ plastic covered female connector plugged into plastic male socket; small grey w/ bare female connector pushed onto remaining bare spade connection). Early ('66-'69 cars have ignition coil attached to rear body panel and, therefore, it's wiring must be attached later. Late ('70-'73) models also use an external ignition coil ballast resistor. See #5, pp. 35. if you have any doubts about the more complicated coil wiring on these models. (You may melt points or be unable to start car if wiring is wrong). Long coolant temperature sensor wire with protector boot is green in color and plugs into top of water pump by-pass banjo fitting retainer bolt on cylinder head. On late cars, coil high tension and primary wires should be routed through retainer/insulator gromet fitted to bracket atop fan shroud housing (these relocated ignition coils require long wires). Spiders have two oil pressure sensors (see Figure I, pp. 140 of "Abarth") and Coupes one.

To test if you have Spider sensor wires fitted correctly, turn on ignition key and if oil pressure gauge immediately pegs itself to right, you have wires switched. (Usually the wire that is slightly shorter and has a large rubber protector boot fitted to it, is the one that goes to low-pressure warning light sensor) .

4. With Spider-based models, jack up engine until transaxle bell housing makes contact with firewall. With rags wrapped around bumper tips and plastic mounting gaskets in place and located by rear body panel attaching studs, start to insert body panel/ motor mount perch into position (sometimes jack must be lowered just slightly for panel to clear muffler tail pipes). As panel is moved into place, insert mount stand sleeve and large lower rubber doughnut between panel mount perch and engine mounting bracket. (see Figure K, pp. 141 of "Abarth"). Take care not to pinch any electrical wires while pulling up and tightening 6 nuts and special serrated flat washers that attach rear panel to body. Lower engine until contact with mount perch is made and insert large mounting bolt and flat washer from beneath mounting perch. Fit small upper rubber doughnut, large washer and nut. Lower engine and remove jack. Hold bolt head from beneath with a 17mm box-end wrench or vise grip pliers and pull-down and tighten locking nut from top using a 1/2" drive ratchet, 6" extension and 17mm socket. Install bumper mounting strap bolts (special serrated locking type) loosely and jack car up one-side-at-a-time to install bumper tip attaching bolts from within the rear wheel wells ('72 and '73 models access is through inner fender panels). While right side of car is jacked up and supported with a stand, install lower flywheel dust cover with power unit ground strap attached to right side bolt (10mm socket and long extension for 3 bolts. If threads are stripped use a 1/4X20 tap and fit u.s. bolts). Then fit a new lower radiator-to-water pump hose and clamps. On '67-'69 models attach stop/tail/turn wiring by plugging in plastic sockets on either side of the engine compartment. License plate and backup light wires (brown and yellow) should have their individual spade connectors pushed together and rubber insulator sleeves forced over them (it is easiest to slide insulator sleeve over "male" end and pull it back before pushing connectors together. Then lubricate connectors and sleeve with WD-40 to allow sleeve to slide over connector. If you have a '70-'73 Spider) and you marked lighting wires with tape on disassembly you are in good shape when refitting them. If not, see pp. 58 for hookup diagram and don't forget to replace six square protector boots while you're at it.

On Coupe models, mount bracket, spring assembly, and engine torque strut should be fitted to engine in one piece (see Figure- 12). With engine jacked up, slide rear panel (with body gaskets fitted) into body and draw up and tighten nuts with special washers. Lower engine, remove jack, install lower flat and lockwasher and tighten nuts. Attach torque strut to left inner rear body panel using 2 rubber gromets, steel spacer sleeve, through-bolt, lockwasher, and nut (see Figure- 12). Install rear bumper (4 special bolts at sides of engine compartment and 2 pinch-bolts for outer tips) and attach license plate and backup light wires. Jack up right side of the car and fit flywheel dust cover, ground strap, and lower hose as noted for Spiders.

***Within Engine Compartment (and if necessary, Within Passenger Compartment):**

'66-'69 Coupe and Spider Models can have ignition coil/distributor wiring attached now (see #5, pp. 35 for coil wiring detail.

Follow carburetor and choke control cable attachment directions detailed in Step #4 of 600-based installation procedures. (pp.21), noting that 850-based throttle pedals often develop a lot of play in them before carburetor actuation is accomplished. The lever arm is staked onto the end of throttle pedal pivot shaft where it pokes through center (shifter) tunnel near driver's right foot. It needs to be removed (see pp. i7) and welded without getting it hot enough to melt the plastic pivot bush/ bracket. Carefully inspect heater hose where it slides onto thermostat housing tube. Often, end of this hose is split

from impatient removal, crystallised from heat, or smashed by original wire-type clamp. Pull hose a little further out of firewall and carefully trim off about the last 5/8" of damaged end. Now slide hose onto thermostat housing tube and fit new American style clamp. Install a new top radiator hose and clamps. Force rubber fan bellows over lip on radiator shroud and install large wire 01amp. Fill cooling system with normal tap water but do not fit lower cooling shroud and muffler heat shield or radiator cap yet. If *you* are retaining pollution control equipment on '70-'73

model cars, hose attachment details are provided on pp. 45 .

5. Jack car up in front of left rear tire and support with safety stand.

***From Beneath :**

Inspect transmission mount brackets for splitting or spot-weld failure (see pp. 67 and Figure -12. for repair and strengthening modifications). Shift linkage rubber coupler should be watched as shift lever is moved slightly forward and back. If coupler moves more than transmission shaft, check for worn pivot sleeve or attachment hole in coupler (see Figure-15).

Now see that shift lever is in a perfect perpendicular position when car is in neutral. If not, 2 coupler clamp-bolts can be loosened and shifter moved to perpendicular before retightening. Watch for excessive drive train movement as clutch and shifter are operated and check rear body panel/engine mount perch for spot weld failure and torn sheet metal (see pp. 67 and Figure-12 for repair and modification details). Lying on your back in front of rear tire, use 13mm ratcheting box-end wrench to adjust handbrake (long threaded rod at rear of shifter tunnel) so that rear wheels lock at about five clicks of lever movement. Still on your back but now beneath muffler, use two 10mm open-end wrenches to adjust clutch pedal free play. Move threaded adjuster sleeve on cable-end (attached to operating fork in bellhousing) until adjustment is achieved (1 inch pedal free-play or to suit driver). Note also as pedal is operated, if left side of center tunnel (near driver's right foot) moves or groans. This problem can be cured by strengthening the area where cable pivot pin attaches to inner tunnel (see pp. 67).

*** At Front :**

Check that all electrical switches are in 'off'" position and attach ground cable to "prepared" battery (see pp. 56).

Make sure to fit positive cable-end insulator boot and install battery cover plate (2 plastic thumb nuts and rubber washers). Check to see that you have "fire" to ignition points (see #6 - pp. 22 of procedure for 600-based models).

Starting, Adjustments, and Break-In Procedures

Quite frequently, with a freshly rebuilt "tight", engine, nothing short of a brand new starter and battery will turn things over fast enough (or at all) for these motors to start. It's not that the engine is too tight but that this starter is just not a very strong unit even though it may have started a previous "loose" motor just fine. It is normally necessary to tow the vehicle with another car or hand push it down a moderately steep incline. If your car has external oil lines and remote filter end/or oil cooler, it is highly recommended to crank or tow the car with spark plugs removed until oil pressure shows on the gauge. On engines without external lines, it's up to the individual whether to develop oil pressure before attempting to start. If you have a 600/750 motor with paper element oil filter, be sure to fill the canister with oil before fitting the lid (see Figure 3) for filter parts-breakdown). Pump brake pedal again a few times to make sure everything is still in order. An operational handbrake is a big plus during pull/push starts. A horn and stop lights might come in handy too.

"Starting Drill" for All 600 and 850 Based Cars

1.If you are going to pull it, tie a fairly long rope around front leaf spring-to-chassis attaching brackets. Don't even think about "pushing it with another car" and with an aluminium bodied model, caution your helpers to be very careful where they apply pressure if hand-pushing.

2.With a screwdriver, scratch a reference mark across joining point of cylinder head and distributor housing (if not done earlier). Adjust idle mixture needle screw out 1 1/2 turns off its seat. Adjust carburetor idle stop screw in about 2 1/2 turns after it starts to make contact. Place screwdriver (for idle and mixture adjustments), open/box wrench (to move distributor for timing adjustment), a glove or small rag for your left hand (to rotate distributor by its cap), and a jug of water next to you on passenger seat. Full choke fully out and make sure it is opening and closing properly. Turn on ignition switch and see that generator and oil lights (if fitted) are on. Place car in third gear and push clutch in.

3. After slack in rope is taken up, have driver of tow car pull away slowly and wait until he has reached about 10 miles per hour. Let clutch out and give a small pump or two to accelerator pedal.

4.If everything is right the fact that you have "primed" carburetor float bowl beforehand should allow car to fire immediately.

As soon as it does catch and start to run, shove in clutch while operating throttle. At same time, honk horn or stick your left arm out of open window to signal driver ahead that car is running and start to brake in relation to how quickly the tow car is stopping. If you are having trouble keeping it running with throttle pedal, a handbrake stop will make things a little easier (you won't have to move your foot from throttle to brake pedal). If you didn't use handbrake to stop, apply it not and shift gearbox into neutral. Engine should be idling very fast and no doubt misfiring considerably. Look at oil pressure gauge or tight to be sure you have pressure (cold starts should show at least 50 lbs. with a new engine).

If no oil pressure is indicated, shut off engine immediately and investigate. Don't be alarmed about all the smoke coming from rear of car. It is only the oil you squirted into cylinders being burned and paint/oil residue smoke off of exhaust headers. If someone is available, have them operate throttle linkage in engine compartment (if necessary to keep engine running) .

5. Grab your screwdriver, wrench, and glove/rag and run to back of car. Adjust idle speed down a little as engine allows and if possible try to open choke linkage a-little-at-a-time conditions permitting. If you are able to open choke fully and lower idle speed to around 1500 RPM within a minute or so, you are in position to make some preliminary adjustments by turning idle mixture needle screw in and out and loosening and rotating distributor back and forth (use glove when moving distributor by grasping cap) a little to eliminate misfiring. Keep adjusting idle so that it stays around 1500 RPM.

Optional

If you cannot open choke without engine immediately wanting to stall or can barely even keep it running with choke fully on, try slowly loosening idle-jet retainer brass screw (see Figure 5 for 30 DIC 2-barrel carb models) off its seated position anywhere from 1/32 to 1/3 of a turn. If idle speed goes up immediately at any particular position, idle jet is, either plugged, a larger jet is required, or you have a vacuum leak (see pp. 129-130 of "Abarth" and pp. 43 of this booklet for details).

6. Look under car for signs of oil, fuel, or water leaks (stop engine to investigate if leaks are noted remembering that any water pump seal leakage may cure itself in a day or two). Be especially careful that cars with front or auxiliary radiator have run long enough to open their thermostat (if fitted) and/or purge themselves of air bubbles. If motor seems to be running well enough, try driving car around the block (don't get too far from home yet) 4 or 5 times while keeping an eye on water temperature and oil pressure gauges. Don't let water temperature get above 200°F or do any hard acceleration. While driving, note any irregularities regarding driver controls (shifter, clutch, throttle, brakes, steering, etc.) that should be attended to when you return (see Chapter Three). Back car up to your work area, recheck water level, check condition of radiator cap before fitting, adjust idle down to around 1200 RPM (if possible) and play with fine idle mixture needle screw, stopping just before idle speed shows any sign of faltering or slowing down while turning screw in. Remember to keep a close eye on water temperature (200°F maximum) while completing final tuning adjustments.

Final Adjustments

1. With the possible exception of primary-side idle jet on 2-barrel Weber 30 DIC carburetors, standard jetting should be just right as fitted for any stock Fiat or Abarth engine/carburetor setup. If you have modified the engine (cam, compression, head work, or alternate carburetion) see *Race Preparation*, Chapter 6 (pp. 19) for rejetting guidelines. If you have a good distributor, I have found that the best way to set final ignition timing is "by ear." With glove on your left hand, grasp top of distributor cap as you start to loosen distributor housing clamp nut.

As you slowly rotate distributor counter-clockwise (more advance), engine speed will increase until a very definite misfiring occurs. Now slowly rotate distributor clockwise (retard) until engine almost stalls. Final timing point will be found when distributor *is* rotated from retard (stall) position 1/4 of the way back (counter-clockwise) towards where misfiring is pronounced. Sit on a stool and play with timing for a few minutes *until* you are satisfied that you have found the spot to lock distributor housing in place. You will realize that the point at which engine runs best and idles fastest is not the proper place to set timing as engine will be slowed down considerably from fastest idle when properly positioned. Look at reference mark you scratched on cylinder head/distributor housing base and don't be surprised if these "static timing" marks are now 1/8" or less from each other if you used the recommended setup procedure (see pp.42).

Now drive car around the block another half dozen times. As a quick double check of timing, try going around, end accelerating lightly out of a fairly slow (900) corner in third gear. If engine "pings" badly (fresh premium fuel is a must for this test), it is a sign that you have too much advance. Although excessive retard may spoil best acceleration, idle, and starting performance, too much advance can really be detrimental to engine life (especially if you lug the car up hills without enough momentum (see pp. 118 of "Abarth").

2. *When* you return to work area, place a large piece of cardboard on ground under engine (extending from crankshaft pulley to beyond flywheel. Try some additional adjustment of fine idle mixture and idle speed screws. A good idle speed is 1050 to 1150 RPM (never mind that the Fiat manual says). Below 1000 RPM, idle may be irregular and prone to stalling while over 1200 RPM you frequently encounter detonation or "running-on" after ignition is shut off. Note gauge readings for oil and water and turn off ignition key. Remove cardboard and inspect for signs of oil leakage. A fine spray of droplets on pulley end is normally from timing cover oil seal or centrifuge (if fitted), and on flywheel end it denotes front seal problems. Now is the time to find and stop leaks, as later-on after more driving, oil will be blown around making location of the source more difficult (see pp. 37 for common oil leaks).

3. If your starter and battery are decent, you should now be able to restart car and put 15 or 20 miles on it (no dusty conditions without air cleaner though). A good break-in procedure is to drive car at about 35 miles per hour and then accelerate relatively hard (not full throttle though) to 55 miles per hour before backing off to allow deceleration to 35 miles per hour again. Do this about 10 times during your drive. Remember to monitor temperature and oil gauges carefully (see pp. 126, last paragraph of "Abarth" for acceptable oil pressure readings). Park car for the rest of the day. Cover carburetor air intake and set engine lid (if removed) in place.

Cylinder Head Retorquing and Valve Adjustment

I have found that, despite the extra work, retorquing the head after the first time the engine has been brought up to operating temperature is a really good idea.

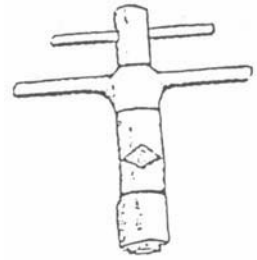
1. With engine cold, check oil and water levels before draining cooling system (drain top or plug fitted to bottom or front of lower radiator tank or detach lower hose at radiator).

Unclip cap from distributor and set it off to right side of cylinder head. Disconnect fuel and emission line(s) at carburetor and plug hose(s) with a golf 'T'. Detach throttle cable linkage rod at carburetor. Be very careful on 850-based cars while using a screwdriver to lever delicate plastic ball-socket off (keep screwdriver tip as close to socket as possible to avoid breakage). Then remove linkage pivot arm cotter pin (600-based) or retainer clip (850-based) and upper spacer washer. Pull off outer cable housing dust boot (if fitted) and remove retainer plate (600) or clip (850). Lift pivot arm off valve cover pivot pin while detaching throttle return spring and pushing outer cable forward and out of holder bracket on valve cover. (When done in suggested manner, cable adjustment will not be lost). Tuck cable with attached linkage out-of-the-way. On some cars, you will need to detach choke cable before removing carburetor and drip tray (if fitted). On other models, carburetor can be unbolted (600-based= 2 studs, 850-based=4 studs) without cable detachment and moved to an out-of-the-way position thus avoiding readjustment of choke control cable as well. 600 or 750 cylinder head water outlet and hose may be left intact, but 850 and OT1000 style thermostat housing (2 or 3 hoses connected) will need to be removed (unless you have the special "crow's-foot" off-set wrench formerly sold by Fiat in 14mm and 17mm sizes) to gain access to headbolt behind it. Use speed wrench to remove valve cover hold-down nuts and then carefully lift cover (large screwdriver tip sometimes helpful to lever it off when stuck to gasket) just enough to facilitate removal of washers from 4 studs (magnet probe may help; 600/750=4 lock washers, late 600D/850/OT1000=4 lock and 4 hold down plate washers). Use socket to remove 4 rocker stand hold down nuts and washers a-few-turns-at-a-time and pull off rocker assembly.



2. Starting in center of head and progressing outward in a spiral pattern, torque ten head bolts (one is inside intake manifold port) to 38 to 40 ft. lbs. (600/600D engines only=22 ft. lbs.). Then torque a second time, as center bolts frequently loosen up when outer ones are tightened. Replace rocker assembly, flat washers, and lock nuts, pulling down nuts a few turns at a time while making sure that all adjuster studs stay properly located in push-rod sockets. Torque locking nuts (600/750/ early 850 sedan with 8mm studs using 14mm socket=15 ft. lbs. 850/OT1000 with 10mm studs using 17mm socket=25 ft. lbs.)

3. Valves must now be readjusted (see specifications on pp. 132 of "Abarth"). I like to loosen all jam/locking nuts with a socket wrench before beginning valve adjustments. It saves time, and also when job is finished, if you have any doubt that all valves have been adjusted, simply attempt to rotate each jam nut with your fingers as a final check. To obtain proper adjustment, loosen jam nut 1/2 turn, unscrew adjusting stud 1/4 turn, insert feeler gauge, turn adjusting stud back until nearly as tight as your fingers can accomplish, spin jam nut down with fingers and tighten with open end wrench. Frequently, adjusting studs will not even need to be held with tools to stop them from moving as jam nut *is* tightened. A small- adjustable (crescent) wrench or pliers can be used to hold>-studs if your fingers are not enough though (special Fiat adjusting tool was formerly available). If gauge is too 10088 or tight now, try again. I find it easier to provide a relatively heavy drag on gauge when finished. Each adjustment should naturally have about the same amount of drag on gauge as the others.



Adjustment Sequence:

With transmission in neutral, use a ratchet and socket on generator pulley nut to turn engine over in direction of engine rotation (some people will find this job easier if spark plugs are removed). You will need to apply finger pressure to belt on right side and beneath generator pulley to stop belt slippage on clockwise motors (600-based cars) or from left side of pulley and on top of belt for counter-clockwise units (850-based). Turn pulley until #4 cylinder valves are rocking (exhaust just finishing closing and intake, just beginning to open) and adjust both valves of cylinder 1. Continue in sequence with: #2 rocking, adjust #3; #1 rocking, adjust #4; #3 rocking, adjust #2.

4. Replace thermostat housing and hoses (if removed), valve cover, carburetor drip tray (if fitted) and gaskets, carburetor, distributor vacuum hose (if fitted), throttle cable with linkage and spring, choke cable (if removed), fuel line(s), distributor cap. Test for proper choke operation.

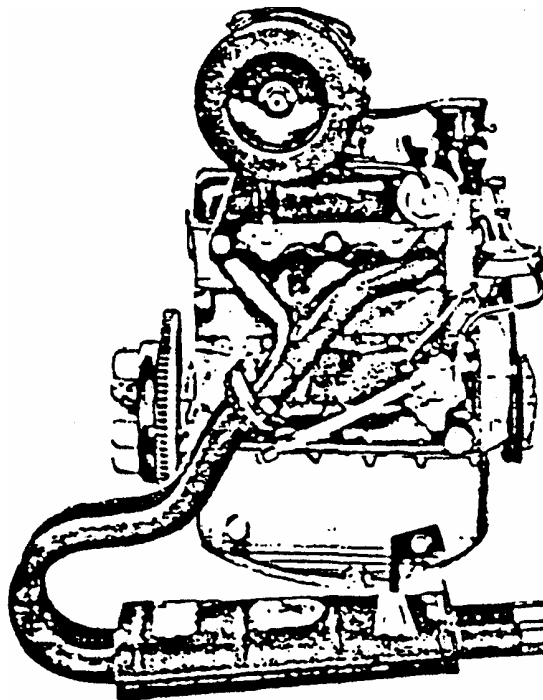
5. To install 850/OT1000 Coupe or Spider air cleaner, first slide a piece of new fuel line hose onto intake manifold fitting for direct crankcase breather valve leaving the other end uncut to length for now. Slip valve cover breather hose (with internal flame-trap screen fitted) onto large tube fitting on underside of air cleaner assembly. Drop 3 spacer sleeves onto carburetor lid studs (retap stripped stud threads and use 1/4X20' U.S. studs or bolts) before lowering air cleaner body with rubber gasket fitted, onto studs as breather hose is pushed over tube on valve cover filler neck. Fit large retainer plate (sometimes necessary to straighten plate with hammer on a flat surface) and then install three locking nuts (10mm socket) being careful to not over-tighten and strip threads. Bend three retainer tabs on air cleaner lid inward, hold new filter element in place, and bend tabs back to hold filter in place. Place lid on air cleaner assembly and attach 3 hold down clips. Carefully route direct-crankcase-breather valve hose around throttle linkage and cut to length before fitting to remaining (small) tube on underside of air cleaner assembly. Snap carburetor fuel line into clip on right underside of cleaner assembly (see Figure 6 for parts identification).

600/750 & 850-Sedan air cleaners slide over a round rubber seal that sits on top of carburetor intake/air horn. 600-based types have a clamp-bolt to be tightened and attachments for two small crankcase breather hoses (one from valve cover, one from cylinder block). 600, 600D, and 750 all use different filter elements. 850 Sedans use same style valve cover breather tube (with flame-trap screen inside), direct-crankcase-breather hose, and filter element as 850 Coupe and Spider (see paragraph above). All types attach support strap(s) to (longer) exhaust header mounting stud(s) and 850 Sedan has an additional mounting bracket that attaches to a stud "ear" cast onto side of carburetor assembly. (Again, see Figure 6).

6. Check belt tensions and readjust if necessary. Close radiator drain top or refit bottom hose, and if there are no water leaks, fill cooling system with a mixture of 50% permanent type coolant and the rest distilled water. Start engine (If engine doesn't turn over fast enough to start now, you probably have a bad starter motor and/or battery.) noting any obvious/excessive valve noise and add coolant as necessary to compensate for air bubble evacuation during warm-up (take special care for cars with front or auxiliary radiators) before replacing radiator pressure cap. On 850/OT1000 models (not OTS or OTR) fill plastic coolant recovery tank about 1/2 full of coolant. While on the subject, you can clean inside of plastic tank by tossing a handful of nuts add some solvent into tank and shaking vigorously while covering filler/outlet holes with your palms. Step Two is to replace solvent with soap and water..

7. Finally, if no fluid leaks are apparent) install engine compartment and cooling system shroud (see Figure 11" and Figure D pp. 136 of "Abarth") on right side and with 850-based models, also muffler heat shield on left using 7mm-head sheet metal screw with special serrated flat washers.

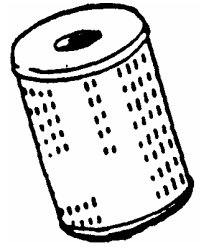
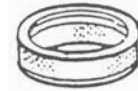
You can drive car normally now, but do not maintain *any* given speed on the highway for more than 4 or 5 miles at a time and refrain from drag-race starts or full throttle acceleration for about five hundred miles ; at which time you should change the motor oil (with engine hot). Some people like to retorque cylinder head and adjust valves at this time also, but those who recommend this, have normally not done these jobs just after the first time car was driven. If you don't mind the extra work though (and it will help you sleep better), go ahead and da it a second time.. As motor continues to loosen up during break-in period. idle speed should be adjusted back down to around 1100 RPM.



Fiat-Abarth 850 TC Power Unit



CHAPTER 3



MAINTENANCE, ADJUSTMENT, AND REPAIR PROCEDURES

Fiat and Abarth Routine Maintenance Checklist

Suitable after engine break-in is completed (at 500 miles, vehicle is in good condition, and being used as regular transportation. If maintenance history *is* unknown and restoration not planned, do complete checklist when you obtain the car.

Daily:

Check operation of dashboard warnings lights and gauges (especially oil pressure, coolant temperature and charging system).

Weekly

Check coolant and oil levels with engine cold and watch for signs of fluid leakage beneath car. Coolant recovery tanks on 850-based cars should remain about half full. If the tank is near empty just a few days after refilling several times, look for blown head gasket or defective or incorrect radiator cap.

Monthly :

Check battery water (especially in hot weather) and brake fluid (if low check for signs of master or wheel cylinder leakage) levels, tire inflation pressures (see PP.55) and wear characteristics (uneven wear could mean wheel alignment is out of adjustment), condition of wiper blades (you sure wouldn't want to scratch that expensive windshield because of defective wipers), generator and water pump belt tension (see pp. 35), and windshield washer fluid level (always keep reservoir filled on late cars with rear mounted washer bags as empty plastic bags are easily melted due to close proximity of exhaust headers). If heater (850-based cars) has not been used this month, drive car for a few minutes with heater water-valve open. Change DOHC engine oil filter every 1500mi.

When Evident:

Adjust (or repair) brakes (600/750 front and rear, 850/0T1000 to mid-1968 rear only) when too much pedal movement or poor braking efficiency are noted. Adjust handbrake (5 clicks optimum). clutch:" throttle, choke, or shifter controls when effectiveness is reduced. Investigate steering and suspension noise, play or stiffness of operation and brake noise or spongy pedal on application. Keep engine clean by utilising coin-operated car wash to spray hot soapy water throughout engine compartment from above and below. Plastic bags should be tied over distributor and air filter intake. After rinsing, drive car home and wipe everything with clean, dry cloth. This keeps things nice, aids in repair work, and allows source of an oil leak to be spotted immediately.

Every 2500 to 3000 Miles:

Change engine oil and filter element (if fitted) (centrifugal filter should be cleaned about every two years or 25,000 miles). Grease two front suspension king pins, 6 steering tie-rod-ends (600-based only). Adjust greaser cap on distributor in 2 or 3 turns (600 based). Check air filter element if conditions are dusty and replace when necessary.

Every 5000 or 6000 Miles or as Required: .

Do a tune-up (see pp.33). (Poor performance, starting, idling and fuel economy are signs that it's time to check things out). Retorque cylinder head and adjust valves (see pp. 29&30).

* see pp.22 for 600/750 & pp. 25 for 850/0T1000 clutch adjustment.

Every 10 000 to 12,000 Miles or Yearly: Retorque head and adjust valves with engine cold: Replace in-line fuel filter (if fitted), check fuel and emission lines and if necessary replace with new 6 or 8mm fabric-braided neoprene hose and new clamps. Check freeze. plugs/water hoses and drain coolant. If radiator interior shows debris lodged in ends of tubes (seen through filler hole) remove radiator and have it rodded out. If exterior fins are plugged with dirt and grease pull radiator to carefully scrape/brush solvent/steam clean away blockage noting that disintegrating fins are cause to replace radiator core itself. Allow engine to run with drain plugs removed, and heater valve (if fitted) on, and a water hose inserted in filler neck to replenish fluid loss until drain water is totally clear before shutting off engine and water hose. When system *is* empty, replace plugs and fill radiator with 50/50 coolant and distilled water. Rotate radial tires front to back on the same side of car noting irregular wear (alignment problems, etc.) and check air in spare tire. Check generator/alternator brushes and replace if necessary. 600/750 generators should have their external oiler fitting (on commutator-end) filled with 50 wt. oil. Change transaxle gearlube(90 wt.) and check steering box adjustment & lube level. Check for excessive play in axles, sleeves, and couplings (see pp.49) and condition of axle boots, shock absorbers, and engine/transmission mounts including excessive drive line movement (see pp. be.). Check floor, under-body, and spare tire well for formation of rust and lubricate door/hood/engine lid hinges and locks plus seat slider rails & adjusters.

Every 25,000 Miles or 2 Years:

Clean oil centrifuge (see pp. 36 if fitted) .

Remove and clean fuel pump and carburetor filter screens. On older 600-based cars that are not driven regularly, remove and clean fuel tank pick-up screen and check for rust inside tank.

Disassemble and inspect brakes for lining wear or fluid seepage. Check rubber brake hoses for cracks or deterioration. Bleed brakes until replacement of all fluid is accomplished. Disassemble generator to repack bearing(s) (switch to sealed bearings when replacing) and on 600/750 models check commutator end bushing play. Repack front and rear (crush spacer required) wheel bearings. Change steering gearlube (90 wt -1/2pt).



Tune-Ups

1. First check for excessive oil buildup within air cleaner housing. Normally there is almost no sign of oil when your engine is "tight". A lot of oil film probably means broken piston rings and excessive compression blow-by from crankcase breather tube.

2. Compression Test: Four readings that are close to each other is much more important than high readings in some cylinders. Warm motors throttle held open and all spark plugs removed a strong engine might register say 180 lbs. per sq. inch after about four to six engine rotations. All the way down to about 120 lbs. per sq. inch is good as long as all readings are within about 10% of each other. To determine if a low reading is caused by a ring or valve problem, use a lever operated oil can to deliver about 3 or 4 squirts of engine oil into a low cylinder and try the test again. If your reading shoots up from 60 lbs. to say 190 lbs. you would know that rings are the problem (oil temporarily "sealed" rings). If there was little or no change from 60 lb. reading you might be able to cure the problem with just a valve job. A cylinder with excessive blow-by also frequently fouls its spark plug with oil.

3. While spark plugs are out, check plug color and gap. Color of center insulator should be light brown or grey and gap .022"-.025". *When* center electrode tip is significantly rounded off or plugs are fouled, replace spark plugs. As a temporary emergency fix, an "oiling" cylinder can have one

hot plug (ie : F.850=N13Y ,BP4ES...) installed to burn away oil fouling. Don't take a chance trying this with irreplaceable Abarth motors.

4. Pull off distributor cap and use a socket wrench to rotate generator pulley (apply finger pressure to crankshaft belt to stop belt slippage) until ignition points are fully open. (Rock advance mechanism forward and back to be sure of full point gap). Point gap should be about .018" with no pronounced tit on one point and a depression in the other. Mildly burned points without tits showing can be saved by filing with an abrasive stick as long as 8S care is taken to clean away all signs of grit when finished. While points are open, grab hold of rotor and try to wobble distributor shaft side to side. If more than about .002" of change in point gap is seen, distributor should be replaced as there are no service parts available for this condition (worn cam/advance bushing). A small amount of grease should be applied to rubbing cams where they contact point rubbing block and a drop or two of engine oil given to the felt wick within cam spindle and under rotor (except for early Marelli 850/OT1000 distributors with large round rotor and advance on top). Now grasp rotor again and rotate the advance clockwise to check free movement. When you release rotor, advance should snap back immediately. If it doesn't, worn advance mechanisms and/or loose springs are probably the cause. Springs are still available but some advance mechanism parts are not. If your advance works good, lightly oil moving parts, if not obtain a new distributor. Check all distributors to see that primary wire plastic insulator block is in good condition so as not to allow electrical shorts. Tip of rotor can be very lightly filed and distributor cap electrodes scraped with a pocket knife to improve contact surfaces. Be sure rotor is not a sloppy fit on distributor shaft. Early large round Marelli 850/OT1000 rotors come in two different styles. One is notched on bottom to allow advance weight movement and other one is not. When replacing, use notched type which fits both distributors. Plug wire sockets, carbon brush, & terminals should be checked carefully for arcing/erosion*/damage. 600/750 vacuum advance units should be checked with a special tester/pump tool and external grease cap fitting filled with grease. Side-entry distributor caps are a little more expensive but fit all models whereas top-entry plug wire type will only fit 850/OT1000 Coupes and Sedans. Side-entry style also offers a more compact plug-wiring arrangement regardless of car model. .Check high tension wires for cut, chafed, hard or oil softened insulation and damaged boots and replace when indicated. Cars without radios can use solid copper-core wires with silicone covering.

* especially with Ducielier (black) caps fitted to 70-71 Spiders

With a radio, suppression wire should be used. Shop around for high quality plug wires and use retainer guides and wire holders to route and support them. Late 850 (903 engine with right side of engine compartment coil mounting) has long coil-wire supported by rubber gromet held in bracket atop fan-shroud housing. NOTE : late long wire' Marelli points also fit early distributors.

5. Check ignition coil polarity noting that all models have a negative ground electrical system. Before 1970, coils with internal ballast resistor were used. To check polarity, remove wire from SW, BAT, B, or positive terminal of coil, turn ignition switch on, and momentarily brush wire connector across any bare metal ground. You should see a small spark. On CB, D, or negative coil terminal there should be a wire going directly to distributor-terminal stud.. Other wire for tachometer (usually brown) is also attached to negative coil terminal.

1970 and on Spiders and Coupes have external ballast resistors (white or brown ceramic block with two terminals and attached to coil mounting bracket). The problem here occurs when coil is replaced. Many auto parts store catalogs are confusing or in error on this subject. So If you are given a coil with internal resistor for a late car, you now have two resistors and maybe not enough juice to start the car. On the other hand, if you are given a coil without an internal resistor for an early car, you will have no resistor at all and stand a good chance of melting point rubbing-block or eventually"

frying the points themselves. The same thing will happen if you get the wiring wrong and bypass the resistor on a late car.

Use same procedure as described with early coil to determine which is hot wire from ignition switch (usually blue and white wire). Attach it to SW, BAT, B or positive side of coil.

The other coil terminal should have a stiff red wire attached between it and ballast resistor.

Remaining D, CB or negative terminal on ballast resistor should have one wire going directly to distributor terminal stud (routed through holder gromet on fan shroud along with high tension wire) and tachometer wire (usually brown) attached to it. It is a good idea to have your coil tested at an auto electric repair shop to ensure that it is not weak. For replacement purposes, I recommend using earlier (internal resistor) coil on all models and tossing external resistor away.

6. Check ignition timing (see pp. 28), carburetor adjustments (mixture, idle speed - 1100 RPM, throttle. and choke operation and full movement pp.21) and lubricate all carburetor linkages. Check or replace air filter. If necessary clean carburetor

7. Check belt condition and adjustment (see pp.35). Check exhaust system (holes, broken welds, mountings, flanges, pipes, muffler) and quick check cooling, fuel, and emission hoses.

8 . Clean and test battery (see pp.56).

9. Check operation of all electrical equipment including: lights (stop, tail, turn, headlight-aiming., instrument, interior, backup, side markers, engine compartment, etc.) horn, wipers, electric washer (if fitted), and fuse connections.

Belt Condition and Adjustment

Belts should not be cracking, fraying, or oil-soaked. About $\frac{3}{4}$ " of back-and-forth belt deflection should be noted when pressure is applied. Spare belts should always be carried in the car.

APPENDIX

Fiat and Abarth Specifications

Fiat 600 Major Changes & Improvements :

Fiat 600 in 1959

- *handbrake moved from transaxle to rear wheels
- *fine spline transaxle input shaft and stub axles adopted
- *starter solenoid with switch incorporated in ignition switch replaces pull-cable starting system
- *self-centering steel brake shoes replace hinged aluminum type
- *carburetor size increased from 22 to 26mm':

Fiat 600D From Mid-1960

- *increased engine displacement 767cc vs 633cc (new crankshaft, block, pistons, connecting rods. etc.)
- *larger valves, improved cylinder head * and rocker arm assembly
- *larger carburetor 28mm vs 26mm
- *larger water pump
- *oil filtering via centrifuge instead of paper element
- *higher ring and pinion ratio 4.86 vs 5.36 - (Sedan)
- *larger wheel cylinders (7/8" vs 3/4" on 600 Sedans)
- *movable vent windows in front doors

Fiat 600D From 1965

- *rear opening doors (hinged in front) with movable vent wing windows

Fiat 850 Spider Improvements and U.S.A. Required Changes:

Fiat 850 Spyder U.S.A. very early 1968

- *decreased engine displacement 817cc (engine # 100GS3 040) vs 843cc (# 100GS 000) via 64 mm bore rather than 65mm.
- *improved radiator, water pump. and hoses
- *improved design of front disc brakes
- *self-adjusting (friction type) rear drum brakes
- *dual master cylinder with tandem reservoirs
- *coarse thread front wheel lug-bolts (to match rear wheels)
- *non-recessed uncovered headlights
- *small round side marker lights added
- *backup light added to rear bumper (switch on transaxle)
- *high-back bucket seats
- *passenger-side sun visor added (early cars had only one)
- *passenger grab handle deleted from dashboard
- *new design outside mirror and relocated from fender to door *safety break-away interior mirror
- *Windshield washer bag moved from luggage compartment to engine bay *minor changes to gauge faces and trim rings (black instead of gold)

Fiat 850 Sport Spyder U.S.A. 1970-on

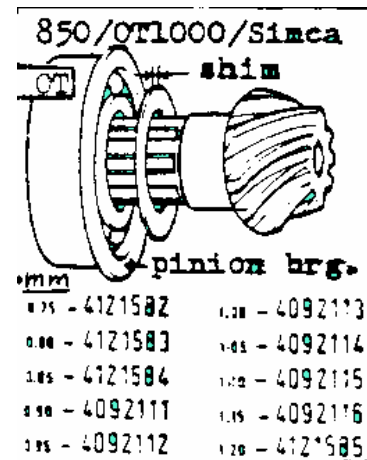
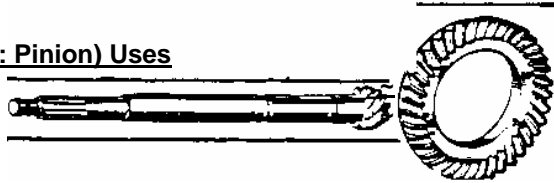
- *increased engine displacement 903cc(#100GBS040) vs 817cc (new crankshaft. block, 65mm pistons from 843 engine, connecting rods, cylinder head, valves, pushrods, head bolts, distributor/oil pump drive shaft. finned alloy sump - 4.5 qt. capacity vs 3 qt.)
- *larger primary carburetor Venturi 23mm vs 21mm with pollution control devices added to fuel and exhaust systems plus transaxle switches
- *larger water pump with 4 bolt mounting (vs 3 bolt) and improved fan cooling-shroud
- *alternator charging system with regulator, 2 relays, and one in-line fuse replaces generator system

*600 combustion chamber volume in head is 24.3cc.600D is 29.5cc

- *ignition coil with external balast resistor
- *new design ignition distributor manufactured by Ducillier (French) *wider wheels - 5" vs 4 1/2"
- *redesigned rear body *panel and tail* lights with backup lights incorporated and separate rectangular rear reflectors fitted
- *larger front turn signals
- *larger rectangular shaped side marker lights
- FIAT 850 Sport Spyder U.S.A. '72-'73
- *engine lubrication modified to include pressurized center main bearing
- *larger water pump pulley (6-bolt)
- *new design ignition distributor manufactured by Marelli
- *redesigned steering wheel, dashboard, hand throttle, heater box, switches, and electrical accessory equipment. Rocker switches '73 only
- *redesigned bumpers, and license lights moved from bumper tips to rear body panel

Popular* final Drive (Ring & Pinion) Uses

Tooth Count	Ratio	Common Use
7/45	6.43	600 Multipla
8/43	5.38	600, 600D MU1tipla, 5iata 750
8/39	4.88	600D,F-A 750 pushrod, Fiat 850w/13" wheels
8/38	4.75	F-A Monomille, 750 DOHCRecord Monza
8/37	4.63	OT/OTS/OTR 1000, 850 Sedan w/12" wheels
9/41	4.56	F-A 750/850 pushrod (DB,Berlina,Allemano)
9/39	4.33	750/850/1000 pushrod (Allemano,Berlina,Zagato, Monomille), 700/850/1000 DOHC (Bialbero TCR
8/35	4.38	Simca 1000(for conversions---see pp.63)
9/37	4.11	OTR 1000,A-S 1150,1000TC
10/39	3.90	1300/124,scarpione,1.3-Z.
9/35	3.89	, A-S 1300/1600, 1000SP
10/37	3.70	F-A 1300/124,Scorpione
10/35	3.50	A-S 1.3/1.6/2.0,2.0/3.0 SP



Many other ratios were available for racing.
 Note that 600/750, 600D/F-A 1000, & Fiat 850/OT 1000/Simca 1000/A-S 1150 belong to 3 different gearbox families; so pinion shafts do not interchange. ...600/750 pinion shim are NLA.

* Many models were commonly fitted with several different ratios as standard equipment.

Transmission Ratios(approximate)

Gear	600/D 600		DOHC Close-	fiat-Abarth	850/	Abarth-Simca
	750	Mult	Ratio'-4sp	5-sp	OT1000	6-sp
1st	3 -38	3-38	3.33	3-38 3.32	3.64	3.17.2.57
2nd	2.06	2.06	2.06,1.75	2.4,2.1,1.9,1.8, 1.6.1.4 1.3 1.2	2.06	2.00.1.89
3rd	1.33	1.28	1.33 1.20	1.6.1.4,1.3.1.2	1.41.	1.52.1.48
4th	.89	0.84	0.96 0.83 1.04 0.90 0.86	1.5, 1.2, 1.00, 0.90	0.96	1.30 1.25
5th				1.2, 1.0, 0.90, 0.80	(0.87)	1.17 1.12
6th						1.08.1.00

** see Lou Canut article ::m making your own close-ratio transmission in Abarth Register Newsletter #23 (April '82) pp.6 and also #40 (Dec. 85) for Glenn Sipe article on pp. 27-30

**Carburetor Jetting
Fiat 600-Based Cars**

Application	55-59 Fiat 600	59-61 F 600	61-69 F 600D	F-A 750 ohv	F-A 850 ohv	1000ohv	750dohc	1000dohc
Carb model	Weber 22IM	Weber 26IM	Weber 28ICP	Weber 32IMP/E	Solex 32PBIC	34PBIC	2W.36DCL	2W.40DCDE
Throttle	.87"	1.02"	1.10"	1.26"	1.26"	1.34"	2-1.40"	2-1.57"
Main venturi	16mm(.63")	19mm(.75")	19mm(.75")	22mm(.87")	24mm(.94")		25mm	33mm
Main Jet	.80	1.00	1.00	1.25, 1.30	1.30		.90	1.30
Air Jet	2.00 or 2.15	1.90	1.90	1.90,1.75, 1.80,2.00			2.25	2.50
Emulsion	F2	F3	F1	F4, F9, F1	T2			
Idle Jet	.45	.45	.45	.45, .50	.45		.45	.45
Needle & Seat	1.50	1.5	1.25	1.75				
Starting jet	F6 120	F5100	----	F5 150	110			
Float level	5mm (.197")* 7mm(.275")**	7mm	7mm	9mm(.354")				
Flop Drop	7mm	7mm	7mm					
* plastic float ** brass float			Pump jet	.45			.45	.45

Fiat 850-Based Cars

Application	Fiat 850 Sedan	127/A112			850 Coupé & Spider		OT(OTS)1000		A112 Abarth 1050 (1000)		1300/124
Carb model	Weber 30ICF	Weber 32IBA			Weber 30DIC(A) 2-bl		Weber 30DIC 2-bl		Weber 32DMTR 2-bl		Weber 32DCOF
Throttle	1.18"	1.26"			P-1.18"	S-1.18"	P-1.18"	S-1.18"	P-1.26"	S-1.26"	2-1.26"
Main venturi	21 or 22	24	22	21	21(23)	23	21	23	22	22	23
Main Jet	1.15 or 1.20	1.38, 1.35	1.20	.10, .12	1.15(1.17)	1.15(1.17)	1.10, 1.15	1.20	1.00	1.15	1.10
Air Jet	1.45	-	-	.40, .90	1.85	1.85(1.70)	1.85	1.85	1.65	2.00	1.65
Emulsion		-, F52	F52, F50	F52, F50	F15	F15		.45	F30	F30	F30
Idle Jet	.40	.45	.45	.47, .45	.40, .42(.45)	.45(.50)	.50		.45(.50)	.70	.45
Idle Air Jet	2.00	1.70	1.70	.70, .40							
Aux. Venturi		5, 3.5	4	3.5, 4	4.5	4.5			4.0	4.0	
Pump Jet	.45 or .50	.40	.40	.40	.40(.50)	---	.40	---	.40(.45)	---	
Needle & Seat	1.50	1.50	1.50	1.5	1.5				1.50		1.50
Float level	7mm(.275)				6mm(.235)						

Measure float level with drill-bit as bowl lid is held vertically with gasket fitted & float arm tang just touching the spring-loaded ball at tip of needle valve

Main venturi diameter is often cast onto rear of carb body above throttle linkage.

Fiat
600 & 850 Engine Rebuilding
Clearances & Specifications

Main Journals: 1.9996 to 2.0002"	Oil Pump Gear to Housing -.0004 to .004" (replace -.006")
Main Brg. Clear: .001 to .0025	O.P. End-Play -.0004 to .002" (replace -.004")
Rod Journals: 1.5742 to 1.5750"	O.P. Gear Lash -.003 (repl -.006")
Rod Brg. Clear. - .001 to .002511	O.P./Dist. Shaft Bush -.001 to .0025"
Crank End-Play - .0025 to .010"	600 Fuel Pump Rod Project.
600 Piston @ Sk1.rt - .0015 to .0020"	850 F.P. Rod Project. -.040 to .060"
850 Piston @ Sk1.rt - .0025 to .003"	Tappet Clear - .0005 to .0015"
600 Pin in Piston - .0001 to .0005"	Valve Stem to Guide -.001 to .0025"
6850 Pin in Piston - .0003 to .0006"00	850 Stem Diameter - .275 to .2755
Pin in Rod - .0002 to .0005"	600 Valve Spring -33.4kg @.24.5cm
Ring End-Gap - .008 to .014"	850 Outer Spring -102.5 lb. @.972"
Top Ring to Groove - .002 to .0025"	850 Cam Timing-25/51/64/12(sport) 16/50/56/16(sedan)
2nd Ring to Groove - .001 to .002"	
850 Inner Spring -39.7 lb. @.815"	
Oil Ring to Groove - .001. to .0015"	
Cam Brg. Clear. - .001 to .003"	

Abarth OT 1000 Characteristics & Engine Rebuilding Clearances

1000 type 202: 65x74-. 982cc, 9.5 compression (OTS 11.5), 26/75/67/30
valve timing, 8° initial adv., .016 point gap, 29/26mm valves, .008"adj.

1000 type 200(Radiale) 10.5 compression, 27/65/67/25 v.timing, .010" adj.

Main Journals: 2.1228 to 2.1232". Main Clear.: .002 to .0024"
Rod Journals: 1.5734 to 1.5742". Rod Clear.: .0018 to .0022"
Piston Skirt Clear: .0035 to .0045",. Cam Brg. Clear.:.0016 to .0028"

Abarth 750 & 1000 Bialbero (DORC) Characteristics
& Engine Rebuilding Tolerances (courtesy of Lou Canut)

750 type 221: 61x64mm, 747cc, 9.7 compression, 52/68/73/25 valve timing,
8° initial advance, .48mm. point gap, I-.28 E-.43mm valve adj.,33/29dia.

1000 type 229: 65x74mm, 982cc, 10.5 compression,52/75/62/34 valve timing,
15° initial. advance(Bosch), .33mm point gap. I-.23 E-.43 valve adj.

Main Journals: 750 center-50.76 to .50.77mm, 750 ends-50.79 to 50.80mm.
1000 all-53.92 to 53.93mm

Main Clearance: 750 center-.045 to .080mm. 750 ends..025 to .060mm,
1000 all-.051 to .087mm .Crank End Play: all-.06 to .08mm

Rod Journals: 750-35.988 to 35.998mm, 1000-39.964 to 39.985mm
Rod Clearance: 750-.022 to .057, 1000-.040 to .062mm.

Piston Skirt Clear.(90° from pin axis): 750-.09 to .1, 1000-.105 to .115mm

Pin in Piston: all- .002 to .013mm .Pin in Rod Bush: all- .001 to .013mm

Piston Ring to Groove: all top-.045 to .072, 2nd-.025 to .0;2, oil-.020 to .061mm .Ring End Gap: all-.1mm

Cam Follower Clear.: all-.005 to .037 . Valve Stems: I-7.97 to 7.96,
E-7.96 to 7.95 .Stem Clear.:I-.03 to .05,E-.04 to .06

Valve Spring& Tension: 750 In-14.8kg @ 21mm. Out-24.7 @ 22.5mm, 1000 In -22.5 @ 22mm,
Out-30.6kg @ 23.5mm.

Cam Journal to Head. Clear.: all-.020 to .062mm . T.Chain Deflect.:8-10mm

- Notes:
1. When rebuilding engine, it is desirable to obtain clearance. As close as possible to the minimum(smaller) figure.
 2. See pp.132 of "Abarth." for tune-up & torque wrench specifications.
 3. To convert from inches to millimeters divide by .03937 To convert from mm to inches multiply by .03937
 - 4 Optimum clearances are listed. Wear limits for replacement sometimes exceed then figures by several tenths of a mm..

**Fiat 127, Autobianchi A112, & A112 Abarth
specifications & Engine Rebuilding Tolerances**

127 type 100GL & A112 type A0 or A5: 65x68mm, 903cc, 9.0 compression, 25/51/64/12 or 17/43/57/3 or 11/43/43/11 valve timing, 10° initial advance, .016" point gap, 29/26mm valve dia., I-.006 E-.008" adj.
 A112 Abarth 1000 type A1: 65x74mm, 982cc, 10.0, 20/46/60/6, 10° adv., .016", 29/26mm, .008 & .01011 adj.
 A112 Abarth 1050 type A2: 67.2x74mm, 1050cc, 10.4, 16/56/56/16, 10° adv., .016", 29/26mm, .010 & .012" adj.

Main Journals 903: 1.9994-2.0002"	Top Ring Clear. : .0016- .0028"
Abarth: 2.1224-2.1232"	2nd Ring Clear. : .0009- .0020"
Mains Clear. 903: .0011- .0029"	Oil Ring Clear. : .000b- .0019"
Abarth: .0013- .0025"	End Cam Brgs.Clear: .0010- .0030"
Rod Journals 903 : 1.5741-1.5750"	Center C.Brg.Clear: .0018- .0036"
Abarth: 1.5733-1.5743"	Oil Pump Gear-Housing: .002-.0055"
Rods Clear. 903: .001 - .0083"	Oil Pump End-Play: .0008- .0041"
Abarth: .0017- .0032"	Oil Pump Gear Lash: .006"
Crank End-Play: .002 - .010 "	Oil Pres.Releif Spring:9.5 lb.@.89"
Piston @ Skirt 903: .002 - .0027"	Fuel Pump Rod Project.: .039-.059"
Abarth: .0027- .0035"	Tappet Clearance: .0004- .0018"
Pin in Piston 903: .0003- .0004"	Valve Stem-Guide: .0009- .0023"
1000: .00008- .0003"	V.Stem Diameter: .2748- .2756"
1050: .00016- .0004"	Outer Valve Spring: 54 lb.@ 1.437"1
Pin in Rod 903: interference	Inner Valve Spring: 12 lb.@ 1.279"
Abarth: .0003 - .0006"	Rocker Arm Clear.: .0005- .0018"
Ring End-Gap: .009 - .015 "	Oil Pressure (hot): 43-57 lbs

Fiat/Fiat- Abarth Quick Reference Engine Chart

Use	Fiat 600	F-A 700	F-A 750	Fiat 600D	F 850	F-A 850	F/OT 850	F-A 850	F850	127, * A112	F-A 1000	OT 1000	A112 abarth	A112 abarth
CC	633	695	747	767	817	833	843	847	903	903	982	982	982	1050
Bore	60	61	61	62	64	62	65	62.5	65	65	65	65	65	67.2
Stroke	56	59.5	64	63.5	63.5	69	63.5	69	68	68	74	74	74	74
Configuration	Ohv	Dohc	Dohc	Ohv	Ohv	Ohv	Ohv	Ohv	Ohv	Ohv	Ohv	Ohv	Ohv	Ohv
Based on	600	600	600	600D	850	600	850	600	850	127	600	850	127	127
Rotation	Cw	Cw	Cw	Cw	Ccw	Cw	Ccw	Cw	Ccw	Cw	Cw	Ccw	Cw	Cw
Engine number	100	222	215, 219, 221	100-D	100-G3	217	100G, 203	214, 220, 214G	100-GB	100G L, A112-A0	210/208, 229, 210G	202, 200	A112-A1	A112-A2
Years Produced	55-61	60-66	56-61	61-71	68-71	58-60	64-	60-71 60-61 69	70-	69-on	60-71, 60-66, 66-71	64-70	71-75	76-on

*also:
Panda & Uno
"45" models

600 & 850 Drum Brakes

	600	600D	Multipla	850 Cp/Sp
Master cylinder	3/4"	3/4"	1"	3/4"
Front wheel Cyl.	3/4"	7/8"	1 1/8"	Disc
Rear Wheel Cyl.	3/4"	7/8"	3/4"	3/4"
Drum Diameter (Original)	7.293-7.304		8.672-8.683	7.292-7.303
Max Oversize	.040"		.040"	.040"
Lining Width	1.18"			

New Lining Thickness : all models .16"

Replace Linings: .040"

Note: Use Lubriplate #110 Brake lube at all points of metal-to-metal effort (from G. Mortensen)

600/750 Electrical

Group 22N/32amp.hr. Battery

Conversion(see pp. 70)

Length - 9 1/4"

Width - 5 1/4"

Height - 8"

Marelli Generator R90-180/12-2500 (600/750-180watt)	Regulator A/4-180/12 (14.5volt)
Bosch generator D90/12/16/3 (600/750-230watt)	Regulator GN 1/12/16 (14.2volt)
600 Starter- B76-0.5/12S	
600D Starter- E76-0.5/12S	

How About Installing The Complete Fiat 850 Drive-Line In A 600-Based Car?

At first glance, it seems highly desirable to use the nice all-synco 850 transaxle and also not be required to reverse the 850 engine rotation....

As you might expect though; if this was a "clean & simple conversion", I wouldn't have spent all of chapter 13 in "ABARTH" talking about the reverse rotation 850 conversion (as well as pages 59-61 at this book regarding the 127/A112 engines which don't require a rotation change).

Here are some of the details of the Complete Drive-Line Conversion:

A) Major Fabrication & Welding

The rear suspension arms must be cut and the inboard pivot points relocated to allow room for the wider 850 transaxle. Needless to say, this is a precision job and it forever alters the originality of the CarNext, the left engine compartment firewall will need to be trimmed about 3 or 4 inches to accommodate the off-set 850 bellhousing. Some cutting under the rear seat area to allow linkage clearance will be necessary as well. With the gearbox in position and 850 axles. 600 splined-sleeves fit. ad., aeaB1lre 850 motor mount off-set so that the 600 mount perch on the rear body panel can be cut off and moved to the left the correct amount. You'll want to beef-up the perch supports quite a bit as the rear panel was not meant to carry the motor off-to-one-side(as with 850s), not to mention the fact that the panel will be weakened even further when you trim away some of the surrounding sheet metal for crankshaft pulley clearance. With engine and rear panel fitted.. a new motor mounting bracket can be made. 850 trans mount brackets are retained and mounting holes drilled in body/frame channels for use with long bolts and rubber pads when mounting gearbox. Complete 850 shifter and all related hardware must be installed about one inch further to the rear than the 600 lever was positioned.

Careful alignment of everything is critical if you expect the wheels to rotate freely(without axle bind)when you're done.....

B) Minor Details?

A special speedometer cable will need to be made-up. 850 radiator can be used but mounting holes on the firewall must be moved, and you may have some trouble making the fan and radiator shrouds line-up properly. The 600 radiator air-exit door must be permanently located in the open position.. Heater tube on lower radiator tank must be plugged. Heater tube on thermostat housing can be used for Jaeger water temp. sensor or plugged. Some 850 water pump pulleys may be too large to clear right inner tender.

600 valve cover with a special longer linkage rod Can be used. Choke cable will be too short. Air cleaner intake tube must be cut off to clear deck lid. Mufr1er heat- shield panel must be cut away to fit 850 exhaust system. 850 voltage regulator must be substituted. Some body styles will require deck lid modification to clear distributor. Oil gauge connection may necessitate minor alterations.

As you can see, the above conversion extensively and permanently butchers the car. Doing it to a beat-up 600 might be OK, but don't even consider MUTILATING an Abarth in this way (and to little or no *real* advantage)....

And by-the-way, there is a company who will. sell you (for \$10.00) a four page set of instructions which talks about suspension, mounting, shifter and clearance modifications but does not mention the Minor Details as listed in item B above ... The rest is up to you.