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I.)

Customer Name: _____

Date: _____

The _____ Engine Sold has Casting # _____

The Casting # on this Engine represents _____ Production Year.

Congratulations on the purchase of your Turnkey engine from Engine Factory. This engine has been hot run tested with all adjustments made. It has passed all rigorous quality control tests. It's critical that all instructions and warnings be read and understood. Please review the supplied DVD of your engine running.

If you don't feel comfortable with the tasks below please seek out a qualified mechanic.

II. Your New Engine :

1. Careful attention should be made when un-crating the engine. It's important to inspect all boxes and pieces inside the box, do not throw out any boxes until everything has been inspected. There are times extra parts are shipped separately with the engine and marked on the box.
2. Engines are shipped with non-synthetic 10W/30 oil, please verify oil levels prior to start up. *NOTE: International shipments are shipped with NO FLUIDS.*
3. Fuel system has been tested for leaks where applicable. It is the installing mechanics responsibility to inspect fuel system for leaks during and after installation.
4. MAX RPM's of this engine is 5800 RPM or DAMAGE WILL OCCUR.
5. If your engine is not being installed right away keep it in dry area protected from the elements.
6. 92 Octane fuel recommended; always use clean fresh fuel. Make certain your gas tank is rust free.

Some Suggested tools & supplies needed

Open end wrenches, engine hoist / cherry picker, rubber mallet, electric drill, wire cutters, vice grips, torque wrench, Torque Wrench, Hammer, Test Light, Hydraulic Jack, Jack Stands, Safety goggles.

III. General Engine Removal, Prep. & Safety Tips - Safety is # 1 and this is your responsibility.

1. Work area must be well organized, well ventilated and properly lit.
2. Start by disconnecting your battery cables and removing the battery you're your vehicle. This eliminates the possibly of shorting out any wires.
3. Never disconnect any air condition lines, they have high pressure refrigerant which can cause severe burns or eye damage. If air condition compressor must be removed leave line on compressor, unbolt with the lines attached and tie compressor up out of the way with a piece of rope to the inside of the fender..

4. Remove hood being careful with hood springs and hinges.
5. Tag any wires and vacuum lines for proper location of reassembly
6. Keep all tools clean and use proper size sockets
7. Use small plastic bags and a magic marker to properly identify bolts that you take off so they can be installed correctly in the proper location upon reassembly.
8. Any parts removed should be inspected for wear or flaws, keep a list of new parts to be ordered.
9. If using a hydraulic jack to lift up your vehicle, use jack stands as an extra safety precaution.
10. Many mechanics will try to remove the engine and transmission as an assembly, this is usually a judgment call, but if possible it is easier to line up the transmission and engine when it out of the chassis as an assembly, but you must be sure that the hoist you're using is capable of the combined weight of the engine and transmission assembly. If you chose to leave the transmission in the chassis then you must properly support it before removing the engine. Be sure to use common sense at this point, you will be lifting a lot of weight, never work under an engine that is up in the air, lower it first, always think of it this way- if it slips or falls, where will you be? Always stay clear.
11. **Radiator**- many times a radiator looks OK but the truth of the matter is the tiny little tubes that the coolant flows through can be partially restricted, and can cause overheating and engines damage. You have made a considerable investment in a turn key engine- protect it. Replace the radiator, we recommend a 4 row heavy duty radiator or a good aluminum one. "Don't try to save a radiator and waste your engine". Also remember that if you remove your radiator and that if it sits dry for even a few days it dries out inside and the tiny tubes clog. Bottom Line: install a new radiator and also don't forget to replace the radiator cap.
12. **Hoses and Clamps**- Hoses can collapse, leak or suck air into system, replace all hoses. Caution lower radiator hose should have a coil spring inside it or it can collapse at highway speed and starve block for coolant.
13. **Fan shroud**- helps the fan pull cool air through the radiator, check for cracks or missing pieces.
14. **Radiator Cap**- Most modern engines require a 14lbs cap; for every lb of pressure that you raise your cooling system you raise your boiling point 2 degrees. Example: normal boiling point is 212 degrees with a 14lb cap your boiling point now becomes 240 degrees.

15. **Fan and/or Fan Clutch-** This is important for proper cooling. An easy way to check to see if the fan is pulling the proper amount of air through the radiator, place a piece of newspaper on the front of the radiator if the fan is working properly it will pull the newspaper tightly against the radiator.
16. **Replace fan belts** and check pulleys for cracks or damage, a broken \$20.00 belt could waste a \$10,000 engine.
17. **Motor Mounts-** A broken or sagged mount can cause serious vibrations. Replace if defective.
18. **Check exhaust system** for any rusted or parts.
19. **Check Clutch** Disc, pressure plate, throw out and pilot bearing for wear.
20. **Check automatic trans** for leaks, broken mounts or leaky modulator.
21. **Drive Shafts-** Check universal joints for wear
22. Look over any defective special sensors or switches, replace as necessary.
23. Some engines may require a vacuum booster to safely operate power brakes; installing mechanic can determine this with a simple vacuum test.
24. Engine Factory does a fuel pressure test on any engine that we include a fuel system; we make and retain a copy of the video of the complete test. Sometimes during installation an installing mechanic can create a fuel leak by moving a line to install a bracket etc.; therefore it is the owners and installing mechanics responsibility that upon immediate start up of engine to check for any kind of fuel leak.
25. **Gas Tank-** As with most items in today's world, things are not what they used to be. Gasoline will lose its octane rating within about 8 months, also if you have a 30 year old fuel tank by now it has started to rust on the inside, if you start up your fresh engine, these rust particles will be pumped into your carb and lodge under the needle and seat which will cause the engines to run rich and rough and cause internal engine damage within a few miles. **Please install new fuel and have the fuel tank cleaned or replaced.**
26. **Fan-** look over your fan for bent or missing blades. If your engine has an aluminum fan clutch just behind the fan, replace it. They look fine from the outside but in many cases they are not good. Be sure to replace your coolant hoses old hoses can leak or suck air. Be sure the lower radiator hose has a coil spring in it; otherwise it can suck down flat and starve the block. **Also be sure that you have all of the air out of the cooling system when you fill it. Most cooling systems and blocks that are dry will hold about 4.5 gallons of coolant.**

27. If you have purchased your engine with a serpentine belt system they usually recommend using an electric fan. They work fine, just be sure that they are as large as space permits and that they pull air through the radiator and set it so that it comes in at about 180 degrees.
28. Another warning if you plan on using your existing fan and your engine came with a single belt serpentine system that has an alternator, power steering and a.c. compressor. Those systems actually turn the water pump in reverse, so you have to be sure to use a fan or fan clutch that is designed for a reverse turn water pump or damage will occur. Also if you remove the polished nose cap on front of the water pump and plan on bolting your fan in, the bolt length is critical. If bolts are too long they'll damage the pump.
29. **Headers-** We recommend the 1 5/8 up to 500 HP 1 3/4 for the over 500 HP. The rest will be determined by the make and model of the vehicle. **Also a word of warning, when you install headers you must retighten the bolts after the vehicle is run for an hour otherwise the gaskets will shrink up and leak.**
30. If you have ordered our serpentine system with the one wire alternator it is designed to run the wire on the back of the alternator directly to the positive on your battery. **Be sure to use at least a 10 gauge heavy wire. Warning; do not run this wire inside the vehicle. It is designed to run it only to the positive on the battery. Keep it clear of any hot exhaust. We also recommend a circuit breaker between the alternator and the battery positive terminal.** We also recommend that you put a separate heavy ground snap from the engine block to the frame of the vehicle. Remember your entire engine sits in rubber mounts.
31. If you have ordered your engine with an air conditioner compressor. These pumps have the correct amount of refrigerant oil in them. They are also compatible with the latest refrigerants. **Warning- Do not hook up the compressor wire until you are ready to charge the system with refrigerant.**
32. All Engine Factory engines that are supplied with the fuel lines in place have been inspected and pressure tested for leaks. **It is the installing person's job to check for leaks upon immediate start up.** Sometime during installation someone can move a fuel line to install a bracket etc. and can create a fuel leak. Never use a drop light when working near open fuel lines. If the drop light falls and the bulb break the glowing filament can cause an instant fire.

Please be sure to read and study all of the above listed items. They are all important and will make your engine installation experience a safe and pleasant one.

IV. VEHICLE PREPARATION

Your replacement engine in most cases delivers more Horsepower and Torque than your original Engine. It will perform only as well as its supporting components. Make certain some of these parts are Replaced, Inspected or Upgraded:

Rear End Gears: Upgrading to a Higher Gear Ratio can have a dramatic effect on how your vehicle responds. 3.25-3.73 is a general range to stay within. Speak with Drivetrain Specialist to determine what's best.

Torque Conv. / Clutch: All the power from your engine is useless unless it can be converted to the Rear Wheels. Upgrading the Clutch or Going with a slightly Higher Stall Speed Torque Converter will help get the engine in its power band faster. A Transmission specialist can help determine this.

Transmission: Depending upon the Horsepower / Torque levels of your engine your existing Transmission may need upgrades or simply need to be replaced.

Headers: When installing Exhaust Headers, make certain they are torque down properly and use a quality exhaust gasket to prevent leaks

Other: A Classic Muscle car doesn't handle or stop as well as a modern day vehicle; Upgrading your suspension and your Brakes will not only make your vehicle handle better but make it safer to drive.

General Suggested Parts to Inspect / or Replace with your New Engine

	Inspect / Replace when necessary	REPLACE NEW
Radiator		X
Starter		X
Automatic Trans	X	
Torque Converter		X
Manual Transmission	X	
Clutch Kit		X
Yoke		X
Driveshaft	X	
Electric Fan		X
Mechanical Fan		X
Sensors / Switches	X	
Radiator Cap		X
Coolant Hoses		X
A/C Lines	X	
P/S Lines	X	
Rear End Gears	X	

V. General Installation Notes:

1. Always install a new radiator, be sure that fan is pulling a good amount of air through radiator, Monitor system with a gauge, never exceed 220 degrees.
2. Choke positive terminal must be hooked up to 12 volt key controlled ignition (on and off with key) Always install a throttle return spring.
3. Coil and Electric Choke positive terminal and choke positive terminal must be hooked up to 12 volt key controlled (on and off with key).

4. If we supply engine with an alternator run a 10 gauge wire from the terminal on the back of alternator to battery positive. Do not remove rubber plug, also run a separate ground wire from engine block to frame, no other wiring is necessary, system will charge at 14.2 volts.
 5. The complete fuel system has been checked for leaks. A video has been made and is retained by engine factory it is the installer's responsibility to check or test existing fuel lines. Always test for leaks at start up.
 6. Engine oil is full in most cases. Except for international shipments which arrive empty, we do not recommend synthetic oil initially, change after 500 miles with a good quality SAE 10w-30 oil. After a few oil changes if you prefer synthetic you may do so.
 7. A 180 degree thermostat has already been installed. Upon startup verify that it is opened when engine is up to temperature. Always Monitor Temperature.
 8. This flywheel and front balancer must remain with this engine for proper engine balance.
 9. If your vehicle has a manual transmission your clutch pedal must be adjusted so that it has free play or engine thrust bearing damage will occur, this is not covered by your warranty.
 10. It is normal for oil press to drop 20 psi from cold to hot.
 11. Fill Cooling System with a 50 / 50 Mix of Water and Antifreeze. Make certain Radiator is topped off and "Burped" of all Air in the Cooling System.
 12. Distributor Timing has been Pre set on our Turnkey Engines. No further adjustment needed. Coil Hook up - Positive Terminal must be hooked up to a 12 volt Key Controlled Source (On-Off with Key). Negative side to the Tach where applicable.
 13. Carburetor has been preset at our factory. If encountering tuning issues review Edelbrock DVD or contact Edelbrock Directly. Phone # on bottom of these notes.
 14. Starter. It is important that the proper Flywheel and Starter Combination are used so engagement is correct.
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VI. Ford Small Block Engine Notes

Information that can help install Fittings and Lines:

Power Steering Pump: Based upon a 1990 – 1993 5.0 Mustang, Unless provided with a GM Style Saginaw Power Steering Pump.

*May be necessary for a Hydraulic Shop to fit lines from Steering Rack to Pump

Air Compressor: Sandon Compressor accepts R134A Refrigerant (Already has Oil)

Miscellaneous Install Notes for 302 & 351w Ford Engines

(Applies to Carbureted setups. Fuel Injection can vary)

- If you're installing a Heater Hose on your 302 or 351w engine, remove the Rubber block off Cap installed on the water pump. This is where one of the Heater Hose feeds goes onto. It's typically 5/8 or some cases a 3/4 of an inch coming off the Water Pump. The return line can be run from the Intake Manifold using a 1/2 inch Pipe plug Nipple that's positioned approx. 1 inch behind the Thermostat housing. (Applies Carbureted setups. Fuel Injection has some differences)
- Oil Pressure Switch thread size: 1/4 inch NPT Fitting. Fits in between the Fuel Pump and Oil filter on the Engine Block.
- Water Temp Switch can be installed on the Thermostat Housing if 3/8 NPT threads are available or it can be installed towards the front Drivers side of the Intake Manifold which is 3/8 NPT threads also.
- When a Reverse Rotation Water Pump is installed, it's necessary to install a reverse Finned Flex Fan or overheating can occur. Whenever possible we recommend using an electric fan to reduce the amount of drag on the front of the engine.
- **302 and 351w Small Block Ford Engines:**
Steel Bellhousing to Engine block bolt size: 7/16 x 1 1/2 " coarse
Factory Alum. Bellhousing to block size: (Top 2 bolts) 7/16 x 1 1/2 " coarse.
The remaining 4 bolts are 2 inches Long. Use 7/16 Lock washers between Bellhousing Bolts.

Component Vehicle (Kit Cars) Misc. Intallation Notes – Ford Powerplants.

When purchasing a 5 speed Manual Transmission (T5z, Tremec TKO 500 or TKO 600) the following parts will be needed to finish installation: (Some may be provided by the Manufacturer of the kit already)

Oil cooler

Pressure plate bolts – 8mm x 20

High Performance 10.5 inch Clutch Kit

Bellhousing or Scattershield

Fork & Cable

Throttle Cable Bracket

Yoke

Driveshaft

Transmission Midplate (fits behind flywheel)

Shifter Ball

Starter – Mini High Torque Starter – Ford Racing # M1100-A50 (157 Tooth flywheel only)

- The Turnkey carbureted engines we provide already have a mechanical Fuel Pump,
- A 3/8 fuel feed line from your fuel tank is necessary.
- A throttle Cable Bracket is provided by some manufacturers otherwise Lokar is a good contact on this.
- If you need to remove the Flywheel in order to install a midplate to the back of the engine. Torque ratings for the 302 are 70lbs. (USE Sealer on the 302 Bolts) The 351w (80lbs.)
- Clutch Fitment. Make certain you use a suitable clutch capable of handling the torque of the engine and everything is aligned properly.
- Typically a 87-93 Mustang Header will bolt up to the Edelbrock Aluminum Cylinder Heads. A minimum of 1 5/8 size would be ideal for most cases up to 500HP for Kit Cars.
- When Oil temps Readings are used, this can be tapped from the oil filter relocater provided by the Manufacturer or use the threads off the oil pressure Tee Threads. Some aftermarket pans have a oil temp bung to use. Typically Oil temperatures are 20-30 degrees hotter than coolant Temps.
- If installing an Oil Cooler. Make certain all lines don't leak and there is sufficient amount of oil to support it. Always use a new Oil cooler.
- There are two Spacer Rings provided with Engine when purchased with the Steel Bellhousing. The **thinner Spacer Ring is used for the Tremec TKO Transmission mated to the Steel Quicktime Bellhousing.** The **thicker Spacer Ring is used for a T5 mounted to a Steel Bellhousing.** The T5 Transmission Mated to an Aluminum Bellhousing does not require one.

Transmission to Bellhousing Bolt Sizes:

- Tremec TKO Transmission Mated to a Quicktime Steel Bellhousing Requires 7/16 coarse thread x 1 ½ inches.
- T5 Transmission to Aluminum Bellhousing requires Bolt size of M12 X 1.75 Pitch x 1 ½ inches.

ENGINE WIRING HARNESS HOOKUP - KIT CARS / HOT RODS

Our engines will start and run perfectly with just 4 wires hooked up. You will need a couple of things 1st purchase a Battery positive cable for a 90 mustang, 2nd purchase 10 ft. of 10 gauge red wire and two eyelet terminals to fit that wire for your alternator, 3rd purchase a 12 volt test light just the inexpensive one usually around \$ 10.00 the light comes on when you have 12 volts and off when there is none.

Starter first don't use the separate starter solenoid that the kit car company supplied just keep it and put it away it is not needed. Have the negative battery cable disconnected for now. --- Now hook up the battery cable that you purchased on the top large terminal of the starter motor. Now you should make sure that all bare wire are not touching anything and hook up your negative battery cable to a clean spot on the side of the engine block. A word of warning Whenever you are working with electrical wires make sure you don't have any gas around a shorted wire could cause a fire.

Now you will need a helper to sit in the car and be able to turn the ignition key so that you can trace wires as necessary. What you will want to find is a wire that lights your test light when the key is turned to the extreme right the start position and the light goes off when you release the key when you find that wire you want to hook that wire up to the small spade terminal on the starter you may have to splice the red wire that we supplied so that it will reach. Be sure you keep all wires away from hot headers. Once that is hooked up you should be able to turn the key to the start position and hear the starter turn over the engine. Note at this point you are just testing the starter circuit Once that checks out ok disconnect your negative battery cable at the battery for now.

Alternator on the back of the alternator you will see a nut with a terminal. Make up a wire connector and put it on the red 10 gauge wire that you purchased run that wire over to and hook it up on the battery positive terminal on your battery. That is all that is necessary when the vehicle starts and runs it will automatically charge your battery at the proper voltage.

Coil Now you want to just turn the key onto the start position it is just one click to the right and you want to find a wire that has juice with the key on and none with the key off. Hook that wire up to the plus + on the coil. Now to quickly test you should be able to turn the key and the car will start and run. Only run it for 30 seconds because we still have to wire the choke. And be sure you have oil and fuel in the car.

Choke find another wire that will have juice when you turn the key on one notch to the right and no juice when the key is turned off. This is the wire you want to hook up to the Choke + positive red wire to it will heat up the choke so that it will open when the vehicle runs.

The Electric fan and the distributor must be on isolated circuits --- if your fan is hooked up to the same wiring as the distributor when you shut the engine off the fan is still spinning it acts like a spinning generator and sends electrical current back to the distributor it eventually burns out the distributor module. You must hook the fan up to a circuit on your fuse panel that says Acc for accessories. The distributor must be hooked up to a terminal on the fuse panel that says ignition or directly off your key switch that says ignition. Once again those two circuits must be totally isolated.

Engine Storage / Startup:

Often times the engine may sit for several months before actually starting. The bearings are coated with a heavy duty lubricant which protects the engine from dry startups. Oil pressure should come within 30 seconds of startup. If the engine sits beyond 6 months removing the spark plugs and spraying the cylinders with some WD-40 otherwise known as fogging the cylinders is a common practice, Then reinstall the spark plugs.

Aftermarket Fuel Injected Systems.

- There is more plug ins and labor time involved with installing a Fuel Injected engine. If you're not comfortable with the installation leave it to a professional Mechanic.
- Follow Manufacturers Instructions closely.
- Fuel injection has a much higher fuel pressure rate than a Carburetor. Proceed with Caution. Check for any fuel Leaks during and after installation.
- When dealing with an Aftermarket Fuel Injection System. Read Manual Carefully. It's possible to short out a wire if not hooked up properly.
- Install the O2 sensor about 4 inches away from the beginning of the collector. Some exceptions may apply.
- Aftermarket fuel injection systems like EZ EFI and Atomic EFI are self learning and may need to drive the car several times before engine is running optimally.

EZ Fuel Injection Installation Notes:

<http://www.fordcobraengines.com/documents/FASTEZ-EFI.pdf>

Atomic EFI Installation Notes:

<http://www.fordcobraengines.com/documents/AtomicSpec.pdf>

VII. Frequently Asked Engine Prep and Installation Questions

Q. What's the best way to lift the engine?

A. If the lifting points are Accessible, pickup diagonally from the front Left or Right Front Cylinder Head to the Rear Left or Right Cylinder Head. Otherwise from exhaust port holes in the cylinder Heads. Use a high grade Bolt. USE a heavy duty chain or cable long enough to prevent scratching the Valve covers or damaging the Air Cleaner

Q. What grade Oil do you recommend and how often should I change the Oil?

A. We normally suggest going over to a high Grade SAE non - synthetic 10W / 30 Motor oil. After a few oil changes if you would like to go with a synthetic or blended version then this is O.K. Do an initial oil change after 500 Miles then just every 3000 miles from there.

Q. What do I need to do to break in the Camshaft and engine?

A. Engine Factory will normally do the break in of the camshaft on our Turnkey Carbureted engines. Upon taking your vehicle on the road for the first time stagger the throttle from 30 to 50 MPH several times to get the Piston Rings seated properly. Keep the RPMs under 4000 RPMs for the first 1000-2000 miles.

Q. What is the max Redline RPM on this engine?

A. Keep them under 5800 RPMs. The power starts to drop above this anyway in ost Street Engines. You will have all the power you'll ever need below this level anyway. Going beyond this definitely increases your chances of damaging internal Parts and will not covered under warranty.

Q. What's the proper way of filling the Cooling system?

A. When filling cooling system, top off Radiator with 50/50 Mixture of Antifreeze and Water with engine cold. After engine is started check coolant Level after engine reaches 180 F. Top off as necessary. Always use caution around hot coolant. Engine has a 180 F. Thermostat already.

Q. What other parts should I replace or upgrade before installing the engine?

A. This can be a huge list but one of the most important ones to mention would be the Radiator. Use a brand new Aluminum or 3 to 4 core Radiator to keep your replacement engine cool. Some other items would include Engine and Transmission Mounts, Clutch, Torque converter, Fan, belts, hoses, U-Joints, pulleys, hoses and clamps, fuel lines, sensors etch. Reference our installation tips list along with a manual. If you don't feel comfortable to take this on then contact a qualified mechanic. Early model vehicles with drum brakes should be converted to disc brakes when installing a high performance engine.

VIII. Final Check off List: (General)

- _____ Headers are Torqued and checked for any exhaust Leaks
- _____ Coolant topped off and Purged of any Air
- _____ Double Check Oil Levels
- _____ If installing an Oil Cooler, only use a New One. (Typically requires an extra quart of oil)
- _____ Fuel Lines Secured in place and checked for leaks
- _____ Throttle Linkage checked for any binding
- _____ Engine / Trans. Mounts Replaced / Tightened.
- _____ Independent Ground Strap mounted to Frame of Vehicle
- _____ Radiator has shroud for channeling Air Properly
- _____ Radiator Cap Replaced and Holds Proper Pressure
- _____ Starter Installed and Aligned Properly
- _____ Replaced any damaged or Frayed Hoses / Belts
- _____ Clutch Kit Replaced (where applicable) & matches w/ the HP/Torque of engine
- _____ Torque Converter Engaged Properly.
- _____ Fuel Tank is Rust Free and contains Fresh Gas

IX. Phone #s

Edelbrock Tech Line:	1-800-416-8628
Fast EFI Tech Line:	1-877-334-8355
MSD:	1-915-857-5200
Pertronix Tech Line:	1-909-599-5955
Tremec :	1-800- 401-9866
Lokar:	1-877-469-7440
March Performance Pulleys:	1-888-729-9070

X. Ford Tune Up Parts (some exceptions may apply)

ITEM	MANUFACTURER	PART#	Notes
Spark Plugs	Champion	RC12YC	.045 Gap
ignition Wires	Accel / Taylor		
Distributor	Pertronix	D7130710 or D7131710	302 or 351w
Cap and Roter Kit	Pertronix	D600710	
Ignition Coil	Pertronix	44001	
Fuel Filter	Edelbrock	8129 for braided fuel line	
Oil Filter	Fram	PH16	
Air Cleaner	Proform	66804	14 inch Round
PCV Valve	PCV 71	KEM	
Breather	Proform / Mr. Gasket	66035 or 2061	

Titling/Registration:

Engine Factory Inc. can not ensure whether the engine you purchase will comply with any or all individual state laws for its use.

Emissions:

Engine Factory does not guarantee our engines to be smog / emissions legal. Federal / Individual state laws vary from state to State, or Country to Country.