2003 CM50

Owners / Service Manual

“CHAMPIONS START HERE”

For **parts orders** contact your local dealer

To locate your closest Cobra dealer
log on to
www.cobramotorcycle.com
or call
(330) 549-9600

If you need **technical assistance**
contact your local dealer or call
the Cobra Technical Support Hotline at
(330) 549-9603

Cobra Motorcycle MFG., Inc.
11511 Springfield Road
North Lima, Ohio 44452

MCCM2003.6

DISCLAIMER OF WARRANTY

This motorcycle is sold "as is" with all faults, obvious or not. There are no warranties expressed or implied, including any warranty of merchantability and warranty of fitness for any particular purpose.

"WARNING"

THE COBRA CM50 IS A COMPETITION MODEL ONLY AND IS NOT MANUFACTURED FOR, NOR SHOULD IT BE USED ON PUBLIC STREETS, ROADS OR HIGHWAYS.

THE USE OF THIS BIKE SHOULD BE LIMITED TO PARTICIPATION IN SANCTIONED COMPETITION EVENTS UPON A CLOSED COURSE BY A SUFFICIENTLY SKILLED RIDER AND SHOULD NOT BE USED FOR GENERAL OFF-ROAD RECREATIONAL RIDING.

IMPROPER USE OF THIS MOTORCYCLE CAN CAUSE INJURY OR DEATH.

THIS BIKE IS INTENDED FOR EXPERIENCED RACERS ONLY AND NOT FOR BEGINNERS.

IT IS YOUR RESPONSIBILITY AS THE OWNER OF THIS COBRA MOTORCYCLE OR AS THE PARENT, OR LEGAL GUARDIAN OF THE OPERATOR, TO KEEP THIS COBRA MOTORCYCLE IN PROPER OPERATING CONDITION.

THIS BIKE WAS DESIGNED FOR RIDERS THAT WEIGH LESS THAN 80 LBS WITH FULL RIDING GEAR AND SHOULD NOT BE OPERATED BY RIDERS THAT WEIGH MORE THAT.

BE SURE THAT THE RIDER ALWAYS WEARS ADEQUATE SAFETY GEAR EVERYTIME HE OR SHE RIDES THEIR COBRA MOTORCYCLE.

IMPORTANT SAFETY NOTICE

⚠ WARNING

Failure to follow WARNING instructions could result in severe injury or death to the machine operator, a bystander, or a person inspecting or repairing the machine.

CAUTION:
A CAUTION indicates special precautions that must be taken to avoid damage to the machine.

NOTE:
A NOTE provides key information to make procedures easier or clearer.

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Specifications - General

Items	CM 50
Dimensions	
Wheelbase	35.75” (908mm)
Wheel size	10” (254mm)
Seat height	23.9” (607 mm) Stock #TCHJ0001
	22” (559 mm) Optional # TCHO0001
Engine	
Type	2-stroke, single cylinder, reed valve
Cooling system	Liquid-cooled
Displacement	49.8 cc
Bore and stroke	39 mm x 41.7 mm
Ignition system	Electronic
Spark plug	Splitfire SF406B
Gap	0.023” – 0.025” (0.58 – 0.64 mm)
Ignition timing	0.050” (1.3 mm) Before To Dead Center (BTDC)
Fuel type	*Sunoco MO2$_X$* or 93 octane pump gasoline
	OTHER RACE FUELS ARE NOT RECOMMENDED
Oil type	*Cobra Venom 2-cycle Race Oil*
Fuel / oil mix ratios	Between 32:1 and 40:1 (after engine Break-In is complete)
Carburetion	14 mm Dell’Orto
Main Jet	92
Slow (Pilot) jet	55
Float Height	16mm $\pm$ 0.5mm (0.63” $\pm$ 0.020”)
Transmission	
Speed	Single
Clutch	Cobra 3 shoe
Final drive ratio	13/37 T
Chain	88 links 420
Transmission / clutch oil type	*Cobra Venom 3 Shoe Clutch Milk,* or Dexron III
Quantity	235 ml (8.0oz)

Chassis	
Front tire	2.50 - 10
Pressure	15 psi minimum
Rear tire	2.75 - 10
Pressure	15 psi min. (20 psi for hard pack or rocky conditions)
Front fork	Marzocchi 32mm
Fork oil type	SAE 20 weight
Fork oil amount	200 ml (6.8 oz) oil change, 220 ml (7.4 oz) rebuild
Collapsed fork oil height	70 mm (2.75”) spring in, no spacer

Specifications - Torque Values

Fastener	Torque Value			Size & Remarks
	ft-lb	in-lb	Nm	
Cylinder head nuts	9.2	110	12	¼"
Crankcase bolts	6.6	80	9	6 x 1.0
Spark plug	(SP)	(SP)	(SP)	14 x 1.25
Stator bolts	2.1	25	2.8	#8
Stator cover bolts	1.7	20	2.3	#8
Clutch cover bolts	5.8	70	7.9	6 mm
Clutch	40	480	54	10***
Engine mount bolts	22	265	30	8 mm
Swingarm Pivot	21	250	28	14 mm
Intake manifold bolts	4.6	55	6.2	6 mm
Ignition rotor nut	40	480	54	10 mm**
Rear Sprocket Bolts	18	216	24	7 mm
Rear shock mounts	40	480	54	10 x 1.5
Rear Axle Bolt	25	300	34	12 mm

****** Use green (wicking / bearing retainer) thread locker, with primer, on the flywheel / crankshaft taper but none on the threads.

******* Use green (wicking / bearing retainer) thread locker, with primer, on the crankshaft / clutch taper but use red (high strength) thread locker, with primer, on the nut.

(SP) To apply the proper torque to the spark plug when inserting, one must first screw the spark plug in until the metal gasket ring causes resistance and then turn another 1/8 to ¼ turn.

Optional Components

- Carburetor jets
- Sprockets
    - Front
    - Rear
- Seat with lower seat height, 22” (559 mm), # TCHO0001
- Suspension Springs

Weight of Rider (lb)	Fork Spring	Shock Spring
Less than 38 (light)	KCMZ0012A	SCMU0321 (yellow, 320 lb/in)
38 – 45 (std)	KCMZ0012	SCMU1360 (red, 260 lb/in)
46 to 55 (stiff)	KCMZ0012B	SCMU1380 (white, 380 lb/in)
Extra stiff		SCMU1400 (silver, 400 lb/in)

- Suspension Valving

Damping Rate	Fork Valving Compression (right)	Fork Valving Rebound (left)	Shock Valving (kit)
Soft (fast)	KCMZ0033A	KCMZ0032A	SCMU0318A
Standard	KCMZ0033	KCMZ0032	SCMU0318
Hard (slow)	KCMZ0033B	KCMZ0032B	SCMU0318B

Break-In Procedure

Your Cobra CM50 is a close-tolerance high performance machine and break-in time is very important for maximum life and performance. The CM50 can be ridden hard after the first ½ hour break-in time but it is recommended that no adjustments are made to the carburetion or suspension until the full 8 hours of bike break-in has elapsed. Also, after the engine, transmission, and drive train have been broken-in for the full 8 hours, the bike will be faster!

Use a fuel / oil mixture of 32:1 for the full 8 hour break-in period. Be sure to use 93 octane pump gas, or *Sunoco MO2$_X$* , with Cobra's specially formulated *Cobra Venom 2-cycle Race Oil*. (Part # MCMUOL02)

CAUTION:
Failure to use proper fuel, oil, or fuel/oil mixture may result in premature engine wear or damage to the machine.

Adhering to the following break-in schedule will result in long lasting high performance machine.

- First ½ hour of operation
  - Follow the starting procedure listed in this manual.
  - Avoid prolonged operation at Wide Open Throttle.
- After 1 hour of operation
  - Check for loose bolts and nuts on the bike and retighten as necessary (proper toque values are listed under Specifications).
  - Clean the carburetor bowl.
  - Change the transmission / clutch lubricant.
- After 8 hours of operation
  - Change the fork oil.
  - Have a Certified Cobra Mechanic change the shock oil.
- Your bike is now ready for the highest level of competition!

NOTE:
During break-in the bike will likely loose some engine coolant through the radiator overflow hose. Loosing up to 4 oz (120 ml, ½ cup) is normal. Proper coolant level will cover the top of the radiator cores. Removing the radiator cap and looking inside is the only way to check the coolant level.

⚠ WARNING
Never open the radiator cap of a machine that has a hot or warm engine or one that has recently been ridden. Burning and scalding could occur.

CAUTION:
It is important that the radiator cap is installed correctly and completely otherwise engine damage could occur.

Starting Procedure

Before starting the machine inspect the following:

- Check for proper tire pressure in both tires.
- Observe the chain tension and adjust if necessary.
- Observe the coolant level and fill if necessary.
- Verify that the chain rollers do not have improper wear.
- Inspect the frame, for;
  - Cracks in the metal.
  - Cracking paint which might indicate overly stressed material.
- Verify that the handlebars are tight.
- Check the throttle for;
  - Smooth operation and sound closing.
  - Frayed strands of the cable inside the throttle housing.
- Check for loose bolts and nuts, and re-torque as necessary.
- Verify that the air filter is clean and properly saturated with oil.
- Insure that the fuel tank contains an adequate volume of fuel / oil mixture to complete the distance required. (*Sunoco MO2X* or 93 octane pump gas with Cobra's specially formulated *Cobra Venom 2-cycle Race Oil*)
- Turn the fuel on by rotating the fuel petcock knob to the vertically downward position (reserve position is horizontally forward)

CAUTION:
For best results from your Cobra Motorcycle use only the recommended fuels. Testing has shown that most 'race' fuels actually degrade performance.

When your pre-ride inspection is complete the bike may be started. For a cold engine follow this procedure.

1. Place the motorcycle on a stand of sufficient strength that positions the motorcycle in a level upright position with the rear wheel off the ground.
2. Pull up the choke knob and turn it to lock it.
3. Kick start the engine.
4. Rev the engine in short spurts, turning the throttle no more than 1/4 open until the engine will run without the choke.
5. Verify a functional engine shut-off switch by shutting off the engine.
6. Restart the engine and proceed with riding when the engine is sufficiently warm (i.e. the side of the cylinder is warm to touch).

CAUTION:
Never rev an engine full throttle when it's cold or slightly warmed up. Cobra recommends that you tell your child to take it easy the first couple of minutes in practice until the engine comes up to full operating temperature. Make sure your engine is properly warmed up before racing.

General Tips

1. Always wear a helmet and other protective riding gear.
2. Cobra recommends that you tell your child to take it easy the first couple of minutes in practice until the engine comes up to full operating temperature.
3. Make sure your riders' foot is not resting on the foot brake while they are riding.
4. Evaluate the bikes jetting only after it has been warmed up to race temperatures.
5. A properly maintained machine is safer, faster, and more fun to ride.
6. When washing the bike, be careful to not directly aim the hose at the bottom edge of the seat, or water is apt to enter the airbox.
7. Your Cobra Motorcycle has a 10 digit VIN (Vehicle Identification Number). The first two digits indicate the model and the seventh indicates the model year (MY).
    a. Example, CMxxxx3xxx is a 2003 MY CM.

Maintenance

Schedule & Tips

It is important that you adhere to this maintenance schedule so as to promote the longevity of your Cobra Motorcycle.

- Between each ride
  - Check the air filter (clean and re-oil as necessary).
  - Insure the smooth operation of the throttle cable (throttle soundly 'clacks' shut).
  - Check for frayed strands of the throttle cable inside the throttle housing and replace if necessary.
  - Check for adequate tire pressures and adjust if necessary.
  - Check all nuts and bolts for proper torque and re-torque if necessary.
  - Spray all moving parts with WD40 or other light oil.
  - Check drive chain for
    - Proper tension and adjust if necessary.
    - Adequate lubrication and lubricate if necessary.
  - Insure that the ignition stator and rotor are clean and dry.
  - Check the frame for cracks in the metal or cracks in the paint that might indicate that the metal has been stressed beyond it's safe limits. Replace or get properly rewelded as necessary.
  - Inspect the rear sprocket damper plate for bending or warping. Straighten or replace if more than 1/16" (1.6 mm) from flat.
- Every 2 hours of operation
  - Replace the transmission oil.
- Every 10 hours of operation
  - Replace the fork oil.
  - Have the shock oil replaced by a Certified Cobra Mechanic.

CAUTION:

1. Because of the amount of heat generated by the clutch and engine during extended periods of riding, it is advisable to remove the ignition cover afterward to allow the ignition to cool off. The heat transfers through the cases and can damage the stator as it cools off because of lack of airflow around the stator.

2. If you ever need to weld anything on the bike, disconnect the spark plug cap, unplug the ignition, disconnect the kill switch, scrape the paint bare near the area to be welded and put the ground clamp as close to the area to be welded as possible.

⚠ WARNING

Be sure the fuel tank and carburetor have been removed and safely located away from the welding process.

3. The frame is 4130 Chrome Moly and it is important to weld it with the proper rod and heat settings set as light as possible. Cobra recommends replacing the frame with a new one if the old one becomes damaged.

4. If your kick-starter lever does not return to the rubber bumper, use WD-40 or light penetrating oil under the plastic cover behind the spring on the shaft. The shaft is a very close fit to the case and also has an O ring in it and is difficult to get lubrication to which may cause binding. If it does not loosen up, remove the kick-starter cover and kicking assembly. Grease the shaft.

M1: Replacing Transmission / Clutch Lubricant

Tools needed:

- 225 ml (7.6 oz) *Cobra Venom 3 Shoe Clutch Milk* (Part # MCMUGF01), or Dexron III Automatic Transmission Fluid.
- 13 mm combination wrench

Procedure:

1. Begin this procedure with a bike that has been ridden more than 5 minutes but less than 10 minutes. It is desired to have the engine warm enough so that the oil 'runny' but not so hot that there is risk of being burned by the engine or the oil.

⚠ WARNING

Hot oil and hot components on the motorcycle may cause burns.

2. Lean bike against something or set on stand with oil drain hole.
3. Using a 13 mm wrench, remove the oil drain bolt located on the right side of the engine, on the clutch cover, near the brake lever (Item 2, figure 1).

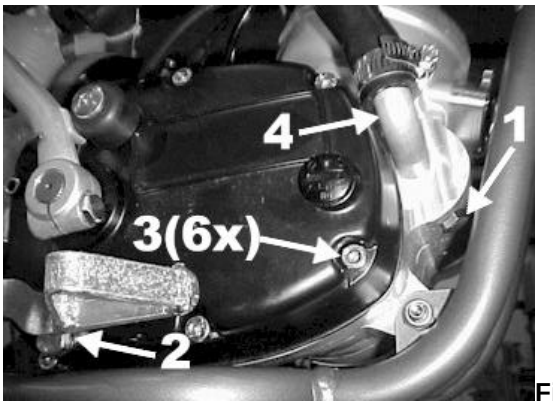


Figure 1

NOTE: You may need to adjust the brake pedal (up or down) to gain access to the drain bolt.

4. After it has drained, reinstall the bolt being sure that the copper gasket is in place. Torque to 15 Nm (11 ft-lb).
5. Reapply oil from oil fill plug 235 cc *Cobra Venom 3 Shoe Clutch Milk*, or Dexron III Automatic Transmission Fluid, thru the fill plug.

NOTE lean bike over onto it's left hand side so that the clutch cover is up unless you have a squeeze bottle.

6. Reapply the oil fill bolt, hand tight, being sure the fiber gasket is in place.

CAUTION:
Cobra has spent considerable time and money developing the proper lubrication to handle the harsh environment of the automatic clutch and transmission of this motorcycle. Cobra was forced to put forth this effort because the other available options and not adequate. Cobra's specially developed *Cobra Venom 3 Shoe Clutch Milk* (Part # MCMUGF01) is the recommended lubricant for your CM50 motorcycle.

M2: Chain adjustment

Figure 2

1. Make sure that the rear wheel is aligned properly.

2. Push down on the seat, compressing the suspension down to where the chain is tightest.

3. The chain should not be too tight but not too loose. A minimum of 2.5 in. of slack should be between the swing arm and the chain.

M3: Front brake adjustment

Tools recommended for front brake maintenance:

- 10mm open end wrench

Figure 3, from the brake lever

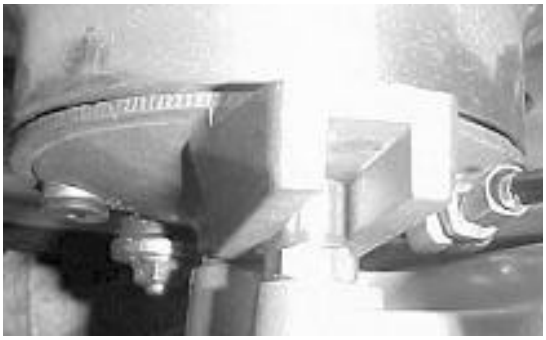


Figure 4, from the brake hub

From the brake lever:

1. Loosen the locking nut on the brake lever.
2. Adjust the bolt to desirable position.
3. Tighten the locking nut.

From the brake hub:

1. Loosen the 10mm nut on the hub.
2. Adjust the brake cable to desirable position
3. Tighten the 10mm nut.

CAUTION:
If you tighten the front brake up too much, the brakes may hang up causing the brake pads to wear incorrectly and prematurely.

M4: Rear brake adjustment

Tools recommended for rear brake maintenance:

- 10mm open end wrench

There are 2 adjustments on the brake.

Figure 5, adjust brake lever free height

Figure 6, adjust brake lever 'free play'

From the brake lever:

4. Loosen the 10mm nut on the back of the brake pedal.
5. Adjust the bolt to desirable position
6. Tighten the 10mm nut.

From the brake hub:

1. Adjust the wing nut up to desirable position.

CAUTION:
If you tighten the wing nut up too much, the brakes may hang up. If so, the brake pads will burn up, and need replaced.

M5: Air Filter Cleaning

Tools recommended for air filter maintenance:

- #2 Phillips head screwdriver
- 4 mm hex key (Allen)
- Foam filter oil

Procedure

1. Removed the seat with the 4 mm hex key
2. Remove the two Phillips head screws holding the filter to the entrance of the airbox.
3. Clean the filter in a nonflammable solvent to remove the filter oil.
4. Clean the filter in hot soapy water to remove all dirt particles.
5. Allow it to dry thoroughly.
6. Saturate with filter oil and remove excess.

⚠ WARNING

Do not clean the air filter with gasoline or other highly volatile petroleum product. Diesel fuel or kerosene would be preferred but caution should still be taken. Hot soapy water works well.

NOTE:

The Cobra is equipped with a special designed Air box. It is very important to keep the air filter clean and properly oiled with high quality water-resistant foam filter oil. It's very important to oil your filter consistently each time because varied amounts of oil will change your carburetor jetting.

NOTE:

Make sure you change or clean your filter after each moto. We recommend carrying **3** or more filters in your toolbox.

- 1 for practice
- 1 for each moto

M6: Fork Oil Replacement

Tools required

- 5 & 6 mm Allen wrench
- 19 mm wrench or socket (two required)
- Spring clip remover

Disassembly

1. Remove the front wheel.
2. Remove the fork legs from the triple clamps.
3. Perform the following on one leg at a time.
4. Using your hands, remove the black rubber plug from the top of the fork leg exposing the white plastic cap.
5. Secure the fork leg assembly in a vice by gripping the leg across the flats through which the axle bolt goes through.
6. Depress the white plastic cap inwards (down) and remove the wire spring clip from its groove.
7. Remove the white cap, the fork spring preload sleeve, and the fork spring.

NOTE: Depressing the fork leg will facilitate removing the white cap.

8. The fork can now be turned upside down and drained.

Assembly

1. Fill the leg with 200 cc (6.8 oz) 20 wt fork oil.
2. Standard fork oil level is 70 mm (2.75”) from the top edge with the fork collapsed.

NOTE: Remove the preload sleeve but leave the spring in for the measurement.

3. Install the preload sleeve.
4. Install and depress the white cap while installing the spring clip.
5. Fork may be reinstalled.

Engine Service / Parts

2003 CM ENGINE ASSEMBLY REFERENCE DRAWING					
REF. #	PART #	DESCRIPTION	REF. #	PART #	DESCRIPTION
1	CAKG0002	Clutch, Complete	44	ZCKG0002	Gasket, Base
2	CAKG0004	Shoes, Clutch w/ Washer Springs	45	ECKG0041	Cylinder, 50cc
3	CAMU0008	Spring Set, Washer type for Clutch	46	ZCMUOR07	Oring, Exhaust Flange
4	CCMU0031	Arbor for 3 Shoe Clutch	47	ECKG0015	Exhaust Flange
5	ECMU0018	Nut, Crankshaft Starter	48	HCBC0602	Screw, 6x20
6	ECMU0033	Clutch Hub w/ Gear	49	ECMU0008	Stud, Cylinder
7	ECMU0040	Clutch to hub spacer	50	ZCMUOR03	Oring, Cylinder head, Small
8	ECDC0105	90 Degree Crankcase Vent	51	ZCMUOR05	Oring, Cylinder head, Medium
9	ECMU0017	Seal, Crankshaft	52	ECKG1121	Cylinder Head Dome-Insert
10	ECMU0016	Bearing, Crankshaft	53	ECMU0403	Spring, Kickstarter Return
11	ECMU0001	Bearing, Trans., Secondary Gear	54	HCNS1401	Nut, 1/4-20
12	ECMU0020	Bearing, Trans., Precision	55	ZCMUOR02	Oring, Cylinder head, Large
13	ECMU0105	Gear, Trans., Primary	56	ZCMUOR08	Oring, Cylinder head
14	HCNS1202	Nut, 1/2-20, Left Hand	56A	ZAKGOR02	Oring Kit, Top End
15	ECKG0018	Crankcase, Clutch side	57	ECKG0025	Cylinder Head - Outer Cap
16	ECMU0131	Water Elbow	58	HCWF1401	Washer, 1/4"
17	HCBH0805	Screw, M8x12mm, coolant drain	59	ICMU0006	Rotor
18	ECMU0103	Shaft, Trans., Secondary w/gear	60	ICMU0007	Stator
19	ECMU0104	Shaft, Trans., Output w/gear	60A	MCKGGR00	Grommet, Engine case
20	ECKGBR01	Bearing, Trans., Output shaft	61	ECKG0073	Impeller, Waterpump
21	ZCKG2001	Gasket, Crankcase	62	ECKG0074	Seal, Waterpump
22	HCDP1401	Dowel, for Engine Cases	63	ECKG0203	Intake Manifold
23	ECMU0038	Crankshaft, Welded and Balanced	64	ZCMU0032	Gasket, Reed to case
24	ECKG0017	Crankcase, Ignition side	65	ZCMU0031	Gasket, Intake to Reed
25	ECKG0004	Snap Ring, Int. for Water Pump	66	ECKG0202	Reed Assembly
26	ECKGSE01	Seal, Output shaft	66A	ECKG0204	Reed Kit
27	HCBC0606	Screw, M6x45	67	ZCKG0101	Gasket, Ignition Cover
28	HCBC0604	Screw, M6x35	68	ECKG0001	Cover, Ignition
28A	HCBC0603	Screw, M6x30	69	HCBC0802	Screw, 8-32x1-3/4
29	HCBC0608	Screw, M6x55	70	ECMU0043	Piston Kit
30	PCKG0013	Sprocket, 13T for output shaft	70A	ECMU0055	Piston Ring
30A	ECKGSR03	Snap Ring, Ext., for output shaft	71	ECKG0012	Wrist pin
31	HCWP0001	Washer, Stator	72	ECMU0077	Bearing, Wrist Pin
32	HCBH0803	Screw, 8-32x7/8	73	ECMUSR00	Snap Ring for Piston
33	HCBC0801	Screw, 8-32x1-1/2	74	ECMUSP01	Spring, Kick Start Dog
34	HCNS1001	Nut, 10mm	75	ECMU0207	Gear, Kickstarter, Small
35	ECKG0042	Pulley, Waterpump-Crank	76	ZCMU0030	Gasket, Clutch Cover
36	ECKG0070	Belt, Waterpump	77	ECMU0205	Kick Starter Rubber
37	HCBB0001	Screw, 10-32x1/2"	78	HCWC0000	Gasket, Copper
37A	HCBC1033	Screw, 10-32x3/4"	79	HCBH0805	Screw, M8x12mm, oil drain
38	HCWF0601	Washer, 6mm	80	ECMU0204	Kick Starter Dust Shield
39	ECMU0080	Belt Retainer	81	ZCMU0001	Gasket, Oil fill plug
40	ECKG0075	Pulley, Waterpump-Fan	82	ECMU0037	Oil fill plug
41	HCSS8201	Screw, 8-32x3/8	83	ECMU0202	Kickstarter Lever
42	ECKG0072	Bearing, Waterpump	84	ECMU0206	Kickstarter, complete
43	ECKG0141	Shaft, Waterpump	85	ECMU0003	Brass Clutch Bushing

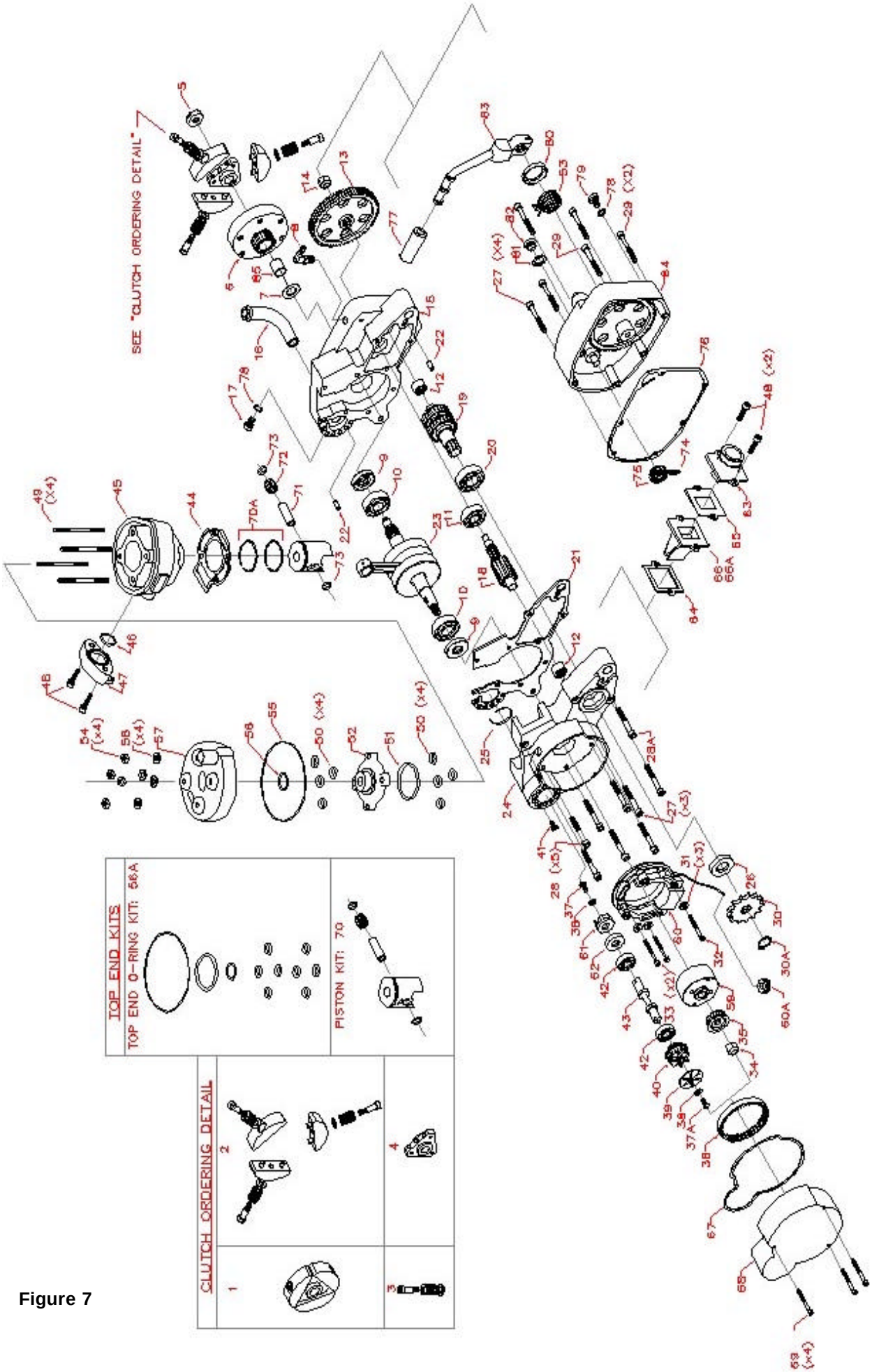

SEE "CLUTCH ORDERING DETAIL"
TOP END KITS
TOP END O-RING KIT: 56A
PISTON KIT: 70
CLUTCH ORDERING DETAIL

Figure 7

Trained technicians with precision gauging and proper assembly fixtures carefully assemble all Cobra engines to specific clearances. If you feel you have the skills, and the appropriate tools, to perform the following service tasks please follow the instructions closely. The part numbers are listed throughout to help you when ordering parts from your local Cobra dealer.

If you don't feel comfortable with the service work, simply take your engine out of the frame and sent it to:

Cobra Precision Engines
11511 Springfield Road
North Lima, Ohio 44452

Cobra has specialized mechanics that will go through the entire engine, replacing gaskets, bolts, any old part that is worn. The engine will be rebuilt using the same precision gauging and assembly fixtures as when it was assembled new. Before leaving, the engines performance will be measured on a dynamometer to ensure that your engine is operating at its highest potential. All this for one low nominal fee. Call (330) 549-9603 for details.

ES1: Engine Service

One method for determining whether the top end of your engine needs rebuilt is to perform a WOT (Wide Open Throttle) kicking compression test. Before performing the procedure please read the caution notes below.

CAUTION:

- There appears to be a wide range of variability in reading compression gauges across the country.

- The head volume of this Cobra Motorcycle is very small and so requires many kicks ~20 before you establish the most accurate reading possible.

- Because of the geometry of the spark plug used in this Cobra Motorcycle, the adapter used with your compression tester must have a similar volume protruding into the combustion chamber to establish an accurate value.

- Length of hose on the compression tester will affect the reading. The shorter the hose length the more accurate your reading will be.

Because of these difficulties in measuring an *absolute* compression value, a useful *relative* value can be achieved by testing your bike's compression with your own particular gauge after a new top end or when the bike is new so that you know what your particular gauge reads on a 'fresh' engine. When it has dropped to 90% of its original value the engine will be down on power and would benefit from a rebuild. When it's dropped to 80% it really needs rebuilt! Using the table below will help you determine monitor the condition of your top end.

	Engine is Fresh Measured Value	Engine Down on Power Measured Value * 0.9	Engine NEEDS Rebuilt Measured Value * 0.8
Example	110 psi	110 psi * 0.9 = 99 psi	110 psi * 0.8 = 88 psi
Your Values			

Procedure for Compression Testing

1. Shut off the fuel petcock.
2. Install the compression gauge into the spark plug hole.
3. Hold the throttle to wide open, and kick repeatedly (approximately 20 times) or until the gauge reading does not increase in value with each kick.

E1: Engine Removal

To service the bottom end and transmission, the engine must be removed from the frame.

Tools required

- 5/16", 10, 14, 22 mm socket
- 10, 13, 22 mm wrench
- 10, 17 & 19 mm sockets
- 9/64", 3,4 & 5 mm hex key (Allen wrench)
- 7 mm nut driver, flat or Phillip, screwdriver for hose clamps
- Spring remover
- Flywheel / clutch puller (#MCMUTL68)
- Clutch nut removal tool (Call local dealer for details).

Procedure

1. Remove the seat (4mm hex key).
2. Turn of the fuel at the petcock and disconnect the fuel line.
3. Remove the tank (5 mm hex key & 10 mm socket).
4. Remove the carburetor from the inlet (flat head or Phillips head screwdriver, 7 mm nut driver).
5. Remove the right side number plate (3mm hex key).
6. Remove the silencer & pipe (spring remover, 5mm hex, & 10mm wrench).
7. Disconnect the ground wire from the reed cage with a 5 mm hex key (depending on your ultimate repair, you may want to reinstall the fastener in the inlet.
8. Leaving the coolant lines connected to the engine, remove the radiator from the frame (5mm hex with 10 mm wrench).
9. Remove the master link from the chain.
10. Remove front engine mount bolt (13 mm socket, 6 mm hex key).
11. To access the swingarm bolt, remove brake lever (13 mm wrench, 5 mm hex key).
12. Remove the swingarm bolt (22mm socket & wrench).

NOTE:
Only drive the swingarm bolt far enough to clear the engine, leave it holding the one side of the swingarm to the frame

13. Remove the engine from the right side of the frame.
14. Locate a suitable container for the engine coolant and remove radiator hoses from engine (coolant will drain).

NOTE:
If the coolant looks to be free of contaminates it may be reused.

NOTE:
If you are merely performing a top end service skip ahead to *Top End Disassembly Procedure*.

E2: Complete Engine Disassembly Procedure

1. Remove the magneto cover (9/64" hex key)
2. Remove the bolt from the water pump shaft (4mm) and slide off the belt cover and the water pump belt
3. Using a flywheel holding tool and 14 mm socket remove the nut that secures the flywheel.
4. Using the Cobra flywheel / clutch puller (#MCMUTL68), remove the flywheel from the crankshaft.
5. Remove the stator (9/64" hex key).
6. Remove the nut holding the large gear to the transmission input shaft (19 mm socket).
7. Remove the special nut / starter gear that holds on the clutch (special tool available, contact your local dealer).
8. With the Cobra flywheel / clutch puller (#MCMUTL68), remove the clutch from the crankshaft (details in Clutch Service portion of this manual).

E3: Top End Disassembly Procedure

1. Remove the cylinder head nuts (5/16").
2. Remove the outer cylinder head.
3. Remove the inner cylinder head.

INSPECTION NOTE:
Inspect the cylinder head for deposits and abrasions.

1. If there are deposits they should be removed
    a. Black oily deposits (indicating a rich mixture or improper oil type/quantity) can be removed with solvent
    b. Crusty deposits (indicating dirt ingestion) can be removed with solvent and may require some scraping.
2. Abrasions
    a. Pitting or erosion indicates detonation and may require cylinder head replacement, also
        i. Retard the ignition timing
        ii. Use a higher octane fuel
    b. Missing chunks or indentations indicate broken hardware or ingested items - replace the cylinder head.

4. Remove the cylinder.

INSPECTION NOTE:
Inspect the cylinder bore for abrasions, deposits, and missing coating.

1. If abrasions: scrapes, scratches, pitting, etc… are found, replace the cylinder.
2. If deposits are all are found
    a. Clean with muratic acid.
    b. Once the deposits are removed, inspect for abrasions and missing surface coating.
        i. If there are abrasions or missing coating, replace.
        ii. If all looks well, the cylinder may be saved.

5. **⚠ WARNING**
6. Muratic acid can be dangerous. Follow the manufacturers instructions closely.

7. Remove the piston clip with a scribe.
8. Remove the piston pin with a piston pin remover.

INSPECTION NOTE:
Inspect the piston for abrasions and deposits on the top and sides and clean or replace as necessary.

E4: Splitting the Cases

1. Remove the fasteners holding the two halves of the crankcase together.
2. Separate the cases with a proper case splitting tool.

CAUTION:
Take caution when handling the crankshaft. It is the main power transfer to the rest of the engine. If it is out of alignment, it will cause premature failure of your bearings which can lead to serious damage to the cylinder and the rest of the engine. Do not try to true the crank yourself. Truing the crank should be done professionally.

Cobra trues every crank before it leaves the factory, and also welds the pin to keep it true. If there are any problems send the engine in, or call tech support (330) 549-9603 to determine what the problem is.

CAUTION:

- If you split the cases, check the gear tooth faces for chapping & signs of fatigue.
- Check the small needle bearings for fatigue. If the bearings are damaged, the engine cases should be checked to make sure the needle-bearing casing didn't oblong the bearing hole in the case.
- Needle bearings should be replaced every racing season.

E5: Engine assembly

CAUTION:
For any seals that are to be installed, apply a light amount of grease to the seals' ID and a small amount of oil to the OD.

1. Press the three bearings into the respective holes in each case half.
2. Press in the crank seals such that the concave side faces the crank weights.
3. Press in the counter shaft seal (concave side faces inside of transmission)
4. Install the water pump assembly
5. Wire ring retainer
6. Press in the water pump assembly
7. Tap both ways axially then verify easy rotation
8. Press crank into left case half
9. Insert the transmission input shaft and install large drive gear as shown in figures 8 & 9.

NOTE:
If the nut was removed from the input shaft, it will be easier to install and tighten later.

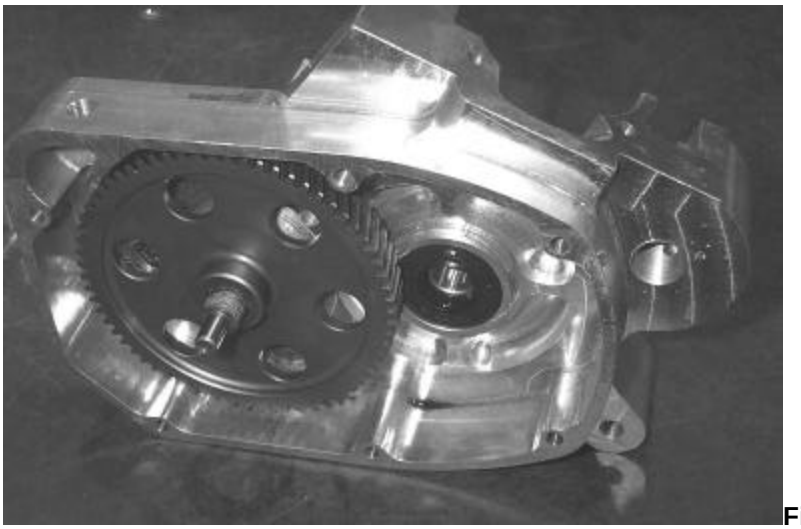


Figure 8

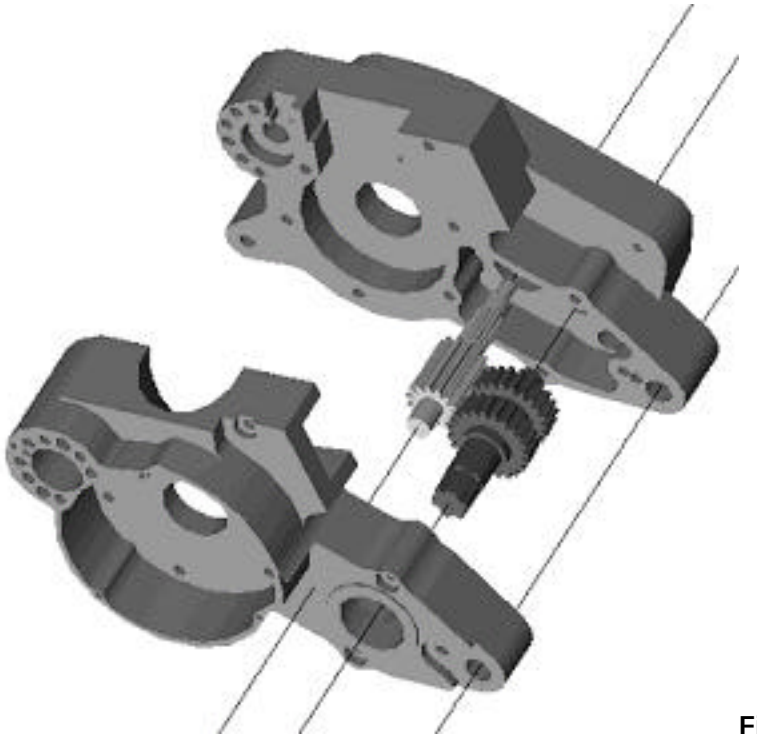


Figure 9

10. Insert dowel pins in the left side case as shown in figure 10.

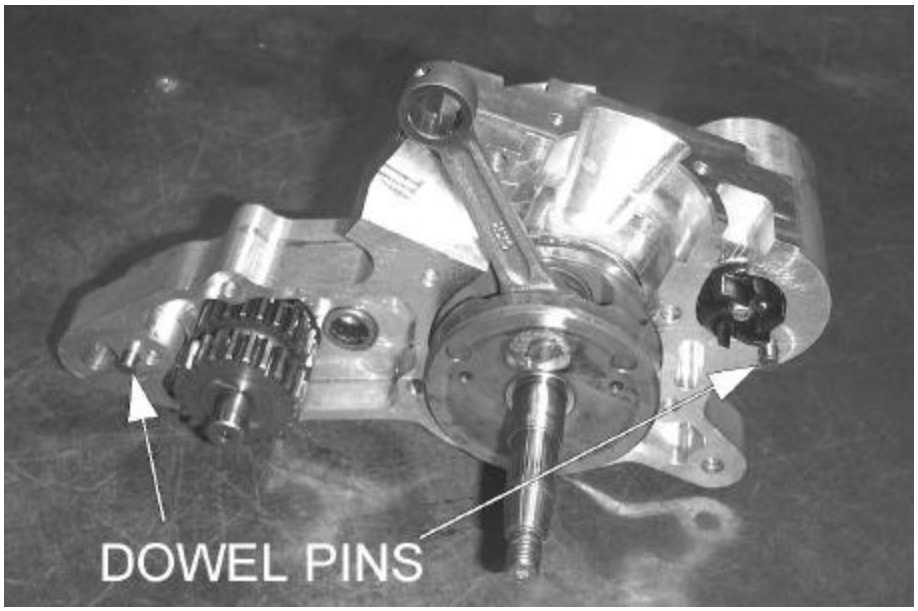


Figure 10

11. Apply gasket sealer (NAPA Aviation Form-A-Gasket #765-1210 or equivalent) to the mating surfaces of both crankcase halves.
12. Apply the crankcase gasket to the left crank case half being sure to install the gasket behind the connecting rod.
13. Insert the screws with the three longer ones (40mm long) at locations shown.

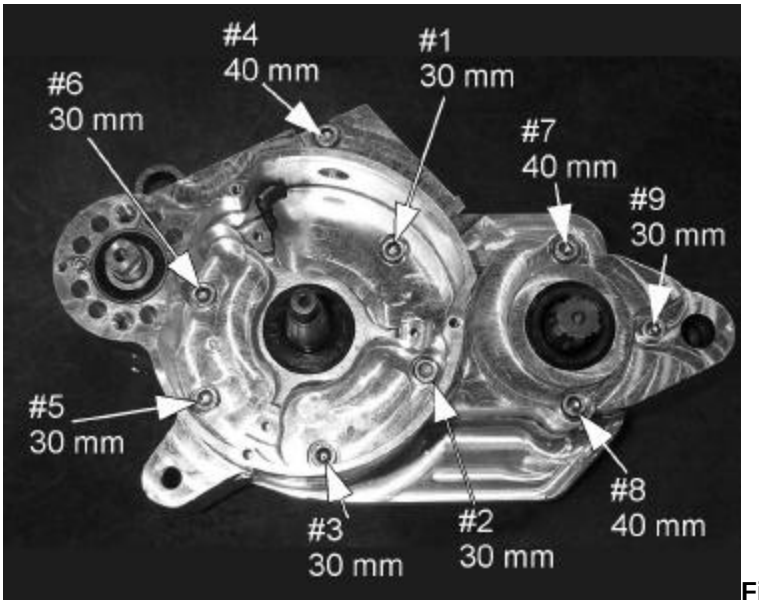


Figure 11

14. Torque to 9 Nm (80 in-lb) in the pattern shown in figure 11.
15. Install the piston with new wrist pin bearing and, pin and clips.
16. Install the piston rings.

CAUTION:
Be sure to align the piston such that the arrow on the top piston surface points to the exhaust (front of bike/engine).

17. Apply gasket sealer (NAPA Aviation Form-A-Gasket #765-1210 or equal) to the cylinder deck areas around the coolant passage and cylinder studs as shown in figure 12.

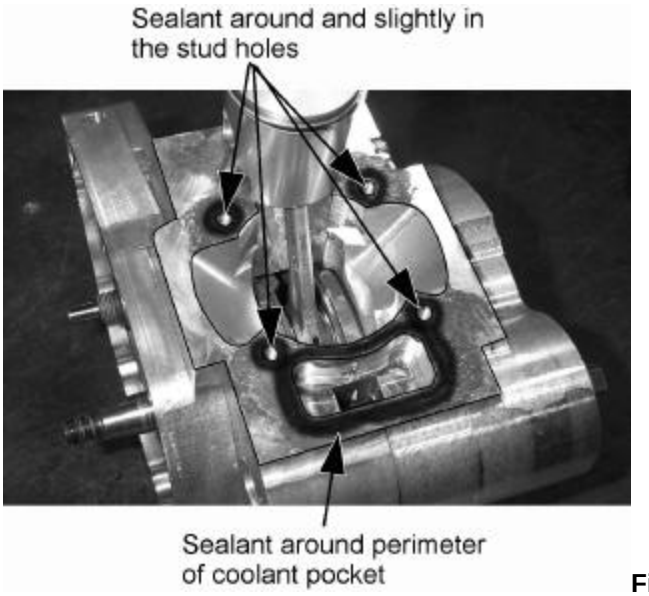


Figure 12

18. Install the base gasket
19. Install the cylinder being sure that the piston rings are properly aligned with the indexing pins.

CAUTION:
Never force the cylinder. If resistance is felt, determine the problem and solve it.

20. Install the cylinder studs and o'rings as shown in figure 13

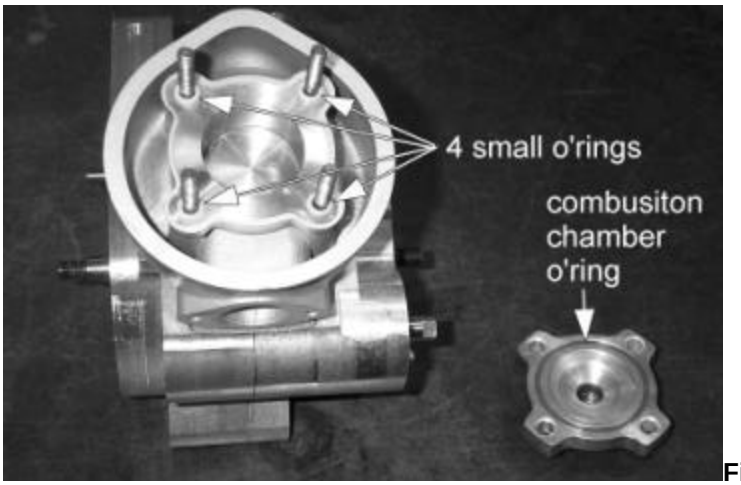


Figure 13

21. Install cylinder head insert
22. Install O'rings as shown in figure 14

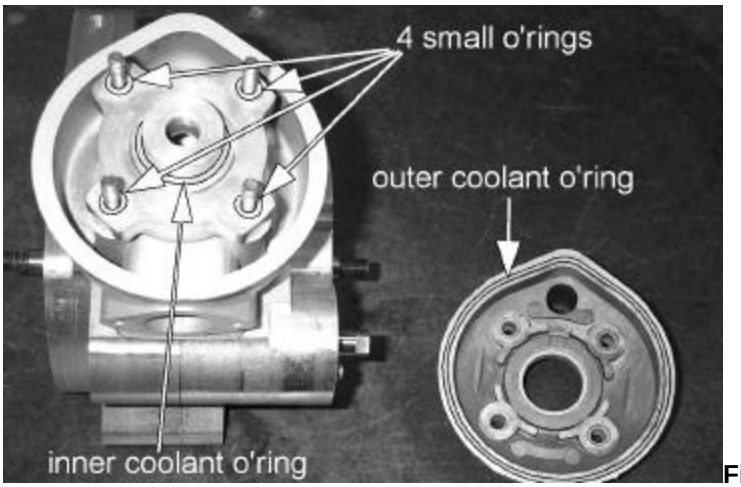


Figure 14

23. Install the cylinder head and torque to 9.2 ft-lb (12 Nm)
24. Install stator reinstalling the grommet and wires (snug the bolts).
25. Install the rotor per *Rotor Installation* section, under the *ES4: Ignition* portion of this manual.
26. Install the water pump outlet pipe (apply Ultra black Hi-Temp RTV silicon gasket maker to the threads before assembly) before installing the clutch and rotate to a vertical position with the engine resting on a bench
27. Install the clutch per *Clutch Installation* section in this manual.
28. Install the coolant drain plug with copper washer (11 ft-lb, 15 Nm).
29. Make sure that the exhaust spacer is on the cylinder (53 in-lb, 6 Nm).
30. Install the spark plug with a fresh gasket (to apply the proper torque to the spark plug when inserting, one must first screw the spark plug in until the metal gasket ring causes resistance and then turn another 1/8 to ¼ turn).
31. Install reed and inlet manifold with new gaskets (58 in-lb, 6.5 Nm).

ES3: Clutch

Cobra clutch puller assembly:

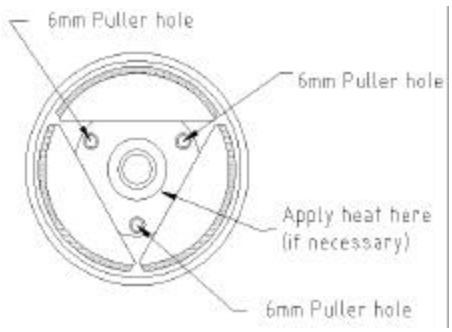


Figure 15

Clutch puller diagram

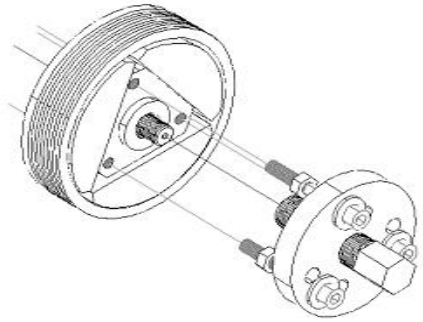


Figure 16

Tools recommended for clutch service:

- 22mm socket
- Universal clutch puller- a universal puller that pulls the clutch, main drive gear and rotor. (Part # MCMUTL70).
- 5mm T-handle
- Clutch nut removal tool (Call local dealer for details)
- *Cobra 3 Shoe Clutch Milk* (Part # MCMUGF01)

CLUTCH REMOVAL:

1. Drain the engine transmission oil.
2. Remove the pipe and remove the 6 bolts that hold the kick-starter cover on.
3. Remove the clutch nut (right handed nut) on the end of the crankshaft with a 22mm socket.
4. Attach the *COBRA CLUTCH PULLER.* There are three 6mm clutch puller holes located on the ends of the center hub. (figures 15 & 16) You must use a *draw type puller* to remove the clutch.

CAUTION:
Do not use a jaw type puller or use the 6mm tapped holes as jackscrews or you are likely damage the clutch drum or clutch.

5. If necessary apply heat to the center clutch hub.

CAUTION:
Do not heat the crankshaft threads or the aluminum shoes.

6. Keep tension on the puller as you are heating it.

⚠ WARNING
The clutch will often pop off under tension from the puller and it will be very hot.

CLUTCH WASHER STACKUPS:
Once the clutch is removed, and cool to touch, carefully put it into a vice and remove the center shoulder bolt out of each clutch shoe. You will probably have to heat the center hub again to remove the bolts. Once you get a bolt loosened, carefully remove it with the shoe and observe the way the spring washers are stacked.

CAUTION:
It is very important that the clutch stack be reassembled as it was disassembled unless new shoes are being installed then it is important to reinstall per figure 17.

CLUTCH ASSEMBLY REFERENCE DRAWING		
REF #	**PART #**	**DESCRIPTION**
1	CAKG0004	Set of three shoes, springs, bolts, flat washers & nuts
2	CAMU0008	Set Of three springs, washers, bolts & nuts
3	CAKG0005	Set of three shoes
4	HCBS5603	Single center shoulder bolt

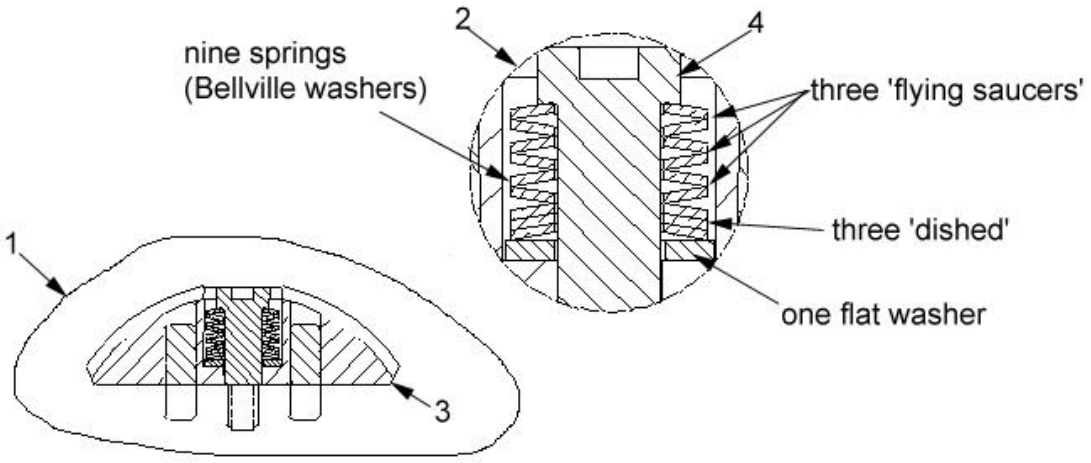


Figure 17 Recommended clutch spring stack. Each 'spring' stack contains nine springs (Bellville washers) - six arranged into three 'flying saucers', and three arranged in a 'dished' arrangement against the flat washer.

Clutch shoe wear:

- If the clutch has been slipping and shows signs of glazing, it is best to replace the shoes. We have found that once the shoes are glazed, even if deglazed with emery paper or a file, the performance is reduced.
- The best way to prevent glazing is by not gearing too high, changing the oil as specified and by not blipping the throttle. Every time you blip the throttle, you are working your clutch springs.

CAUTION:
The clutch produces a tremendous amount of heat and when a rider is blipping the throttle. This makes the clutch and clutch springs wear out quicker. This also makes your engine tend to run hotter which decreases engine power and degrades ignition stator efficiency. It is important to train your rider ***NOT*** to be a **throttle 'blipper'**.

CAUTION:

Sludge build-up between the spring washers also keeps the clutch shoe from engaging fully and this will cause the clutch to start to slip. So you will need to clean the sludge out or just replace the spring washers and bolts with new ones. How quickly this sludge builds up depends on how often you **change your oil** and whether your rider is a throttle 'blipper'.

REF #	PART NO.	DESCRIPTION
1	ECMU0017	Crank seal
2	ECMU0040	Clutch to hub spacer
3	ECMU0003	Brass bushing
4	ECMU0033	Clutch Hub w/ brass bushing
5	CAKG0002	Clutch Complete w/ Arbor
6	ECMU0018	Clutch nut

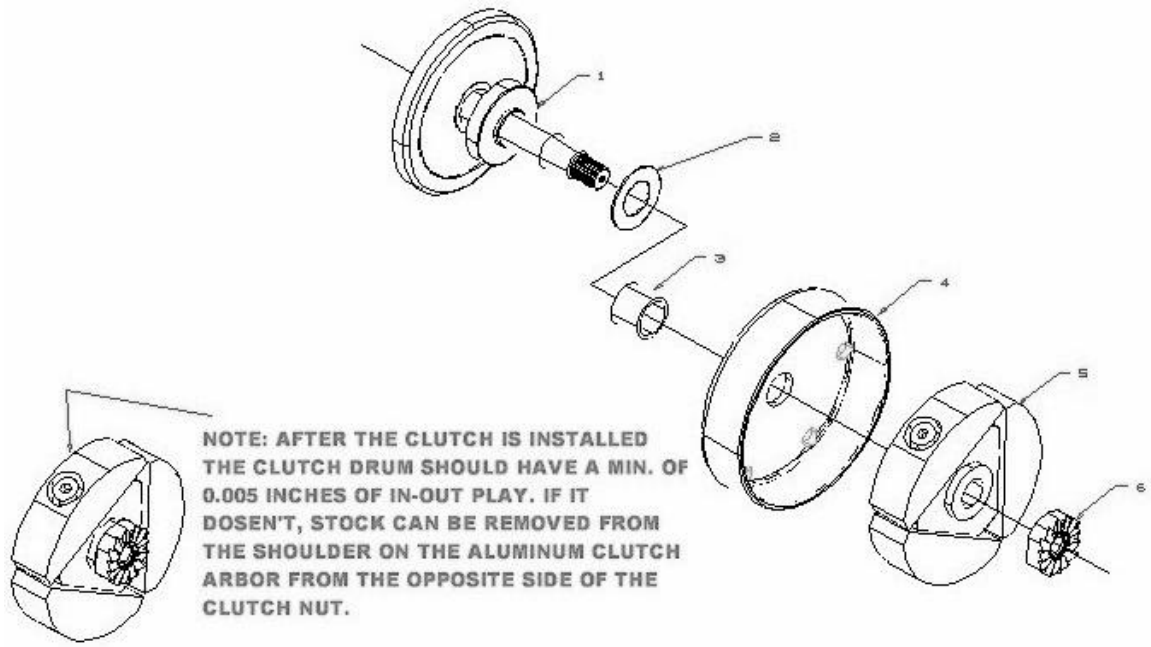


Figure 18, Clutch Assembly Drawing

CLUTCH ASSEMBLY:

1. After cleaning or replacing the spring washers, reassemble the stack up of washers.

CAUTION:

It is important to reassemble the washer stack to that recommended or to your own specialized stack.

CAUTION:
It is also important that all three shoes are stacked the same. (See figure 17)

2. Clean the threads of the stack bolt and the clutch with contact cleaner removing all old thread locking material.
3. Apply high strength (red) thread lock material to the stack bolt and tighten as tight as possible without stripping the Allen head.

CAUTION:
Avoid allowing excess thread lock material to contact the spring washers and the clutch or the clutch is likely to malfunction.

4. Use fine emery paper on the center hole of the clutch and on the tapered section of the crankshaft.
5. Apply a small amount of wicking / bearing retainer (green) thread lock agent to the center tapered section of the crankshaft and taper of clutch arbor.
6. Put the clutch back in
7. Apply high strength (red) thread locking agent to the threads and install the nut and torque to 40 ft-lb (54Nm) with the special socket (see figure 18).

CAUTION:
Use high strength (red) thread locker on the threads of the clutch nut. If you are using an impact socket, just zap it lightly with an air wrench to tighten it because there are only about 4 threads inside the nut and they can be easily stripped. If you are tightening it by hand, you can very carefully use a 3/4" piece of wooden dowel rod inside the exhaust port to block the piston so you can tighten the nut. Do not use something harder than your aluminum piston and do not crush the top of the piston into the ring.

INSPECTION NOTE:

- There must be in / out play in installed clutch (1.5 mm maximum).
- Excess in/out will cause early crank seal failure.
- A blue clutch drum is worn out from excessive slippage or improper lubrication.
- Should be no looseness in clutch shoes.

8. Install the clutch cover taking care to put the two longer bolts in their proper locations and tightening in the order specified in figure 19. (5mm hex key, 5.8 ft-lb, 7.8 Nm)

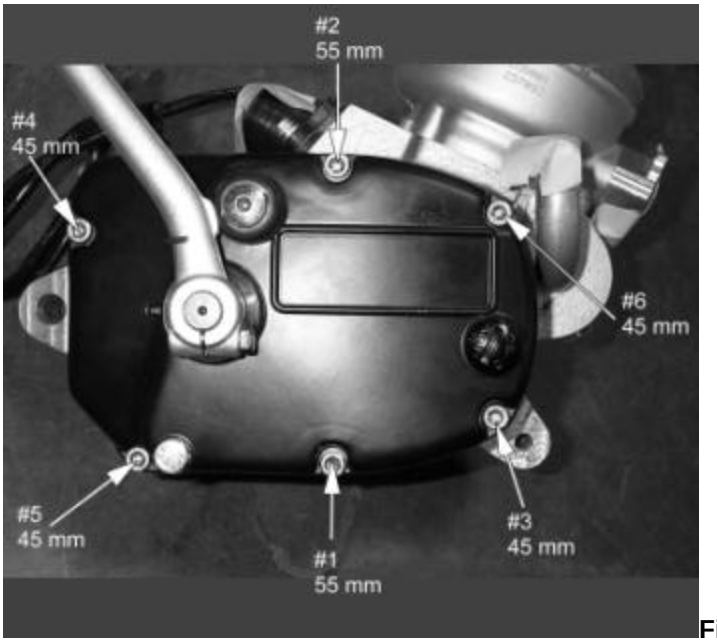


Figure 19

9. Put pipe back on and add oil (225 ml (7.6 oz) *Cobra 3 Shoe Clutch Milk* (Part # MCMUGF01).

ES4: Ignition
Stator care:

Stator failure will result from running the bike hot. Following is a list of things that will make your engine run hot.

1. The timing should not exceed the maximum specifications listed.
2. Improper carburetor jetting.
3. Improper spark plug heat range. Never run a hotter plug than the specified spark plug.
4. Clutch slippage. See "CLUTCH" section for causes of slippage.

CAUTION:

- Because of the amount of heat generated by the clutch and engine during extended periods of riding, it is advisable to remove the ignition cover afterward to allow the ignition to cool off. The heat transfers through the cases and can damage the stator as it cools off because of lack of airflow around the stator. Spray the stator and rotor with CRC 3-36 or WD-40 and let it drip dry or blow it off a little with an air nozzle.

- Ignition will overheat if the gap between the rotor and stator is not large enough. There should be even clearance as the rotor rotates relative to the stator.

- Non-resistor spark plug caps should be used. Resistor caps will result in a weaker spark that will reduce performance.

- Make sure ground wires are secure. If the bike is not grounded it will not run.

- Make sure connections are free of dirt.

CAUTION:
If the engine is hot, it is EXTREMLY important to take the ignition cover off, put a fan on it to let it cool, and spray it with CRC 3-36 or WD-40. If you don't maintain the ignition, it is destine to burn up the stator. (Stator- Part # ICMU0007)

Timing on the 2003 CM50 is very crucial. Cobra has found that the best place to set it is at **0.050"** before Top Dead Center (0.050" before the piston's highest point of travel). We do not recommend advancing the ignition timing as it will cause the engine to run very hot, in-turn causing power loss, shortened clutch life, and possibly lead to premature stator failure.

Tools recommended for timing service:
- Compact motorcycle dial indicator
- Universal clutch puller- a universal puller that pulls the clutch, main drive gear and rotor. (Part # MCMUTL70).

TIMING YOUR IGNITION:
1. Remove the spark plug cap, and sparkplug.
2. Insert the dial indicator into the spark plug hole.
3. Remove the four 8/32" X 1 ¾" bolts from the ignition cover.
4. Remove the water pump belt from the rotor and water pump shaft.
5. Turn the crankshaft counterclockwise until it reaches top dead center.
6. Set the dial indicator to zero
7. Turn the crankshaft clockwise until the dial indicator reaches 0.050" (1.3 mm) from top dead center.
8. Line up the lines on the stator and the rotor (figure 20). Otherwise loosen the three 10X32 bolts to adjust the stator.

NOTE:
If you cannot adjust your stator, you must take the rotor off and readjust the timing settings so the lines line up on the rotor and stator. The rotor is not keyed to the crankshaft.

ROTOR READJUSTING:
1. Use the universal clutch puller on the rotor to remove it.
2. Insert dial indicator (figure 21).
3. Turn the crankshaft counterclockwise so it reaches top dead center.
4. Move the crankshaft clockwise to 0.050" (1.3 mm) before top dead center.
5. Inspect and remove markings, scratches, and thread locker residue from the rotor and crankshaft.

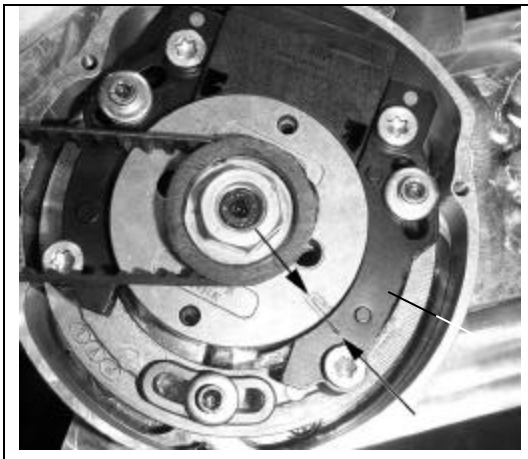


Figure 20, Lining up the line on the rotor with the line on the stator.

Figure 21, Using a dial indicator to measure piston height for setting ignition timing.

ROTOR INSTALLATION:

1. Use wicking / bearing retainer (green) thread locker on the inside of the rotor, and on tapered part of crankshaft.

CAUTION:
It is recommended that you apply the proper thread locking primer to the components that are to receive thread locking material per the manufacturers instructions.

2. Eyeball the lines on the rotor and stator then press the rotor onto the crankshaft firmly (figure 20).
3. Torque the nut on the rotor to 40 ft-lb (54 Nm).
4. Recheck the timing following the procedure of *timing your ignition.*
5. Install the water pump belt back on.
6. Bolt the ignition cover back on.
7. Put the spark plug back in, and firmly stick the spark plug cap onto the spark plug.

ES5: Cooling System

The water pump in the engine keeps the radiator fluid in circulation throughout the motor. The air stream running through the radiator cools the radiator fluid. Therefore dirty radiators additionally reduce the cooling effect.

Radiator fluid removal:

1. Remove the coolant drain plug (A) on the front of the engine case (figure 22).

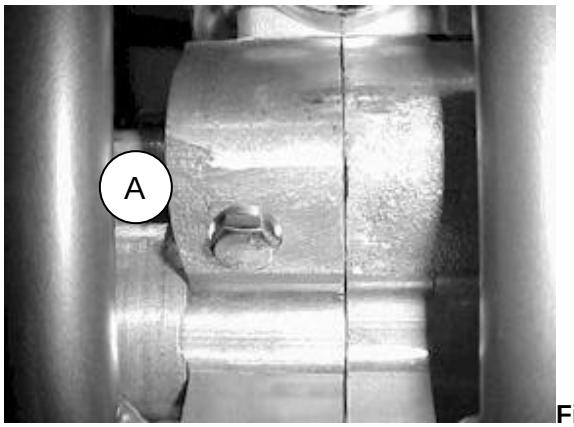


Figure 22

To remove radiator cap:

1. Turn the cap counter clockwise to the first stop and wait there for a few seconds.
2. Push the cap down and turn it further in the same direction and remove the cap.

NOTE: Inspect the old coolant for visual evidence of corrosion and abnormal smell.

Fill the radiator up to the bottom of the radiator filler neck with coolant. Install the cap, turning it clockwise about ¼ turn.

Tools recommended for impeller service:

- Flat head screwdriver
- 5mm hex key
- 13mm- hex wrench
- 1/8" hex key
- 9/64" hex key
- 3/32" hex key
- Propane torch
- 3/8" diameter x 8" long steel rod
- Hammer

COBRA IMPELLER SERVICE INSTRUCTIONS

1. Remove exhaust pipe and gas tank (you will be using a propane torch in step 12.
2. Remove radiator cap and drain engine coolant by removing the 13mm- hex head coolant drain plug.
3. If the impeller is damaged or broken completely back flush the coolant system to ensure no solid pieces are in the system.
4. Remove foot brake.
5. Drain engine transmission oil by removing drain screw using a 13mm- hex wrench. (item 2 in the figure below).
6. Remove kick-starter cover using a 5mm hex key. (item 3 six places)
7. Remove clutch and basket.
8. Unscrew water elbow fitting. (Figure 23)

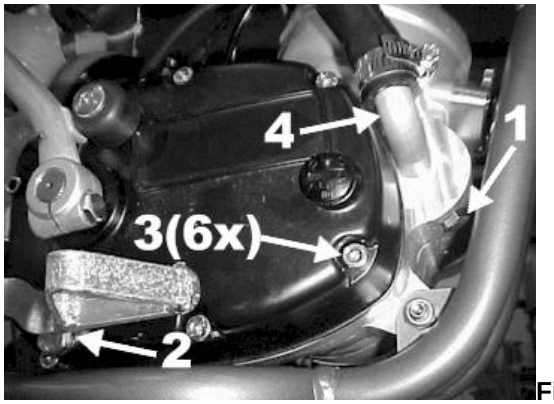


Figure 23

8. Remove ignition cover using a 9/64” hex key (four places)
9. Remove belt retainer screw using a 1/8” hex key. (Figure 24 - item 1)
10. Remove belt retainer, water pump belt and water pump fan pulley.
11. Remove bearing retainer screw using a 3/32” hex key. (Figure 24 – item 2)

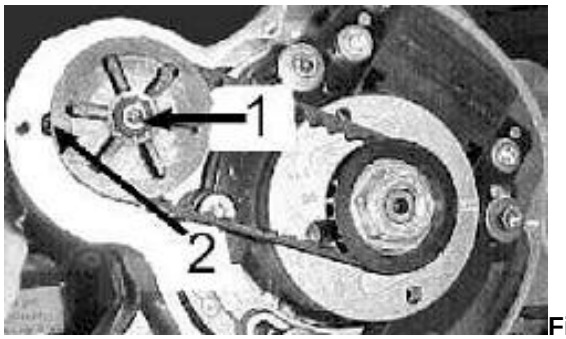


Figure 24

12. Heat engine case around area of impeller lightly with a small Burnsmatic propane torch. Using a 3/8” diameter x 8” long steel rod, tap impeller assembly out of engine as shown in figure 25.

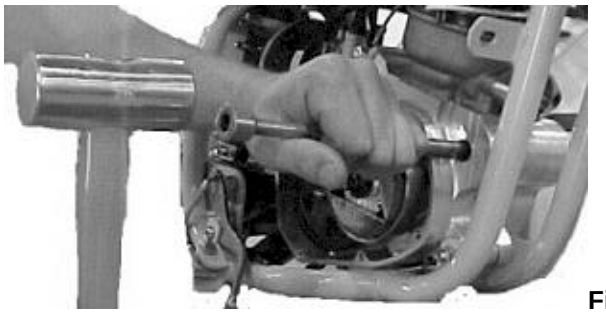


Figure 25

CAUTION:

Too much heat can be detrimental to the engine cases.

13. The shaft assembly is serviceable. Use a 1/8” hex key to remove impeller retainer screw. Remove impeller, seal and both bearings. Check shaft for wear in the area of the seal. If there is any sign of wear (like a groove) replace the shaft.

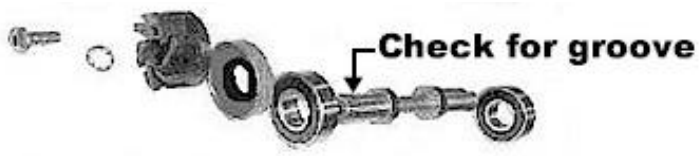


Figure 26

14. Reinstall new bearings, seal and impeller. Clean all threads and use green (wicking / bearing retainer) thread locker.
15. Using a liberal amount of grease on the outside seal, bearings and inside of case, reinstall bearing assembly by using a 0.500” ID by 1.000” OD steel tube 2” long and tap on end of tube per figure 27.

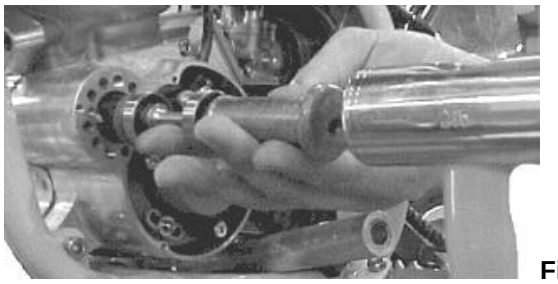


Figure 27

16. Re-assemble in same order of disassembly. Clean all threads and use green (wicking / bearing retainer) thread locker on the belt retainer screw.

ES6: Fuel & Air System
Carburetor:

Tools recommended for carburetor service:

- Small flat head screwdriver
- WD-40
- 8mm socket

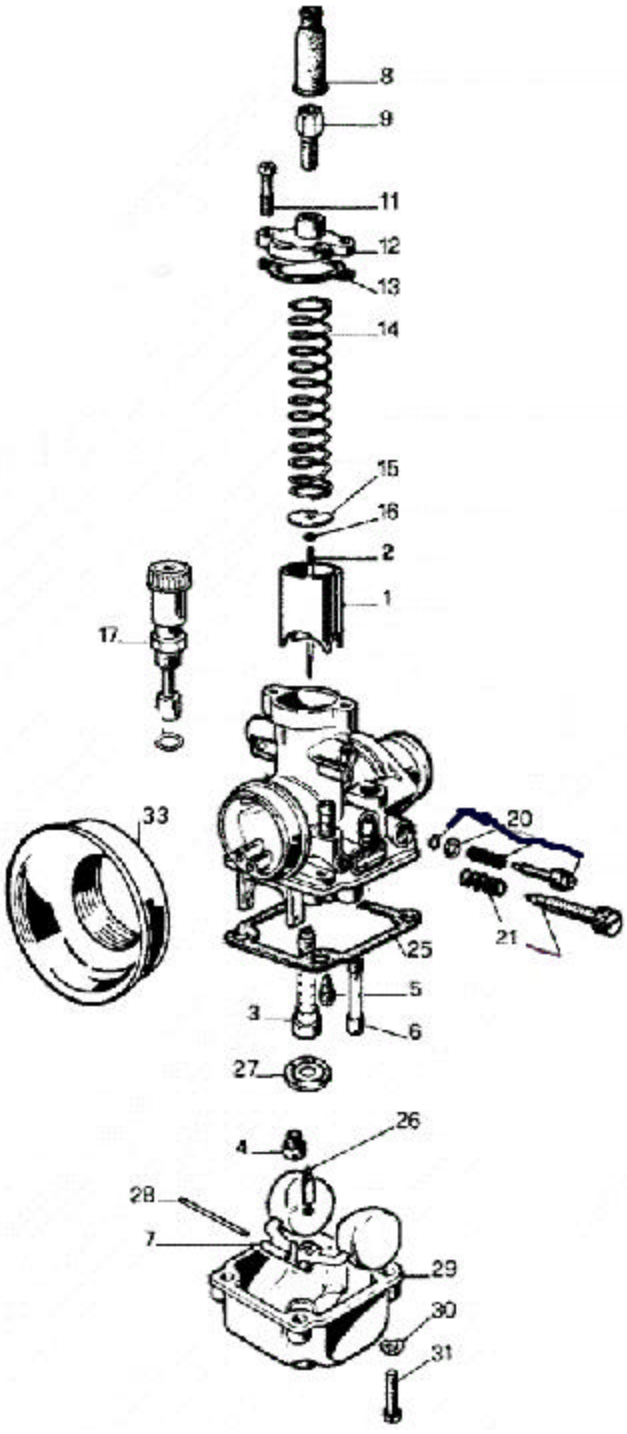


Figure 28

CM50 Carburetor Ref. Drawing		
REF. #	**PART #**	**DESCRIPTION**
1	RCMU0305	CARB SLIDE
2	RCMU0601	NEEDLE
3	RCMU0002	ATOMIZER
4	RCMU0092	MAIN JET
5	RCMU0055	PILOT JET
6		CHOKE JET
7	RCMU0301	FLOAT
8	RCMU0102	RUBBER CABLE CAP SEAL
9	RCMU0003	CABLE ADJUSTER
10		
11	RCMU0006	TOP CARB SCREW
12	RCMU0106	CARB TOP
13	ZCMU0007	TOP CARB GASKET
14	RCMU0004	SLIDE SPRING
15	RCMU0205	NEEDLE RETAINER PLATE
16	RCMU0007	NEEDLE CLIP
17	RCMU0204	CHOKE ASS'Y. 2001 CM
20	RCMU0009	FUEL MIXTURE SCREW
21	RCMU0011	IDLE ADJUSTMENT SCREW
25	RCMU0103	FLOAT BOWL GASKET
26	RCMU0107	FLOAT NEEDLE
27	RCMU0012	DIFFUSER
28	RCMU0016	FLOAT RETAINER PIN
29	RCMU0106	FLOAT BOWL
30	RCMU0201	BOTTOM FLOAT SCREW WITH WASHER
31		
33	RCCM0301	VELOCITY STACK

Your Cobra is equipped with an adjustable carburetor. Some fine-tuning may be needed according to weather condition and altitude. Proper jetting is ***very*** important for engine performance and engine life. Serious damage to the engine can occur if not properly adjusted.

IDLE ADJUSTMENT:
On the left side of the carburetor, there are two adjustment screws. The larger screw with the knurled head is the idle adjustment screw. To raise the idle, turn the screw in clockwise (in 1/4 turn increments) and rev the engine after each adjustment. To lower the idle, turn the screw counter-clockwise.

TOP END JETTING:
Indications that the engine is running too rich (too much fuel for the air) are:
- Engine not revving out or blubbering at high RPMs.
- Engine will not 'clean out'
- Wet or black spark plug

NOTE: Before changing jetting be sure that the air filter is properly cleaned and has the usual amount of air filter oil. An overly dirty air filter can cause the engine to run rich.

If the engine is running rich on the top end it should be leaned out. Leaning it out can be done by:
1. Changing the main jet to a smaller number.
2. Raising the needle clip (this lowers the jet needle) one notch at a time on the slide.

Indications that the engine is running too lean are:
- Engine cutting out on top end.
- Engine overheating and ultimately seizure.
- White spark plug

CAUTION:
It is much safer to operate the engine slightly rich as opposed to slightly lean. This is because an overly rich engine will just run poorly while an overly lean engine will seize, potentially causing an expensive top end rebuild and a DNF.

To richen the carburetor:
1. Change the main jet one number at a time (larger).
2. Lower the needle clip (raising the jet needle) one notch at a time until the engine starts to blubber on the top end, then move the clip back up one notch or until you get the blubber out.

FUEL MIXTURE SCREW
The smaller brass screw that is towards the front of the engine is a fuel mixture screw. This screw will also richen and lean your engine more on the bottom and mid-range. In warmer conditions, turn the screw in. In colder conditions, turn the screw out. Be sure to keep the carburetor very clean and make sure you don't

have water or dirt in the carburetor bowl. Use automotive carburetor cleaner or WD-40 to clean the carburetor inside and out.

STOCK CARBURETOR SETTINGS

The 2003 CM50 stock carburetor settings from the factory are:

- 55 pilot jet
- 92 main jet

Cleaning the carburetor:

⚠ WARNING

Clean the carburetor in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvent to clean the carburetor.

1. Make sure the fuel is shut off.
2. Remove the carburetor.
3. Drain the fuel in the carburetor.
4. Disassemble the carburetor.

CAUTION:

Do *not* use compressed air on an assembled carburetor. Or the pressure may deform the float. Do not use a strong carburetor cleaning solution, which could attack the parts of the carburetor; instead, use a mild high cleaning solution safe for plastic parts.

5. Immerse all the metal parts in a carburetor cleaning solution.
6. Rinse the parts in water.
7. After the parts are cleaned, dry them with compressed air.
8. Blow out the fuel passages with compressed air.
9. Assemble the carburetor
10. Install the carburetor onto the motorcycle.

NOTE:

The **three most common problems** with this carburetor are (figure 29):

1. Installing the **carburetor top backwards**, and
2. The carburetor **slide** indexing **pin falling out**.
3. Either side **vent elbow falling out**.

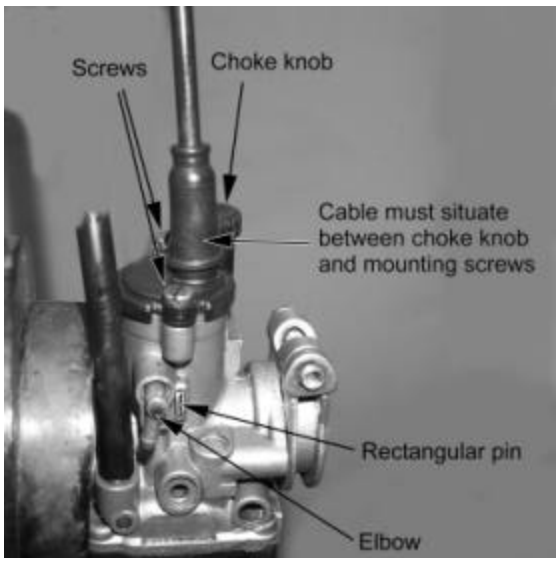


Figure 29 Proper carburetor top installation and location of rectangular slide indexing pin and one of the elbows that has been known to fall out.

Reeds:

- The reeds must lay flat on the reed cage.
- If the reed tips aren't lying flat, replace them immediately.
- The reeds must have a tight seal on the reed cage.
- If the reed is damaged in any way, replace it. This means cracks, chips, and ruptures. Anything abnormal, replace the reeds.

Take the reed cage out and hold it up to the light and look in through the cage. If you see light between the reed pedals and the frame, then replace the reeds. If you do not see light, then the reeds should be ok. (See figure 30)

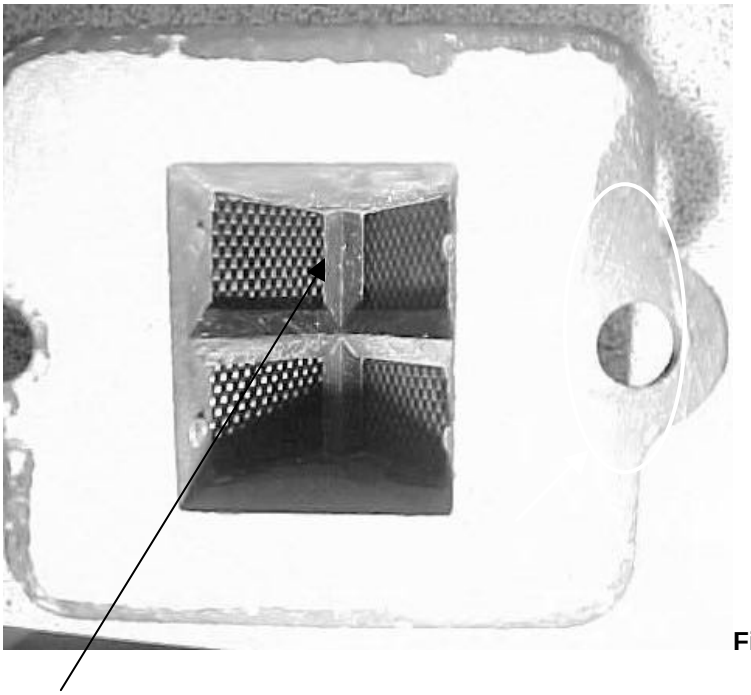


Figure 30

The presence of light indicates that the reeds should be replaced, or possibly turned over.

ES7: Exhaust

The pipe is a crucial element to a motorcycle. Any kinks, dents, or damage done to the pipe will result in a major performance loss.

NOTE:
Be sure to take the pipe off, and any carbon that may be built up. Carbon build up is created from exhaust. Exhaust has oils in it, and the oils cling to the walls of the inside of the pipe. Over a long period of time, the diameter of the pipe will decrease, due to carbon build up. So it is essential to clear the residue.

CAUTION:
It is important to repack the silencer. Signs of your silencer needing to be repacked are:

- The bike is louder than normal.
- A loss of power.

Chassis Service

CS1: Wheels & Tires

Rear wheel

Rear wheel dampening

Tools recommended for wheel service:

- 13mm socket
- Flathead screwdriver
- 11mm wrench or socket
- 19mm wrench

The Cobra is the only 50cc to have the rear wheel damping system. This feature prevents engine impact shock caused by hard landings. This design allows the cushioned sprocket to move forward and backwards separately from the wheel. After each moto, check the 4 rubber dampers, spacers and bolts for fatigue. You should keep extra rubber dampers in your toolbox (part # PCMU0059). Different sized sprockets are also available.

Watch for bending and warping of the outside rear damper plate. If it is bent or warped, the rubber dampers in the sprockets do not last as long as when using a straight unit. Usually you can straighten the plate with a hammer or just flip it over.

Changing the rubber dampers:

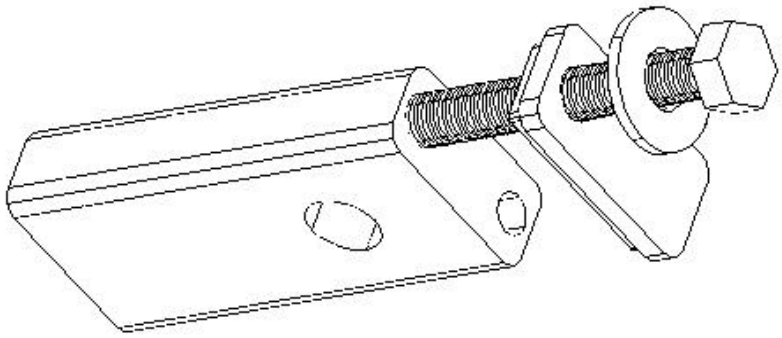
1. Remove the four bolts with the 11mm wrench
2. Take the backing plate off
3. Observe the four rubber dampers, and pull the sprocket upward to remove it.

Figure 31

1. Pop the four rubber dampers out of the sprocket.
2. Push the rubber dampers into the sprocket.
3. Place the sprocket with rubber dampers, onto the aluminum studs.
4. Place backing plate over the dampers and sprocket.
5. Insert the 11mm bolts into the holes and tighten to 18 ft-lb (24 Nm).

Rear wheel pullers

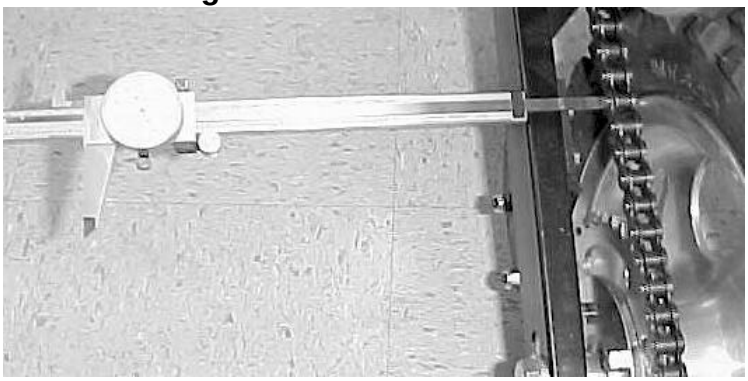
Disassembly:



1. Remove axle, and back wheel assembly.
2. Pull the rear wheel pullers out of the back of the swing arm.

Figure 32

Rear wheel alignment:



1. Measure from the side of the swing arm to the outer edge of the rim and make sure both sides are equal.
2. Adjust the wheel pull bolt on the rear wheel puller to get the distance from the swing arm to the rim about the same.

Figure 33

CS2: Suspension

Rear shock

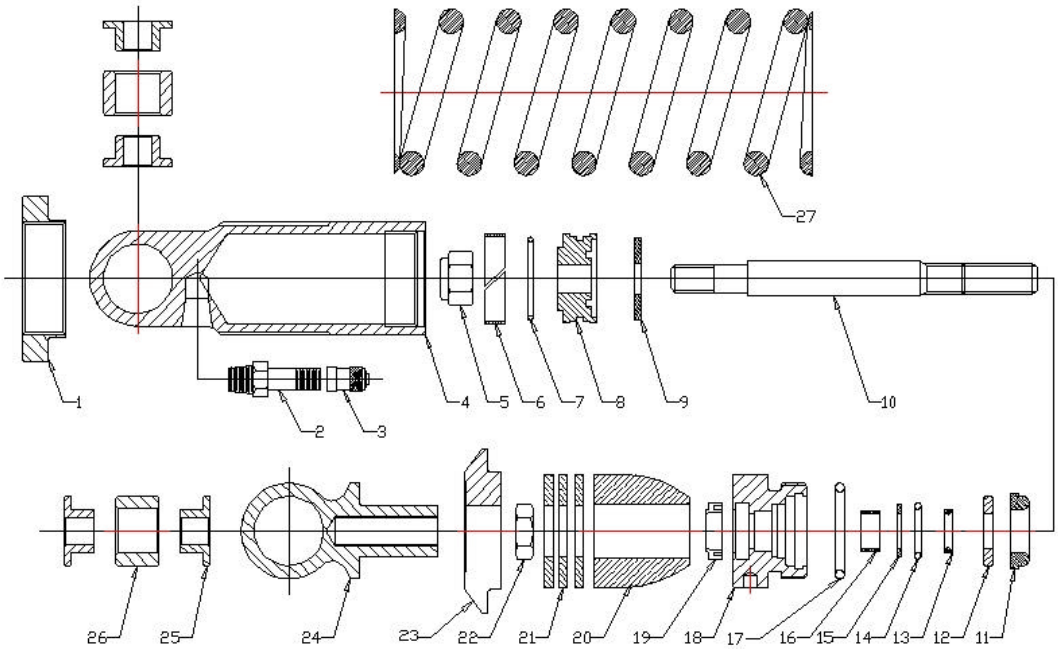


Figure 34

REF #	PART #	DESCRIPTION
1	SCMU0304	PRELOAD NUT
2	SCMU0114	VALVE STEM
3	SCMU0004	CAP
4	SCMU0300	BODY
5	HCNJ1001	LOCKNUT
6	SCMU0311	BUSHING
7	ZCMU0023	ENERGIZER
8	SCMU0305	PISTON
9	SCMU0322	STOP DISK
10	SCMU0301	SHAFT
11	SCMU0320	PISTON BUMPER
12	SCMU0312	BUFFER DISK
13	SCMU0310	BUFFER SEAL
14	ZCMU0114	LOADER
15	SCMU0314	BUSHING RETAINER
16	SCMU0306	BUSHING
17	ZCMU0216	O-RING
18	SCMU0308	SEAL HEAD
19	SCMU0309	ROD WIPER
20	SCMU0316	BUMPER
21	SCMU0317	BUMPER SPACER
22	HCNJ0716	JAMNUT
23	SCMU0303	SPRING STOP
24	SCMU0307	ROD END
25	SCMU0200	MNTG SPACER (4x)
26	SCMU0313	BUSHING (2x)
27	SCMU0321	SPRING

Because of different rider weights, sizes and riding styles, we offer various suspension options:

See *Optional Components* section of this manual for details on these and other optional components for your Cobra Motorcycle.

Rear Shock Disassembly

1. Bleed the gas pressure from the shock.

⚠ WARNING
Hold a rag over the bleed (Schrader) valve during this operation as the contents are at extremely high pressure.

2. Remove the spring by removing the lock nut and other nut with a large spanner.

NOTE:
Measure the distance from the top of the spring to a feature on the top of the shock for repeatable reassembly.

3. Using a 'Pin' type spanner, separate the top portion of the shock from the bottom.

NOTE:
Holding the shock in a vertical manner with the bleed valve 'down' during separation will minimize the amount of oil that is spilled.

4. Drain the oil into a suitable container for proper recycling
5. Clean the components of old oil and contaminates.
6. Look for signs of wear and replace if necessary.

Assembly

1. If the bleed valve was removed, clean the threads of both components, apply some Teflon pipe sealant to the threads of the bleed valve, and install (torque to 10 ft-lb (14 Nm)).
2. With the bottom shock portion situated vertically, fill with 2.5 wt (often called 3 wt) shock oil until 37 – 38 mm from the top edge.
3. Install damper unit, into the bottom portion of the shock taking care to not 'splash' out shock oil in the process (tighten securely).
4. Holding the shock vertical, with the bleed valve **upward**, stroke the piston through its complete travel several times, slowly, and then bleed off any excess air.
5. Charge the shock with 230 psig nitrogen.
6. Reinstall the spring, to the previously measured compressed length and secure with the lock nut.

Front Forks

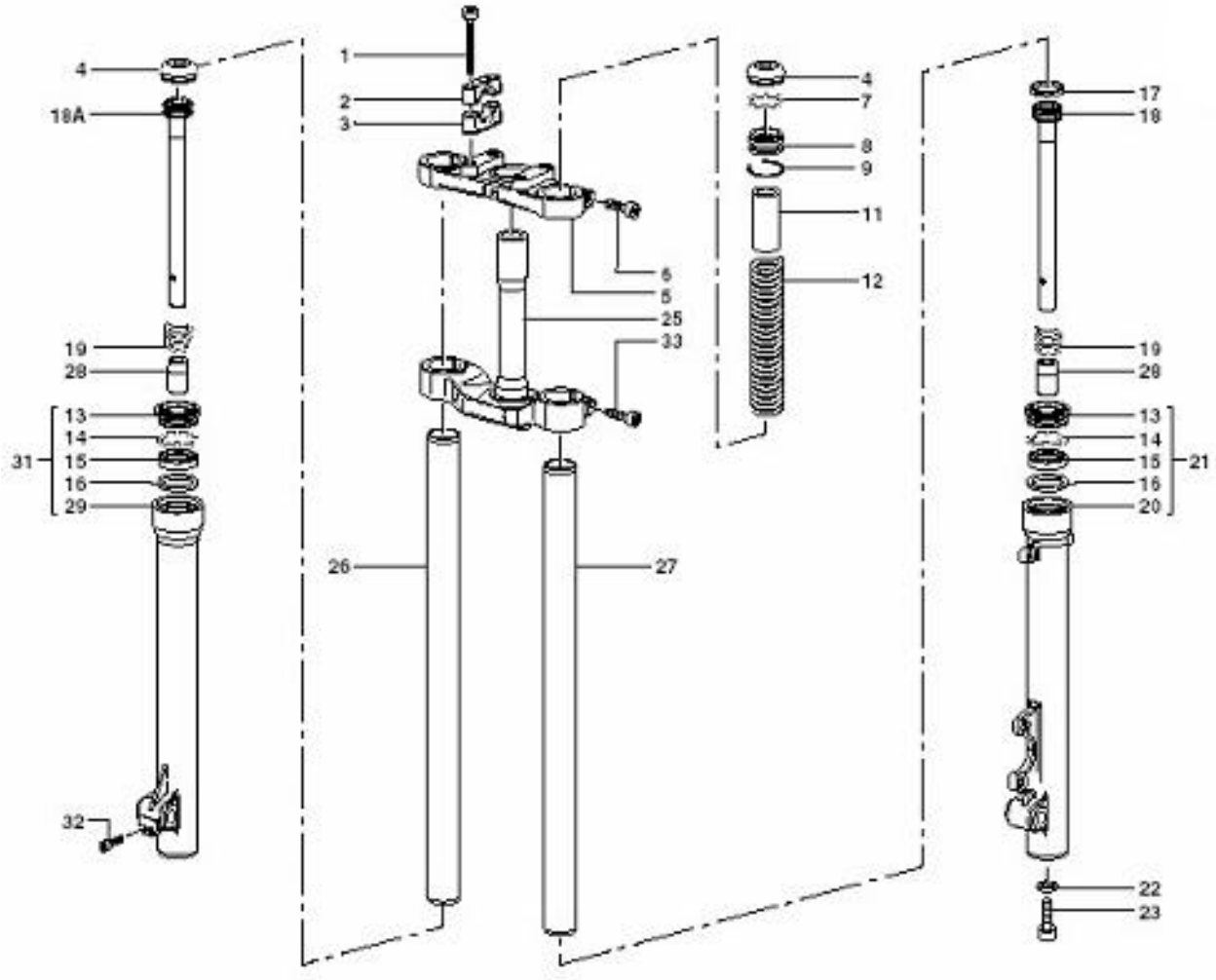


Figure 35

Because of different rider weights, sizes and riding styles, we offer various suspension options:

See *Optional Components* section of this manual for details on these and other optional components for your Cobra Motorcycle.

2003 CM50 FRONT FORK PARTS LIST

REF #	PART #	DESCRIPTION
1	KCMZ0001	8 X 50 CS
2	KCMZ0002	TOP HANDLE BAR CLAMP
3	KCMZ0003	LOWER HANDLE BAR CLAMP
4	KCMZ0004	FORK PLUG – BLACK
5	KCMZ0005	TRIPLE CLAMP UPPER
6	HCBC0806	8 X 30 CS PINCH BOLT FOR TOP TRIPLE CLAMP
7	KCMZ0007	SNAP RING FOR FORK CAP
8	KCMZ0008	INNER FORK CAP - WHITE
9	KCMZ0009	O-RING UNDER FORK CAP
11	KCMZ0011	PRELOAD SLEEVE
12	KCMZ0012	FORK SPRING
13	KCMZ0013	SWIPER
14	KCMZ0014	SNAP RING
15	KCMZ0015	FORK SEAL
16	KCMZ0016	WASHER
17	KCMZ0017	SNAP RING FOR PISTON
18	KCMZ0018	PISTON ROD - REBOUND
18A	KCMZ0018A	PISTON ROD - COMPRESSION
19	KCMZ0019	REBOUND SPRING
20	KCMZ0020	FORK LEG OUTER LEFT
21	KCMZ0021	FORK LEG – 5 PIECE UNIT – LEFT
22	HCWC0000	WASHER
23	HCBC0806	8 X 30 CS
25	KCMZ0025	TRIPLE CLAMP BOTTOM W/STEM
26	KCMZ0026	FORK TUBE – INNER RIGHT
27	KCMZ0027	FORK TUBE – INNER LEFT
28	KCMZ0028	TOP OUT BUMPER
29	KCMZ0029	FORK LEG – OUTER RIGHT
31	KCMZ0031	FORK LEG – 5 PIECE UNIT – RIGHT
32	HCBC0609	6 X 20 CS
33	HCBC0525	6 X 25 CS

Troubleshooting

1) **Engine not behaving properly**
    a) Carburetor top is installed backwards (happens a lot)
    b) The carburetor slide indexing pin is missing
2) **Engine is down on power**
    a) Clutch engagement is not set properly
    b) Jetting is incorrect
    c) Silencer needs repacked
    d) Exhaust pipe
        i) Has excess carbon buildup
        ii) Has large dent in it
    e) Compression is low
        i) Piston
        ii) Rings
    f) Reeds are damaged
    g) Ignition timing is incorrect
3) **Engine is excessively loud**
    a) Silencer needs repacking
4) **Engine 'blubbers' at high RPMs**
    a) Jetting too rich
5) **Engine won't start**
    a) Fuel
        i) None in tank
        ii) Is sour or bad
    b) Carburetor is dirty
    c) Ignition
        i) Spark plug fouled
        ii) Spark plug cap off
        iii) Engine Shut-off 'kill' switch is shorted
        iv) Bad electrical ground
        v) Stator winding damaged
    d) Exhaust is plugged
6) **Engine won't idle**
    a) Idle knob needs adjusted
    b) Carburetor jets are dirty

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