MARK-3® DIS Digital Ignition Solution

Overview:

WATERAX offers a conversion kit Digital Ignition Solution (DIS) for users that want to convert a MARK-3® from breaker points and mechanical cut-out switch to the upgraded electronic ignition and Digital Overspeed Switch systems. These instructions will guide you through the conversion process.

Parts Breakdown:

ID	ITEM NO	DESCRIPTION	QTY
-	600556	DIS MK-3 CONVERSION KIT UPG TO CDI / DOS	1
1	600125	B-7592 ELECTRONIC IGNITION BOX ASSY	1
2	701109	R-668E MAGNETO FOR 185CC	1
3	800073	R-661-CDI STATOR, COIL/ARMATURE ASSEMBLY	1
4	800544	R-150 NUT M6X1.0 HEX FUJI LOCK ZINC	1
5	800408	B-5562-18 CLAMP PLASTIC COATED 9/16" ID	1
6	700593	B-6289-1 DOS PRODUCTION UNIT	1
7	700616	B-6289-2 DOS MK-3 BRACKET	1
8	800443	B-6289-3 SCREW M4X0.7X35 PHILLIPS CHEESE HEAD ZINC	2
9	800402	B-6289-4 SCREW M4X0.7X8 PHILLIPS RAISED CHEESE ZINC	2
10	800413	B-6289-5 SCREW M4X0.7X8 PHILLIPS FLAT ZINC	1
11	800400	B-6289-6 LOCKWASHER M4 EXTERNAL TOOTH ZINC	4
-	801116	CABLE TIE 4" NYLON BLACK	3
-	701161	USER INST DIGITAL IGNITION SOLUTION DIS	1

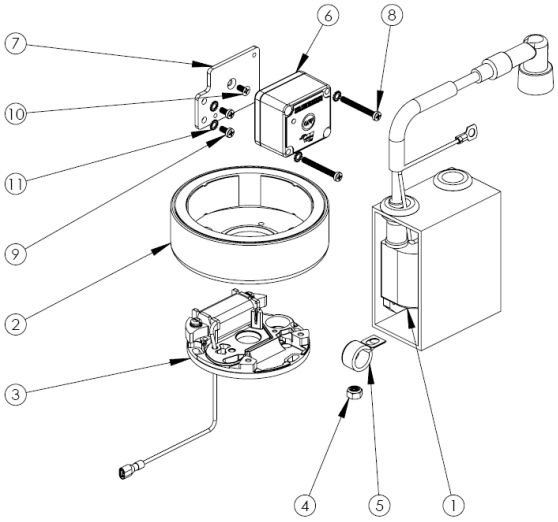


Figure 1: Digital Ignition Solution (DIS) (600556)

Tools and Materials Required:

To complete the installation, you will require the following tools:

ID	ITEM NO	DESCRIPTION	QTY
1	600154	R-929 FLYWHEEL HOLDING TOOL, PLATED STEEL	1
2	701159	PISTON LOCKING TOOL FOR 185CC	1
3	700723	R-927 PULLER - MAGNETO (M38 X 1.5)	1
4	701158	JIG FOR DOS BRACKET DRILLING	1
5	801117	DRILL BIT #30 HIGH SPEED STEEL 2-3/4"LG	1
6	801118	TAP M4X.7 D4 SPRIAL POINT PLUG HIGH SPEED STEEL	1
7	801146	CDI IGNITION TIMING ADJUSTMENT TOOL	1
8	801162	DIS - FRAME DRILLING TOOL	1

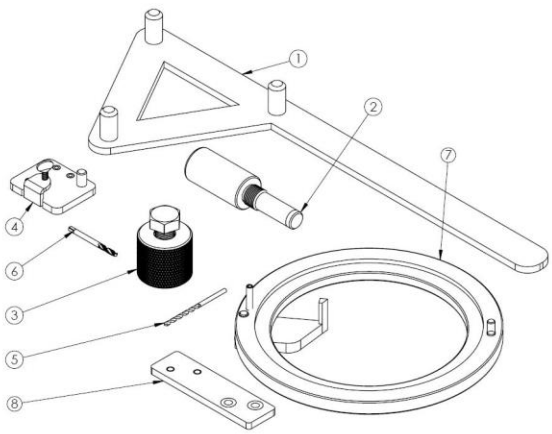


Figure 2: Special tools for conversion (available from ***WATERAX***)

DESCRIPTION	QTY
TORQUE WRENCH	1
13 MM WRENCH	1
10 MM WRENCH	4
7/16” WRENCH	3
13 MM SOCKET	1
10 MM SOCKET	1
7/16” SOCKET	1
17 MM SOCKET	1
RATCHET WRENCH	1
CUTTER	1
FLAT SCREWDRIVER	1
PHILLIPS SCREWDRIVER	1
NEEDLE NOSE PLIERS	1
17/64” DRILL BIT	1
VARIABLE SPEED ELECTRIC DRILL	1
M4X0.7 TAP	1
#30 DRILL BIT	
TAPPING LUBRICANT	1
PENCIL OR MARKER (IF NOT EQUIPPED WITH DOS DRILLING JIG)	1
CENTER PUNCH (IF NOT EQUIPPED WITH DOS DRILLING JIG)	1
THREAD LOCKER LOCTITE 243 OR EQUIVALENT	-
RTV SILICONE SEALANT LOCTITE 5910 OR EQUIVALENT	-



Figure 3: Required tools for conversion

Procedures:

1. Remove the 12-16 pump end.
2. Remove the fuel connection and disconnect the fuel line from the carburetor.
3. On the carburetor, rotate the fuel strainer cover by 180 degrees from position A to B (see picture).

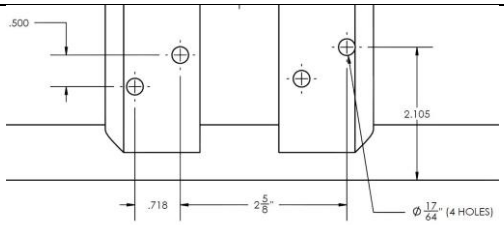


Position A



Position B

4. Remove the frame.
5. Use the Drilling Jig to drill two 17/64" holes on the right leg (see images). If not equipped with tool use the hole pattern provided. The CDI box assembly will be mounted on the left and the fuel connection will move to the right.

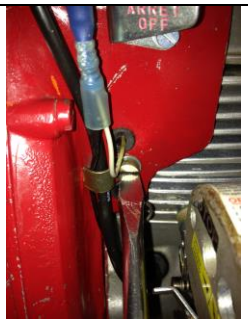






6. Remove the ON/OFF switch and disconnect the cut-out switch wire. Discard.
7. Remove the ignition cable clamp (#10).
8. Remove the fan cowl.







9. Uninstall and discard the mechanical cut-out switch and grommets.
10. Remove the pulley and gasket.
11. If equipped with an aluminum fan, use the fan/flywheel holding tool R-929 and remove the nut (R-303) that locks the flywheel assembly onto the crankshaft.





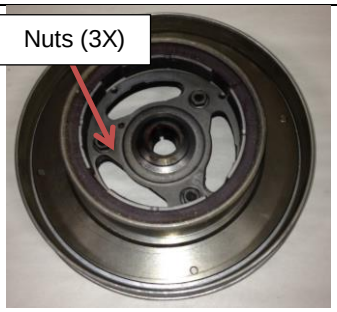
12. Using the fan/flywheel holding tool (R-929), the flywheel assembly puller (R-927) and an adjustable wrench, remove the flywheel assembly.





13. **NOTE:** If equipped with a thermoplastic fan, use piston locking tool 701159 instead of R-929.
Screw tool onto the cylinder head and rotate crankshaft until the piston reaches the tip to lock the shaft rotation. 701159 can be used with both fans.

14. Remove the point magneto by removing the three nuts. Discard. If the magneto is stuck on the backing plate, it can be pried off with a soft hammer and a flat screw driver. Be careful not to damage the fan.



Point magneto



New magneto for CDI

15. Install the new magneto for CDI using thread locker Loctite 243 or equivalent. Tightening torque for the three nuts: 8-10 Nm.



Loctite 243

16. Remove the point stator assembly and replace with the CDI stator assembly. Discard point stator.

17. To position the stator, remove labyrinth ring and install ignition timing adjustment tool 801146. Turn stator clockwise until coil rests on adjustment tool. Tighten the three screws with flat and lock washers.



Point stator assembly



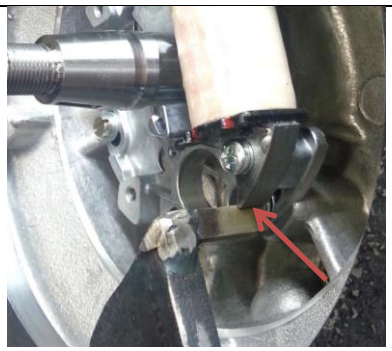
CDI stator assembly

Tightening torque: 2.5-3 Nm. Be careful not to squeeze/pinch the green wire.

18. If you are not equipped with the timing adjustment tool, fit the stator plate so that the oblong holes are centered with the crankcase threaded holes; then rotate the stator plate 1-1.5 mm counter-clockwise and tighten the three screws. Refer to the MK-3 Service Manual for dynamic ignition verification procedures



Timing adjustment tool



Coil resting on tool



Stator plate adjustment, 1-1.5 mm CCW

19. First pass the green wire through the crankcase hole and then through the grommet. Install the grommet on the crankcase.

20. Pull the green wire through the grommet and apply a dab of RTV silicone sealant.







21. Install the flywheel assembly. Ensure that the key is properly installed. Apply Loctite 243 on the hex nut (R-303) and tighten using the fan/flywheel holding tool (R-929). Tightening torque: 45-50 Nm.

22. Install the gasket pulley and pulley.

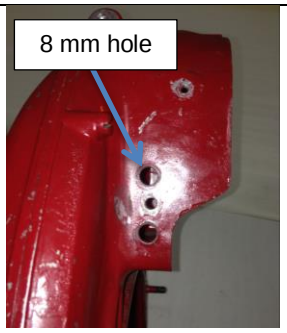




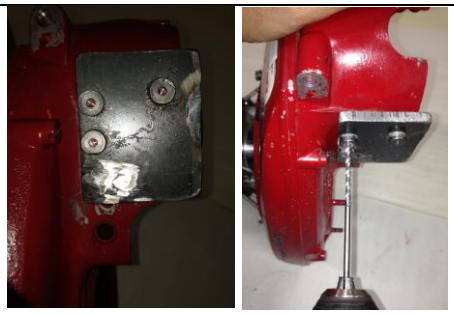
23. To install the DOS, three holes will need to be drilled and tapped on the side of the fan cowl.

24. If you're using the DOS bracket drilling jig, install it on the top 8 mm hole and lock it in place. Drill the three holes with a #30 drill bit.

25. Carefully tap all three holes with an M4x0.7 tap. Important: use tapping lubricant.



Fan cowl before drilling of 3 holes



Drilling jig



Tapping lubricant

26. If you are not equipped with the drilling jig, you can use the bracket to position the holes. To correctly position the bracket and prevent any interference, install the DOS on the bracket. Position the assembly on the side of fan cowl and ensure that:
    - There is no interference with the carburetor shroud;
    - There is no interference with the spark plug cover;
    - The bracket lays flat on the fan cowl (be careful of the radius on the fan cowl).



27. Mark the holes with a center punch.

28. Remove the fan cowl. Drill and tap.



29. Install the fan cowl. Do not install the top lock nut, air filter side. It will be used as a ground at a later step.

30. Install the DOS bracket using the three 8 mm long screws and two tooth lock washers.



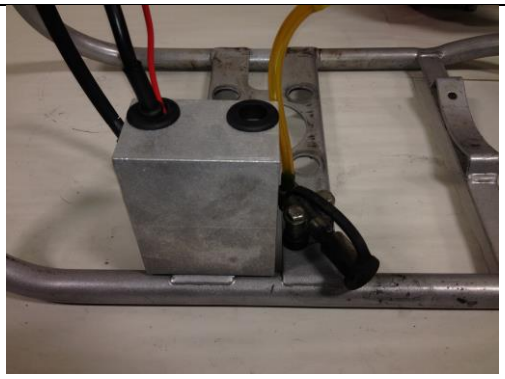


31. Install the DOS using the two 35 mm long screws and two tooth lock washers. Ensure that the DOS is firmly mounted on the bracket to ensure proper ground contact.



32. Install the electronic ignition box assembly and the fuel connection.

33. Install the frame.





34. Connect the green wire from the stator in the second terminal from the right.

35. Connect the red wire from the DOS on the far right terminal.

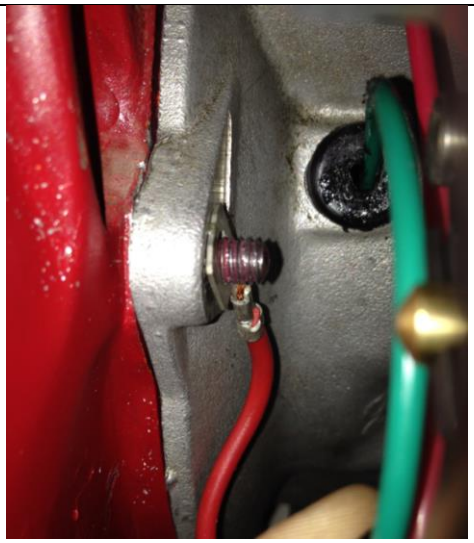


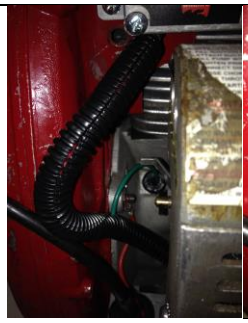


36. Install the ground wire (red) coming from the CDI module on the fan cowl grounding stud.

37. Install the split loom.

38. Install the plastic coated clamp and tighten the lock nut.







39. Install the ignition cable clamp.

40. Connect the ignition wire to the spark plug.

41. Secure the wiring with cable ties.

42. Install the spark plug cover.

43. Install the pump end.





Impact on Field Use:

Below are the minor changes to the operation of the MARK-3® equipped with the DOS.

Starting the engine:

Before starting the engine, slowly pull the starter rope and crank over the engine a couple of times in order to charge up the DOS. The LED will light up and flash to indicate that the DOS has been charged and that the MARK-3® is ready to be started.

Start the engine as directed in the MARK-3® Instruction & Service manual. (Note that there is no "ON" switch).

Stopping the engine:

To stop the engine, press and hold the OFF button until the engine shuts down.

Overspeed condition:

If the engine overspeeds (e.g., during a loss of prime), the DOS will immediately shut down the engine.

Always ensure that the cause of the overspeed condition has been identified and corrected before attempting to restart the engine.

When attempting to restart the engine (after an overspeed condition or after pressing the OFF button), wait 10 seconds from the time the engine shut down. This will enable the DOS to reset itself. Failure to wait the prescribe duration of time will make it difficult to start the engine. It may lead to a flooding condition.

Warranty, Service and Support:

Product and service documentation such as tech notes, data sheets, manuals and information on the limited warranty provided on products manufactured by *WATERAX* can be found on our Web site at: www.waterax.com.

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