AMERICAN POWER BOAT ASSOCIATION
STOCK OUTBOARD INSPECTION MANUAL

Dear Stock Outboard Racer:

The Stock Outboard Inspection Manual and specification sheet has been prepared by your Stock Outboard Technical Committee and approved by the Stock Outboard Racing Commission. It is our hope that this will greatly aid in inspection.

Sincerely,

Mike Jones
Stock Outboard Vice President
American Power Boat Association
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General Requirements

Inspection is an important part of the APBA racing program. Many races are won or lost in the inspection area.

Inspection of a motor is not a public exhibit. Only the driver and the mechanic of the motors being inspected should be allowed in the inspection area. A person representing the Race Committee in authority in the inspection area to keep order and protect the Inspector from interference by other persons would greatly assist in this work. If this is not enforced the inspection is subject to protest.

Below are suggestions to the Race Committee which will facilitate an efficient and orderly inspection and aid the Inspector in his important job. The Race Committee should—

(1.) Provide an enclosed area. Snow fence often can be obtained and used to advantage; if unavailable, rope off the inspection area.

(2.) Provide at least two tables: one for the Inspector's instruments, and the other for engine disassembly. Picnic tables will serve.

(3.) Provide cardboard boxes for motors that have been torn down and small bags for delicate parts so drivers can carry their motors away.

(4.) Provide motor stands. Borrow several road barricades from the local highway department.

(5.) Insist that Pit Manager get motors to Inspector as soon as possible and provide for weighing where necessary. Make available for Pit Manager's use wired shipping tags with the following printing: Class, Final Standing, Boat No., Engine Serial No., Driver's name.

At least 10 tags per class scheduled will be needed, five each for the first five boats and engines. Spares should be available for elimination heats.

(6.) Be sure scales for weighing boats are at race site. These scales should carry a recent Sealer's stamp certifying their accuracy. Platform scales are frequently used.

(7.) Radio, telephone, or other good communications should be provided between the judges stand and the inspection area. In case of a disqualification the other contestants positions have to be recomputed by the scorers on the basis that the disqualified boat did not participate in the race. Such recomputation does not always advance all contestants but at times also change their relative positions which information is required by the Inspector.

Classes of Inspection

Inspection shall be divided into three classes: A, B, C. Class "A" inspection is a superficial inspection that covers only easily accessibel components. Items 1 through 8 of the Inspection Procedure. Class "B" inspection is a fairly thorough inspection that covers many important items on the outboard motor. This is covered by items 1 through 13. Class "C" inspection is a complete inspection.

For the sake of uniformity, the following classes of inspection shall be applied:

(1.) Record Claims: Class "C" inspection.

(2.) Marathon, National and Divisional Championships: First three legal finishers in each class, Class "C" inspection; fourth and fifth legal finishers in each class, Class "B" inspection.

(3.) All other races: First legal finisher in each class, Class "B" inspection; second and third legal finishers in each class, Class "A" inspection.

(4.) Previous to Engine Sealing: Class "B" inspection.

Inspection Procedure

1. Check lower unit for file marks, unduly sharp edges, unusually long propeller nut. (Q), broken-off skeg. Check gear shift for proper operation.
2. Measure R. S, using calipers and scale, and Ra, using drill. Only in case of indication of tampering is a check of W, X, Y, and or Z necessary.
3. Check sizes of exhaust relief holes using gauge or drill shank.
4. Have spark plugs removed and check compression volume using burette or syringe, either of which should be graduated in cc's and of sufficient calibration mark spread and accuracy to make a reading to 0.1 cc possible and significant.
5. Have carburetor removed, check for file marks and measure throat diameter using telescope gauge, and venturi diameter using small inside calipers.
6. Measure stroke using vernier depth gauge or depth micrometers.
7. Check visually for signs of tampering, filing and polishing in crankcase carburetor opening, reed block intake passages, MK 20H exhaust manifold, filler block and driveshaft housing, or rotary valve. Check rotary valve timing.
8. Have intake deflector covers removed and inspect visually for tampering. If necessary, compare with new casting.
9. Check A-A1 using telescope gauge. Inspect ports for signs of tampering.
10. Have exhaust cover removed and check C-C1. Inspect ports for signs of tampering.
11. Check distance from top of intake port to piston timing edge with piston at B.C.D., (A-E) or (A-EE), using small inside calipers or plug gauge.
12. Check lower unit gear ratio by turning flywheel and counting turns, or using degree plate.
13. Check water pump impeller for cut-off blades and "feathered" blades.
14. Have powerhead removed from driveshaft housing and cylinder block separated from crankcase. Measure crankcase gasket thickness in compressed portion. Use this thickness in computing all dimensions involving the gasket thickness.
15. Measure bore using telescope gauge or inside micrometer. Check cylinder head for proper shape.
16. Measure port height (A, C) using depth vernier or any convenient special tool in conjunction with micrometers.
17. Check K using depth vernier and micrometers.
18. Check reed stop height using plug gauges. Check also reed shape and length. Measure reed block ports. Check reed block passages for illegal filing and polishing.
19. Check crankshaft cheeks for illegal chamfering.
20. Check piston top shape, number of piston rings, F and L dimensions.

21. Weigh flywheel.
22. Weigh pistons and connecting rods (7b, 7c).
23. Check bearings.

Inspection Tools

The following list is intended only as a guide in the acquisition of tools. Other equally satisfactory tools have been frequently substituted by the experienced Inspector.

1. 0-1" Micrometer
2. 1" 2" Micrometer
3. 2" 3" Micrometer
4. Small, 5" Inside Calipers
5. Large Outside Calipers
6. Set of Telescoping Gauges (Lufkin 79-L, or equivalent)
7. Depth Vernier
8. 16' Flexible Steel Tape Rule (Carlson 416, or equivalent)
9. 25 cc Syringe
10. 6" Steel Scale
11. 5/32", 11/64", 1/4", 0.209" (#4), 0.228 (#1) Drills
12. Penlight
13. APBA Rule Book and Specification sheets
14. Two parallel blocks, about 8" long, with several holes to serve as vernier supports in some measurements
15. S shape spark plug hole bore gauge

Inspection Practices and Interpretations

In Stock Outboard racing no modifications are permitted unless specifically spelled out in the rules. Since the rules are necessarily brief, interpretations by the Stock Outboard Racing Commission and the Stock Outboard Technical Committee are sometimes necessary. Some of the interpretations made over the last few years are given herewith.

MOTOR MODIFICATIONS: GENERAL

1. Specification sheets and class inspection manuals received from S. O. V. P. or S. O. Technical Committee Chairman only shall be considered official.

2. Full throttle discs (commonly called "butterflies") are recommended as a safety measure. Throttle discs of any manufacture may be used but must be of sufficient diameter to match that of the carburetor throats in which they are used. Any needle valve may be used in any carburetor permitted on stock engines provided that no change is made in the threaded section or the pointed end of the needle valve in order to use it. Crossbars may be soldered to the exterior end of needle valves to facilitate adjustment.

3. Any type of device to shut off or stop the motor in case the driver loses control shall be permissible and recommended as a safety measure.

4. Solid swivel bushings of any make or manufacture may be used on the swivel pins of all outboard motors in the interest of safety.

5. Separate fuel tanks may be installed in the hull or on the outside of transom or on the motor or steering bar mounted in a safe manner. There shall be no restrictions on design or manufacture of such tanks other than safety. Auxiliary fuel lines and connections may be added as needed. A filter or pressure regulator may be added to any fuel line or fuel tank. Electric fuel pumps may not be used.

6. Any type or make of spark plugs, piston rings, seals, bearings, magneto parts or propellers may be used provided other parts are not altered to accommodate them.

7. The screw fastening the carburetor butterfly valve to the throttle shaft must be as furnished by the manufacturer. With that exception, any make or type of nut, bolt, screw, washer or stud may be used anywhere on any stock engine. Gaskets of any make or manufacture, including homemade, are permitted providing they are equivalent to the original in shape and thickness and, in case of cylinder base gaskets, maintain the cylinder port dimensions within the limits of the engine specifications.

8. Any type brackets for throttle, spark, steering controls and tachometer will be permitted. For reasons of safety, flexible fuel lines may be installed on any motor. Any standard hose fittings may be used with the flexible lines but there shall be no alteration of the threads in the carburetor, fuel pump, fuel filter, or gas tank.

9. Oversize pistons furnished by the manufacturer of an outboard motor or by manufacturers of replacements approved by SORC may be used in the model for which they apply. The bore of the engine may be enlarged by the amount that the oversize pistons differ from the standard size pistons. Under no circumstances may the bore be enlarged more than 0.025" over the original dimension. It is not permissible to chromium plate cylinder walls.

10. Main bearing bores in crankcases of stock engines may be bored and fitted with bushings to provide a good fit on standard crankcase main bearings. Alternatively, the crankcase may be rebored to accept any bearings having oversize outside diameters but which are otherwise standard. Similarly, on engines having flywheel magnetos, the magneto neck of the crankcase may be fitted with a sleeve to provide a tight fit in the magneto stator bore. Conversely, the stator bore may be fitted with a bushing for the same purpose. Magneto stator plates may be clamped or otherwise fixed in position on the crankcase by any means.

11. It shall be permissible to use studs of larger than standard diameter for the purpose of joining the lower unit to the exhaust housing. Also, modification of exhaust housing to accommodate the larger studs is permissable.

12. Broken or damaged parts may be repaired by welding or the use of plastic compounds, provided that all internal dimensions, contours, and surfaces of powerhead parts are restored as closely as possible to original condition. In the case of lower units, external dimensions, contours and surfaces shall be restored as closely as possible to original conditions. The inspector will pass repairs which meet the word and spirit of this rule and will disqualify engines having repairs which are obviously intended to provide unfair advantage.

13. Tail cones may be made for replacement for gearcases which require rebore and rethreading provided outside dimensions meet those of originals. There is no minimum on number of threads for a tail cone. Lock screws are allowed.

14. There shall be no substitution of components such as lower units, carburetors, etc., unless replacement components are specifically designed as stock for a particular model by the SORC.

15. It is not permissable to grind the reed block to line it up with the crankcase.

16. No drilling or modifications of any type, except repair, may be done on the water jackets to change the cooling pattern.

17. Knurling of piston surfaces is not permitted.

18. Broken skegs and cavitation plates may be used provided that the edges of the break or breaks have not been filed or smoothed or otherwise altered and provided that reasonable time was not available for repair or replacement. One or two weeks will be considered a reasonable amount of time. At championship events, the inspector may rule out the use of broken skegs or cavitation plates.

19. The inside of the carburetor is considered an internal passage of the powerhead.

20. It is permissible to resleeve any block provided engine specifications are maintained.

21. To repair stripped spark plug holes, Helicoils, oversize holes, or bushings are permissible.

CLASS J MOTOR MODIFICATIONS

1. Engine cowlings may be removed or altered without limitation except that rewind starter must remain in place and operative. Spray shields may be added. Integral gas and tanks and protective rims may be altered to permit full spark advance. Choke assemblies may be removed from all engines.

2. The KF5, Mark 5, Mark 6 and Mark 6A engines shall be considered as one and the same and complete interchange of parts between these models shall be allowed, including choice of integral as separate fuel tank systems and choice of the 16:21 or 14:23 gear ratios on any of these models.

3. There shall be no interchange of parts between the Mercury 60-J and older models of class J engines.

4. The neutral clutch control for the Mark 5 and Mark 6 engines for the J classes may be removed.

5. Internal passages in the powerhead may be polished and beveling of openings will be permitted to permit alignment of parts, on models KF5, Mark 5, Mark 6, and Mark 6A **only** providing such alterations do not bring measurements above or below the manufacturer's specifications.

6. Material may be removed for balancing on revolving or reciprocating parts, provided minimum weights as specified are maintained. This rule pertains only to models KF5, Mark5, Mark 6, and Mark 6A.

7. External underwater parts may be polished on KF5, Mark 5, Mark 6 and Mark 6A, providing the contour and specified measurements of the parts are not changed.

8. Polishing, beveling, aligning, balancing of internal parts in the powerhead along with polishing of under water external parts is prohibited on the Mercury 60J.

9. There shall be no limitation on polishing, plating, painting, or other decorative finishing on cowls, driveshaft housings or other external surfaces of current motors.

10. Mufflers, expansion chambers or other exhaust system components must remain as furnished by the manufacturer. Cutouts must remain closed. Exhaust relief holes may not be added or enlarged. Muffler covers and exhaust relief plates must be in place and properly secured as designed.

11. Adjustable needle valves may be used on all engines.

12. It is not permissible to drill the propeller shaft for any reason.

CLASS A MOTOR MODIFICATIONS

1. Engine cowling may be removed or altered without limitation except that rewind starter must remain in place and operative. Spray shields may be added. Integral gas tanks and protective rims may be altered to permit full spark advance. Choke assemblies may be removed from all engines.

2. The KG4 and Mark 15, along with all parts except block and pistons from KG7, KH7, KE7 and Mark 20 engines, shall be considered as one and complete interchange of parts, except the aforementioned restrictions, between these models shall be allowed, including choice of integral or separate fuel tank systems. Engines originally built with integral gas tanks may not be equipped with fuel pumps of either the pressure or suction type.

3. Internal passages in the powerhead may be polished and beveling of openings will be permitted to permit alignment of parts, providing such alterations do not bring measurements above or below the manufacturer's specifications. Beveling of the crankcase opening behind the carburetor is not permitted, nor the crankcase or cylinder block intake by-pass.

4. Material may be removed for balancing on revolving or reciprocating parts, provided minimum weights as specified are maintained. It is recommended that balancing of crankshafts be done by the drilling of holes. Balancing by beveling is allowed only on the outermost throughs. When balancing, only one piston and/or rod may have material removed.

5. External underwater parts may be polished provided the contour and specified measurements of the parts are not changed.

6. There shall be no limitation on polishing, plating, painting, or other decorative finishing on cowls, driveshaft housings or other external surfaces of the motor.

7. Mufflers, expansion chambers or other exhaust system components must remain closed. Exhaust relief holes may not be added or enlarged. Muffler covers and exhaust relief plates must be in place and properly secured as designed.

8. Skegs on the so-called "long skeg" lower units may be shortened to match the original short skeg model, provided that the modified skeg matches the original short version in length, shape, thickness, radii, contour, and surface finish. It is understood that the water inlet will, of necessity, differ from the original short skeg version. The minimum skeg depth is 3¼", said measurement to be determined from a perpendicular line starting at the bottom of the propshaft.

9. Crankcases with the so-called small hole may be remachined to match the larger hole of other model crankcases.

10. Co-pilot springs may be removed from driveshaft housings provided holes are plugged to prevent exhaust leakage.

11. It is not permissible to utilize a roller bearing center main on the crankshaft.

12. Polishing, beveling and balancing, while allowed, are not encouraged and require judgment decisions. Year after year, it has been proven that the "stockest" engines are the fastest.

CLASS B— CHAMPION

1. Polishing and filing of the Champion engines, in general, is permissible provided that it had been done at the factory and that the modified part had been subsequently treated with the Alrok surface treatment.

2. Champion connecting rods with four oil slots approximately ½ inch wide and 1/16 inch deep are permissible.

3. The grinding operations performed on the ends of the Champion connecting rod at the Champion factory are permissible.

4. It is not permissible to convert a Champion 16 HP engine to a racing model.

5. Champion engines can be run with either the pressure system or the fuel pump furnished by the Champion Corporation.

CLASS B—MERCURY

1. No polishing or balancing of the Mark 20H is permitted. For instance, it is not permissable to remove the machining marks on the crankcase interface or the 20H cylinder block.

2. The 20H must be raced with the rewind starter mechanism.

3. It is not permissible to run the Mk25 powerhead.

4. It is permissible to mill or file the 20H exhaust filler block for a good fit to the cylinder block. It is also permissible to seat the filler block in a sealing or bedding compound to seal it to the cylinder block.

5. The reed blocks with the 5/8" by 1-7/32 holes are not permissible on the 20H, as they were never manufactured for the 20H. The only reed blocks permissible for use in the Mark 20H engines have a 1" by 5/8" reed block opening and a needle bearing center main.

6. The "stuffed" crankcases are not permitted.

7. Any KA series carburetor can be used as long as the venturi stays at one inch and the throat diameter at one and one-eighth inches. This includes the KA-3A, KA-1A, and KA-2A, any needle and seat from the KA-7A is legal. The bore of the nozzle can be checked with a No. 27 drill (0.1440 inch) and this will be used as a "no-go" gauge and shall not enter the hole. The allowable Carter Carburetors are N-2150-S and N-2537-S.

8. All A-B gearcases are legal if they meet the spec sheets.

9. It is permissible to put in a new keyway in the flywheel for repair. It must, however, be 180° opposite the existing keyway.

CLASS 25SS MOTOR MODIFICATIONS

1. Legal engines: 1970, 1971 and 1972 models as follows—22 c.i. Mercury, 22.1 c.i. OMC and 19.96 c.i. Chrysler. Older engines not permitted.

2. Engines must be run only with the cowls intact. This is to include the bottom, top and/or wrap around versions. All manufacturers' identifying marks must be intact and no removal of said identifying marks, decals, emblems, etc., is permissible.

3. Engines may be run using the standard driveshaft housing. The gear units is to be removed at the natural manufactured break point for said removal. At this point, a racing gear unit may be adapted to the standard driveshaft housing provided no modification of the housing is necessary to facilitate the adaption or exhaust relief.

4. Powerheads, with all cowls, may be mounted on an "A" Quicksilver driveshaft housing. Gear units may be adapted to the quickie unit.

5. Any gear units approved for and for which specs are on file with either the Outboard or Stock Outboard categories are legal in the 25SS class. The only stipulation on units is that a definite skeg

length must be maintained. Said skeg must be center mounted on the unit and must measure a minimum 3¼ inches in depth, including resultant wear and damage. Said measurement to be determined from a perpendicular line starting at the bottom of the propshaft.

6. 25SS class hydros and runabouts must meet "B" weights and boat dimensions.

7. 25SS class drivers must meet "B" age requirements.

8. As provided in the General Motor Modification rules, any needle valve may be used, any type brackets for throttle, spark, steering controls and tachometer will be permitted. No other modifications of this class engine are allowed unless provided for in this inspection manual and in Rule 3 of the Rule Book. The intent of this class is to run the motor exactly as provided by the manufacturer.

CLASS "C" INSPECTION MANUAL ITEMS

1. Any 4 cylinder mag used on a Mercury motor is legal.

2. Two types of cylinder blocks have been manufactured, both being permissible. One of these is assembled with four small intake port covers whereas on the other two large intake port covers are utilized. Small curved as well as small straight port covers are permissible. Also the Wizard 25 block is legal for the use in Mark 30H engines. Excluding all padded blocks.

3. Small grinding or deburring marks may be found in the transfer passages of a Mark 30H and are permissible if produced at the factory for the purpose of flash removal.

4. Bronze or aluminum reed blocks that were furnished by the manufacturer are legal.

5. Powerheads equipped with an idle bleed system identical to that used in the gear shift version also utilize two large intake port covers.

6. It is permissible to use either one or two fuel pumps on any Mark 30H. When one pump is used, a disconnected Mercury fuel pump cover plate of any maunfacture may be used to cover the holes in the fuel pump pad so long as no modification of threads or casting is made to accommodate the cover.

7. The Mk 30 and Mk 30H powerheads are identical and therefore interchangeable.

8. Allow the turning and balancing of stock flywheels to two lbs. weight minimum with the timing belt pulley on.

9. It is permissible to cut the flange off the top main bearing cap so a timing belt can be replaced without taking off the flywheel.

10. Any type seal can be used as long as it is similar to the original.

CLASS 36—JOHNSON, EVINRUDE

1. It is permissible to polish Class 36 engines built prior to January 1, 1954, but it is not permitted to polish or balance any engine built after that date.

2. It is permissible to remove the top cowl but the hand starter mechanism and bracket must be retained.

3. It is permissible to remove the air intake silencer.

4. It is not permissible to use the 1954 or 1955 carburetor on the 1956 model.

5. The electric starting flywheel can be used only if the ring gear is left in place on the flywheel and if the engine is equipped for an electric starter.

6. It is permissible to remove the spark stop from engines used in the 36 Class.

7. It is not permissible to use the 1956 Class 36 cylinder head and pistons from a 1955 Class 36 big twin, as that would involve intermixing parts from two different models with two distinct sets of specifications.

8. It is permissible to use the pressure fuel system made by O.M.C. for the Class 36 engines.

9. It is not permissible to remove the reverse gear from a Class 36 engine. The reverse gear and all related linkages must be intact and fully operative.

10. Stainless steel reeds are legal replacement for all copper reeds. These stainless steel reeds are identical in size with the copper reeds. The 1956 reed blade is not permissible for earlier models inasmuch as specifications call for a larger diameter hole under the reeds.

11. It is not permissible to alter the water intake screen.

12. Modifications to the fuel system such as by-passing the filter are not permissible.

13. A 1955 or later powerhead may not be used on a 1954 or earlier lower unit.

CLASS 36—WEST BEND, CHRYSLER 350 AND MERC 400 SERIES

1. Engine cowling may be removed, on all but the Mercury engine.

2. Carburetor parts must be furnished by manufacturer — optional adjustable bowl, etc.

3. Carburetor butterfly may be open or the holes filled as long as the finish is not higher than the factory one.

4. Re-wind starter may be removed on Chrysler 350 series (safety).

5. Spark advance timing mechanism may be removed and allow fastening timing plate in a fixed position.

6. Balancing or polishing is prohibited unless done by factory.

7. Small grinding or deburring marks are permissible if produced by the factory for flashing removal.

8. Thermostat may be optional.

9. Forward and reverse gear must be operative.

10. The solid propeller shaft may be used in any year model to relpace the spline shaft (Chrysler 350 series).

11. Solid shock mounts may be used to replace production mounts.

12. It is not permissible to alter water inlet screen.

13. Any engine 350 or 400 may be updated with newer parts as long as parts are not altered to receive the new part.

"D" INSPECTION ITEMS

1. Any 4 cylinder mag used on a Mercury motor is legal.

2. Bronze or aluminum reed blocks that were furnished by the manufacturer are legal.

3. Any curved or straight port covers are permissible.

4. Pistons 726-1611 A4 Std. and 726-1612 A1 .015 oversize are the legal pistons.

5. Allow the turning and balancing of stock flywheels to two lbs. weight minimum with the timing belt pulley on.

6. It is permissible to cut the flange off the top main bearing cap so a timing belt can be replaced without taking off the flywheel.

7. You can convert the Mk 40 fuel system to the present Mk 50 fuel system.

8. You can not use two fuel pumps on the 55H.

9. You can run the long skeg unit on a KG 9 or on a Mk 40 but not the short skeg on a Mk 55-H. It is permissible to use a Mark 55H Quicksilver lower unit with a KG9 powerhead.

10. Any KA series carburetor can be used as long as the venturi stays at one inch and the throat diameter at one and one-eighth inches. This includes the KA-3A, KA-1A, and KA-2A, any needle and seat from the KA-7A is legal. The bore of the nozzle can be checked with a No. 27 drill (0.1440 inch) and this will be used as a "no-go" gauge and shall not enter the hole. The allowable Carter Carburetors are N-2150-S and N-2537-S.

11. Any type seal can be used as long as it is similar to the original.

12. Allow all stock 4 cyl. 40 ci. Mercury blocks, excluding padded blocks, to be used for racing and front case to be milled out to 55-H specs so the Carter or Tillotston carburetors can be used. No porting to be done on block. Mismatched cases and blocks are permissible.