merCruiser
STERN DRIVES & INBOARDS

service bulletin

NUMBER: 84-27

CIRCULATE TO:
SERVICE MANAGER ☐
PARTS MANAGER ☐
MECHANICS ☐
"Place in a Service Bulletin Binder"

A. C-Ring Kit to Eliminate Universal Joint Knocking
B. Universal Joint Knocking in Extreme Turns While Trimmed Out
C. Universal Joint Knocking/Vibration Troubleshooting

A. C-RING KIT TO ELIMINATE UNIVERSAL JOINT KNOCKING

If you encounter a MerCruiser I, TR or TRS stern drive with a universal joint knocking or vibrating problem when turning or trimming, the problem may be caused by excessive side-to-side play in the universal joint cross and bearing assemblies. This condition can be corrected by replacing the standard cross and bearing assembly C-rings with C-ring Kit 53-12067A1. Kit contains 8 C-rings which is enough for 1 drive unit. C-rings are curved at the ends and must be installed with the curve toward the yoke or center socket. (Figure 1) Be sure C-rings are seated in grooves.

IMPORTANT: New C-rings can be used with original cross and bearing assemblies only. C-rings cannot be used with service replacement Spicer cross and bearing assembly 41431 as grooves in bearing caps are too narrow.

C-Ring Kit 53-12067A1

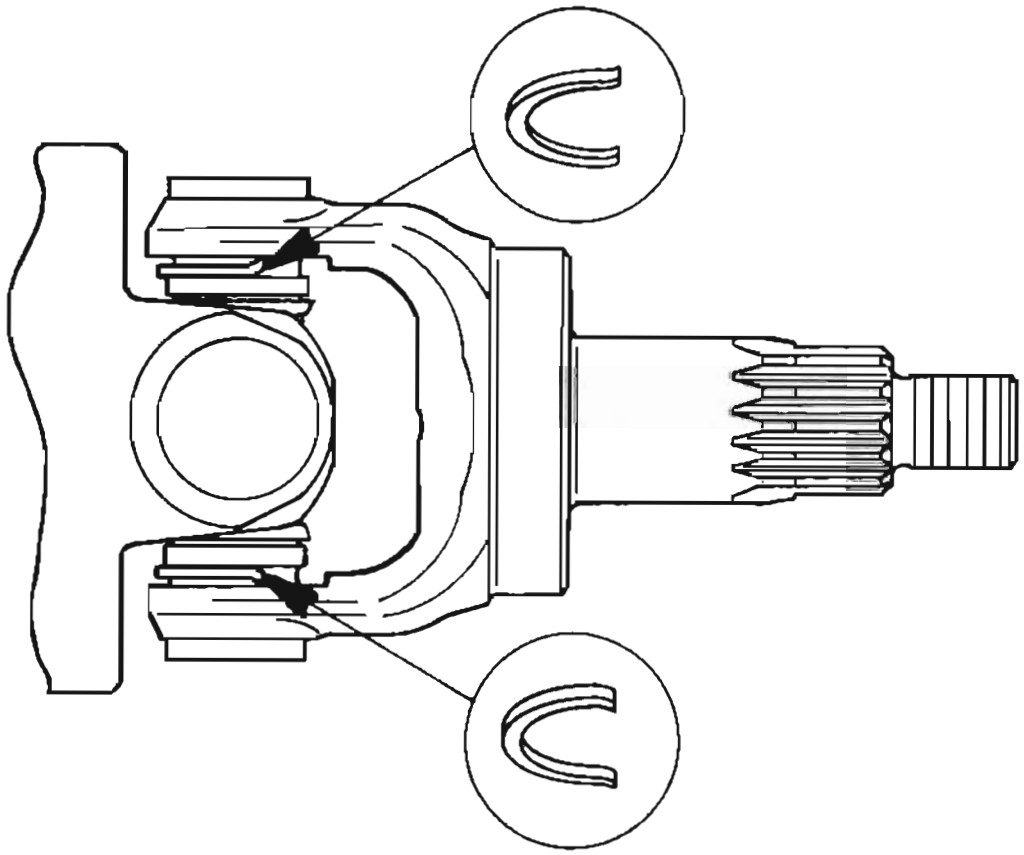


Figure 1. C-Ring Installation

B. UNIVERSAL JOINT KNOCKING IN EXTREME TURNS WHILE TRIMMED OUT

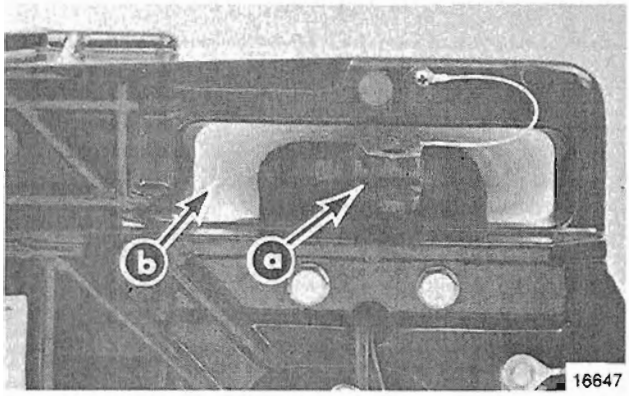
Occasionally, we receive complaints of universal joint knocking in extreme turns. In further investigating these complaints, we find out that many of these people are running the engine at 1500 RPM and above with the drive unit fully trimmed out. This is not considered normal operation and the U-joints may knock slightly under this condition. Knocking condition is usually more audible with the boat out of the water (running on a garden hose) and is more severe on some boats than others due to their construction. The operator should be advised to avoid this type of operation.

C. UNIVERSAL JOINT KNOCKING/VIBRATION TROUBLESHOOTING

The following chart should be of assistance in troubleshooting and correcting universal joint (U-joint) knocking and vibrating type noises. In addition to possible causes for U-joint knocking and vibration, the chart also lists possible causes for noises which may sound similar to U-joint knocking and vibration, but are caused by something entirely different (i.e., steering lever contacting transom cutout, etc.). The remainder of the items in the chart are listed on the basis of probability and ease of checking.

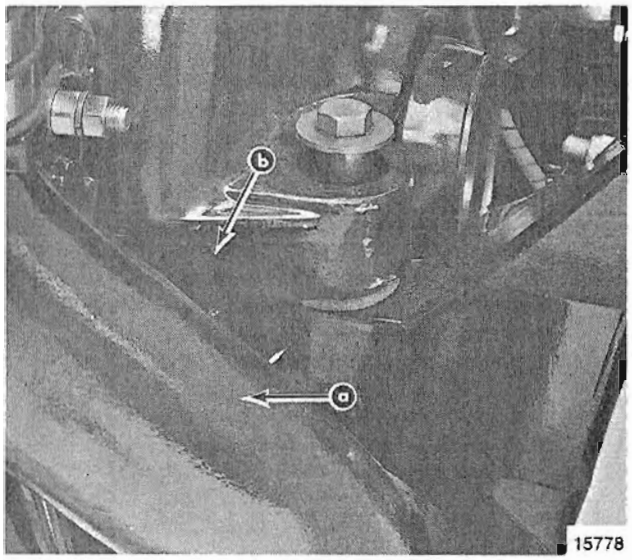
POSSIBLE CAUSE	REMEDY
1. Steering lever contacting transom cutout opening in turns. (Figure 2)	1. Modify transom cutout.
2. Engine flywheel housing contacting inner transom plate or exhaust pipe. (Figure 3)	2. Determine cause for interference (loose engine mounts, transom too thin, etc.) and correct as necessary.
3. Bell housing contacting gimbal ring. (Figure 4) This would cause knocking in the fully trimmed in position only.	3. Check for soft trim cylinder bushings. (Figure 5)
4. Propeller with untrue or out-of-balance blades.	4. Repair or replace, as required.
5. Abnormal stern drive operation (refer to subject B, preceding).	5. Instruct operator on proper operating technique.
6. U-joint cross and bearing assembly C-rings improperly installed or of incorrect size.	6. Make sure that proper thickness C-rings are used and that rings are fully seated in U-joint bearing cap grooves.
7. Excessive side-to-side play in U-joint cross and bearing assemblies.	7. Install C-ring Kit 53-12067A1 (refer to subject A, preceding).
8. U-joint bearing caps contacting center socket or drive shaft housing bearing retainer. (Figure 6)	8. Make sure that proper cross and bearing assemblies are being used. If interference is slight, grind off area on center socket or retainer where bearing caps are hitting. If interference is severe, replace center socket.
9. U-joint cross and bearings rough.	9. Disassemble cross and bearing assemblies and inspect. DO NOT RELY ON FEEL. Replace assemblies if they show signs of scoring, galling, roughness, lack of lubricant, etc.
10. O-rings missing or flattened out on U-joint shaft (Figure 6) -- causing shaft to rattle against ID of gimbal bearing.	10. Install new O-rings.
11. Worn U-joint shaft splines and/or engine coupler splines.	11. Remove U-joint coupling end yoke (Figure 6) and insert into gimbal bearing and engine coupling. Rotate shaft back-and-forth. If play is excessive, replace U-joint coupling end yoke and/or engine coupler, as necessary.
12. Engine alignment incorrect or engine coupler cocked.	12. Adjust alignment, making sure that alignment tool moves in-and-out of coupler freely. After proper alignment has been obtained, check for a cocked coupler by rotating engine 1/2 turn and rechecking alignment. If proper alignment is no longer observed, coupler is cocked and must be replaced.

POSSIBLE CAUSE	REMEDY
13. Gimbal bearing rough.	13. Replace gimbal bearing. **IMPORTANT: On MC-I models with cartridge type bearing, (Figure 7) bearing and carrier MUST BE replaced as an assembly as they are a matched set. Failure to do this may result in a loose bearing fit in carrier.**
14. Loose gimbal bearing.	14. Reinstall bearing using a new tolerance ring if carrier is loose in gimbal housing. If bearing is loose in carrier, bearing assembly must be replaced.
15. Gimbal bearing not fully seated in gimbal housing -- MC-I units with cartridge type bearing only. Yoke moves back and forth in turns and may hammer against bearing if not fully seated.	15. Drive bearing assembly into place. **IMPORTANT: On gimbal housings with snap ring groove, bearing must be pressed in past groove (snap ring is not used). (Figure 8) On newer units without snap ring groove, bearing must be pressed in past lead-in chamfer in bearing bore. (Figure 9)**
16. Excessive clearance between gimbal ring and gimbal housing. (Figure 10) This could cause misalignment between bell housing and gimbal housing and also may allow gimbal ring to vibrate up-and-down in turns.	16. Check and adjust clearance as outlined in appropriate service manual.
17. Stringer height uneven or transom assembly installed cocked on boat transom. This will affect engine alignment, but is usually not detectable with alignment tool.	17. Measure distance between engine flywheel housing and inner transom plate on both sides. (Figure 11) If distances are uneven, problem may be due to uneven stringer height or a cocked transom assembly. Adjust stringer height or relocate transom cutout as required.
18. Weak boat transom or boat bottom that flexs under power and causes engine misalignment -- this condition will usually cause engine coupler to fail.	18. This condition can sometimes be detected by having someone jump up-and-down on the drive unit while watching the inner transom plate. If movement can be observed, transom is weak and must be repaired.
19. Rear engine mount attaching hardware improperly installed or missing. (Figure 11 or 12)	19. Reinstall hardware correctly.
20. Improperly installed or failed rear engine mounts. This will affect engine alignment, but usually is not detectable with alignment tool.	20. Check for uneven mount height or loose or soft mounts. Check to make sure that there is clearance between flywheel housing and fiber washer. (Figure 11) If no clearance exists mounts have probably sagged. Install mounts correctly or replace as necessary.
21. Engine mounting holes drilled off-center in inner transom plate engine supports or engine flywheel housing.	21. Check to make sure that holes are equally spaced fore and aft and are equal distance from centerline.
22. Boat transom too thin [1-3/4" (44mm) minimum on MC-I models]. On older MC-I models this could cause U-joint shaft to bottom out in engine coupler in turns.	22. Add thickness to transom.
23. Boat transom thickness uneven [1/8" (3 mm) variance maximum]. This could affect engine to transom assembly alignment and is usually not detectable with alignment tool.	23. Repair boat as necessary.
24. Misalignment between bell housing, gimbal housing and engine coupler.	24. Contact your regional service center and arrange to have a technical service representative check the unit using a special gauge.



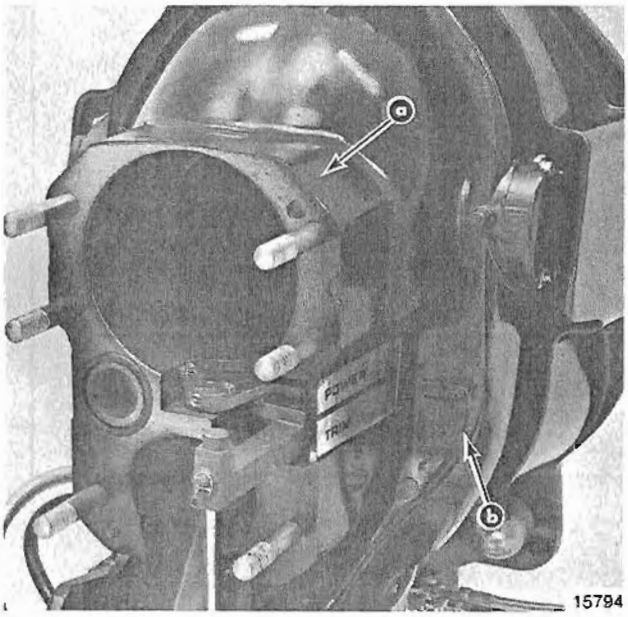
a - Steering Lever
b - Transom Cutout

Figure 2. Steering Lever Cutout (Typical)



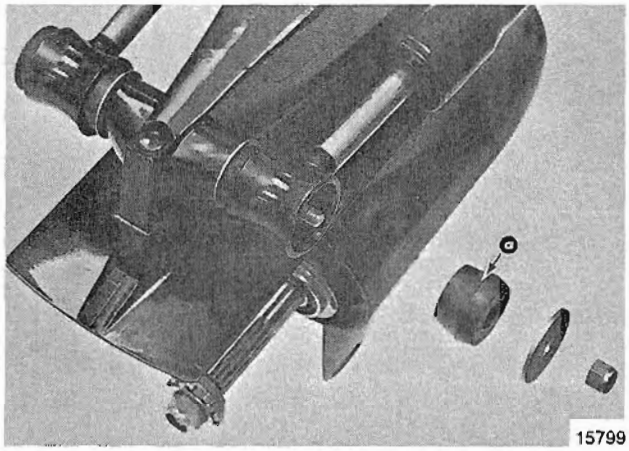
a - Exhaust Pipe
b - Flywheel Housing

Figure 3. Flywheel Housing & Exhaust Pipe (Typical)



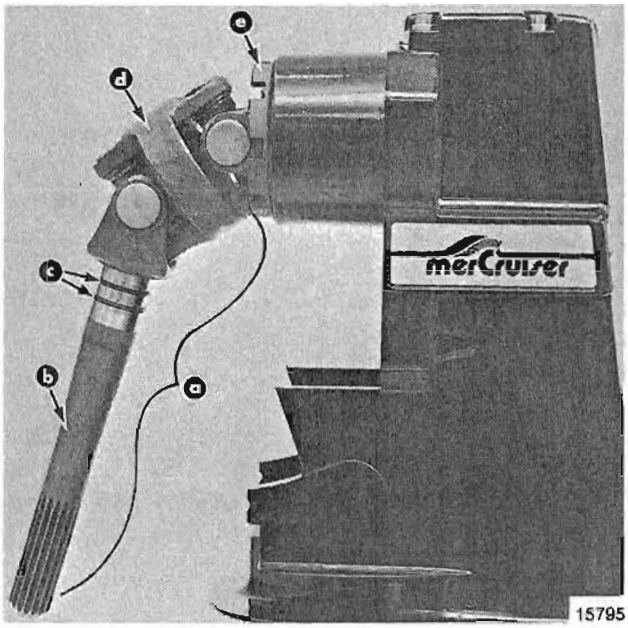
a - Bell Housing
b - Gimbal Ring

Figure 4. Stern Drive Bell Housing



a - Bushing (4)

Figure 5. Trim Cylinder Bushings (Typical)



a - U-Joint Assembly
b - Coupling End Yoke
c - O-Rings
d - Center Socket
e - Drive Shaft Housing Retainer

Figure 6. Universal Joint Assembly

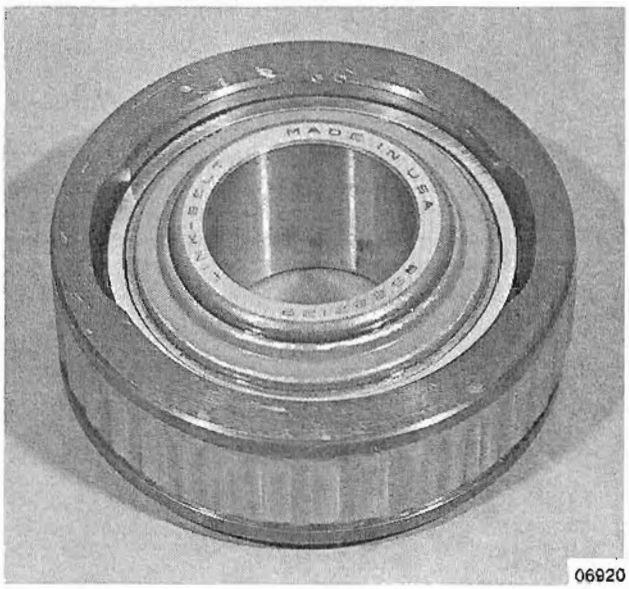
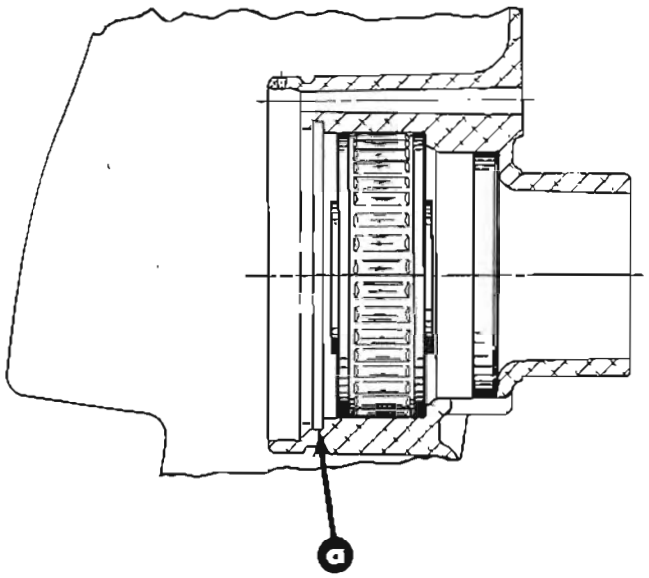
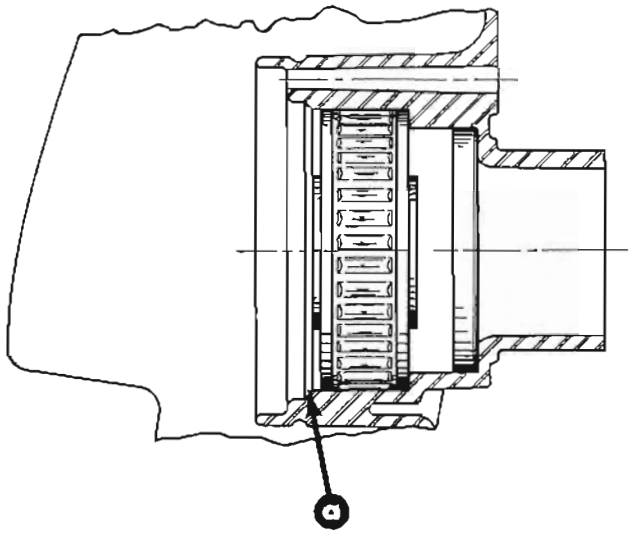


Figure 7. Cartridge Type Gimbal Bearing



a - Bearing Cartridge Must Be Pressed In Past Groove

Figure 8. Gimbal Bearing Installation On Units With Snap Ring Groove



a - Bearing Cartridge Must Be Pressed In Past Lead-In Chamfer

Figure 9. Gimbal Bearing Installation On Units Without Snap Ring Groove

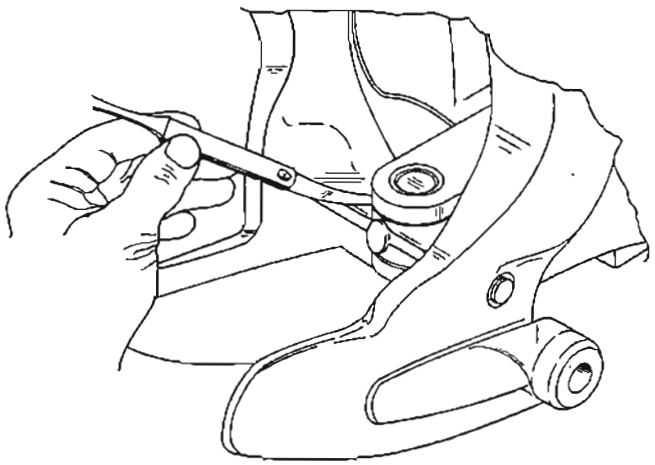
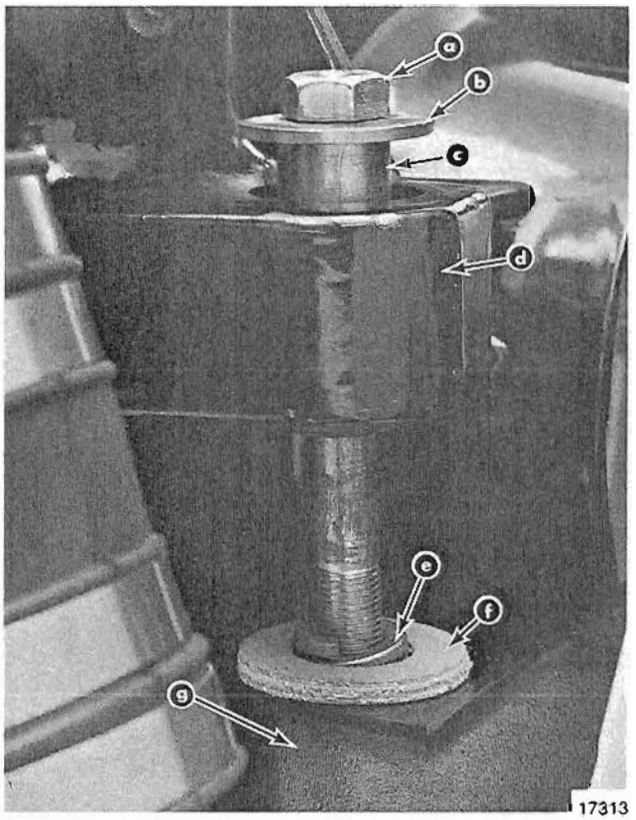
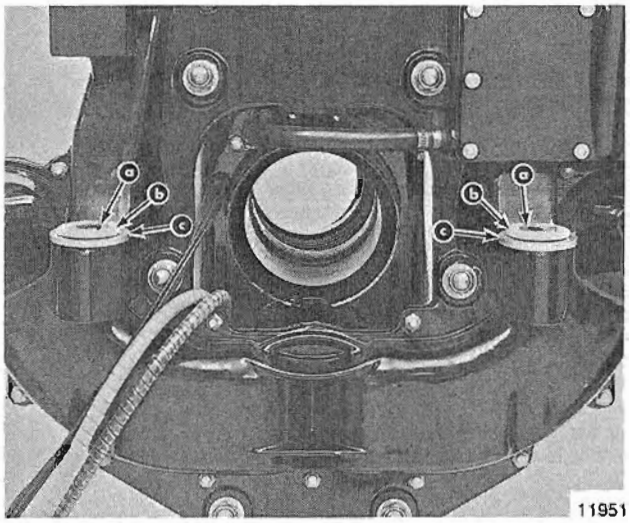


Figure 10. Checking Gimbal Ring-to-Gimbal Housing Clearance



a - Bolt
b - Washer
c - Spacer
d - Flywheel Housing
e - Double-Wound Lockwasher
f - Fiber Washer
g - Inner Transom Plate Engine Support

Figure 11. Engine Attaching Hardware - MC I



a - Double-Wound Lockwasher
b - Fiber Washer
c - Steel Washer

Figure 12. Engine Mounting Hardware - MC TR/TRS