<u>This supplement is for Field Service use only</u>, as complete dis-assembly and re-assembly of the QED reducer by the customer is NOT recommended. This supplement only extends to ***single reduction QED units***. *<u>Double reduction instructions are not available.</u>*

GEAR DRIVE DISASSEMBLY/REASSEMBLY

Refer to *Figure 2 - 1QED, Figure 3 - 2QED, or Figure 4 - 3QED* in this supplement. For part numbers not listed in this supplement, refer to standard unit *IO&M Manual #514*.

1. Lock out power and disconnect electrical service to motor. Remove handhole covers **[1102]** and fasteners **[1103 & 1104]**. Remove low speed shaft guard **[203]** and fasteners **[228 & 229]**. For QED-A, remove fasteners **[1301, 1302, 1303 & 1304]** and split packing gland **[1306]**.

2. Block extension shaft in place through pedestal, just above housing. With shaft secured, loosen gear drive to pedestal bolts **[1105]**. *Do not remove bolts*. Remove shaft end hardware **[300]**.

3. A groove is provided in the top of low speed shaft **[205]** to allow the use of a gear puller (not provided) to assist in disengaging the taper connection between the extension shaft **[400]** and the low speed shaft. See *Figure 1* below. After the taper connection is broken, remove gear drive to pedestal mounting fasteners **[1105 & 1106]**, and lift gear drive away from the pedestal.

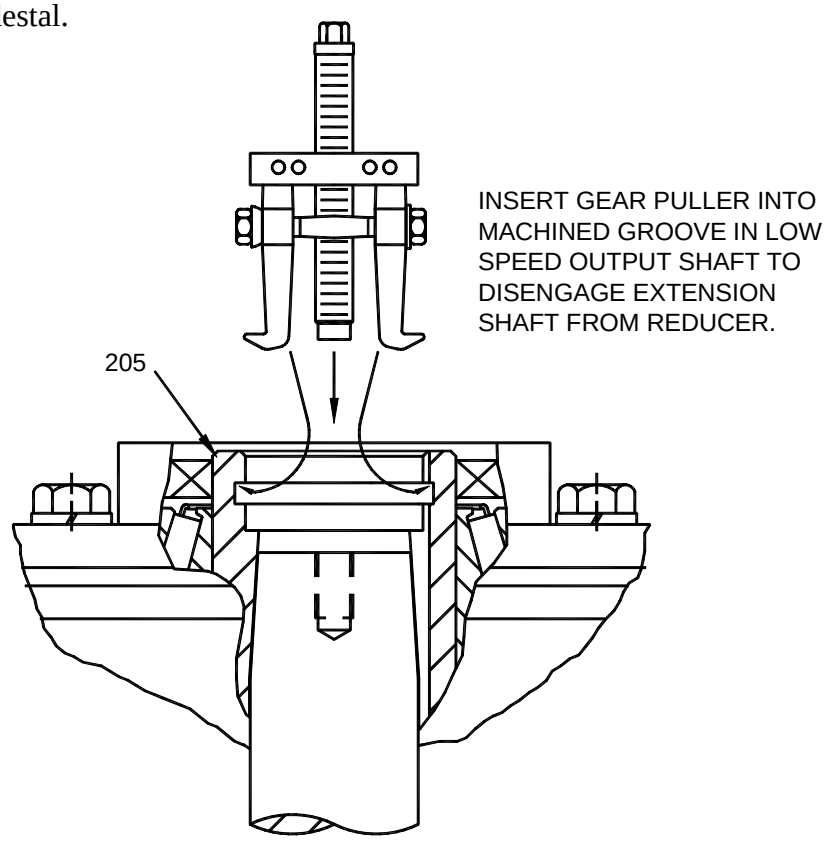

Figure 1: Extension Shaft Removal

DISASSEMBLY OF OUTPUT SHAFT

1. Disconnect gearbox from all other equipment including motor. It may be helpful to place gear drive on a workbench for easier access and handling.

2. Drain oil from gear drive.

3. For 1QED and 3QED, remove low speed shaft cover **[202]**.

4. Remove the fasteners holding the low speed cover/flange **[206]** to the housing **[201]**. Do not remove the cover/flange.

5. Loosen the fasteners in the high speed cap **[204]** about 1/8" and tap the opposite end of the high speed worm shaft **[212]** to loosen the bearings and provide clearance in the gear mesh for disassembly.

6. Remove the entire low speed shaft **[205]**, worm gear **[211]**, and cover/flange **[206]** assembly from housing **[201]**. It may be necessary to tap on the upper end of the low speed shaft (the end opposite the cover/flange) to free these parts from the housing.

7. Remove the low speed shaft **[205]** and gear subassembly from the cover/flange **[206]**. Note the drywell **[224]** and the lower bearing **[210]** stay with the cover/flange. It may be necessary to tap on the low speed shaft (at the cover/flange end) to free the parts.

8. To remove upper bearing and gear, press upper bearing cone **[210]**, Nylos ring **[223]**, and worm gear **[211]** off low speed shaft **[205]**. Note the position of the bearing on the shaft so the unit can be properly reassembled. Caution must be taken not to damage the seal area of the shaft.

9. Remove keys **[226]**, Forsheda v-ring **[225]**, and all low speed oil seals **[208]**.

10. Press on the exposed shoulder of the lower bearing cone **[210]** as it rests against the low speed shaft **[205]** to remove it from the shaft. Remove the lower bearing cup **[210]** from the cover/flange **[206]** using a soft metal drift. When driving out the bearing cup, exercise caution not to damage the housing or cover bearing seat.

11. If replacing upper bearing **[210]**, remove upper bearing cup from housing using the same precautions as above.

DISASSEMBLY OF INPUT SHAFT

1. Disassemble motor adapter **[227]** from housing **[201]**. For 1QED, remove high speed spacer **[230]** located behind motor adapter.

2. Disassemble high speed cap **[204]** from housing **[201]**.

3. Remove high speed shaft **[212]** and bearings **[209]** from housing **[201]**.

4. If changing the bearings or worm, press both bearing cones **[209]** off the worm.

5. Remove high speed oil seal **[207]** from motor adapter.

UNIT REASSEMBLY

This procedure covers the complete unit. If some components are not being replaced, such as bearings, then certain steps may not be applicable, and can be ignored.

Thoroughly clean all parts in preparation for reassembly. Remove all gasket material and sealant from mating surfaces. Inspect all parts for damage or wear and replace as necessary.

CAUTION: If a shaft seal area is cleaned with emery paper, the direction of the resulting finishing marks in the shaft must be perpendicular to the shaft axis. Any small lead inscribed in the shaft surface while cleaning may create a path of oil seepage.

1. Press bearing cones **[209]** against the shoulders on both sides of high speed worm shaft **[212]**. To prevent damage to bearings, press on inner race only.

2. Install high speed seal **[207]** into motor adapter **[227]**. Apply a thin coat of liquid sealant to the bore area that supports the seal. Tap into place using a blunt surface that will not deform the seal casing. When properly installed, the seal should be flush with the casting surface and perpendicular to the shaft axis.

3. Insert bearing cup **[209]** into housing bore on motor adapter end.

4. Assemble motor adapter **[227]** using one (.010" thick) gasket **[213]**. For 1QED, include spacer **[230]**. Dip fasteners **[217]** into pipe sealant compound before installing to prevent oil seepage.

5. Insert high speed worm shaft **[212]** from the opposite end of the housing until it seats against bearing cup **[209]**. To protect the seal during assembly, cover the shaft keyway with tape and apply a thin coat of oil to the shaft seal surface. Once in place, make sure the seal lip is seated properly and not rolled over.

UNIT REASSEMBLY

6. Install the second bearing cup.

7. Attach high speed cap **[204]** using the remaining (.010" thick) gasket **[213]** to achieve .002-.004 inch endplay. Tap each end of high speed worm shaft with non-metallic hammer to seat bearings before checking endplay.

8. Once the proper endplay is established, loosen high speed cap **[204]** about 1/8" and tap the worm extension to loosen the bearings and provide clearance in the mesh for reassembly of the gear.

9. Press upper bearing cup **[210]** into counterbore of housing **[201]** (2QED) or low speed shaft cover **[202]** (1QED and 3QED).

10. Press lower bearing cup **[210]** into counterbore of the cover/flange **[206]**.

11. For 1QED and 3QED, temporarily install low speed shaft cover **[202]** to the housing without gasket.

12. Insert keys **[226]** (two at 90 degrees) into low speed shaft **[205]**. Press gear **[211]** onto low speed shaft **[205]** over keys and against shoulder.

13. Install Nylos ring **[223]** onto low speed shaft **[205]** against the shoulder of gear **[211]**. Press upper bearing cone **[210]** against the Nylos ring.

Rest housing [201] on a flat surface with flange side facing up.

NOTE: The following steps 14-18 determine the bearing adjustment and gear position.

14. Insert the low speed shaft assembly into the gearbox housing **[201]**, until the bearing cone rests on the cup of the upper bearing **[210]**.

15. Slide lower bearing cone (this bearing has a sliding fit) **[210]** onto low speed shaft **[205]** against the shoulder.

16. Lower the cover/flange assembly with lower bearing cup installed (see *Step 10*) onto the lower bearing cone using the proper thickness of gaskets to provide a maximum of .002" endplay while avoiding any bearing preload. Tap each end of the shaft with a non-metallic hammer to seat the bearings, before checking endplay. For 2QED, proceed to *Step 19*.

17. For 1QED and 3QED, remove cover/flange **[206]** and low speed shaft cover **[202]**. Equally distribute the gaskets **[214]** between the two covers.

UNIT REASSEMBLY

18. Brush worm threads with blue dye and reassemble cover/flange **[206]** and low speed shaft cover **[202]**. Retighten high speed cap **[204]** and rotate gear one full revolution in each direction while applying a slight drag on the output shaft. Disassemble and check the cntact on the gear teeth. If off center, remove a small amount of gasket from the side of least contact and move to opposite side. ***CAUTION: Do not add or delete gaskets at this point as this will change the bearing adjustment. Repeat this step until contact is centered.***

19. Remove cover/flange assembly. Remove the lower bearing cone **[210]** from the shaft, then reinstall the shaft and the gear assembly in the housing. Rest bearing cone on the cup in the cover/flange assembly.

20. Apply a thin coating of (#242) Loctite **[232]** in the counterbore of cover/flange.

21. Press drywell sleeve **[224]** into the counterbore of cover/flange **[205]**, making sure that the lower bearing cone is resting on cup (see *Step 19*).

22. Install Forsheda v-ring **[225]** over drywell sleeve **[224]**.

23. Reinstall the drywell and cover/flange subassembly onto the low speed shaft **[205]** in the housing. Make sure the bearing adjustment determined in *Steps 16-18* remains in place.

24. Secure the cover/flange to the housing. Dip the fasteners **[217]** into pipe sealant compound before installing to prevent oil seepage.

25. Install low speed seals **[208]**. Reference *Step 2* for proper seal installation procedure.

26. Attach low speed shaft guard **[203]** to housing **[201]** (2QED) or low speed shaft cover **[202]** (1QED and 3QED).

27. Apply an adequate supply of grease to the upper and lower low speed bearings **[210]**. Refer to ***Gear Drive Lubrication****, Manual #514* for proper type and grade.

28. Add oil to the proper level as indicated on the gear drive. See ***Gear Drive Lubrication****, Manual #514* for recommended type and amount. ***CAUTION: Do not overfill, as this may allow oil to spill over into the drywell sleeve and defeat its purpose.***

UNIT REASSEMBLY

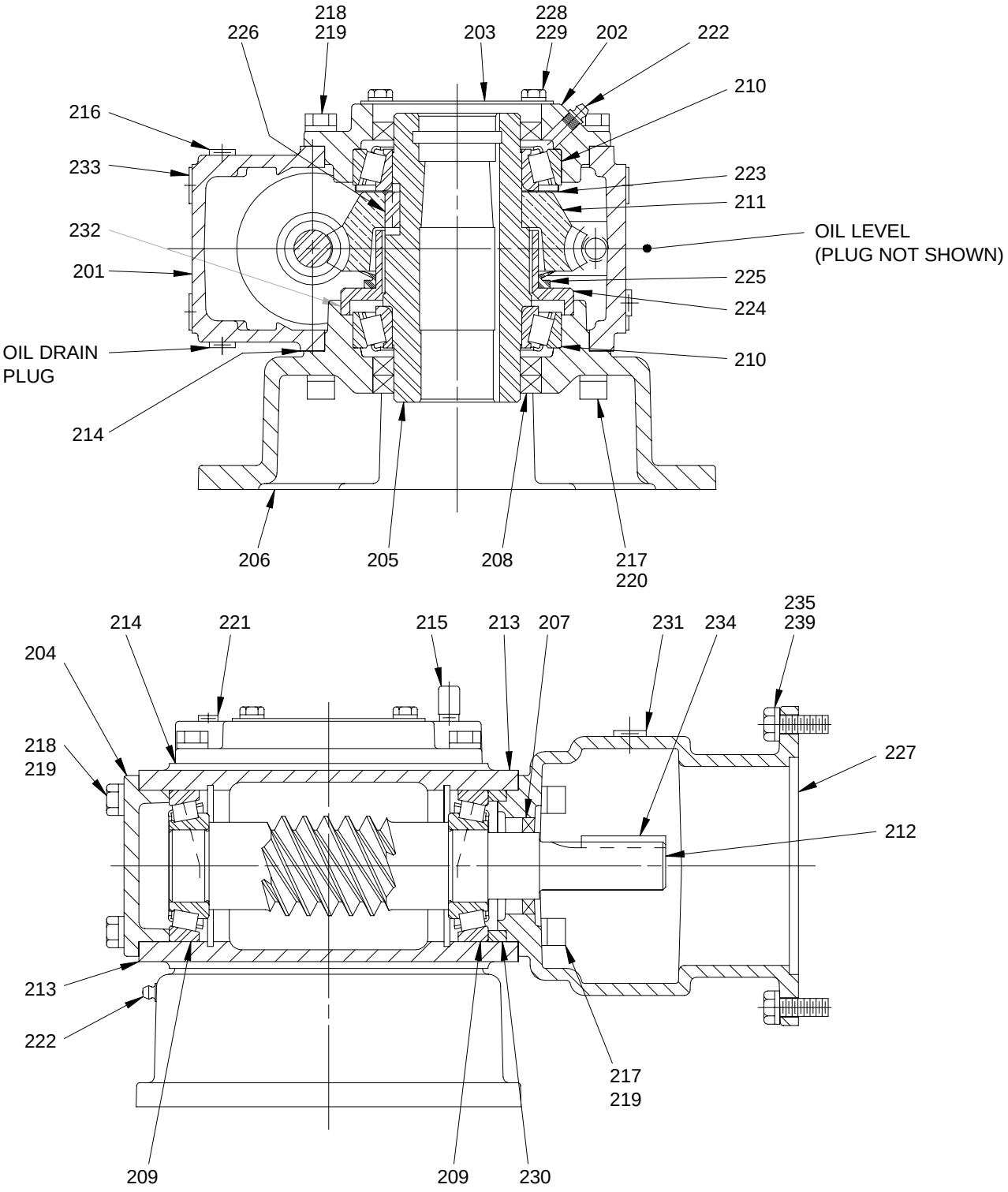

Figure 2: 1QED Reducer, Single Reduction

UNIT REASSEMBLY

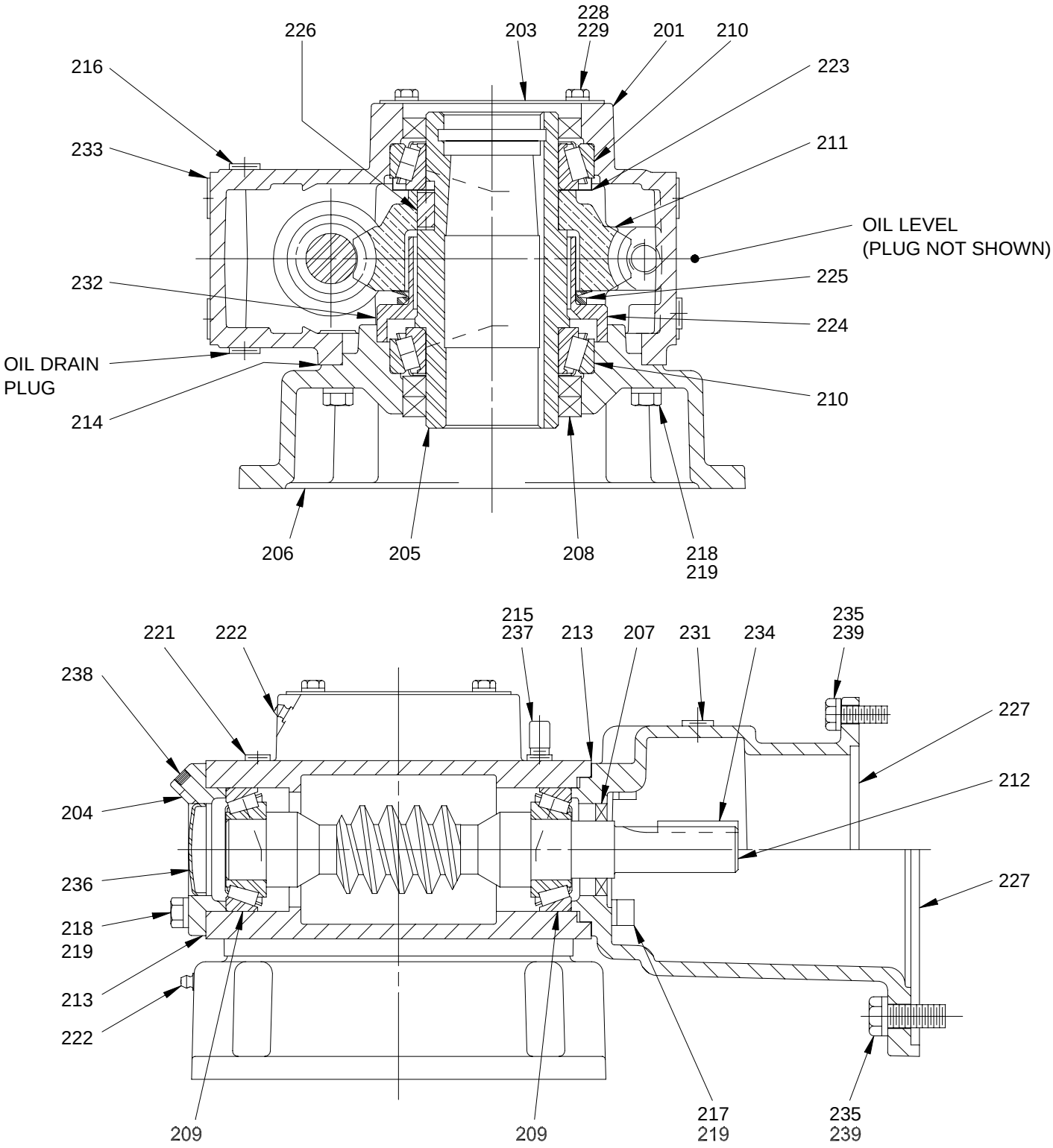

Figure 3: 2QED Reducer, Single Reduction

UNIT REASSEMBLY

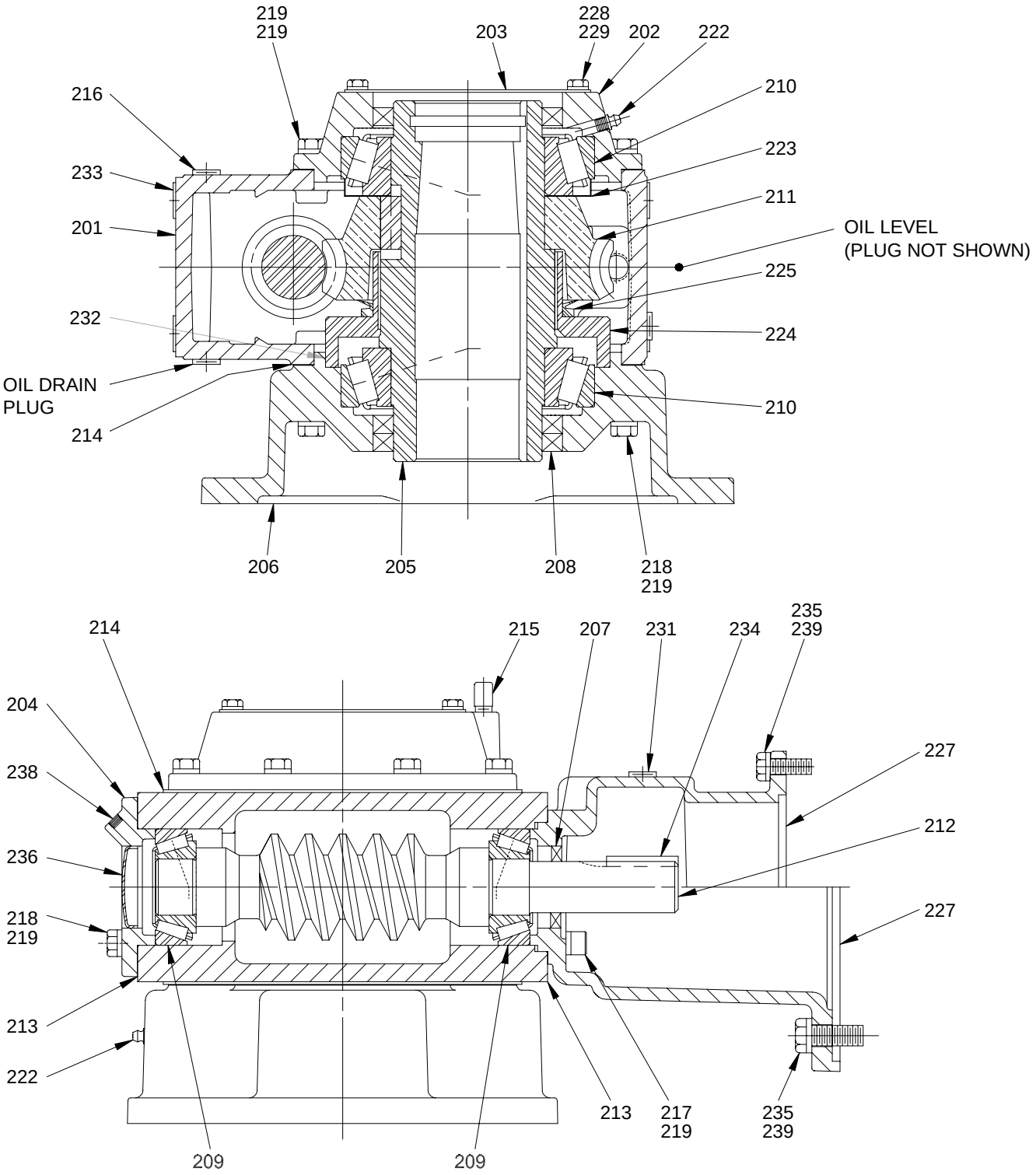

Figure 4: 3QED Reducer, Single Reduction

QED REDUCER PART NUMBERS

Part#	Description	Qty.
200	**gear drive**	
201	housing	1
202	low speed shaft cover	1
203	low speed shaft guard	1
204	high speed cap	1
205	low speed shaft	1
206	low speed cover/flange	1
207	high speed oil seal	1
208	low speed oil seal	3
209	high speed bearing (cup/cone)	2
210	low speed bearing (cup/cone)	2
211	low speed worm gear	1
212	high speed worm shaft	1
213	high speed gasket	2
214	low speed gasket	1-2
215	breather	1
216	pipe plug	4-5
217	socket head cap screw	4-12
218	hex head cap screw	8-12
219	spring lockwasher	16-24
220	hi-collar lockwasher	8
221	pipe plug	1
222	grease fitting	2
223	Nylos ring	1
224	drywell sleeve	1
225	Forsheda v-ring	1
226	key	2
227	reducer bell housing	1
228	hex head cap screw	4
229	spring lockwasher	4
230	high speed spacer	1
231	pipe plug	1
232	Loctite	as req'd
233	button plug	8
234	key	1
235	hex head cap screw	4
236	high speed cap plug	1
237	hex reducer bushing	1
238	drive fitting plug	1
239	spring lockwasher	4