

LEWMAR®

Standard Operation Sheet

Integra Con AP CW BRAKT and Chain

Item No.: 89300111 Issue No.: **DRAFT** Date: 17/03/07

Issue No.:	Date:	Changes Made To Operation Sheet	Approval Signature
DRAFT	03/05/07	DRAFT	



Integra Con AP Drive with 9T Sprocket

Integra Assembly & Test Equipment

1. Assembly Cell:



2. Test Equipment



Standard Operation Sheet

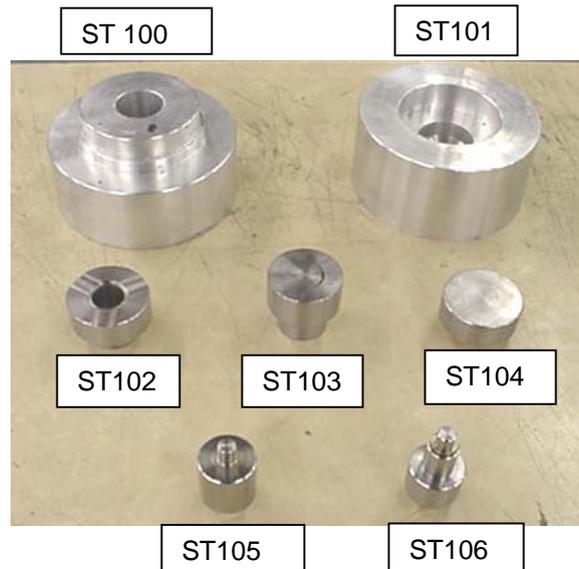
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3. Press Tooling:



4. Hand tools:



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Integra Tool List

Item No	No Required	Tool Description
1	1	ST100 Housing support -press
2	1	ST101 Assembly aid
3	1	ST102 Final carrier support lower -press
4	1	ST103 EP Gear Bush lower support-press
5	1	ST104 EP Gear Bush upper support-press
6	1	St105 Adaptor Plate bearing upper locator-press
7	1	ST 106 Final carrier support upper -press
8	1	ST107 2.4mm extended drill 200mm long
9	1	ST108 pin positioner 200mm long
10	1	ST109 pin punch
11	1set	ST110 plastic gear soft jaws
12	1set	ST111 Metal gear soft jaws
13	1	10.3mm reamer
14	1	10.4mm HSS twist drill
15	1	3/8 drive socket set
16	1	Hot air gun 200W 60-600 deg C
17	1	Torque screwdriver 1-6Nm
18	1	Medium Phillips screwdriver
19	1	Medium screwdriver
20	1	Set of metric Allen keys
21	1	2.5mm hex tee handle driver
22	1	3.0mm hex tee handle driver
23	1	Large long Nose pliers
24	1	Straight Pliers
25	1	Side cutters
26	1	Wire strippers
27	1	External straight Circlip pliers for 10-25 diameter
28	1	Set of metric feeler gauges .05-1.00mm
29	1	Medium weight nylon faced mallet
30	1	½ pound ball pein hammer
31	1	Safety Knife, Stanley type
32	1	Medium size general purpose scissors
33	1	Set of needle files
34	1	Air screw driver set to 1.5Nm
35	1	Pozi size 2 x 90mm ¼ dia long screwdriver bit

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Epicyclic and Motor Sub-assembly Build

Operation:

- 10 Wearing rubber gloves and safety glasses wipe inner and outer surface of bearings (part No 82001372) with Acetone to remove contamination or grease. Remove both covers on one bearing and one on the second. figure 1 refers.

Spray Loctite activator 7471 in bearing locations both sides of Main Housing (Part No 85005243) allow 20 seconds to dry. Figure 2 refers.



Figure: 1

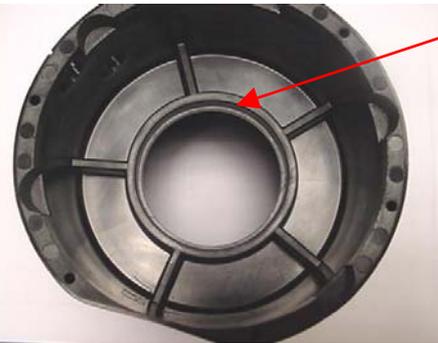


Figure: 2

- 15 Apply a bead of Loctite 480 around the outer race of the bearing with no covers. Location in the geared section of the Primary housing moulding and press into position. (Part No 85005243), figure 3 refers. Remove any excess adhesive. Turn moulding over and repeat above, pressing in semi-covered bearing as shown in Figure 3. Allow 60 minutes to cure before handling.



Figure: 3



Figure: 4

Tool No ST104

Tool No ST100

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- 20 Assemble the Clutch friction plate (Part No 82000584) to the Clutch Adaptor Plate (Part No 85005259) using 3 off M4 pan head screws, and spring washers (Part No`s 82001388 and 82000250). Apply Loctite screw lock 243 to threads; tighten to 1.0Nm using a torque screwdriver.

Turn assembly over and remove any excess screw thread protruding above clutch plate with a windy grinder. Figures: 5 and 6 refer.



Figure: 5

- 25 Clean inner surfaces of bearings with acetone. Coat a cotton bud with Loctite 638 and apply a thin layer onto surface of bearings. Figures 7 and 8 refer.



Figure: 7

Figure: 8

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- 30 Spray the Clutch Adaptor Plate (Part No 85005259) around bearing location diameter with Loctite activator 7471, allow 20 seconds to cure.

Locate Clutch assembly into bearing. Using set-up shown in Figure 4 press home. Allow 60 minutes to cure before handling. Figure 9 and 10 refers.

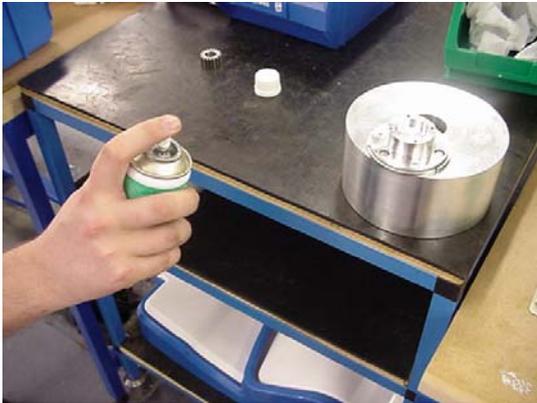


Figure: 9



Figure: 10

- 35 Turn housing over. Locate Primary EP Main Carrier moulding (Part No 85005265) into clutch plate, align screw holes and push home. Secure using 4 off screws (Part No 82000185), apply Loctite screw lock 243 to threads and tighten to 1.0 Nm using the torque screwdriver Figures 11 and 12 refer.



Figure: 11



Figure: 12

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- 40 **Note:** Prior to assembly check clearance between gears 85005252 (9 off per) and EP carriers Part No .85005244and 85005265. There must be between 0.15-0.2mm clearances to prevent gears from seizing. If insufficient, drill out using vertical 3-jaw chuck with bored out soft jaws, tool No ST 110.

Wearing gloves, brush PFG-210 Multiuse Grease into the moulded gear in housing moulding, apply sufficient to cover teeth. Repeat process for 3 off moulded gears (Part No 85005252) and fit over carrier spindles. Assemble 2nd EP carrier (Part No 85005244) and 3 gears as above. Fit 3rd carrier (Part No 85005244) and gears as previous. Figures 13 and 14 refer.



Figure: 13

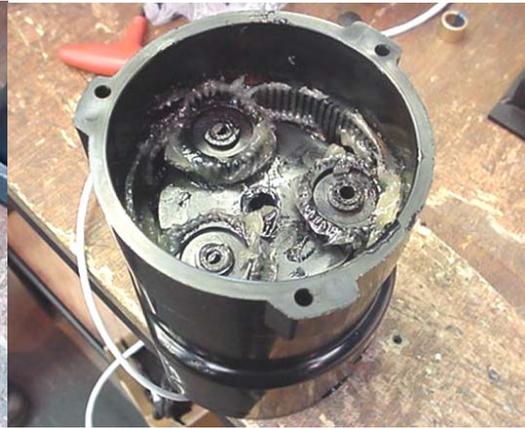


Figure: 14

- 45 Remove metal ferrule from the end of electric motor. Fit I-Drive Motor Output gear (Part No 85005253) over shaft and secure with Nyloc nut (Part No 82000175); Tighten to 1Nm.



Figure: 15



Figure: 16

- 50 Grip end of wire with pliers (avoid damaging wires) and twist cables together to achieve a cross over pitch of 15-20mm. Cut off 400-410mm of heat shrink tubing RS 666-896 and slide over cable. Re-tension cable and shrink tubing using a hot air gun. Figure 12 refers. Fit motor aligning cable with flat on side of housing. Secure using 3 off Posi drive self-tappers No 12 (Part number 82001406) with air screwdriver Figures 17 and 18 refer.



Figure: 17



Figure: 18

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Final Stage Gearbox: EP Housing Sub-assembly Build

Operation:

- 55 Press in Oilite bush (Part No 82001387) into Final Carrier (Part No 85007261) as shown in figures 19 and 20. Ensure bush is pushed below surface of carrier.



Figure: 19

Figure: 20

- 60 Wearing rubber gloves and safety glasses wipe inner surface of bearing in the Final EP Housing (Part No 85005245) and outer diameter of Final Carrier (Part No 85007261) with Acetone to remove contamination or grease. Spray Loctite activator 7471 in bearing surfaces on both parts; allow 20 seconds to dry before handling. Apply a bead of Loctite 638 around the bearing diameter of the final carrier and fit into bearing. It may be necessary to press the carrier into bearing, as shown. Place assembly on rack, allowing 60 minutes to cure before handling. Figures 21 and 22 refer.



Figure: 21

Figure: 22

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- 65 Press fit Oilite bush (Part No 82001387) into EP Planet gear (Part No 85005255, Figures 23 and 24 refer.

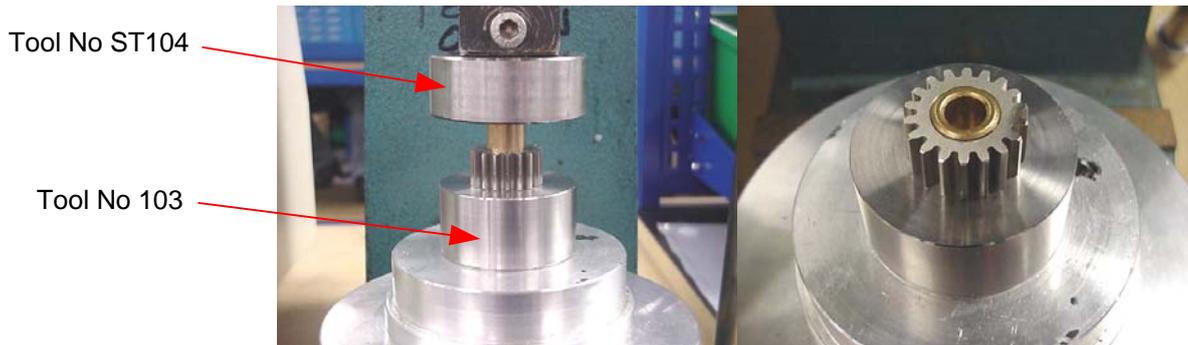


Figure: 23

Figure: 24

Note: Prior to assembly check fit of gear EP Planet gear (Part No 85005255), onto Final Carrier (Part No 85007261) spindles. Gears should turn freely, if tight open using 10.03 reamer. Hold in a vertical 3-jaw chuck with bored out soft jaws tool No ST 111.

- 70 Brush PFG 210 grease into the teeth of the mounded gear insert in the EP Housing (Part No 85005245). Fill to half the tooth depth. Repeat above for EP Planet gear assembly (Part No 85005255). Figures 25 and 26 refer.



Figure: 25

Figure: 26

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- 75 Fit 3 off EP Planet gear assemblies (Part No 85005255) onto the spindles of the Final Carrier (Part No 85007261). Ensure the raised section of the bush contacts the carrier face. Figures 27 and 28 refer. Rotate gears to evenly distribute grease.

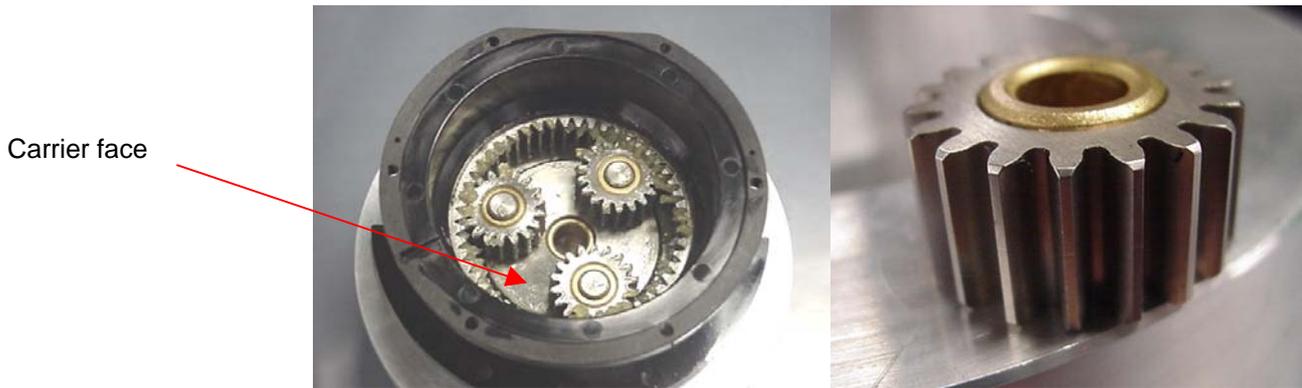


Figure: 27

Figure: 28

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Final Stage Gearbox: Adaptor Plate Sub-assembly Build

Operation:

- 80 Wearing rubber gloves and safety glasses wipe outer surface of bearing (Part No 82001353) and location in Adaptor plate (Part No 85005241) with Acetone to remove contamination or grease. Spray Loctite activator 7471 in bearing surfaces on both parts; allow 20 seconds to dry before handling. Set-up press with tooling as shown in Figure 29. Apply a bead of Loctite 480 around bearing, Figure 30 refers.

Tool No ST105

Tool No ST103

Tool No ST100

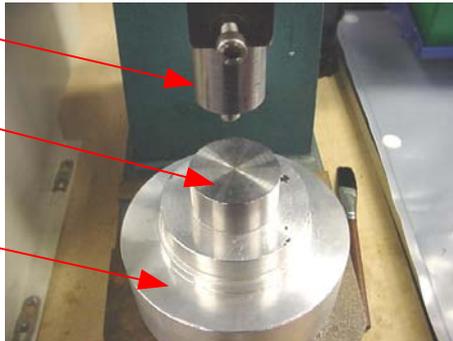


Figure: 29



Figure: 30

- 82 Locate Adaptor plate on the lower tooling; position bearing and press into position. Wipe away any surplus adhesive from bearing/plate. Allow 60 minutes to cure before handling, Figures 31 and 32 refer.



Figure: 31



Figure: 32

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- 85 Wearing rubber gloves and safety glasses clean bearing location surface of EP sun gear (Part No 85005248), and inner diameter of bearing (Part No 82001353, previously fitted Adaptor Plate) with Acetone. Spray Loctite activator 7471 in bearing surfaces on both parts; allow 20 seconds to dry before handling. Apply a bead of Loctite 638 around the location diameter of the EP sun gear and fit into bearing. Wipe away any surplus adhesive from bearing/gear. Place assembly on rack allowing 60 minutes to cure before handling. Figures 33 and 34 refer.

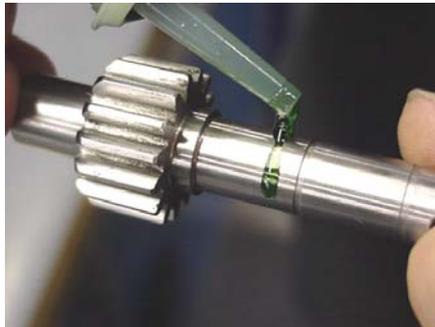


Figure: 33



Figure: 34

- 87 Using circlip pliers fit 2 off circlips (Part No 82001389) and 1 off key (Part No 85006916) as show in figure 35. Remove existing steel grub screws from the clutch and replace with stainless (Part No B5278-A4). Apply Loctite 243 to ends of thread prior to fitting. Figures 35 and 36 refer.



Figure: 35

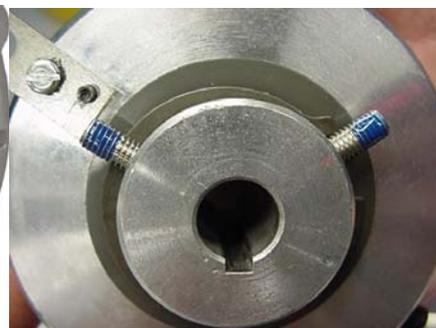


Figure: 36

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- 90 Check the fit between Clutch and shaft. This must be a free fit to allow for adjustment on assembly. If there is any resistance look for burrs around the keyway or the grub screw holes. If necessary use a needle file to dress any edges and burrs. **Remove any flash in cable slot.** Thread the clutch cable through the hole in the Adaptor plate and slide the clutch over the shaft. Figures 37 and 38 refer.

Check for burrs around hole.

Check for burrs on edge or along length of key way

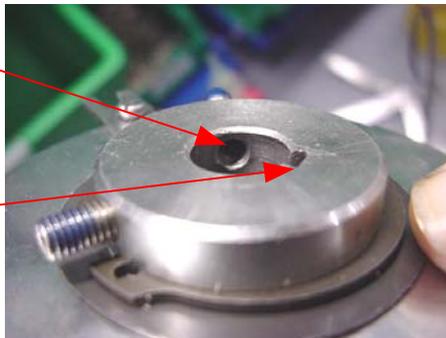


Figure: 37



Figure: 38

- 92 Secure the clutch to the Adaptor plate using a No 8 Pozi self tapper (Part No 82000185). Do not screw all the way but allow the clutch to move 2mm on the shaft. Locate the EP sun gear into the Final Carrier bush, rotate Clutch Sub Assy until cable drops into the slot.

2mm gap under head

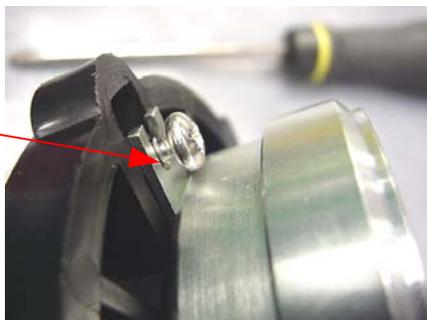


Figure: 39



Locate cable in slot **REMOVE FLASH**

Figure: 40

Final Stage Assembly: Clutch and EP Housing Build

Operation:

- 95 Carefully lift the clutch and EP housing subs and locate onto the main housing. Align the outer profile and locate the adaptor plate lugs into the housing pockets. Secure unit halves together with 6 off No8 Posi self-tapping screws (Part No B414) to a torque of 1.5Nm. Use a diagonal sequence to ensure that the faces fit correctly.

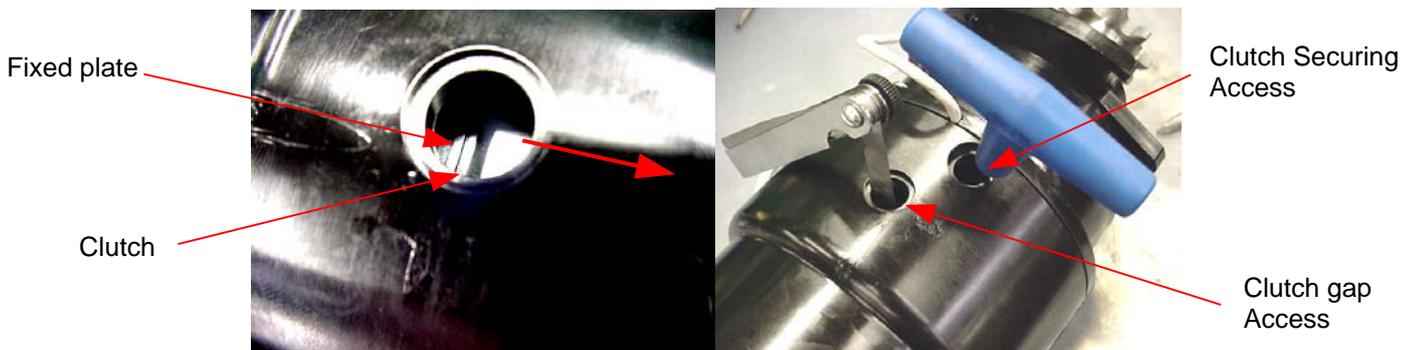


Figure: 41



Figure: 42

- 97 Temporarily fit the key, sprocket and screws (Part No`s 82000575, 85000465 and B5278-A4) to the output shaft. Rotate the shaft until 1 of the 2 clutch securing screws (see Figure 36) can be seen through the access window. Using a flat bladed screwdriver slide the clutch forward until a noticeable gap appears relative to the fixed plate. Insert a 0.2mm feeler in this gap; push the Clutch back until it just grips the feeler. Tighten the screw. Rotate shaft 360 degrees, checking gap every 90 degrees. If consistent 0.2mm tighten second screw. If not repeat above. Figures 43 and 44 refer.



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Figure: 43

Figure: 44

- 99 Locate the unit in bracket (Part No 85007404) and secure with 3 off M6 bolts, flat washers, spring washers and nyloc nut (Part Nos B0682-A4, B1209-A4, B1230-A4, B1077-A4). Tighten bolts to 3.5 Nm.



Figure: 45

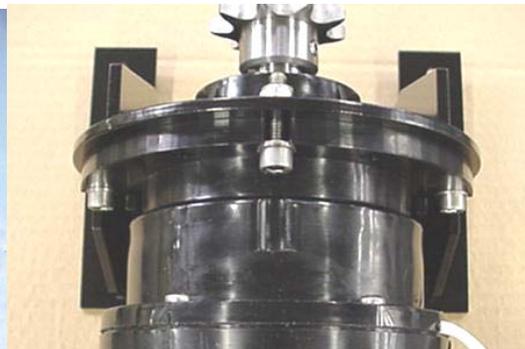


Figure: 46

Final Stage Assembly: Test, Pinning and Packaging

Operation:

- 100 Test the Integra unit using the Steering Division test equipment in conjunction with test method document PI 107, written by Chris Marks.
- 105 Prepare unit for pinning (2 off spiral pins part No B1505) by removing bracket, sprocket and motor. Pack clean tissue around the gears to prevent contamination and loss when inverted.



Figure: 47



Figure: 48

- 107 Transfer to pillar drill. Use extended 2.4mm diameter drill; Tool No ST 107 set depth stop to 18mm and speed to 600 RPM. Line up with pilot holes and drill to depth in 2 positions (1 either side).

2 off 1.9mm diameter pilot holes



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Figure: 49

Figure: 50

- 109 Fit 2 off Spirol pins (Part No B1505) using locator and final punch. Figures 49 and 50 refer.

Pin Locator
Tool No ST108



Pin Punch Tool
No ST109



Figure: 49

Figure: 50

- 110 Apply additional grease over gears; refit motor, bracket and sprocket. Clean unit with Acetone and fit Lewmar and Serial number label (Parts No BN2196-4, 66300044) in positions shown. Fit 2 off housing caps into access holes (Part No 85007148), coil cable and secure with a tie-wrap (Part No 57406-007). Figures: 51 and 52 refer.

Fit 2 off
housing caps



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Figure: 51

Figure: 52

- 120 Make up inner and outer box (Part No B2991). Place unit into box together with the chain assembly and Installation guide (Parts No 89100759 and B12596). Tape-up box and fit dispatch label.



Figure: 53



Figure: 54