STICK ~~PART~~ FOR BFE01208

FINNING CAT

Service Information System

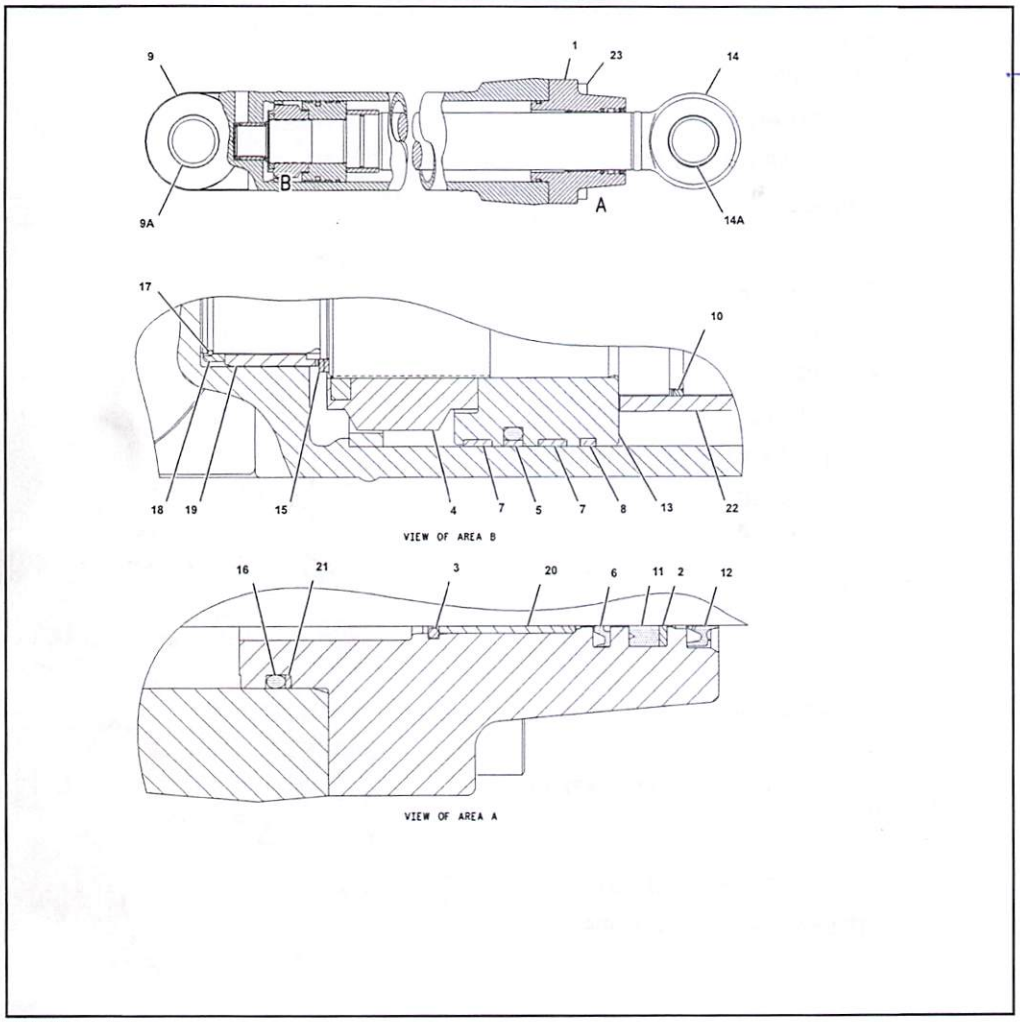
Previous Screen

Welcome: galena

Product: EXCAVATOR
Model: 325C EXCAVATOR BFE01208
Configuration: 325C L Excavator BFE00001-UP (MACHINE) POWERED BY 3126B Engine
Change Customer Info: Cust No: 0023439, Store: FINNING INTERNATIONAL INC.

* Bucket Pin 378-069-546 (320131751) *
1W6248
80 mm = 3.142" ~~2 1/2~~ 3" OAL
grease nipple
2 Bolts.
½ plate 5½ OD
½ plate 5½ OD

179 9785
Changes upto
225-4575



GRAPHIC #1
g00774052

325C L Excavator, Powered By 3126B Engine
Media Number - SEBP3353-48 | Publication Date - 01/08/2018 | Date Updated - 23/08/2018

i03735261

***179-9785* CYLINDER GP-STICK**
S/N BFE1-UP
150-MM (5.9-IN) BORE X 1646-MM (64.8-IN) STROKE
PART OF 179-9784 CYLINDER & SEAL GP-STICK
AN ATTACHMENT

ENTIRE GROUP

Ref.	Qty.	Note	Part No.	Part Name
Grp	(N/A)		*179-9785*	CYLINDER GP-STICK

INDIVIDUAL PARTS

Ref.	Qty.	Note	Part No.	Req. Qty.	Part Name
1			7Y-4660	1	HEAD
2		J	7Y-4669	1	RING-BACKUP
3			7Y-4672	1	RING-RETAINING
4		M	7Y-4695	1	LOCKNUT (M80X2-THD)
5		J	9X-3601	1	SEAL AS
6		J	128-9265	1	SEAL-BUFFER
7		J	188-4217	2	RING
8		J	188-4218	1	RING
9			194-8315	1	CYLINDER AS
9A		YM	235-7770	1	BUSHING
YM			528-7158	1	BEARING-SLV-YM
10		J	5I-8516	1	RING-SEAL
11		J	170-9864	1	SEAL-U-CUP
12		J	165-9290	1	SEAL-LIP TYPE
13			188-4216	1	PISTON
14			194-8321	1	ROD AS
14A			236-6273	1	BUSHING
15			095-0929	2	RING-RETAINING (EXTERNAL)
16		J	095-1633	1	SEAL-O-RING
17			103-8378	1	RING-RETAINING
18			103-8379	1	RING
19			103-8380	1	STOP
20			114-0760	1	BUSHING
21		J	7Y-4673	1	RING-BACKUP
22			7Y-4918	1	STOP
23		M	7Y-5215	8	BOLT-SOCKET HEAD (M24X3X90-MM)
					AVAILABLE REPAIR KIT(S):
		J	191-5619	1	KIT-SEAL (STICK CYLINDER)

Key:

YM - Yellowmark™ Part Available
J - KIT MARKED J INCLUDES PART(S) MARKED J
M - METRIC PART

Oversized Equipment Parts Ltd.

2463 Townline Rd.
Abbotsford
British Columbia, V2T 6L6
Canada

Invoice

Date	Invoice #
10/25/2018	**3331**

Invoice To

Galena Contractors Ltd.
PO Box 70
100 Mill Road
Nakusp, BC, V0G 1R0
Kevin Carter

Ship To

Galena Contractors Ltd.
100 Mill Road
Nakusp BC V0G 1R0

Phone #	(604) 855-9977	Fax #	(604) 855-9976	E-mail	sales@oversizedequipment.com

P.O. No.	Terms	Due Date	Rep	Ship Date	Ship Via	EX Works
621-06	Due on receipt	10/25/2018	BG	10/25/2018	Call	

Description	Qty	Price Each	U/M	Amount
Sale of Parts, sale of Cat 325C front end off s/n# BFE1208	1	19,500.00	ea	19,500.00
Sale of Parts, boom assy, 1807812	1	0.00	ea	0.00
Sale of Parts, stick, 1879883 – 242 6573-179 5169	1	0.00	ea	0.00
Sale of Parts, rebuilt bucket cylinder, 1589021	1	0.00	ea	0.00
Sale of Parts, rebuilt boom cylinder, 1799781	1	0.00	ea	0.00
Sale of Parts, good used boom cylinder, 1799781	1	0.00	ea	0.00
Sale of Parts, used H link, 1865653	1	0.00	ea	0.00
Sale of Parts, two side links, 7Y2392 / 1865650	1	0.00	ea	0.00
Sale of Parts, cat hydraulic thumb c/w cylinder	1	0.00	ea	0.00
Sale of Parts, quick coupler, wedge style, FAS lugging	1	0.00	ea	0.00
Sale of Parts, 80% of pins required to mount everything, missing main boom pin and one bucket pin for sure.	1	0.00	ea	0.00
GST On Sales		5.00%		975.00

There is a no return policy on all "Electrical components", computers, controllers, monitors, switches, engine controllers, all of these items are tested prior to shipping and are guarranted to work.

All work is complete!

Subtotal	CAD 19,500.00

Oversized Equipment Parts Ltd. takes no responsibiltity for shipping of parts, time delays by shipping firms, damage nor loss by the same. Oversized Equipment Parts Ltd "Implied or expressed any form of warranty" on any item sold. Warranty consideration is only given on specific items and must have an additional statement written at the point of sale. Now if anyone has bothered to read anything on this sheet, I will gladly purchase them a beer, cause they deserve it.

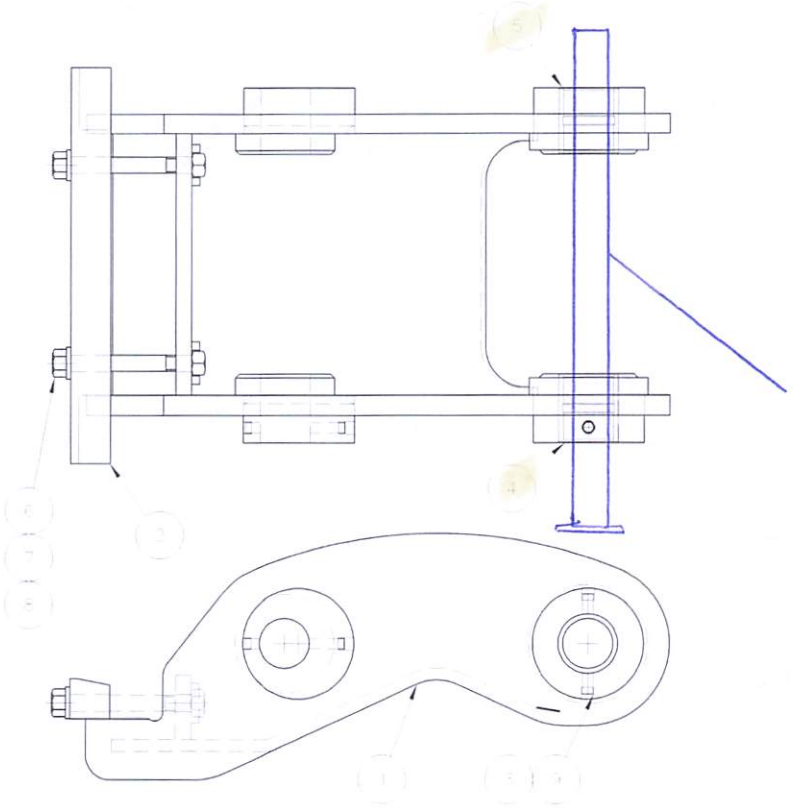
Total	**CAD 20,475.00**
Balance Due	CAD 20,475.00

GST/HST No. 852915727

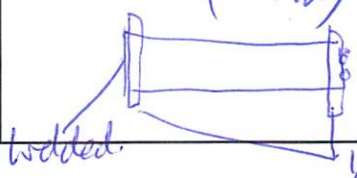
Ex-131

WBM

QUICK COUPLER
250-2, WFI, WMAN, FAB QC
CAT 325/B/C
130-571-380



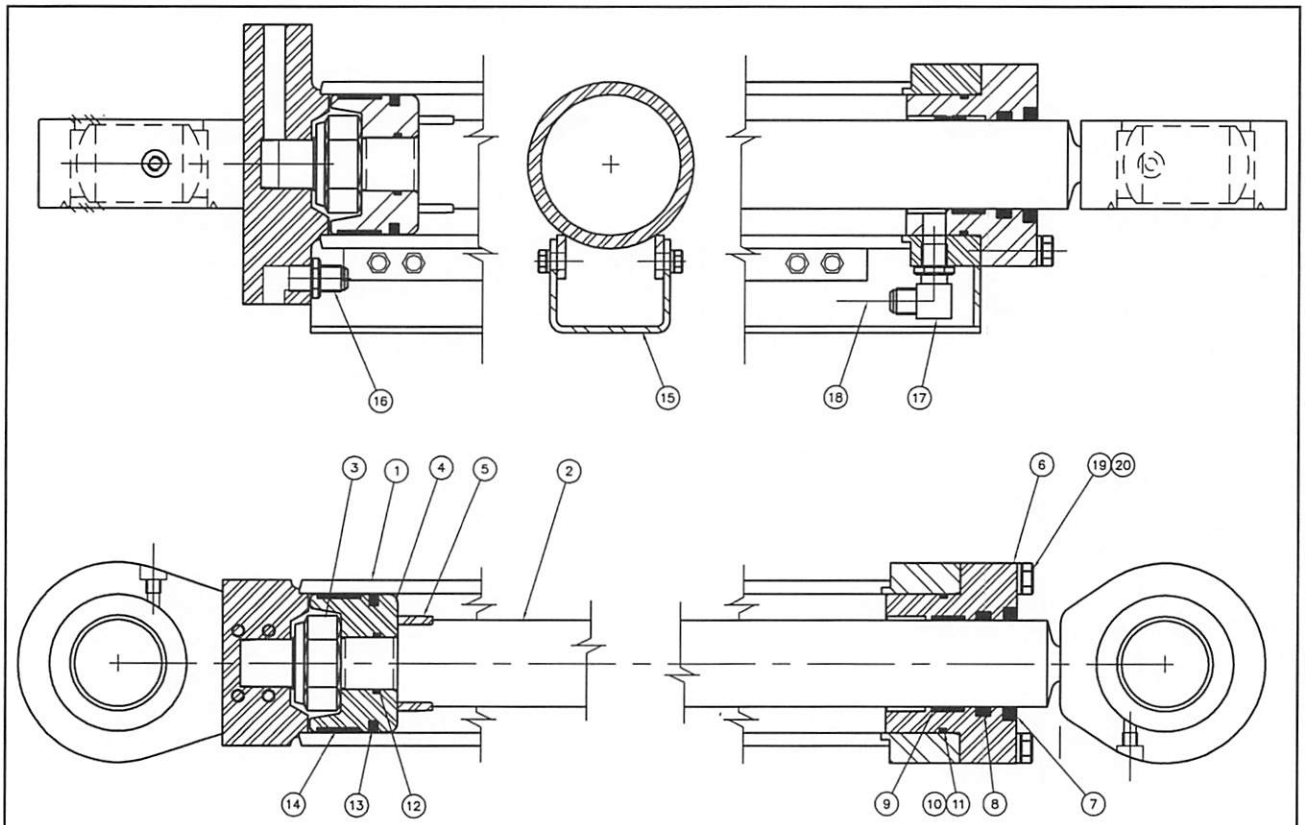
ITEM	PART NUMBER	DESCRIPTION	QTY
1	313-100-036	Frame Weldment	1
2	723-005-044	Wedge Bar, 2.50 x 2.50 x 25.00	1
3	717-091-018	Dowel Pin, -625"Ø x 5.375	2
4	713-022-202	Bushing, 3.152 x 3.753 x 4.125 w/ hole	1
5	713-022-201	Bushing, 3.152 x 3.753 X 4.125	1
6	545-059-325	1-8 UNC HHCS x 8-1/2" lg. Gr-8	2
7	530-069-002	1-8 UNC Sq. Nut Gr-8	2
8	545-074-002	1"Ø Hardened Washer Gr-8	2
9	545-064-053	.750 UNC Hollow Lock Set Screw x .375" lg.	4
		OPTIONAL ITEMS:	
~~10~~	~~530-093-041~~	~~Pin, 80mm x 593mm (7Y2357)~~ x1	~~2~~
1-	378-004-546	THUMB PIN (320131751) 80mm PIN Ø=3.142" 29½" LONG	



MAY 28/21

WBM

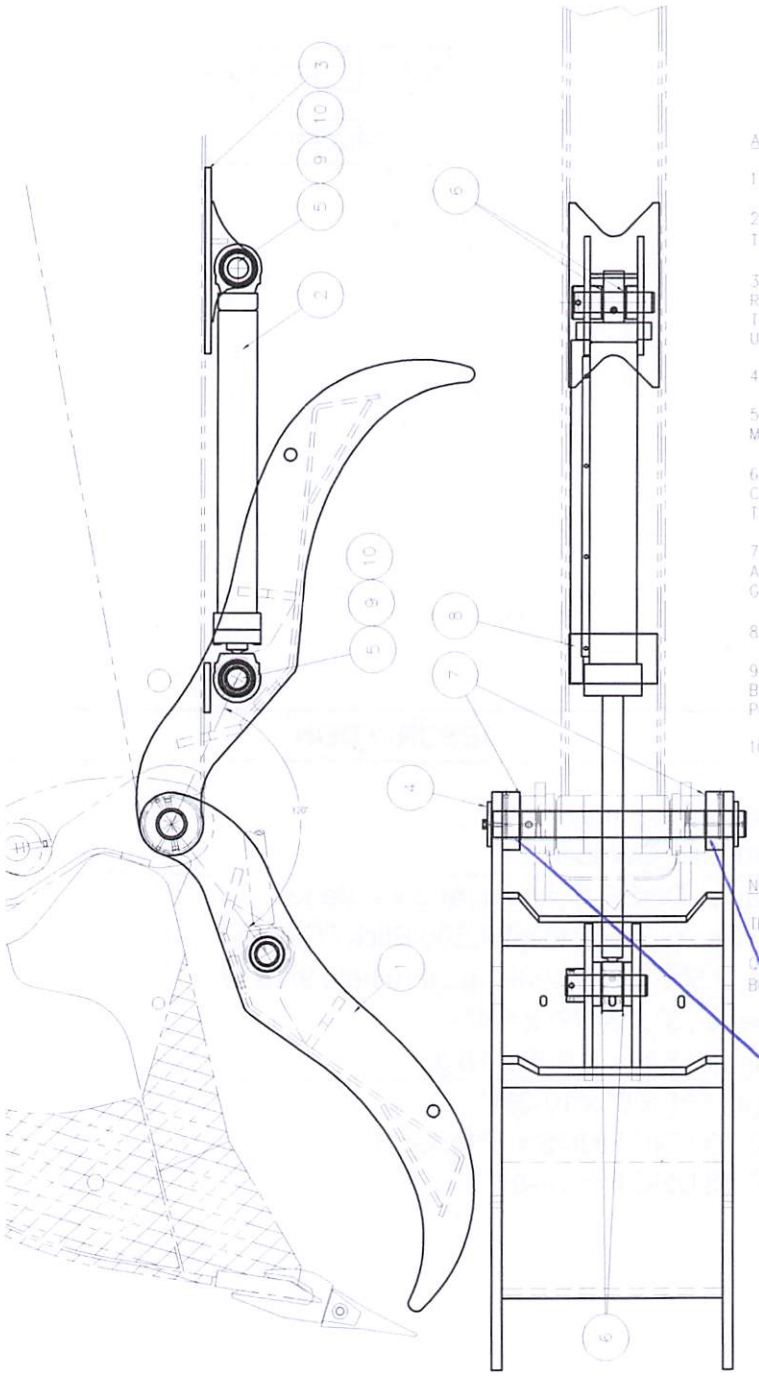
HYDRAULIC CYLINDER
4"Ø Bore x 2-1/2"Ø Rod x 34" Stroke
317-002-325



ITEM	PART NUMBER	DESCRIPTION	QTY
1	317-201-012	Barrel Assembly (includes item a)	1
a	*519-077-003*	*Spherical Bearing (25SF40)*	*1*
2	317-100-213	Rod Assembly (includes item b)	1
b	*519-077-003*	*Spherical Bearing (25SF40)*	*1*
3	530-029-004	1½-12 UNF Grip Nut	1
4	719-501-082	Piston	1
5	719-911-005	Cylinder Rod Cushion	1
6	719-400-070	Head	1
7	530-025-013	Rod Wiper (1K6982)	1
8	530-024-006	Rod Seal (5J0964)	1
9	530-023-026	Wear Ring (8J0112)	2
10	535-030-240	O-Ring #240	2
11	535-040-026	Back-Up Ring #240	2
12	535-030-222	O-Ring #222	1
13	530-024-008	Piston Seal (5J5402)	1
14	530-023-001	Wear Ring (1M1571)	1
15	317-300-050	Cylinder Guard Assembly (includes items c-d)	1
c	*545-059-003*	*3/8-16 UNC HHCS x 3/4" lg. Gr 8*	*8*
d	*545-073-003*	*3/8"Ø Lockwasher Gr 8*	*8*
16	551-093-013	Adapter 0° - #8 ORB - #-8 JICM	1
17	551-097-001	Adapter 90° - #8-ORB - #8-JICM	1
18	361-009-143	Hose Assembly - #8-100R12 - (2)#8-JICF Swivel x 37" OA	1
19	545-059-030	1/2-13 UNC HHCS x 2-3/4" lg. Gr 8	6
20	545-073-005	1/2"Ø Lockwasher Gr 8	6
	132-970-108	Seal Kit (Includes items 7-14)	Ref

WBM

Bucket Clamp, No Link
42-44" Bucket, WFI
CAT 322C / 325C
123-523-371



ASSEMBLY:

1. ASSEMBLE THE CLAMP, CYLINDER AND CYLINDER ANCHOR.
2. INSTALL THE BUCKET CLAMP, BUCKET AND QUICK COUPLER TO THE STICK USING STICK/CLAMP PIN.
3. FASTEN A 1" FLAT BAR TO THE CYLINDER HEAD. FULLY RETRACT THE CYLINDER AND ROTATE THE CLAMP ASSEMBLY UNTIL THE CYLINDER ANCHOR AND FLAT BAR ARE RESTING ON THE UNDERSIDE OF THE STICK.
4. TACK WELD THE CYLINDER ANCHOR TO THE STICK.
5. EXTEND THE CYLINDER FULLY, ENSURING CLEARNACES ARE MET BETWEEN THE CYLINDER AND CLAMP.
6. FULLY RETRACT THE CYLINDER, THEN EXTEND 1/4". FIT THE CLAMP STOP BETWEEN THE STICK AND THE CLAMP. TACK WELD THE STOP IN PLACE.
7. RE-CHECK ALL CLEARANCES. WELD THE CYLINDER ANCHOR AND CLAMP STOP TO THE STICK. RUN OUT WELD ENDS AND GRIND SMOOTH.
8. WELD STICK/CLAMP PIN END CAP IN PLACE.
9. MAXIMUM OPERATING PRESSURE SHOULD BE 2,500 PSI. THE BUCKET MUST BE ABLE TO OVERPOWER THE CLAMP IN ANY POSITION.
10. PROTECT THE CYLINDER WITH EITHER:
    A) A CROSS OVER RELIEF VALVE WITH MAKE-UP, OR
    B) PORT RELIEFS WITH ANTI-CAVITATION CHECKS.

NOTE:

THIS BUCKET CLAMP IS DESIGNED TO BE COMPATIBLE WITH:

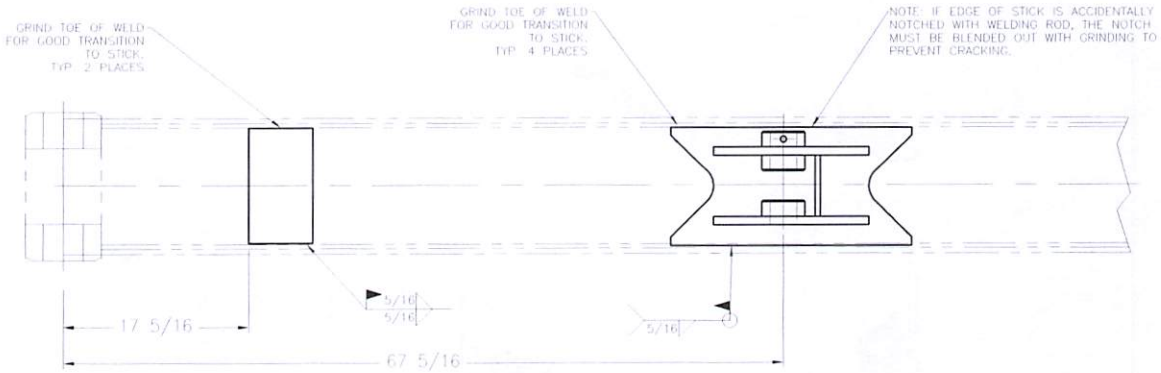
QUICK COUPLER: 250-2, WFI, WMAN, NPIN, C-FAM 130-571-380
BOLT: XSB, 42IN, 1-1/4YD, WFI, CWTS 117-533-070

2- 3-3/8 THK 80mm ID. VTP.
3.75" OD BUSHINGS
CUSTOM TO FIT
CUSTOM THUMB PIN
BORES
MAY 28/21

Ex-131

WBM

Bucket Clamp, No Link
42-44" Bucket, WFI
CAT 322C / 325C
123-523-371



WELD PROCEDURES*:

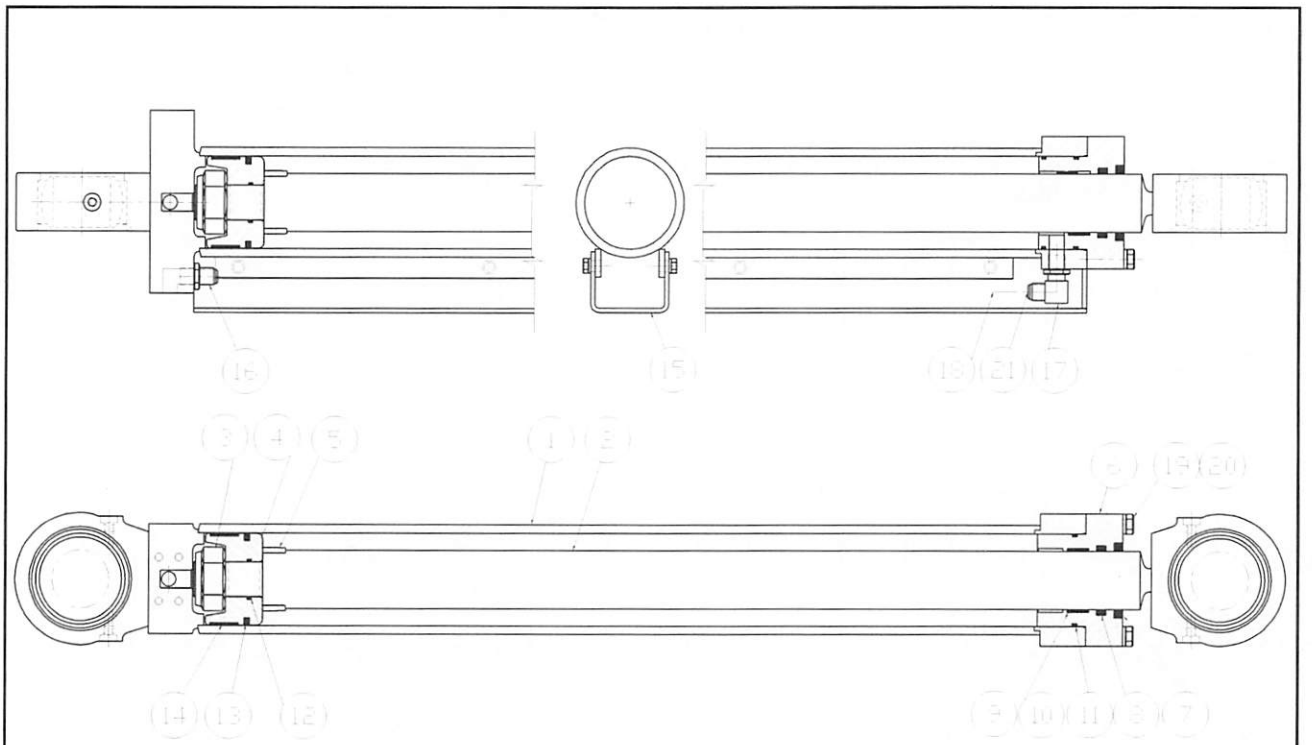
WELD THE CYLINDER ANCHOR TO THE UNDERSIDE OF THE STICK USING 5/16" FILLET WELDS. FIT THE CLAMP STOP AS SHOWN USING 5/16" FILLET WELDS. USE E7018 ELECTRODES (OR EQUIVALENT). USE WELD RUN-OUTS AND GRIND SMOOTH

*SUGGESTED WELD PROCEDURES ONLY. WARRANTY OF STICK IS NOT COVERED BY WELDCO-BEALES MFG. LTD. DUE TO INSTALLATION OF BUCKET CLAMP. IF FURTHER INFORMATION ON WELD SPECIFICATIONS AND WARRANTIES ARE REQUIRED, CONTACT THE MACHINE MANUFACTURER.

ITEM	PART NUMBER	DESCRIPTION	QTY
1	294-102-107	Clamp Assembly	1
2	317-002-325	Hydraulic Cylinder	1
3	294-110-084	Clamp: DHSP, Cylinder, Anchor, Base	1
4	378-004-546	Pin Ass'y, 3.142"Ø x 29.500 Stick / Clamp	1
5	717-175-108	Pin, 2.500"Ø x 10.000" lg., thru hole 9/16"Ø	2
6	700-010-165	Spacer, 3" x 2-1/2" x 1/4"	4
7	545-069-065	Shim, 6.500 x 3.625 x 16 ga.	6
8		Stop, 3/4" x 6" x 10-3/4"	1
9	545-059-036	1/2-13 UNC HHCS x 5" lg. Gr-8	2
10	545-023-003	1/2-13 UNC Nut Gr-8	2

WBM

HYDRAULIC CYLINDER
4"Ø Bore x 2-1/2"Ø Rod x 34" Stroke
317-002-325



ITEM	PART NUMBER	DESCRIPTION	QTY
1	317-201-012	Barrel Assembly (includes item a)	1
a	*519-077-003*	*Spherical Bearing (25SF40)*	*1*
2	317-100-213	Rod Assembly (includes item b)	1
b	*519-077-003*	*Spherical Bearing (25SF40)*	*1*
3	530-029-004	1½-12 UNF Grip Nut	1
4	719-501-082	Piston	1
5	719-911-005	Cylinder Rod Cushion	1
6	719-400-070	Head	1
7	530-025-013	Rod Wiper (1K6982)	1
8	535-050-083	Rod Seal (BD25002500N375/4300)	1
9	530-023-026	Wear Ring (8J0112)	2
10	535-030-240	O-Ring #240	2
11	535-040-026	Back-Up Ring #240	2
12	535-030-222	O-Ring #222	1
13	530-024-008	Piston Seal (5J5402)	1
14	530-023-001	Wear Ring (1M1571)	1
15	317-300-082	Cylinder Guard Assembly (includes items c-d)	1
c	*545-059-003*	*3/8-16 UNC HHCS x 3/4" lg. Gr 8*	*8*
d	*545-074-008*	*3/8"Ø Lockwasher Gr 8*	*8*
16	551-093-013	Adapter 0° - #8 ORB - #-8 JICM	1
17	551-097-001	Adapter 90° - #8-ORB - #8-JICM	1
18	558-027-151	Hose Assembly - #8-100R12 - (2)#8-JICF Swivel x 37" OA	1
19	545-059-030	1/2-13 UNC HHCS x 2-3/4" lg. Gr 8	6
20	545-074-004	1/2"Ø Lockwasher Gr 8	6
	563-041-002	Grease Zerk 1/8 NPT x 0°	4
	132-970-108	Seal Kit (Includes items 7-14)	Ref

WBM

BUCKET CLAMP, NO LINK
42" TO 44" Bucket, WFI
CAT 322C / 325C
123-523-413

ASSEMBLY:

1. ASSEMBLE THE CLAMP, CYLINDER AND CYLINDER ANCHOR.

2. INSTALL THE BUCKET CLAMP, AND QUICK COUPLER TO THE STICK USING STICK/CLAMP PIN.

3. FIT THE CLAMP STOP BETWEEN THE STICK AND CLAMP. TACK WELD THE STOP IN PLACE.

4. FULLY RETRACT THE CYLINDER, THEN EXTEND 1/4". TACK WELD THE CYLINDER ANCHOR TO THE STICK.

5. EXTEND THE CYLINDER FULLY, ENSURING CLEARANCES ARE MET BETWEEN THE CYLINDER AND CLAMP.

6. RE-CHECK ALL CLEARANCES. WELD THE CYLINDER ANCHOR AND CLAMP STOP TO THE STICK. RUN OUT WELD ENDS AND GRIND SMOOTH.

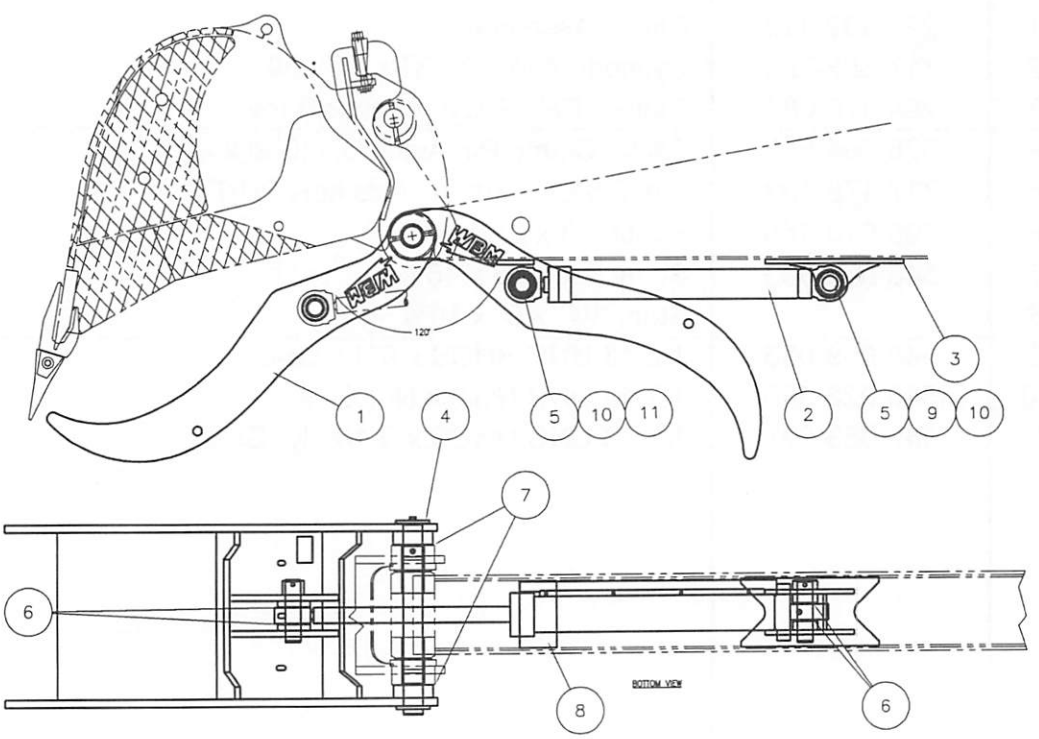
7. WELD STICK/CLAMP PIN END CAP IN PLACE.

8. MAXIMUM OPERATING PRESSURE SHOULD BE 2,500 PSI. THE BUCKET MUST BE ABLE TO OVERPOWER THE CLAMP IN ANY POSITION.

9. PROTECT THE CYLINDER WITH EITHER:
   A) A CROSS OVER RELIEF VALVE WITH MAKE-UP, OR
   B) PORT RELIEFS WITH ANTI-CAVITATION CHECKS.

THIS BUCKET CLAMP IS DESIGNED TO BE COMPATIBLE WITH:

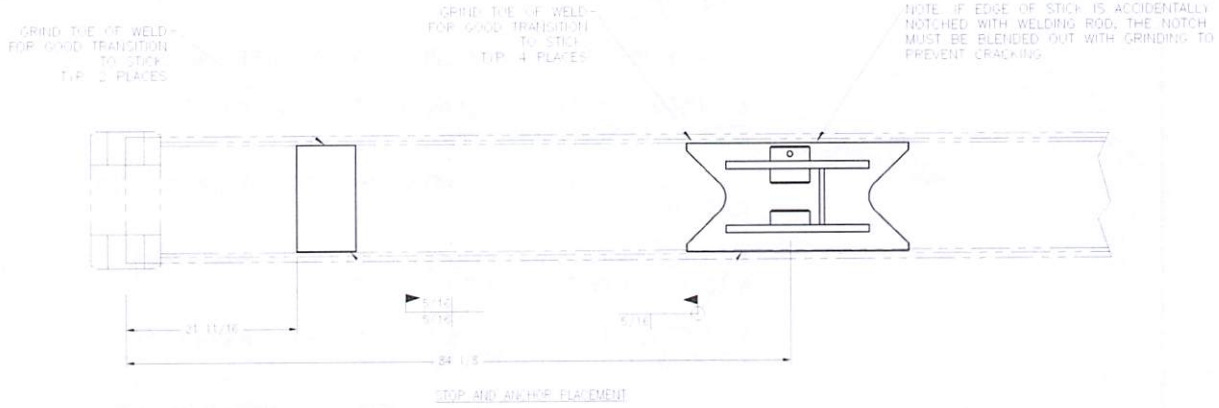
QUICK COUPLER: 250-2, WFI, WMAN, NPIN, C-FAM 130-571-380
BCKT: XSB, 42IN, 1-1/4YD, WFI, CWTS 117-533-070



Ex-131

WBM

BUCKET CLAMP, NO LINK
42" TO 44" Bucket, WFI
CAT 322C / 325C
123-523-413



WELD PROCEDURES*:

WELD THE CYLINDER ANCHOR TO THE UNDERSIDE OF THE STICK USING 5/16" FILLET WELDS. FIT THE CLAMP STOP AS SHOWN USING 5/16" FILLET WELDS. USE E7018 ELECTRODES (OR EQUIVALENT). USE WELD RUN-OUTS AND GRIND SMOOTH

*SUGGESTED WELD PROCEDURES ONLY. WARRANTY OF STICK IS NOT COVERED BY WELDCO-BEALES MFG. LTD. DUE TO INSTALLATION OF BUCKET CLAMP. IF FURTHER INFORMATION ON WELD SPECIFICATIONS AND WARRANTIES ARE REQUIRED, CONTACT THE MACHINE MANUFACTURER.

ITEM	PART NUMBER	DESCRIPTION	QTY
1	294-102-129	Clamp Assembly	1
2	317-002-325	Cylinder, 4"Ø x 2½"Ø x 34 x 50	1
3	294-110-084	Clamp, DHSP, Cyl. Anchor Base	1
4	378-004-546	Stick / Clamp Pin Ass'y, 3.142"Ø x 29.5" lg.	1
5	717-175-108	Pin, 2.5"Ø x 10" lg., thru hole 9/16"Ø	2
6	700-010-165	Spacer, 3 x 2½ x 1/4	4
7	545-069-063	Shim, 6 x 3.25 x 16 ga.	6
8		Stop, 3/4" x 6" x 10¾" lg.	1
9	545-059-036	1/2-13 UNC HHCS x 5" lg. Gr-8	1
10	545-023-003	1/2-13 UNC Nylock Nut Gr-8	2
11	545-059-037	1/2-13 UNC HHCS x 5-1/2" lg. Gr-8	1

FAN REBUILD OVERVIEW

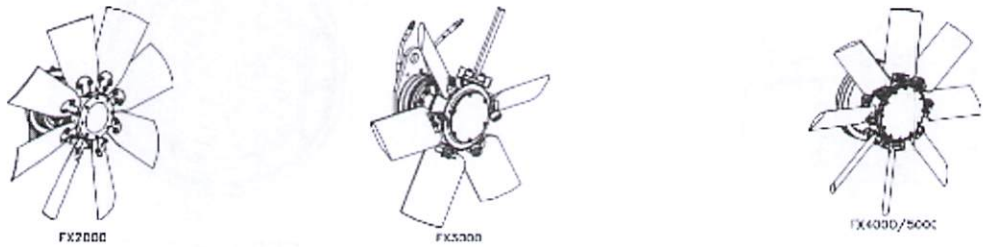
The following procedures assist in dismantling and assembling of the Flexxaire FX fan design from different applications. The FX 3000 design is represented throughout this manual, however, the information is relevant to all FX designs. Figures are provided for any differences as they occur.

This manual is considered complete in all detail to the best of Flexxaire Manufacturing Inc.'s knowledge. Flexxaire Manufacturing Inc. reserves the right to make changes to this manual as it deems necessary with or without prior consent. The information contained in this manual is the property of Flexxaire Manufacturing Inc.

Read these instructions thoroughly. If there are any questions regarding this manual or any other concerns: please contact Flexxaire® at phone number: 780.483.3267 and/or Fax: 780.483.5499.

FAN IDENTIFICATION

Below are reference illustrations for the FX2000, FX3000 and FX4000/5000.



SECTION VIEW OF FAN SYSTEM

The following is a cross sectional view of the Flexxaire FX Fan System. This diagram is for reference throughout this manual to assist in the disassembly and assembly of the fan.

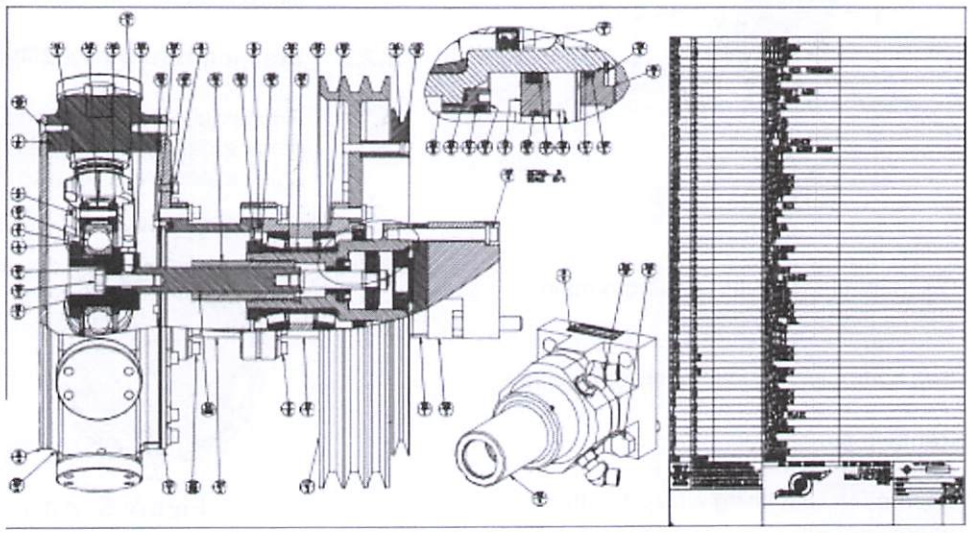


Figure 4 - Cross Section View of FX Fan (95822)

1.1 FAN DISASSEMBLY

1.1.1 Fan Removal

A. Gain access to engine compartment.

B. Remove guards and other safety equipment from around the fan assembly.

C. Loosen fan belts.

D. Remove fan blade fasteners (**Figure 2** and **Figure 3**,Item 2) and blades (Item 3) from fan assembly (Item 1).

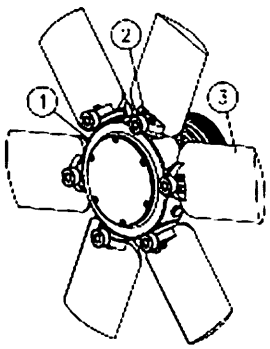


Figure 2 (95426)

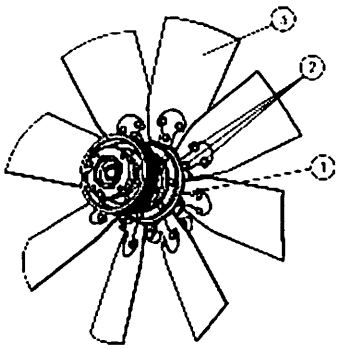


Figure 3 (95823)

E. Disconnect hydraulic lines from main shaft's hydraulic fittings.

F. Cap hydraulic line fittings on application.

G. Remove fan belts.

H. Secure fan with lifting straps to aid in removal of fan.

I. Attach hoisting device to remove fan from machine.

NOTE: Use proper hoist to avoid personnel injury and possibility of damaging equipment.

J. Lift fan group from engine compartment and place into a suitable work area.

1.2 Fan Disassembly

1.2.1 Draining Hub Oil FX 3000-5000 Series

A. Rotate hub until "FILL" and DRAIN" plugs are positioned in the 6:00 and 12:00 respectively, refer to **Figure 4**.

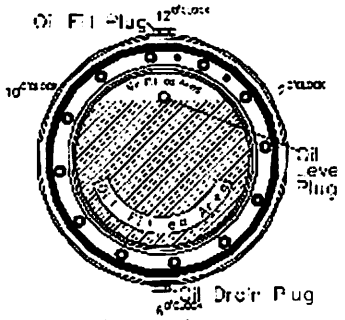


Figure 4 (95337)

B. Remove "DRAIN" plug. Rotate hub clockwise till the "Drain Plug" is at the 6:00 position and capture oil in suitable container until empty. Removal of the "fill" plug may allow oil to drain faster.

C. Flip fan onto hub face to drain remaining oil from behind oil retaining ring.

1.2.2 Draining Hub Oil FX 2000 Series

A. Rotate hub until "FILL" and DRAIN" plugs are positioned in the 12:00 and 2:00 respectively, refer to **Figure 5**.

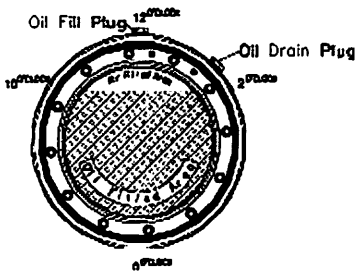


Figure 5 (95824)

B. Remove "FILL" and "DRAIN" plugs. Turn hub slowly clockwise to allow oil to drain with proper air space. Capture oil in suitable container until empty.

1.2.3 Pressure Test

A. Attach an air pressure gauge and an air chuck into the ports from which the oil plugs were removed.

B. Pressurize hub with air to 25 psi +/- 5 psi and wait for ten minutes.

NOTE: Expect an immediate decline in air pressure of 1 to 3 PSI.

C. If a leak is detected, soap test all sealing surfaces, hub inserts, inside and outside diameters of rear seal, and mating surfaces between flanges and spool to determine area of leak.

D. Rotate blade mounting shafts to ensure that there are no leaks along the internal through shaft as it moves through its range of motion past the internal o-ring.

E. Record all possible problem areas for rebuilding purposes.

F. Release air pressure and remove air pressure gauge and an air chuck from the oil plug holes.

G. Install "FILL and "DRAIN" plugs loosely into hub.

H. Attach a manual hydraulic shut off valve and hydraulic pressure gauge between the machine hydraulic source and the fan. This must be done on both lines. Ensure that the shut off valve is in between the machine hydraulic source and pressure gauge.

I. Pressurize the main shaft with hydraulic fluid machine operating pressure and close the first shut off valve. Repeat this on the second line as well. Wait for ten minutes.

NOTE: Expect an immediate decline in hydraulic pressure if there is a leak.

J. If no leaks are detected after ten minutes release hydraulic pressure and remove manual hydraulic shut off valve and hydraulic pressure gauge from both lines.

K. If leaks are detected record all possible areas for rebuilding purposes.

1.2.4 Hub Removal

A. Position fan group's mounting bracket into a vise on a work bench as shown in **Figure 6** to gain access through the hub's cover plate.

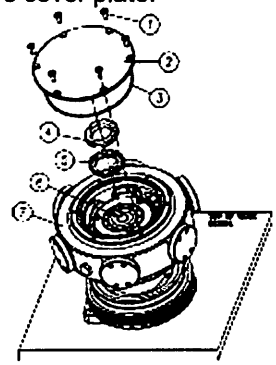


Figure 6 (95410)

B. Hit the flat end of a ball-peen a hammer squarely on the head of the fastener (Item 1) and cover plate (Item 2) to loosen.

C. Remove fasteners (Item 1) with a ratchet. If not loose, repeat step B.

D. Remove cover plate (Item 2) and o-ring (Item 3) from hub ass'y. (Item 7).

E. Bend wing of lockwasher (Item 5) away from locknut (Item 4).

F. Remove locknut (Item 4) and lockwasher (Item 5) from thru bearing end (Item 6).

G. Remove fasteners (**Figure 7**, Item 10) that hold hub assembly (Item 7) onto flange (Item 9).

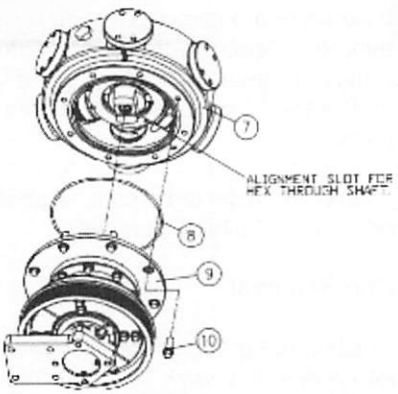


Figure 7 (95411)

H. Remove hub assembly (Item 7) and o-ring (Item 8) from flange (Item 9).

1.2.5 Shifter Block Disassembly

A. Remove fasteners (**Figure 8**, Item 1) from thru hole (Item 2) and threaded shifter block (Item 7).

NOTE: The shifter block is separated by spacers (Item 6). Be careful not to lose spacers.

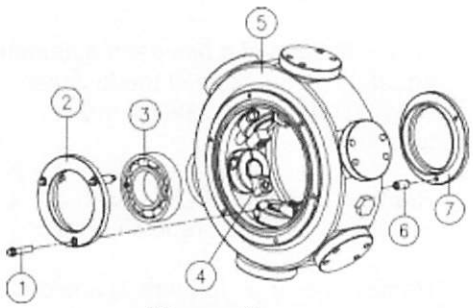


Figure 8 (95412)

B. Remove shifter block, bearing (Item 3)and spacers (Item 6)from hub assembly (Item 5).

C. Remove pivot blocks (Item 4) from hub assembly.

1.2.6 Main Bearing Removal

A. Remove fastener (**Figure 9**, Item 1) and washer (Item 2) from thru bearing end (Item 3).

B. Remove thru bearing end (Item 3) from hex shaft (Item 6).

C. Remove oil dam (**Figure 9**, Item 5). (This is not applicable to the FX 2000 or FX6000 design.)

Note: If the fan has a spool, remove the spool and the oil dam together. Refer to Figure 1 to determine if the fan has a spool.

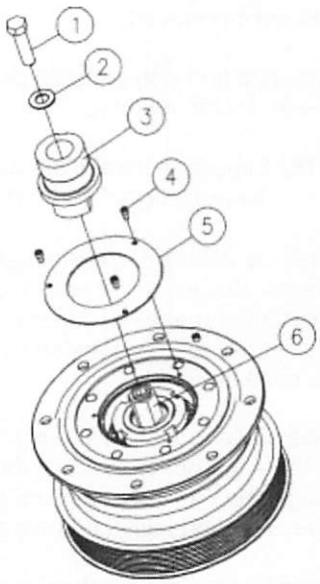


Figure 9 (95544)

D. Remove fasteners (**Figure 10**, Item 5) from bearing carrier (Item 6) if necessary.

E. Remove o-ring (Item 7) and flange (Item 8) from bearing carrier (Item 6) if necessary.

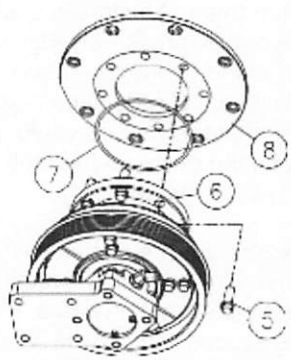


Figure 10 (95542)

F. Bend wing of lockwasher (**Figure 11**, Item 10) away from locknut (Item 9).

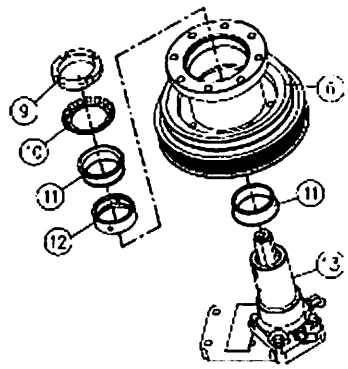


Figure 11 (95413)

G. Remove locknut (Item 9) and lockwasher (Item 10) from main shaft assembly (Item 14).

H. Remove bearing carrier (Item 6) bearing sets (Items 11), bearing spacer (Item 12) and shims (not shown) from the main shaft assembly (Item 14).

I. Remove pulley (if necessary) from bearing carrier.

J. Remove fasteners (**Figure 12**, Item 15) from main shaft assembly (Item 14) onto the fan mounting bracket (Item 16).

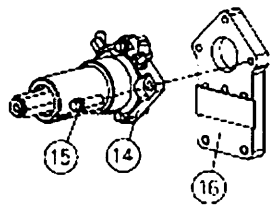


Figure 12 (95413)

1.2.7 Main shaft Disassembly

A. Remove rear snap ring (**Figure 13**, Item 3) from main shaft assembly (Item 1).

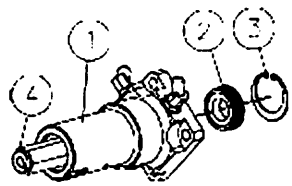


Figure 13 (95415)

B. Remove end cap (Item 2) from main shaft (Item 1).

NOTE: For easy removal of end cap, use air pressure on the hydraulic port (if no air source is available), cup one hand over the end cap and with other hand push the hex thru shafts (**Figure 13**, Items 4) into the main shaft to forcing the end cap out the rear of the main shaft.

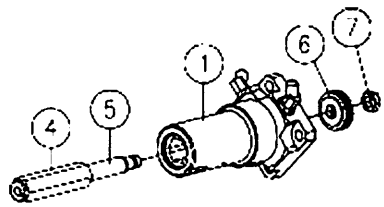


Figure 14 (95416)

WARNING: Do not use excessive force on the hex thru/rod shafts in removing the end cap because the hex thru shaft **will not** pass through the seal retainer (**Figure 15**, Item 11).

C. Remove nut (**Figure 14**, Item 7) from threaded end of rod shaft (Item 5).

D. Remove piston (Item 6) from the main shaft (Item 1).

NOTE: For easy removal of piston, use air pressure on the hydraulic port (if no air source is available), cup one hand over the end cap and with other hand push the hex thru/rod shafts (**Figure 14**, Items 4 & 5) into the main shaft to forcing the end cap out the rear of the main shaft.

WARNING: Do not use excessive force on the hex thru/rod shafts in removing the piston because the hex thru shaft **will not** pass through the seal retainer (**Figure 15**, Item 11).

E. Remove hex thru/rod shafts (**Figure 14**, Items 4 & 5) through the front of the main shaft (Item 1).

F. Remove seal retainer (**Figure 15**, Item 11) using Flexxaire® tool **P/N 00505** or Snap-On® **P/N S6183**.

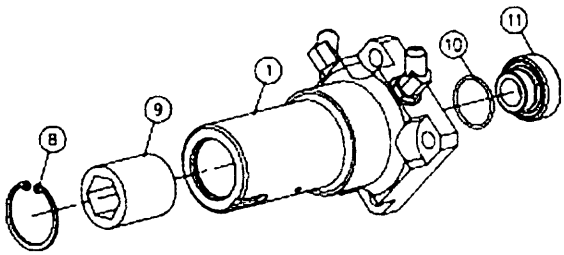


Figure 15 (95417)

G. Remove all seals and o-rings (Item 10) carefully not to damaged the seal bores.

H. Remove hydraulic fittings (if necessary); but note the orientation of the fittings before removing them.

NOTE: Make note of hydraulic fittings orientation prior to removing them from the main shaft.

I. With the fan disassembled, check fan parts thoroughly for damage and/or worn parts. Using a parts book make a list of parts required and contact your local dealer or Flexxaire® Manufacturing at phone number: 780.483-3267 or Fax number: 780.483.5499

2.1 FAN ASSEMBLY

2.1.1 Preliminary Fan Assembly

A. Clean all surfaces and threads prior to assembling.

B. Make sure all parts are present for assembling.

C. To ease assembly, lubricate all seals and o-rings as you assemble the fan.

2.2 Fan Assembly Procedure

IMPORTANT: DO NOT PUT LOCTITE ® OR EQUIVALENT ON ANY FASTENERS GOING INTO ALUMINUM PARTS, UNLESS OTHERWISE STATED.

2.2.1 Hydraulic Main shaft Assembly

Figure 16 represents a completely assembled cross sectional view of a hydraulic main shaft for reference.

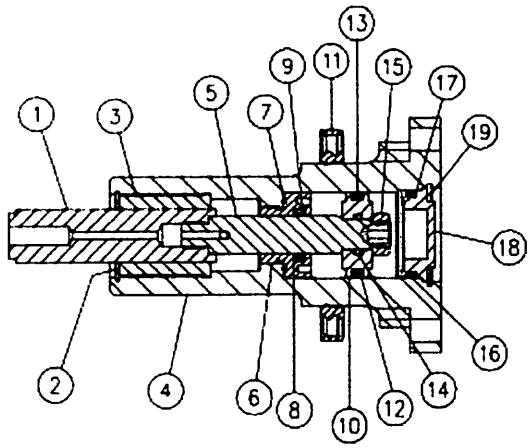


Figure 16 (95418)

1. Hex Thru Shaft
2. Bushing Snap Ring
3. Hex Bushing
4. Main shaft
5. Rod Shaft
6. Seal Retainer
7. O-ring
8. Internal T-seal
9. Back-up Rings
10. Piston
11. Seal
12. Back-up Rings
13. External T-seal
14. O-ring
15. Hex Nut
16. O-ring
17. Back-up Ring
18. End Cap
19. Snap Ring

A. Position main shaft horizontal in a vise.

NOTE: If a main shaft extension is used, apply a few drops of 262 Loctite® or equivalent onto the leading edge threads of the main shaft extension. Thread and torque to **25 ft/lbs**.

B. Clean the inside of main shaft and seal retainer of all possible debris with Brakekleen® or equivalent

C. Place internal T-seal (**Figure 17**, Item 8) into the seal retainer (Item 6).

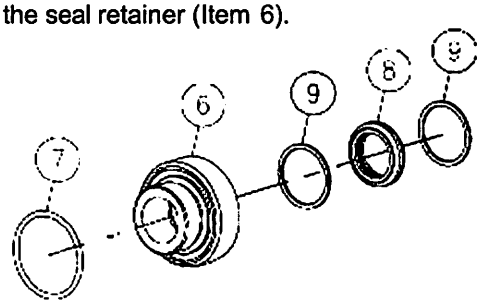


Figure 17 (95666)

D. Insert both back-up rings (Item 9) on either side of the internal T-seal (Item 8).

IMPORTANT: Make sure the ends of T-seal back-ups rings are enclosed on each other properly, see **Figure 18** for correct end positioning for T-seal back-up rings.

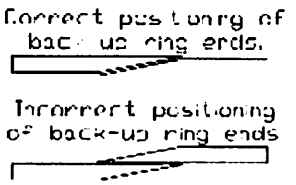


Figure 18 (95587)

E. Apply a small amount of grease to hold o-ring in place and place o-ring (**Figure 17**, Item 7) into groove of the seal retainer's (Item 6).

F. Apply a thin coating of oil onto the internal T-seal of the seal internal.

G. Thread seal retainer (Item 6) into the rear of the hydraulic main shaft (Item 4).

NOTE: Do not apply Loctite® or equivalent to the threads of the seal retainer.

H. Torque seal retainer (Item 6) to **25 ft/lbs** with Flexxaire® tool **P/N 00505** or Snap-On ® tool **P/N 56183**.

I. Slide rod shaft (Item 5) through the seal retainer (Item 6), until the hex thru shaft end (Item 1) comes to rest against the seal retainer (Item 6). Repeat this step for the various sides of the hex thru shaft until a position is found that gives no resistance except seal resistance.

NOTE1: Use a finger, on the other side of main shaft, to help guide rod shaft pass seal retainer.

NOTE2: When sliding rod shaft past seal retainer (Item 6) be cautious not to damage the internal T-seal and/or back-up rings.

J. Place external T-seal (**Figure 19**, Item 13) onto piston (Item 10).

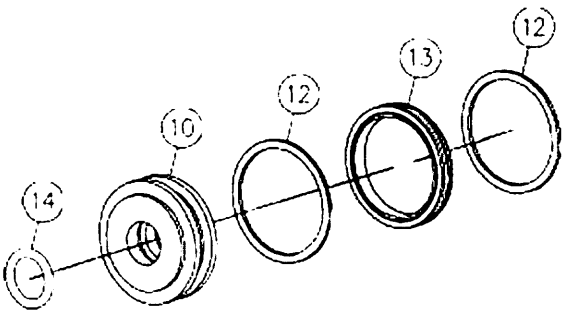


Figure 19 (95667)

K. Insert both back-up rings (Item 12) on either side of the external T-seal (Item 13).

NOTE: Make sure the ends of T-seal back-ups rings are enclosed on each other properly, see **Figure 18** for correct end positioning for T-seal back-up rings.

L. Place internal o-ring (tem 14) into piston groove (Item 10).

M. Apply a thin coating of oil onto external T-seal (Item 13) and o-ring (Item 14) of the piston (Item 10).

N. Push piston (**Figure 16**, Item 10) into the rear of the main shaft (Item 4) and onto the end of the rod shaft (Item 5) until the piston rests up against the shoulder of the rod shaft.

NOTE1: Some designs have a spacer between the seal retainer and piston that needs to installed.

NOTE2: Orientation of piston is critical before installation. 1 7/16" .. piston style has a chamfer on one side of the piston, this chamfer must face the rod shaft and 2" .. piston style has a step face on one side of the piston, this step face must face the end cap, as shown in **Figure 20**.

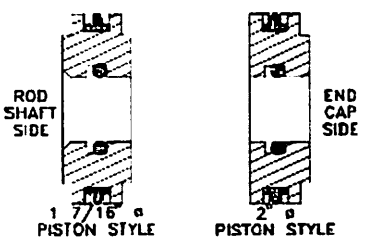


Figure 20 (95668)

NOTE3: Be cautious sliding piston (Item 10) into main shaft (Item 4) and onto rod shaft end (Item 5) not to damage the external T-seal (Item 13), back-up rings (Item 12) and o-ring (Item 14).

O. Apply 242 Loctite® or equivalent onto the threads of the hex nut (Item 15).

P. Thread hex nut (Item 15) onto the rod shaft (Item 5) and torque to **25 ft/lbs**.

NOTE: Slide shafts and piston in and out a couple of times to make sure the sliding resistance is stall negligible.

Q. Push piston (Item 10) until it comes to rest against the seal retainer (Item 6).

R. Install back-up ring (**Figure 21**, Item 17) onto the end cap (Item 18).

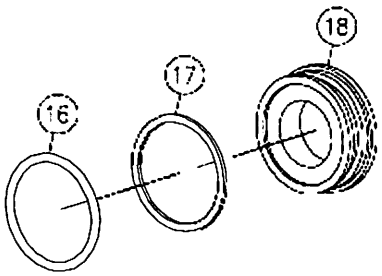


Figure 21 (95669)

S. Install o-ring (Item 16) onto the end cap (Item 18).

NOTE: Make sure the ends of T-seal back-up rings are enclosed on each other properly, see **Figure 18** for correct end positioning for back-up rings.

T. Lubricate the o-ring with a thin coating of oil.

U. Insert end cap (Item 18) into the end rear of the main shaft (Item 4).

V. Install rear snap ring (Item 19) into main shaft (Item 4) to secure end cap (Item 18). Be sure snap ring is properly seated in main shaft.

NOTE: The snap ring's square edge must be facing outwards and properly seated. If a main shaft extension is used in the assembly, install the snap ring into the main shaft extension.

W. Main shaft assembly is completed, now remove from vise.

2.2.2 Main shaft Mounting Onto Fan Mounting Bracket

A. Thread hydraulic connectors (**Figure 22**, Item 4) onto main shaft (Item 2) by hand to correct orientation if required.

NOTE: If orientation information is required contact Flexxaire® at 780.930.6832 for your specific fan model's "Installation Sheet".

B. Mount fan mounting bracket into a horizontal position onto a vertical mounting stand or vise, as shown in **Figure 22**.

C. Place main shaft (Item 2) onto fan mounting bracket (Item 1).

NOTE: Proper orientation of main shaft onto fan mounting bracket must be kept when assembling these parts together, so that fan assembly center line and engine mounting height are correct and hydraulic lines are connected correctly.

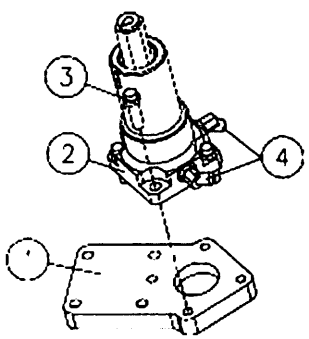


Figure 22 (95414)

D. Apply 242 Loctite® or equivalent onto the threads of the fastener (Item 3).

E. Install fastener (Item 3) into fan mounting bracket (Item 3) and torque to specification.

F. Secure hydraulic connectors (Item 4) to main shaft (Item 2), but do not over torque.

G. Install fan hydraulic hoses if required.

2.2.3 Main shaft Pressure Check

Pressure checking of the main shaft assembly will ensure that all seals are properly seated. If a pressure check is not done, several problems can arise such as leaking of hydraulic fluid or inadequate pressure to change blade pitch, etc.

A. Connect a hydraulic source (an air source can be used if a hydraulic source isn't available) with a manual hydraulic shut off valve and hydraulic pressure gauge between the pressure source and the fan. This must be done on both lines. Ensure that the shut off valve is in between the pressure source and the gauge.

B. Pressurize the main shaft with the same amount of pressure that the machine would produce and close the first shut off valve. Repeat this on the second line as well.

C. Leave pressure to main shaft for a minimum 15 minutes.

D. Check for leaks around the main shaft.

E. If no leaks are detected after ten minutes release hydraulic pressure and remove manual hydraulic shut off valve and hydraulic pressure gauge from both lines.

NOTE: If leaks are found during the main shaft pressure check procedure the main shaft must be disassemble and assemble again to rectify leaking problem(s).

2.2.4 Pre-Bearing Carrier Assembly

Leave hydraulic source connected to hydraulic fittings after doing a Main shaft Pressure Check to ease the assemble of main bearing assembly. During the Pre-Bearing Carrier Assembly the main shaft assembly must remain mounted in the vertical position, as shown in **Figure 23**, Item 2.

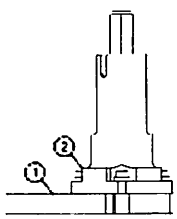


Figure 23
(95670)

A. Place internal fillet spacer (**Figure 24**, Item 3) onto main shaft (Item 2), if required.

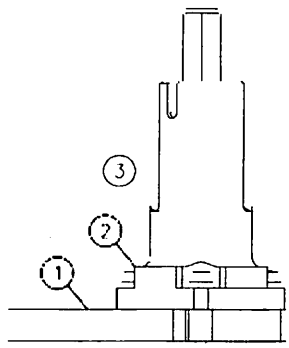


Figure 24 (95671)

NOTE: Not all assemblies require a internal fillet spacer. If required the beveled edge must match the radius edge of the main shaft as shown in **Figure 24**. Following **Figure 24**, internal fillet spacer will not be shown.

B. Push races (cups) (**Figure 25**, Item 5) into bearing carrier (Item 6)

C. Slide first bearing set (Item 4) onto main shaft (Item 2).

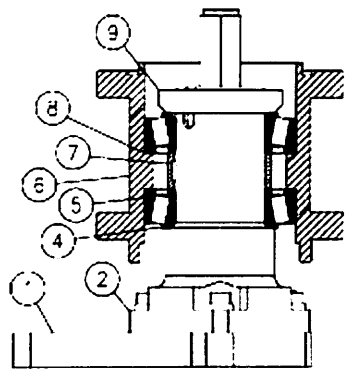


Figure 25 (95586)

D. Slide main bearing spacer (Item 7) onto main shaft.

E. Slide shims (Item 8) onto main shaft (Item 1).

NOTE: Measure thickness and replace old shims with new shims which are supplied with the bearing kit.

F. Set bearing carrier (Item 6) onto first bearing set on the main shaft.

G. Place second bearing set into bearing carrier.

H. Thread locknut (Item 9) onto main shaft and torque with a certified torque wrench to specific value.

I. Mount a finger dial indicator (with a magnetic base) onto a stable base, such as the fan mounting bracket, as shown in **Figure 26**.

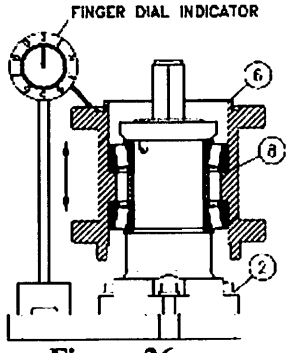


Figure 26 (95672)

J. Set-up indicator to measure the vertical movement of the bearing carrier (Item 6) on the main shaft (Item 2).

K. Raise and lower bearing carrier to measure the vertical movement. Do this with no load.

NOTE: Vertical movement of bearing carrier must be between the specified value.

L. Add and remove shims (Item 8) as necessary to ensure vertical movement is within specifications.

M. Remove finger dial indicator from assembly

N. Remove locknut (Item 9) from main shaft (Item 6).

NOTE: While removing components, stack them in order of removal to ease assembly later.

O. Lift off bearing carrier (Item 6) and place it to the side and place the top bearing on top of the locknut.

P. Remove shims (Item 8), main bearing spacer (Item 7) and lower bearing set from main shaft (Item 6).

2.2.5 Bearing Carrier Assembly

A. Clean seal bore of bearing carrier (**Figure 28**, Item 6) with Brakleen® or equivalent to remove any old Loctite® or equivalent, oil and/or any debris.

B. Place bearing carrier (Item 6) horizontal and shown in **Figure 27**.

C. Apply 620 Loctite® or equivalent to seal bore of bearing carrier and to seal bore surface. Coat completely.

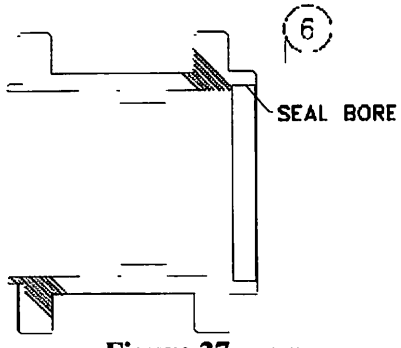


Figure 27 (95678)

D. Place bearing carrier (Item 6) vertical so that seal bore is upwards, as shown in **Figure 28**.

E. Place first main bearing set (**Figure 29**, Item 5) into cone (cup (Item 4)) of bearing carrier (Item 6).

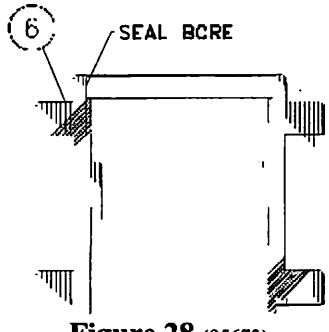


Figure 28 (95673)

F. Press seal (Item 10) into the seal bore until seal face is flush with the edge of the bearing carrier (Item 6).

NOTE: Seal must be square with seal bore of bearing carrier to prevent seal run off.

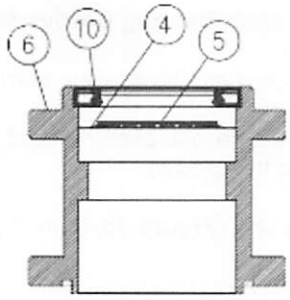


Figure 29 (95674)

G. Flip bearing carrier (Item 6) so that seal bore is downwards on the work surface.

NOTE: If the fan assembly contains a spool proceed to 2.2.5.1; if not proceed to 2.2.5.2.

2.2.5.1 For Fan Models With Spools

A. Install pulley (**Figure 30**, Item 14) onto the bearing carrier (**Figure 31**, Item 6).

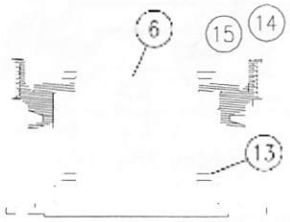


Figure 30 (95679)

B. Lubricate seal (**Figure 31**, Item 10) with light oil.

C. Install the bearing carrier assembly (Item 6) onto the main shaft (Item 2).

NOTE: When sliding the seal (Item 10) over the shoulder of the main shaft (Item 2) care must be taken not to damaged the seal, also make sure that no part of the seal lip are turned up.

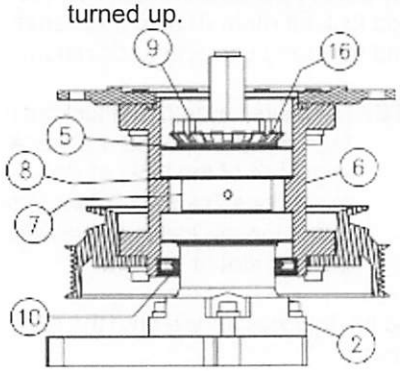


Figure 31 (95588)

D. Install main bearing spacer (Item 7) and shims (Item 8) onto main shaft assembly (Item 2).

NOTE: When installing shims, place smaller to larger thickness first on the main shaft.

E. Slide second bearing set (Item 5) and lockwasher (Item 16) onto the main shaft (Item 2).

F. Apply Loctite 262 to main shaft threads and thread locknut (Item 9) onto main shaft (Item 2) and torque to correct specification.

NOTE: The bevel edge of the locknut must face towards the lockwasher and align one of the locknut slots with on the lockwasher tabs. **Always** tighten, never loosen locknut when aligning tab and slot of locknut.

G. Bend the lockwasher tab onto the slot of the locknut.

H. Clean o-ring groove and install o-ring on carrier (**Figure 34**).

Note: Steps L to P apply if flange was removed from spool earlier.

I. Clean o-ring groove on spool and place o-ring (**Figure 34**) into the groove of spool.

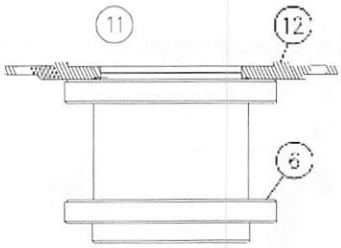


Figure 32

J. Clean flange (Item 12) face with Brakleen® or equivalent.

K. Place flange (Item 12) onto spool (Item 6) and align holes.

NOTE: In some assemblies, the bearing carrier contains an alignment screw which must be used to align flange.

L. Hold flange and spool together, and flip the combination over making sure not to dislodge the o-ring.

M. Apply 243 Loctite® or equivalent completely to the last 3/8" of the fasteners. (Not applicable to FX2000)

N. Insert fasteners (**Figure 33**) and torque to correct value.

O. Place oil dam onto flange and align holes, as shown in **Figure 33**.

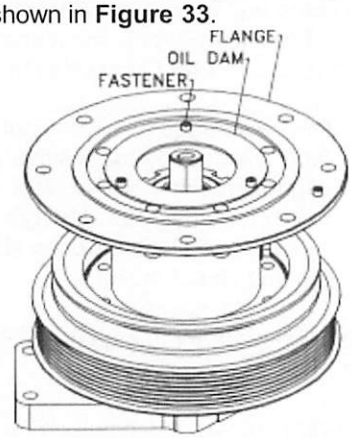


Figure 33 (95686)

P. Insert fasteners and torque to correct value. Place spool on bearing carrier (Item 6) and align fastener holes.

Q. Apply 243 Loctite® or equivalent onto fasteners.

R. Install and torque fasteners to correct specification.

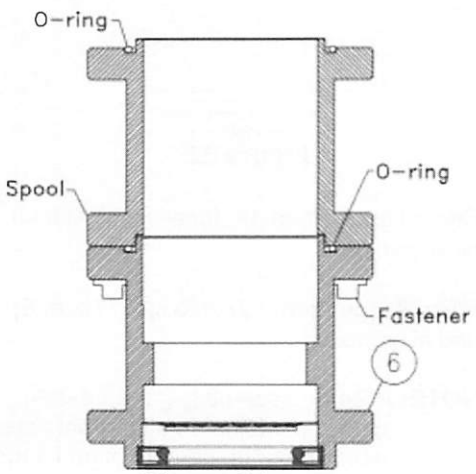


Figure 34(95680)

2.2.5.2 Main shaft/Bearing Carrier Assembly

A. Install pulley onto the bearing carrier.

B. Clean o-ring groove of carrier and install the o-ring into the groove.

C. Lubricate seal (**Figure 35**, Item 10) with light oil.

D. Position the bearing carrier assembly (Item 6) onto the main shaft (Item 2).

NOTE: When sliding the seal (Item 10) over the shoulder of the main shaft (Item 2) care must be taken not to damaged the seal, also make sure that no part of the seal lip are turned up.

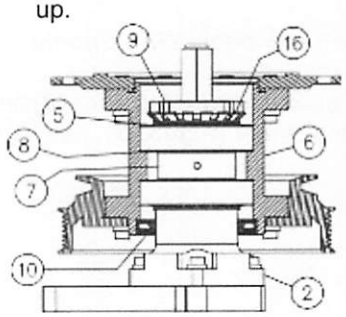


Figure 35 (95588)

E. Install main bearing spacer (Item 7) and shims (Item 8) onto main shaft assembly (Item 2).

NOTE: When installing shims, place smaller to larger thickness first and with burs turned upwards on the main shaft.

F. Slide second bearing set (Item 5) and lockwasher (Item 16) onto the main shaft (Item 2).

G. Apply Loctite 262 to main shaft threads and thread locknut (Item 9) onto main shaft (Item 2) and torque to correct specification.

NOTE: The bevel edge of the locknut must face towards the lockwasher and align one of the locknut slots with on the lockwasher tabs. **Always** tighten, never loosen locknut when aligning tab and slot of locknut.

H. Bend the lockwasher tab onto the slot of the locknut.

I. Place oil damp onto flange and align holes, as shown in **Figure 36**.

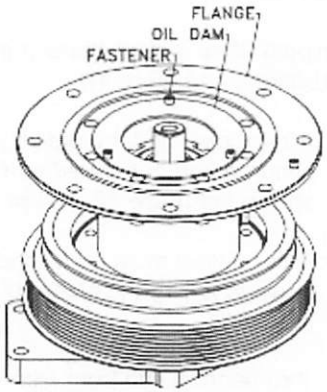


Figure 36 (95686)

J. Insert fasteners and torque to correct value.

2.2.6 Shifter Block Assembly

A. Position a 2" block (3/4" for FX2000) approximately 4 inches in length to raise the threaded shifter block off workbench.

B. Clean threads and seating surface where bearing sits of the threaded shifter block.

C. Remove plastic seal covers from either side of bearing with a screwdriver or pick, see **Figure 37.**

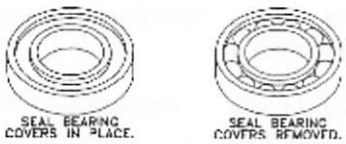


Figure 37 (95681)

D. Insert bearing (**Figure 38,** Item 2) onto threaded shifter block (Item 1).

E. Place threaded shifter block (Item 1) on the 2"block as shown in **Figure 38**.

F. Lay hub assembly (Item 3) face up with the ¼" threaded holes facing upwards.

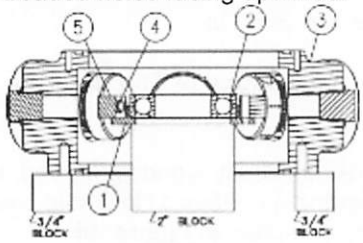


Figure 38 (95682)

G. Turn collar pins (Item 4) within hub assembly (Item 3) such that the bolt heads are facing upwards.

H. Place pivot blocks (Item 5) onto collar pins (Item 4) of the hub assembly (Item 3) .

NOTE: Orient the pivot blocks as per **Figure 40.**

I. Install the hub onto the threaded end of the shifter block.

J. Turn blade mounting shafts (**Figure 39**, Item 6), so that the pivot blocks (Item 5) come to rest against the threaded shifter block (Item 1).

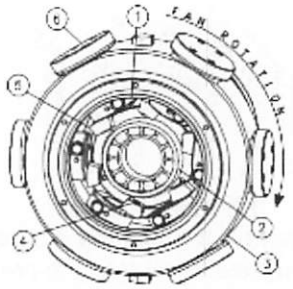


Figure 39 (95547)

NOTE1: Turn threaded shifter block slightly, if the ¼" holes are interfered by the pivot blocks.

NOTE2: Ensure the smooth surface of the pivot block are against the threaded shifter block. Incorrect installation of the pivot blocks will result in binding of the shifter block assembly and damage.

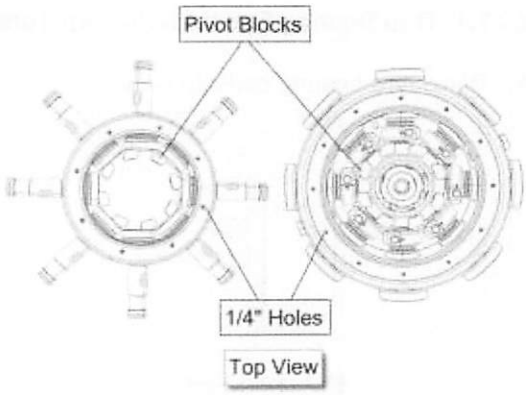


Figure 40 (95832)

K. Place and align spacers (**Figure 41**, Item 7) over the ¼" holes of the threaded shifter block.

L. Install and align thru hole shifter block (Item 8) with the ¼" holes of the spacers (Item 7) and threaded shifter block.

M. Apply 242 Loctite® or equivalent to the shifter block fasteners (Item 9).

N. Insert the fasteners and torque to correct specifications.

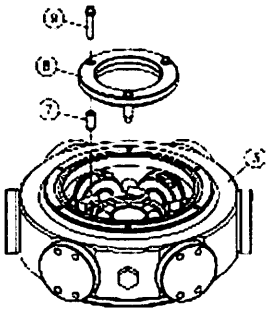


Figure 41 (95556)

O. Slide shifter block assembly around to ensure it moves freely over the pivot blocks.

NOTE: If shifter block assembly is not moving freely over the pivot blocks, the assembly may be binding on the a pivot blocks turned 90Aor spacer(s) not installed and these problems must be repaired before proceeding.

2.2.7 Thru Bearing End Assembly

One of two methods of oil dispersion are used in a fan assembly, **1**) uses a pick-up tube or **2**) an oil splasher is used to disperse oil within the hub.

2.2.7.1 Thru Bearing End With Pick-up Tube

A. Place thru bearing end into a vise.

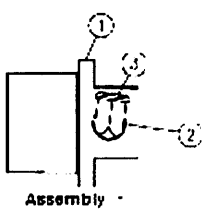


Figure 42 (95833)

B. Apply 262 Loctite® or equivalent to both ends of the nipple (**Figure 42**, Item 2) and thread onto elbow (Item 3).

C. Thread nipple (Item 2) and elbow (Item 3) into thru bearing end (Item 1).

NOTE1: Thread pick-up tube until it is secured and orientated correctly, as shown in **Figure 42**, Assembly 1.

NOTE2: Pick-up tube must be turned slightly to avoid hitting the shifter block fasteners.

D. Remove thru bearing end from vice.

2.2.7.2 Thru Bearing End With Splasher

A. Place thru bearing end into a vise.

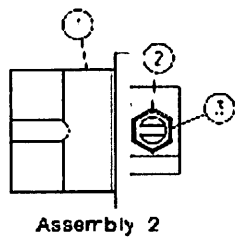


Figure 43 (95589)

B. Apply 262 Loctite® or equivalent to the thread of splasher (Item 2) and thread onto hex nut (Item 3).

C. Apply 262 Loctite® or equivalent to oil splasher (Item 2).

D. Thread oil splasher (Item 2) into thru bearing end(Item 1).

NOTE: Thread splasher until it is visibly thru the threaded hole and back off splasher until it's not interfering and orientated correctly, as shown in **Figure 43**.

E. Tighten hex jam nut.

2.2.7.3. Installation of Thru Bearing End

A. With hub assembly standing on end, slide thru bearing end (Item 1) into seal bearing (Item 6), as shown in **Figure 44**.

B. Ensure pick-up tube (Item 3) or oil splasher (Item 5) is slightly below the edge of the threaded shifter block (Item 7).

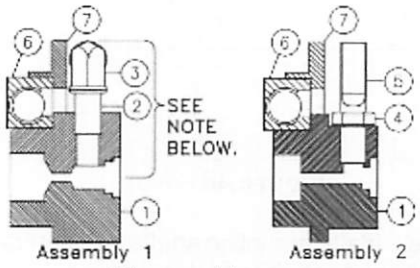


Figure 44 (95543)

NOTE: If either oil dispenser is to high, damage will occur during operation, thus adjust height accordingly.

C. Spin thru bearing end to ensure it does not hit any obstructions.

D. Remove thru bearing end (Item 1) from seal bearing (Item 6).

E. Fully retract hex thru shaft (**Figure 45**, Item 8) into the main shaft assembly.

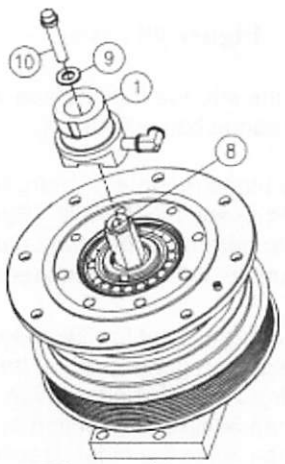


Figure 45 (95544)

F. Place thru bearing end (Item 1) onto hex thru shaft (Item 8).

G. Apply 242 Loctite® or equivalent to fastener (Item 10).

H. Insert fastener (Item 10) and washer (Item 9) into thru bearing end (Item 1).

I. Torque fastener to**25 ft/lbs.**

2.2.8 Setting Shifter Block Assembly Stack Height

When setting the stack height, it is important to refer to the chart at the end of this manual. It must be first determined if the fan's primary use will be sucking (pull) or blowing (pushing). Second, the degree of pitch the fan will have and finally the fan series you have. If any questions, contact Flexxaire prior to proceeding in this section.

A. Make sure thru bearing end is fully retract into main shaft assembly and keep under load.

B. Measure the distance between thru bearing end (Item 1) edge and flange (Item 2), as shown in **Figure 46**.

C. Determine the shims required by referring to the **Chart 3.1.9** located at the end of the manual.

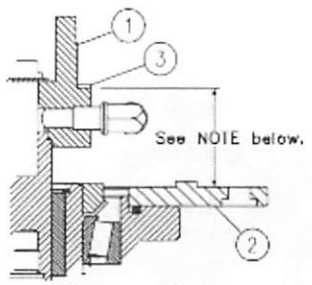


Figure 46 (95555)

D. Install shims (**Figure 46**, Item 3) onto thru bearing end (Item 1), as required.

NOTE: If the distance is greater than the maximum distance stated in **Chart 3.1.9** without shims, a problem may exist with: **I)** thru bearing end isn't seated properly against hex thru shaft, **II)** rod shaft isn't threaded completely into hex thru shaft, **III)** hex nut isn't properly threaded onto rod shaft and/or **IV)** piston orientated incorrectly, and dismantling is required.

NOTE: Replacement of shims with equivalent thickness will make stack height very close to original height.

2.2.9 Hub Installation

A. Install o-ring (**Figure 47**, Item 3) into hub assembly's o-ring groove on the d " threaded hole side and apply grease to hold o-ring in place.

B. Install hub assembly (Item 1) onto flange (Item 2) and align fastener holes.

NOTE: An alignment fastener is used to align hub assembly and flange together.

C. Install a few fasteners to hold hub in place and torque to **35 ft/lbs.**

D. Rotate blade mounting shafts so that shifter block assembly comes to rest against the thru bearing end (Item 4) with shims (Item 5).

E. Torque locknut (Item 6) onto thru bearing end (Item 4) to **25 ft/lbs.**

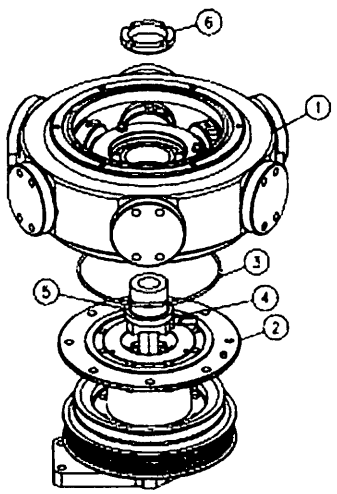


Figure 47 (95546)

A. Symmetrical Pitch Checking

This procedure is performed to verify that the blades will rotate equal distances into full "SUCK" (Pull)" and "BLOW" (Push) positions.

A. Photocopy **Figure 48**; however **do not scale** the sheet. If you are not near a photocopier, cut one of the two blade angle scales available in **Figure 48.**

B. Cut along dashed line of the blade angle scale.

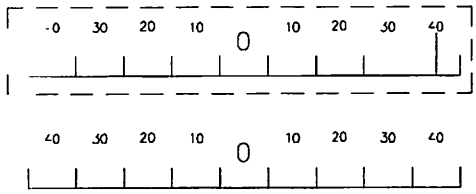


Figure 48 (95557)

C. Rotate blade mounting shafts into neutral position, if not already done.

D. Secure the blade angle scale to the side of the blade mounting shaft as shown in **Figure 49.**

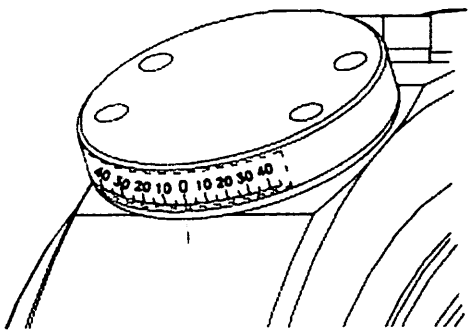


Figure 49 (95545)

E. Sketch a line into the hub surface with a marker or scribe below 0Amark.

F. Rotate the blade mounting shafts into full "SUCK" (Pull) and full "BLOW" (Push) positions to determine the shafts rotate the total amount as the fan is required.

NOTE: If the fan is set for 30A, measure to see if fan goes to 30Ain both directions. If shaft rotation is less than 30Ain one direction and great than 30Ain the other direction a problem may exist with the number of shims located on the thru bearing end . Add or remove shims as necessary, to thru bearing end , this means removing hub assembly each time shims are added or removed.

G. Ensure the blade mounting shafts have a correct rotation both ways, before continuing.

H. Rotate blade mounting shaft into full

"SUCK(Pull) position and spin hub assembly to ensure hub spins freely.

I. Rotate blade mounting shaft into full "BLOW" (Push) position and spin hub assembly to ensure hub spins freely.

J. Remove locknut from thru bearing end .

K. Place lockwasher and locknut onto thru bearing end.

L. Thread locknut onto thru bearing end to **25 ft/lbs.**

NOTE: Bevel edge of locknut must face towards the lockwasher and align one of the locknut slots with on the lockwasher tabs. **Always** tighten, never loosen locknut when aligning tab and slot of locknut.

M. Bend the lockwasher tab into the slot of the locknut.

2.2.10 Completing Hub Assembly

A. Clean the hub's cover plate o-ring groove in the hub (**Figure 50**, Item 1).

B. Install the o-ring (Item 2) into the groove of the hub assembly (Item 1).

C. Place the cover plate (Item 3) onto the hub aligning the fastener holes.

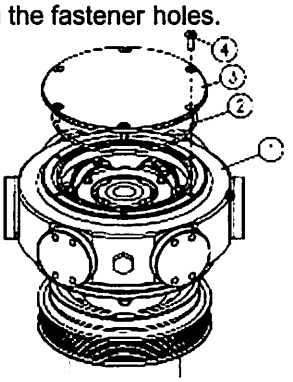


Figure 50 (95548)

D. Insert the cover plate flat head fasteners and torque to specifications. Refer to end of section for torque value.

IMPORTANT: DO NOT PUT LOCTITE ON ANY FASTENERS GOING INTO ALUMINUM PARTS. THE HUB IS ALUMINUM.

2.2.11 Pressure Checking Hub Assembly

A. Attach an air pressure gauge and an air chuck into the oil plug hole.

B. Fill hub with air to 25 +/- 5 psi and wait for ten minutes.

NOTE: Expect an immediate decline in air pressure of 1 to 3 psi.

C. If air pressure continues to decline, soap test all sealing surfaces, hub inserts, inside and outside diameters of rear seal. Also test the mating surfaces between flanges and bearing carrier/spool, to determine possible problem areas.

D. Rotate the blade mounting shafts from full "SUCK" (Pull) to full "BLOW" (Push), this ensures that there are no leaks along the blade mounting shaft and internal o-ring as it moves through its range of motion.

E. If there are no leaks then increase air pressure to 40 +/- 5 psi and repeat the soap test. If there are leaks repair as required.

NOTE: DO NOT OVER PRESSURIZE THE HUB.

F. Release air pressure, and remove air gauge and chuck from hub assembly.

2.2.12 Final Procedures

A. Refer to the appropriate manual for oil filling of the fan assembly.

B. Refer to the appropriate manual for fan installation procedure.

C. All procedures are complete.

3.1 Torque Specifications

Mismatched of incorrect fasteners can result in improper operation resulting in injury or death. Care must be taken not to mismatch Metric and Imperial dimensional fasteners. Prior to installation of any hardware, ensure that components are in good condition. Fasteners must not be worn or damaged and free of rust or corrosion.

Generally fasteners should engage the thread by a minimum of one fastener diameter. All threaded joints should be assembled without lubricants unless specified otherwise in instructions. If required, use de-greasing compound to remove oils and grease that may be present from the manufacturing process. Use non-permanent thread lock on all joints except where noted in instructions or elsewhere in this specification. NEVER use thread locking compound with joints in aluminum unless specified on drawing. Thread and rust sealants are allowed.

When tightening a fastener a certified torque wrench must be used at all times. Two torque values exist with each table below, representing a torque value for a fasteners **without** thread locking compound (**Dry**) and the other torque value for a fastener **with** thread locking compound (**Wet**) and each torque value is measured in **ft/lbs.**

3.1.1 Metric Nut And Fastener Torques

Torque values measured in **ft/lbs.**.

Metric Nuts and Fasteners				
Size	Grade 10.9		Grade 8.8	
	Dry	Wet	Dry	Wet
M6	10	7.5	-	-
M8	25	19	17	13
M10	45	34	31	24
M12	80	60	56	42
M14	125	94	87	65
M16	210	160	145	110
M20	400	300	-	-
M24	740	555	-	-
M30	1600	-	-	-
M36	2700	-	-	-

3.1.2 Metric Stud Torques

Torque values measured in **ft/lbs.**.

Metric Studs		
Size	Dry	Wet
M6	6	-
M8	13	-
M10	26	-
M12	48	-
M16	80	-
M20	125	-
M24	300	-
M30	550	-
M36	880	-

3.1.3 Imperial (UNF) Nut And Fastener Torques

Torque values measured in **ft/lbs.**.

Imperial (UNF) Nuts and Fasteners		
Size	Grade 8	
	Dry	Wet
#8	1.6	1.2
#10	3.4	2.6
¼	14	10
5/16	28	21
d	45	34
7/16	73	54
½	100	76
9/16	142	106
e	225	170
¾	415	310
c	635	475
1½	930	700

3.1.4 Pipe Threads - NPT and NPTF Torques

Torque values measured in **ft/lbs.**.

NPT and NPTF Threads Joints		
Size	**Dry***	**Wet***
1/16 - 27	8	8
c - 27	12	12
¼ - 18	15	18
d - 18	26	33
½ - 14	33	44
¾ - 14	44	55
1 - 11½	55	66

* - Sealant refers to either thread locking compound or thread sealant.

- Use 50% of the above recommended torques values when either male or female thread material is non-ferrous.

3.1.5 Imperial (UNC) Nut And Fastener Torques

Torque values measured in **ft/lbs.**.

Imperial (UNC) Nuts and Fasteners		
Size	**Grade 8**	
	Dry	**Wet**
#8	1.5	1.1
#10	3	2.3
¼	12	9
5/16	25	19
d	40	30
7/16	65	50
½	95	72
9/16	127	95
e	200	150
¾	370	275
c	575	430
1½	850	640

3.1.6 Bearing Locknut Torques

Torque values measured in **ft/lbs.**.

Bearing Locknuts			
Size	**Flex P/N**	**Threads**	**Dry***
N-03	10301	.664-32	40±8
N-05	10025	.969-32	70±10
N-06	10164	1.173-18	100±12
N-08	10226	1.563-18	150±20
N-09	10032	1.767-18	170±30
N-10	11982	1.967-18	200±35
N-14	10167	2.751-18	260±40
N-20	10988	3.918-12	650±50

* - These specifications are used **only** when there is a rigid spacer between the bearings.

- When using a locking washer, tighten the locknut to the specified torque then tighten the locknut to align a slot with the nearest tab.

3.1.7 Bearing Locknut Torques

Torque values measured in **ft/lbs.**.

Bearing Locknuts			
Size	**Flex P/N**	**Threads**	**Dry***
N-03	10301	.664-32	40±8
N-05	10025	.969-32	70±10
N-06	10164	1.173-18	100±12
N-08	10226	1.563-18	150±20
N-09	10032	1.767-18	170±30
N-10	11982	1.967-18	200±35
N-14	10167	2.751-18	260±40
N-20	10988	3.918-12	650±50

* - These specifications are used **only** when there is a rigid spacer between the bearings.

- When using a locking washer, tighten the locknut to the specified torque then tighten the locknut to align a slot with the nearest tab.

3.1.8 Bearings Clearance

Values are shown in Inches.

Cone P/N	Cup P/N	Clearance		SHIMS*
		Min.	Max.	
10029	10018	.001	.003	---
10027	10028	.001	.003	---
10166	10190	.001	.003	---
10487	10487	.001	.003	---
11320	11321	.001	.003	---
11978	11979	.001	.003	---
10034	10035	.001	.003	10240
10169	10170	.003	.005	10250
10611	10612	.003	.005	10250
10813	10814	.004	.007	11016

* - Shims thicknesses: .002, .003, .005 & .010.

* - Max. stack height of shims should not exceed .035.

* - Max. number of shims are: 5.

3.1.9 Thru Bearing End Stack Height

All values in inches

Primary Mode Of Operation Angle	FX2000	FX3000	FX4000/ FX5000
Pull Fan (Sucker) Piston Retracted			
40	0.276	1.229	1.111
35	0.324	1.285	1.167
30	0.375	1.345	1.227
25	0.428	1.408	1.290
20	0.484	1.473	1.355
15	0.541	1.541	1.423
Push Fan (Blower) Piston Extended			
40	1.164	2.273	2.155
35	1.116	2.217	2.099
30	1.065	2.157	2.039
25	1.012	2.094	1.976
20	0.956	2.029	1.911
15	0.899	1.961	1.843