Attachment 5
To
Airworthiness Group Factual Report Addendum 1

Anti-Skid Manifold (S/N 114) Test Results

CRANE AEROSPACE & ELECTRONICS — HYDRO-AIRE P.L. PORTER A Crane Co. Company
3000 Winona Avenue P.O. Box 7722 Burbank, CA 91510-7722
(818) 526-2600 FAX (818) 842-6117 TELEX 677694
FORM # 1834-C (6/93)

RETURNED MATERIALS REPAIR ORDER AND DISPOSITION REPORT

SERVICE REQ# 152715 | JOB ORDER # S876181 | PROD LINE HYTROL VLV | **REPAIR STATION #QD3R785L**

PART NO BEFORE MODIFICATION	PART DESCRIPTION	UNIT SERIAL NO	NEW PART NUMBER	NEW SERIAL NUMBER
33-177	ANTISKID MANIFOLD ASSY	114	N/A	

CUSTOMER NAME	LOCATION	PURCHASE ORDER NO	SALES ORDER NUMBER	DATE RECEIVED	SHIP DUE DATE
6398 FEDERAL EXPRESS CORPO	MEMPHIS TN	TBD		15-AUG-06	
		STATUS: NORMAL	RMA NUMBER: 188158		SHIP DATE

CUSTOMER REASON FOR RETURN CODE: ***NTSB ACCIDENT INVESTIGATION***

CUSTOMER REJ NO | QUANTITY: 1 | A/C TAIL NO

RETURN CATEGORY
1. [ ] OVERHAUL
2. [ ] REPAIR
3. [ ] WARRANTY
4. [ ] REJECTION
5. [ ] MODIFY
6. [ ] OTHER

GOVT: [ ] YES [ ] NO

FAILURE ANALYSIS REQUIRED

VERIFICATION TEST RESULTS CODE: [ ] VALID [ ] INVALID [ ] NOT APPLICABLE

VISUAL DESCRIPTION: FUSE D FITTING IS BROKE. SERVO COVER ON D SERVO IS SCRATCHED/GOUGED.

FINDINGS: Failed pressure Vs current Brakes A, C, and D. Trace hit gates. Internal leakage over max @ port C. (actual = 560cc, allowed = 800cc). Fuse flow leakage over max @ fuse A during 6.0 GPM flow. (actual: 1360, allowed = 1310)

RESOLUTION CODE T.P. 33-177 Rev B 9-16-04

TESTED BY Jeff Hopper

DATE 8-16-06 TEST AREA 117

INSPECTED BY CALHOUN, KANDY DATE: 15-AUG-06

MFG DATE: 01-MAR-2005 PRIOR RETURN

OVERHAUL DATE:

SPECIAL QUALITY ASSURANCE INSTRUCTIONS FOR TESTING

Q.A. ENG

SUMMARY CODE: CORRECTIVE ACTION [ ] APPLICABLE [ ] NOT APPLICABLE WARRANTY HONORED **PENDING**

MAINTENANCE PERFORMED IAW SPEC,REV, DATE

TSN: TSO: CSN: CSO: Q.A. ENG DATE CONTAINER:

CUSTOMER P/N:

Jobs From S876181 To S876181
Sort By Job

Job: S876181

Assembly: 33-177
ANTISKID MANIFOLD ASSY
Status: Released

Serial Number:

Job Mass Loaded on 15-AUG-2006 09
Scheduled Start: 15-AUG-06 00:00
Scheduled Complete: 05-SEP-06 00:00
Routing Revision: 02 15-AUG-06 09:53
Total S/U Time: 2
Total Run time: 8
Routing Reference: REPAIR MECHANICAL

Start Quantity: 1
Lot Size: 0
Sketches:
PART:
DES DOC:

STANDARD REPAIR ROUTING FOR MECHANICAL

Set-Up	Dept	Dept Name	Que	PCS/Hr	S/U Insp.	Comp.Date	Acpt.	Rjct.	1st Artc.	Inspt.	NCMR	Op Seq:
0	087	Issue & Release	.0417	0		AUG 15 2006						800
0	103	Lab - Engineering Test	0	0								801
0	224	Engineering Hold	0	0								802
0	181	Verification Test	.0417	1		8/16/06						810
0	191	Teardown & Evaluate	.0417	1								820
0	235	WARRANTY DISPOSITION	0	0								822

QUEUE RUN TO MOVE REJECT

CRANE | HYDRO-AIRE
A SUBSIDIARY OF CRANE CO.

MUST BE PRINTED ON PINK PAPER

SHEET	1 OF 1
DATE	8/15/06
ENGINEER	C. Valent
MFR. ENGR.	
Q. A ENGR.	

PRODUCT ANALYSIS TRAVELER

******THIS DOCUMENT TO ACCOMPANY PART AT ALL TIMES ******

PROBLEM: Gear Collapse investigation

PART NO.	33-177
SERIAL NO.	114
N. C. M. R. REF.	
WORK ORDER NO.	SB76181
PROGRAM	MD10 mod
CUSTOMER	Fed Ex

STEP NO.	ENGINEERING DIRECTION	ASSIGNED TO	BY	STEP	RESULTS	INSP/OPER.
1)	Remove brake "D" fuse and replace with supplied				Note: Fuse damaged and replacement required for testing	
2)	Obtain Oil Sample				Fuse S/N (D) : 0081	
3)	perform Current VS pressure test.					

NOTE: **AFTER COMPLETION OF EACH STEP THE COGNIZANT ENGINEER SHALL BE NOTIFIED BEFORE PROCEEDING TO NEXT STEP.**

CRANE | HYDRO-AIRE DIVISION P/N: 33-177

PARTICLE COUNT DATA SHEET

FLUID	SAMPLE NUMBER	SOURCE	VOLUME	MO./DAY/YR.	COLLECTED BY	COUNTED BY
SKYDROL	114	RETURN	100ML	08/17/06	JEFF H.	Diego V.

MAG. X	AREA PER FIELD (A)	PARTICLE SIZE RANGE	FIELDS COUNTED (B)	TOTAL PARTICLES COUNTED (C)	PARTICLES IN SAMPLE (B x C)	PARTICLES PER ☐ 100 ML ☐ 100 mL ☐ ORIG. FL.	REMARKS
35	V	250 M	ALL		3		
35		250 100	ALL		13		
35		100 50	ALL		167		
100		50 25	10		1900		
100		25 15	10		10,300		
100		15 5	10		31,100		

COMMENTS: W/O: 5876181 RMA: 188158 CLASS 8

FLUID	SAMPLE NUMBER	SOURCE	VOLUME	MO./DAY/YR.	COLLECTED BY	COUNTED BY
SKYDROL	114	A	100ML	08/17/06	JEFF H.	Diego V.

MAG. X	AREA PER FIELD (A)	PARTICLE SIZE RANGE	FIELDS COUNTED (B)	TOTAL PARTICLES COUNTED (C)	PARTICLES IN SAMPLE (B x C)	PARTICLES PER ☐ 100 ML ☐ 100 mL ☐ ORIG. FL.	REMARKS
35	V	250 M	ALL		6		
35		250 100	ALL		12		
35		100 50	ALL		171		
100		50 25	10		2000		
100		25 15	10		8,900		
100		15 5	10		23,100		

COMMENTS: SAME AS ABOVE CLASS 8

FLUID	SAMPLE NUMBER	SOURCE	VOLUME	MO./DAY/YR.	COLLECTED BY	COUNTED BY
SKYDROL	114	B	100ML	08/17/06	JEFF H.	Diego V.

MAG. X	AREA PER FIELD (A)	PARTICLE SIZE RANGE	FIELDS COUNTED (B)	TOTAL PARTICLES COUNTED (C)	PARTICLES IN SAMPLE (B x C)	PARTICLES PER ☐ 100 ML ☐ 100 mL ☐ ORIG. FL.	REMARKS
35	V	250 M	ALL		11		
35		250 100	ALL		33		
35		100 50	ALL		157		
100		50 25	10		3100		
100		25 15	10		7100		
100		15 5	10		19,900		

COMMENTS: SAME AS ABOVE CLASS 9

CRANE | HYDRO-AIRE DIVISION

PARTICLE COUNT DATA SHEET

FLUID	SAMPLE NUMBER	SOURCE	VOLUME	MO./DAY/YR.	COLLECTED BY	COUNTED BY
SKYDROL	114	C	100ML	08/17/06		Diego V.

MAG. X	AREA PER FIELD (A)	PARTICLE SIZE RANGE	FIELDS COUNTED (B)	TOTAL PARTICLES COUNTED (C)	PARTICLES IN SAMPLE (B x C)	PARTICLES PER ☐ Liter ☐ 100mL ☐ cu. ft.	REMARKS
35	>	250 M	ALL		16		
35		250 100	ALL		43		
35		100 50	ALL		128		
100		50 25	10		1600		
100		25 15	10		8000		
100		15 5	10		30,500		

COMMENTS: CLASS 8

CRANE | HYDRO-AIRE DIVISION

PARTICLE COUNT DATA SHEET

FLUID	SAMPLE NUMBER	SOURCE	VOLUME	MO./DAY/YR.	COLLECTED BY	COUNTED BY
SKYDROL	114	Δ	100ML	08/17/06		Diego V.

MAG. X	AREA PER FIELD (A)	PARTICLE SIZE RANGE	FIELDS COUNTED (B)	TOTAL PARTICLES COUNTED (C)	PARTICLES IN SAMPLE (B x C)	PARTICLES PER ☐ Liter ☐ 100 mL ☐ cu. ft.	REMARKS
35	>	250 M	ALL		4		
35		250 100	ALL		25		
35		100 50	ALL		163		
100		50 25	10		1000		
100		25 15	10		5500		
100		15 5	10		27,800		

COMMENTS: CLASS 7

Form No. 1910 Rev. 1

As Recieved

TEST RECORD

DATE: 8/16/06 Page 1 of 5

TITLE: Manifold Assy, Antiskid, MLG P/N: 33-177 Rev F

SERIAL #: 114 WO/RMDR#: S876181

OPERATOR: Jeff Hopper TYPE FLUID Skydrol IV

QC Accept

Para.	Test	Test Requirements	Test Data
3.5	Examination of Product	No visual discrepancies	Pass (Fail)
4.1	Pre-Dielectric Insulation Resistance	200 megohms minimum	A 1000 megohms B 1000 megohms C 450 megohms D 1000 megohms
4.2	High Potential Dielectric Test	0.5 mA max. leakage and no damage at 1200 VAC 60 Hz	A Ø mA B Ø mA C Ø mA D Ø mA at 1200 VAC
4.3	Post-Dielectric Insulation Resistance	200 megohms minimum	A 1000 megohms B 1000 megohms C 450 megohms D 1000 megohms
4.4	Electrical Resistance Test	180 to 195 ohms	A 185 ohms B 185 ohms C 188 ohms D 187 ohms
4.5	Electrical Bonding	0.030 ohms maximum	A 0.0014 ohms B 0.0013 ohms C 0.0014 ohms D 0.0014 ohms

TEST RECORD

DATE: 8/16/06
TITLE: Manifold Assy, Antiskid, MLG
SERIAL #: 114
OPERATOR: Jeff Hoggatt

Page 2 of 5
P/N: 33-177 Rev F
WO/RMDR#: 9876151
TYPE FLUID: Skydrol IV

QC Accept

Para.	Test	Test Requirements	Test Data
5.2	Proof Pressure Test	No external leakage, weepage, permanent set, or other indications of damage	(Pass) / Fail
5.3	Antiskid Pressure Gain	Within Figure 6-2 Envelope @ 3000 psig supply and hysteresis less than 1.65 mA between 2800 and 200 psig brake pressure	A Pass / (Fail) 0.6 mA B (Pass) / Fail 1.3 mA C Pass (Fail) 2.9 mA D Pass (Fail) 2.0 mA
5.3.5	Droop Test	Above Droop Gate of Figure 6-2 @ 1000 psig supply and hysteresis less than 1.65 mA between 800 to 200 psig brake pressure	A Pass / (Fail) 0.6 mA B (Pass) Fail 0.5 mA C (Pass) / Fail 0.7 mA D (Pass) Fail 1.0 mA
5.4	Stability Test	No instability	A (Pass) / Fail B (Pass) / Fail C (Pass) Fail D (Pass) / Fail

TEST RECORD

DATE: 8/16/06 Page 3 of 5

TITLE: Manifold Assy, Antiskid, MLG P/N: 33-177 Rev F

SERIAL #: 114 WO/RMDR#: 5876181

OPERATOR: Jeff Hopper TYPE FLUID Skydrol IV

QC Accept

Para.	Test	Test Requirements	Test Data
5.5	Step Input Response Test	Pressure Reduction within 0.020 sec. of signal application	A 0.010 seconds B 0.014 seconds C 0.015 seconds D 0.013 seconds
5.6	Internal Leakage Test	Between 800 and 286 cc/min. @ 1500 psig brake pressure	Blocked Port 450 cc/min Tare 340 cc/min A 500 cc/min B 560 cc/min C 860 cc/min D 710 cc/min
5.7	Pressure Sag	130 psid max @ 1500 psig	A 365 psid B 55 psid C 10 psid D 10 psid
	Droop Leakage	900 cc/min max @ 1500 psig	580 cc/min
5.8	Pressure Drop — Pressure To Brake	650 psid max at 5.0 GPM w/ 0 mA	Tare 55 psid A 345 psid B 210 psid C 150 psid D 175 psid

TEST RECORD

DATE: 8/16/06 Page 4 of 5

TITLE: Manifold Assy, Antiskid, MLG P/N: 33-177 Rev F

SERIAL #: 114 WO/RMDR#: 5576151

OPERATOR: Jeff Hopper TYPE FLUID Skydrol IV

QC Accept

Para.	Test	Test Requirements	Test Data
5.9	Pressure Drop - Brake To Return	500 psid max at 10 GPM w/ 55 mA	Tare 220 psid A 470 psid B 460 psid C 445 psid D 460 psid
5.10	Fuse Flow Test	655-1310 cc at shutoff (40-80 in^3) @6 GPM	A 1360 cc B 1180 cc C 1190 cc D N/A cc
		Flow in bypass 3.0 GPM minimum	A 7.2 GPM B 7.6 GPM C 7.7 GPM D N.A GPM
		655-1557 at shutoff (40-95 in^3) @ 0.25 GPM	A 1510 cc B 1330 cc C 1380 cc D N/A cc
5.11	Fuse Reset Procedures	Within 5 sec @ 5 psid max will not @ 20 psid or greater	A ACC B ACC C ACC D N/A

TEST RECORD

DATE: 8/16/06 Page 5 of 5

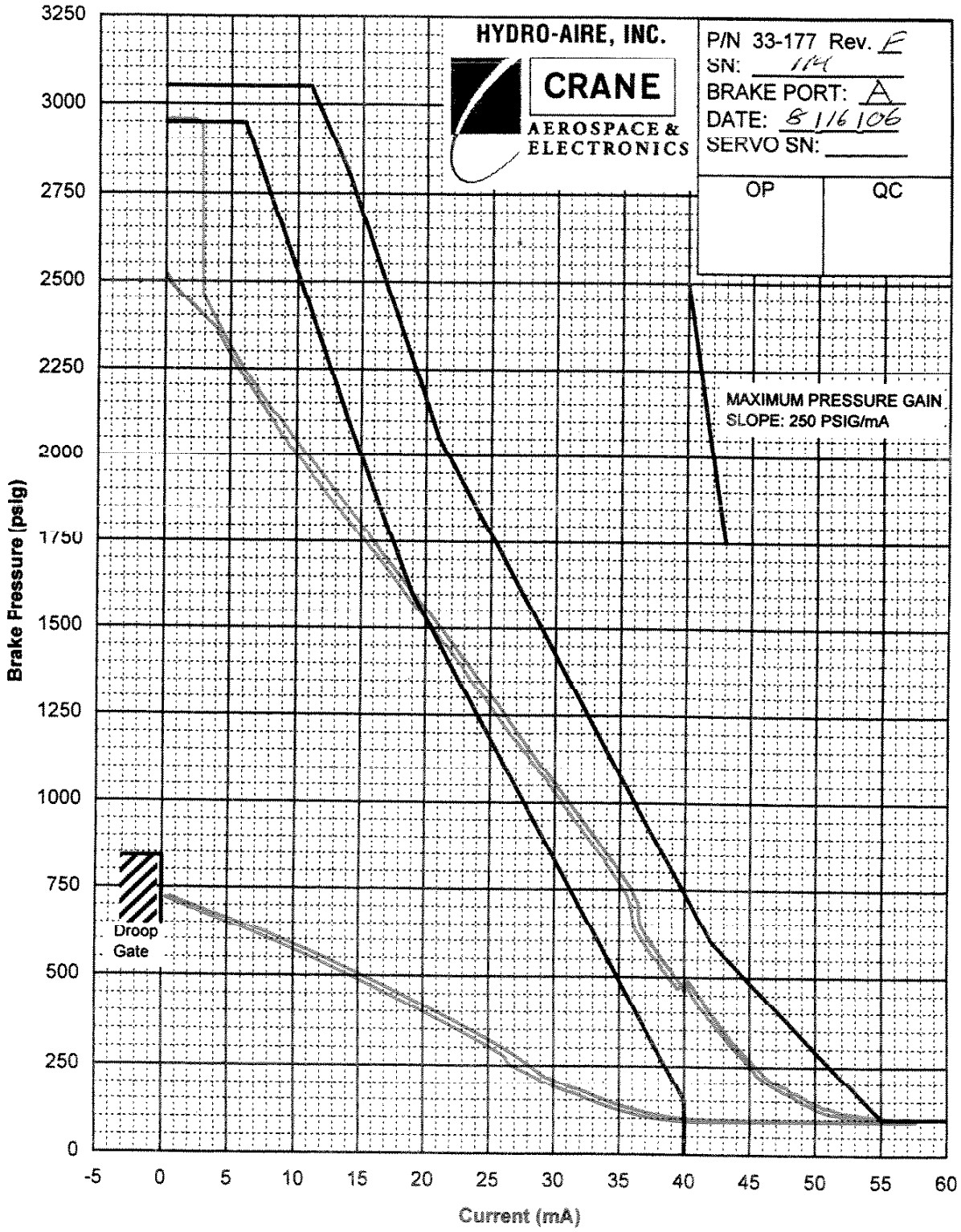
TITLE: Manifold Assy, Antiskid, MLG P/N: 33-177 Rev F

SERIAL #: 114 WO/RMDR#: S876181

OPERATOR: Jeff Hopper TYPE FLUID Skydrol IV

QC Accept

Para.	Test	Test Requirements	Test Data
6	Serial Number	Antiskid Control Valve P/N ~~39-883~~ 39-887	A 142 B 154 C 141 D 110
		Fuse P/N 38-969	A 0017 B 0072 C 0104 D 0081


HYDRO-AIRE, INC.
CRANE
AEROSPACE & ELECTRONICS
P/N 33-177 Rev. F
SN: 114
BRAKE PORT: A
DATE: 8/16/06
SERVO SN:
OP
QC
MAXIMUM PRESSURE GAIN
SLOPE: 250 PSIG/mA
Droop Gate
Brake Pressure (psig)
Current (mA)
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-5
0
5
10
15
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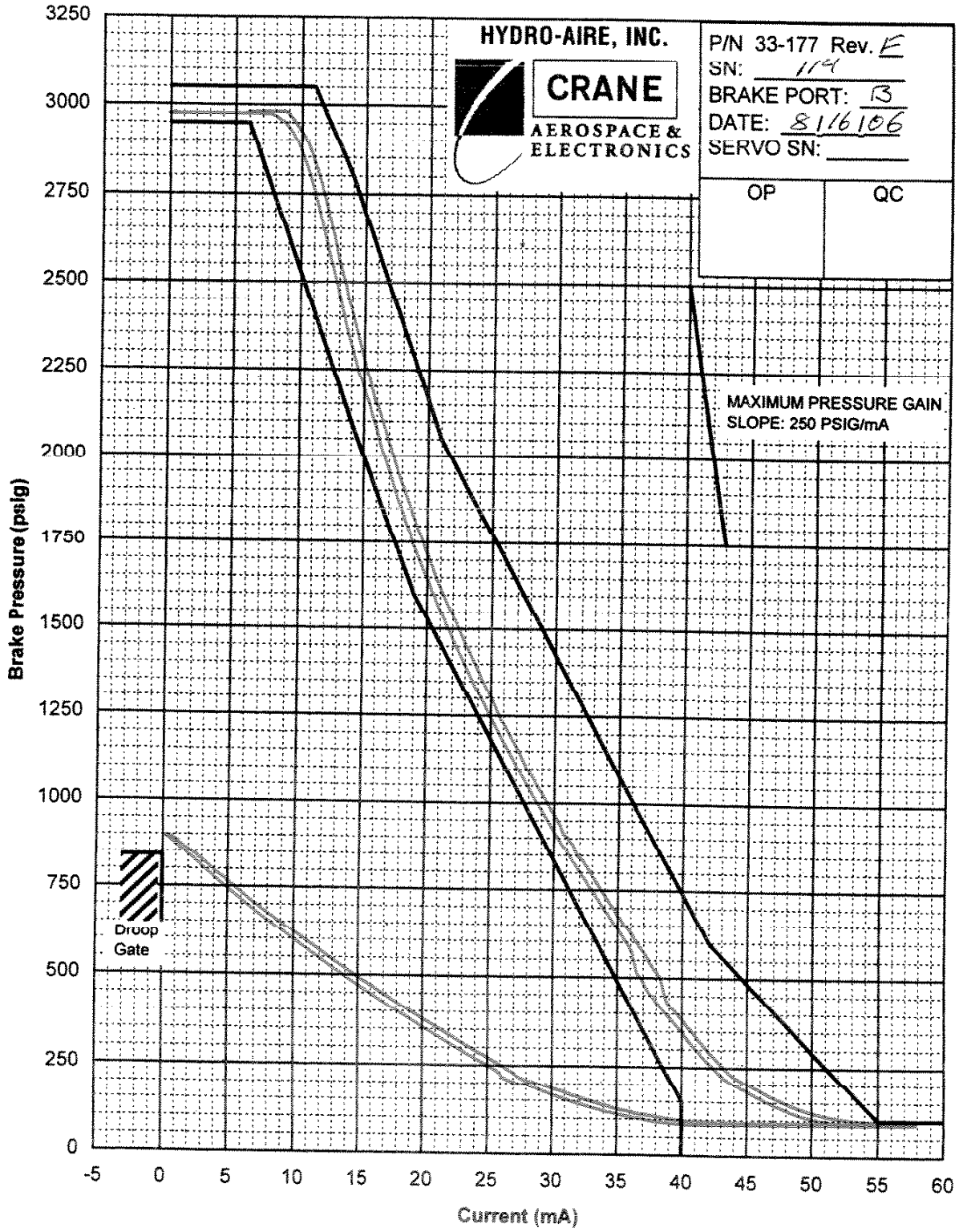
25
30
35
40
45
50
55
60


HYDRO-AIRE, INC.
CRANE
AEROSPACE & ELECTRONICS
P/N 33-177 Rev. E
SN: 114
BRAKE PORT: B
DATE: 8/16/06
SERVO SN:
OP
QC
MAXIMUM PRESSURE GAIN
SLOPE: 250 PSIG/mA
Droop Gate
Brake Pressure (psig)
Current (mA)
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-5
0
5
10
15
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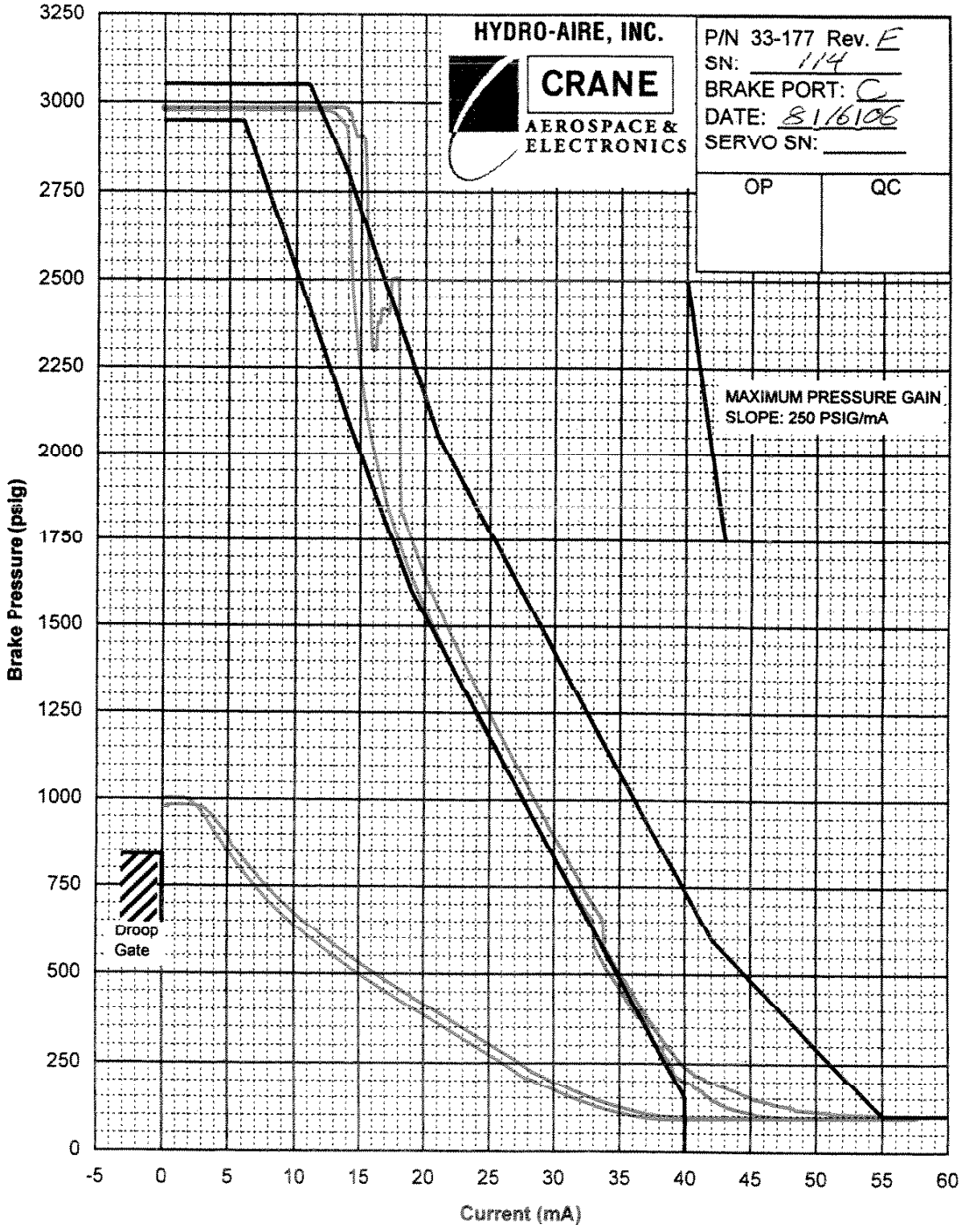
30
35
40
45
50
55
60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CRANE
AEROSPACE & ELECTRONICS
P/N 33-177 Rev. E
SN: 114
BRAKE PORT: C
DATE: 8/16/06
SERVO SN:
OP
QC
MAXIMUM PRESSURE GAIN
SLOPE: 250 PSIG/mA
Droop Gate
Brake Pressure (psig)
Current (mA)
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-5
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10
15
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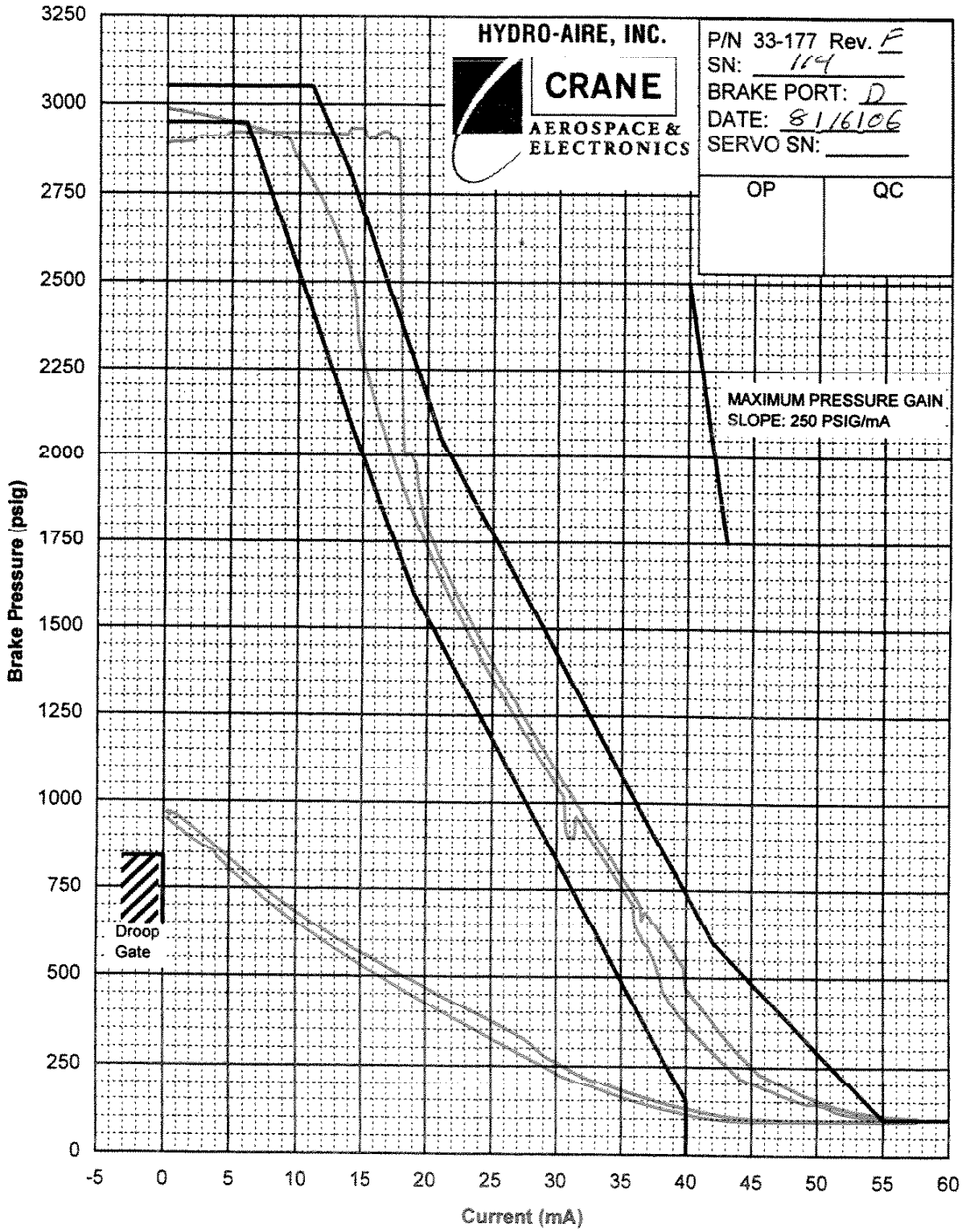
55
60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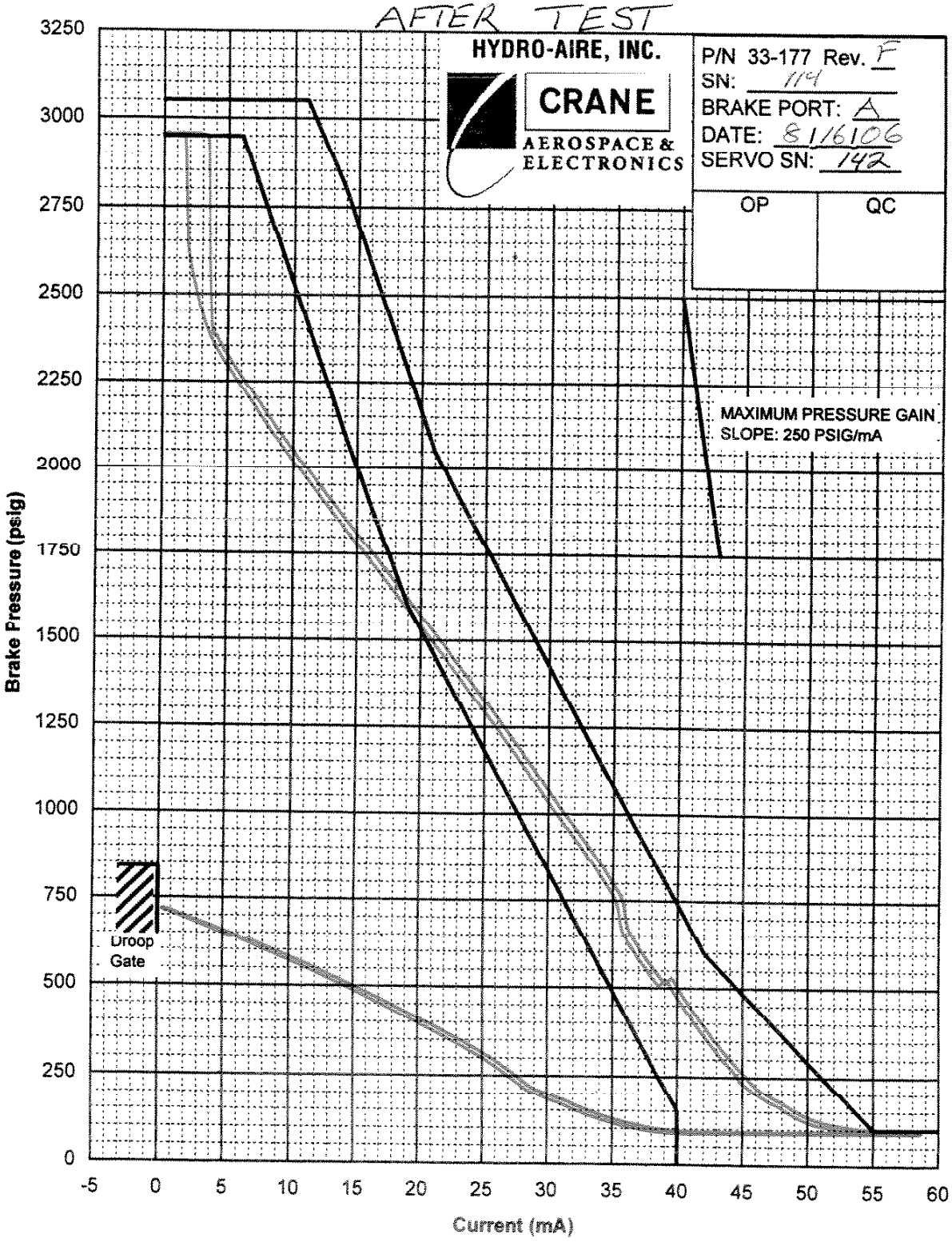
CRANE
AEROSPACE & ELECTRONICS
P/N 33-177 Rev. F
SN: 109
BRAKE PORT: D
DATE: 8/16/06
SERVO SN:
OP
QC
MAXIMUM PRESSURE GAIN
SLOPE: 250 PSIG/mA
Droop Gate
Brake Pressure (psig)
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
Current (mA)

AFTER TEST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CRANE
AEROSPACE & ELECTRONICS
P/N 33-177 Rev. F
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DATE: 8/16/06
SERVO SN: 142
OP
QC
MAXIMUM PRESSURE GAIN
SLOPE: 250 PSIG/mA
Droop Gate
Brake Pressure (psig)
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-5
0
5
10
15
20
25
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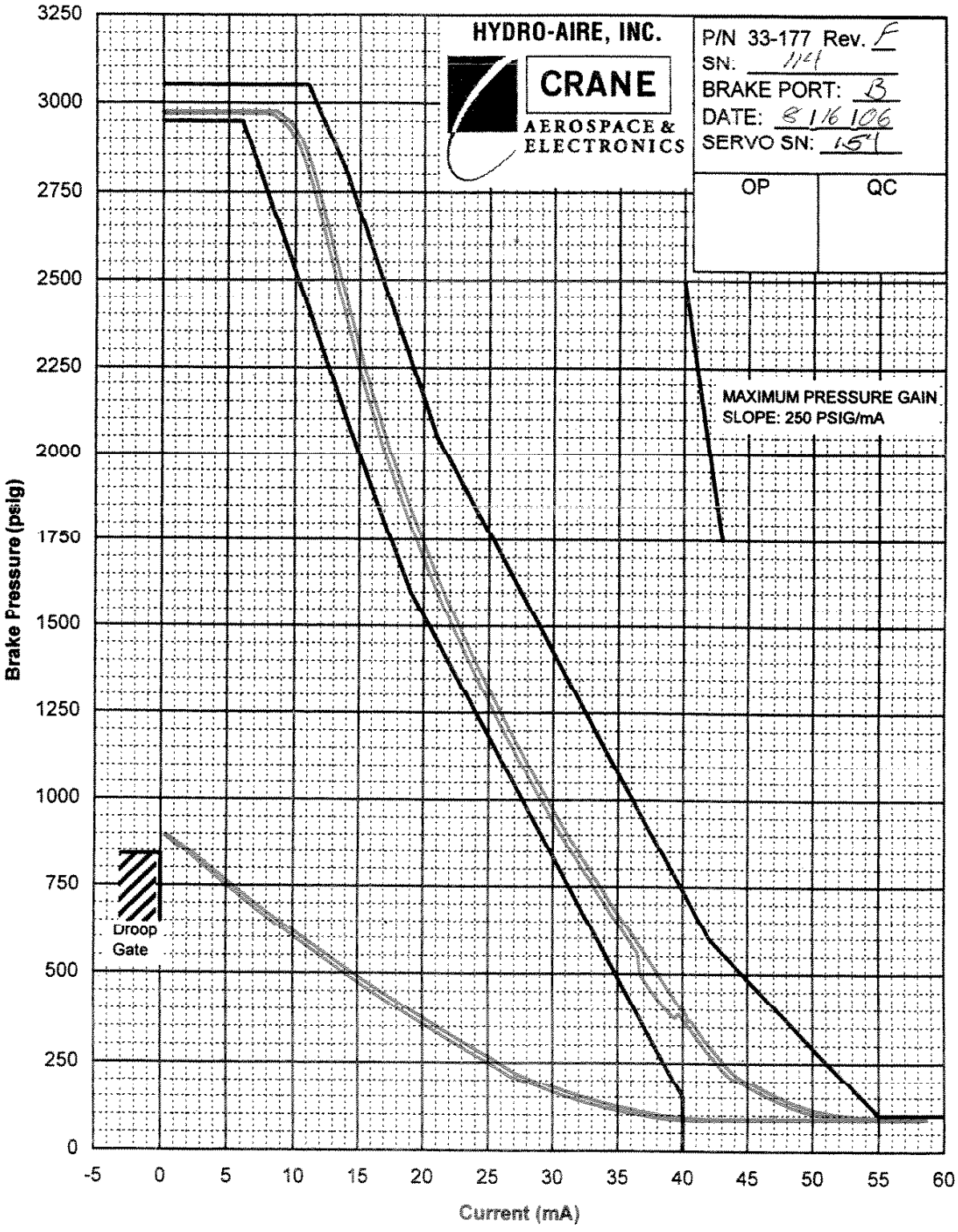
35
40
45
50
55
60
Current (mA)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CRANE
AEROSPACE & ELECTRONICS
P/N 33-177 Rev. F
SN: 1141
BRAKE PORT: B
DATE: 8/16/06
SERVO SN: 151
OP
QC
MAXIMUM PRESSURE GAIN
SLOPE: 250 PSIG/mA
Droop Gate
Brake Pressure (psig)
Current (mA)
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
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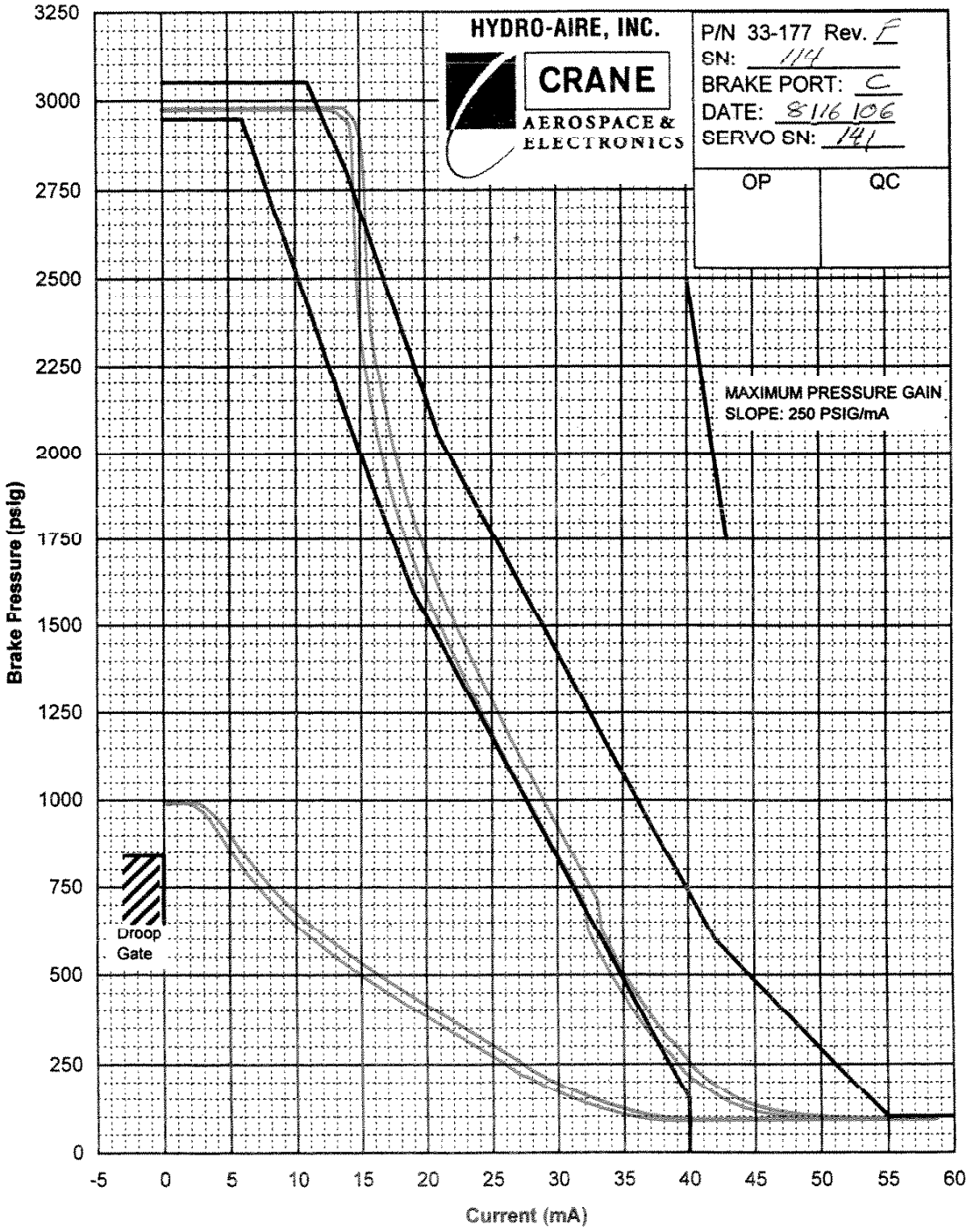
HYDRO-AIRE, INC.
CRANE
AEROSPACE & ELECTRONICS
P/N 33-177 Rev. F
SN: 114
BRAKE PORT: C
DATE: 8/16/06
SERVO SN: 141
OP
QC
MAXIMUM PRESSURE GAIN
SLOPE: 250 PSIG/mA
Droop Gate
Brake Pressure (psig)
Current (mA)
3250
3000
2750
2500
2250
2000
1750
1500
1250
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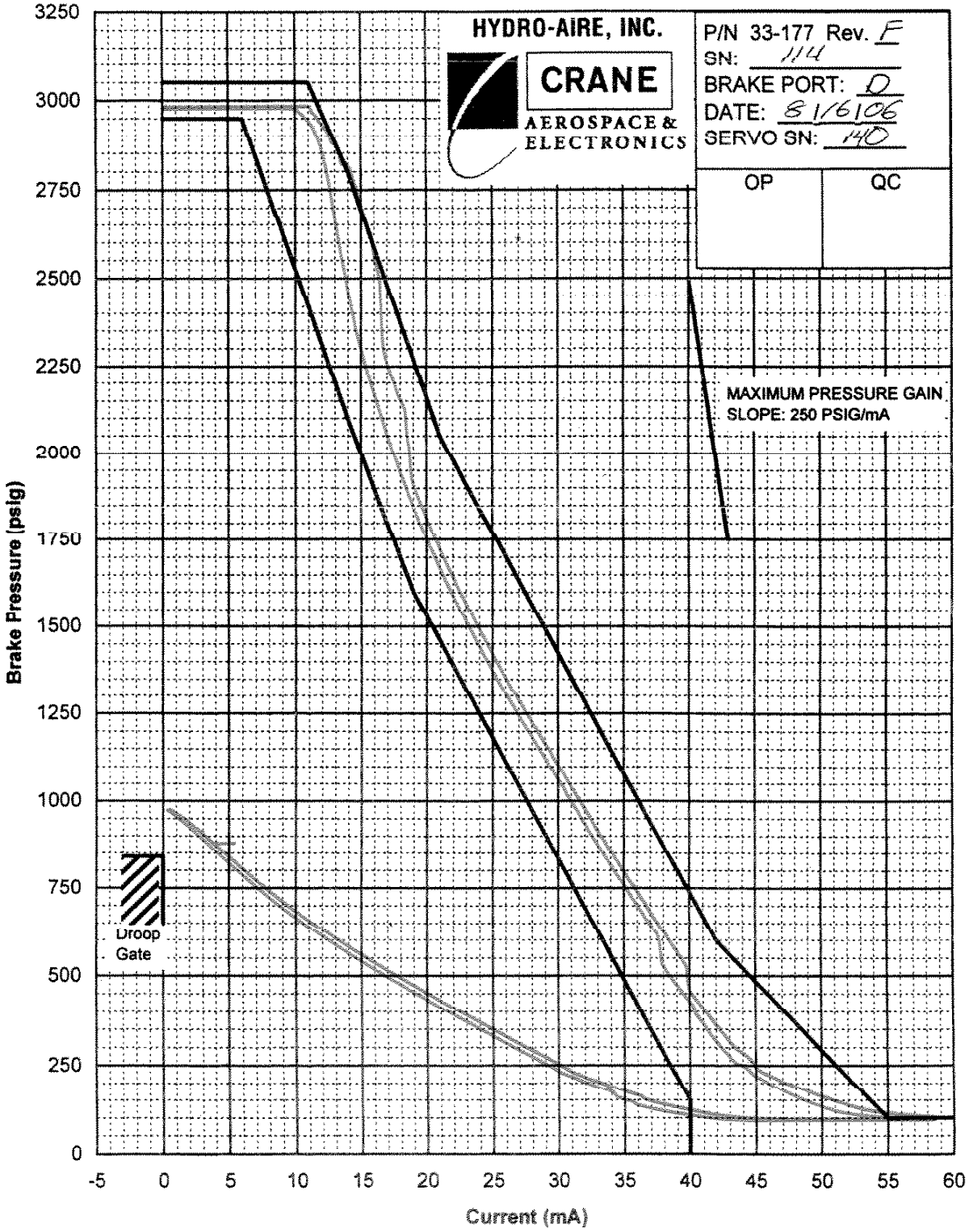
HYDRO-AIRE, INC.
CRANE
AEROSPACE & ELECTRONICS
P/N 33-177 Rev. F
SN: 114
BRAKE PORT: D
DATE: 8/16/06
SERVO SN: 140
OP
QC
MAXIMUM PRESSURE GAIN
SLOPE: 250 PSIG/mA
Droop Gate
Brake Pressure (psig)
Current (mA)
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-5
0
5
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