ATTACHMENT 7

Anti-Skid Dual Control Valve Examination Results

Left Outboard Position

Serial Number 4759

0074

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CRANE HYDRO-AIRE

CRANE CO. • 3000 WINONA AVENUE • P. O. BOX 7722 • BURBANK, CA 91504

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Report No. TP39-249

Revision No. P

DATE 05/05/2015 S/N 4759

OPER. TERRY NEWMAN

WO/RMDR. 5190294

P/N 39-249 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
2.1.1	Insul. Resistance	_____megohms	100 megohms min.
2.1.2	Dielectric	_____mA	0.5 mA max.
2.1.3	Insul. Resistance	_____megohms	100 megohms min.
2.2.1.1	Coil Resistance	198.8 ohms	190–200 ohms @ 70°F ±5°F
2.2.1.2	Coil Resistance	194.6 ohms	190–200 ohms @ 70°F ±5°F
2.2.1.3	Sol. Resistance	52-84 ohms	50 – 54 ohms @ 70°F ±5°F
2.2.1.4	Contact Resistance Pin J – K	_____ohms	1 megohm minimum
	Contact Resistance Pin J – K	_____ohms	2 ohms maximum
4.3.1	Proof Press.	Acc	No leakage/3500 PSIG
4.3.2	Proof Press.	Acc	No leakage/4500 PSIG
4.3.3	Proof Press.	Acc Accept	No evidence of distortion.
5.3.1	Leakage	Acc	Flow, when energized @ 3000 PSIG. No flow when de-energized.
5.3.2	Leakage	0 cc/min.	0.2 cc/min. within 10 minutes per Figure 3
5.3.3	Leakage	0.10 cc/total	38 cc max. in 10 min.
6.3.1	Leakage	800 cc/min.	1800 cc/min. maximum
6.3.2	Leakage	410 cc/min.	1100 cc/min. maximum
6.3.3	Leakage	420 cc/min.	1100 cc/min. maximum
6.5.1	Shutoff Valve	Acc	Flow when energized @ 3500 PSIG. No flow when de-energized.
6.5.2	Shutoff Valve	18 cc/min.	70 cc/min. maximum
7.3.1	Switch On	5 VDC	2 VDC Min. (Lamp ON)
7.3.2	Switch Off	13 VDC	18 VDC Max. (Lamp OUT)

CRANE HYDRO-AIRE

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DATA SHEET 2 of 3

Page No. 23
Report No. TP39-249
Revision No. P
DATE 05/05/2015 S/N 4759
OPER. Terry Newman
WO/RMDR. S1902944

P/N 39-249 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
8.3.1	Differential Pressure to Port B1	294 PSI	400 PSI max.
9.1	Differential Pressure to Port B2	255 PSI	400 PSI max.
10.3.1	Differential Pressure Port B1 to Return	152 PSI	400 PSI max.
11.1	Differential Pressure Port B2 to Return	156 PSI	400 PSI max.
12.2.3	Stability	Acc Accept	No squeal or oscillation
12.3.1	Step Input B1 (3000)	0.008 sec.	Pressure reduction in .02 second max.
		0.018 sec.	63% decay in .06 second max.
13.1	Step Input B2 (3000)	0.006 sec.	Pressure reduction in .02 second max.
		0.016 sec.	63% decay in .06 second max.
13.2.1	Step Input B1 (1800)	0.010 sec.	Pressure reduction in .026 second max.
	Step Input B2 (1800)	0.010 sec.	Pressure reduction in .026 second max.
	Step Input B1 (600)	0.004 sec.	Pressure reduction in .041 second max.
	Step Input B2 (600)	0.004 sec.	Pressure reduction in .041 second max.

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HA 35 T

DATE 05/05/15 S/N 4759
OPER. Terry Newman
WO/RMDR. S1902944

P/N 39-249 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
14.3	Small Signal Track. B1	0.010 sec.	Lag. 025 sec. max.
14.4.1	Small Signal Track. B2	0.008 sec.	Lag. 025 sec. max.
15.3.1	Hysteresis B1	1.0 mA	2 mA max.
	Press.		
	Current B1 @ 3000	Reject Accept	Per Figure 1
	Current B1 @ 1800	Acc Accept	Per Figure 1
	Current B1 @ 500	Acc Accept	Per Figure 1
16.1	Hysteresis B2	1.0 mA	2 mA max.
	Press.		
	Current B2 @ 3000	Reject Accept	Per Figure 1
	Current B2 @ 1800	Acc Accept	Per Figure 1
	Current B2 @ 500	Acc Accept	Per Figure 1

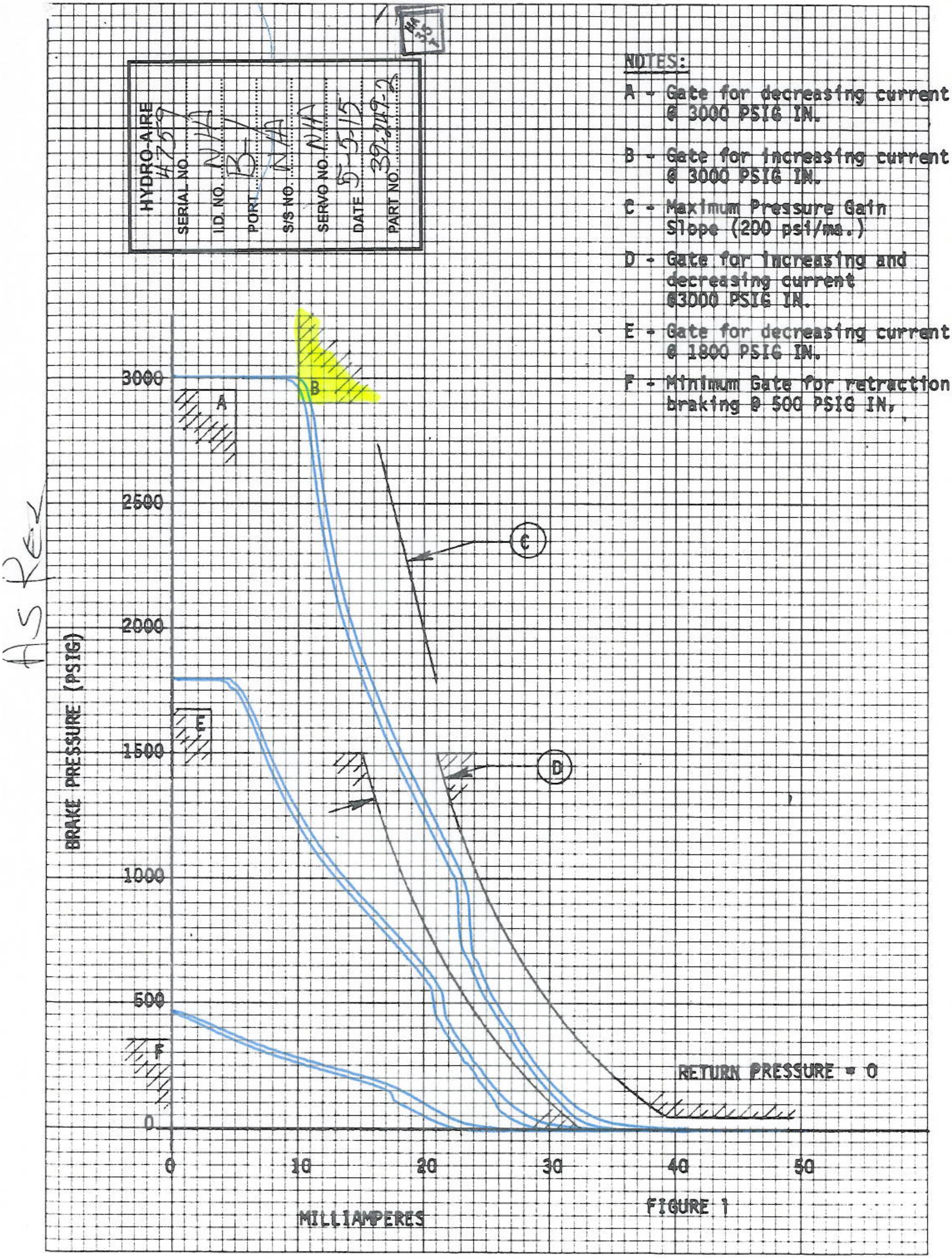
HYDRO-AIRE
SERIAL NO. 4759
I.D. NO. N/A
PORT B
S/S NO. N/A
SERVO NO. N/A
DATE 5-5-15
PART NO.
NOTES:
A - Gate for decreasing current @ 3000 PSIG IN.
B - Gate for increasing current @ 3000 PSIG IN.
C - Maximum Pressure Gain Slope (200 psi/ma.)
D - Gate for increasing and decreasing current @3000 PSIG IN.
E - Gate for decreasing current @ 1800 PSIG IN.
F - Minimum Gate for retraction braking @ 500 PSIG IN.
BRAKE PRESSURE (PSIG)
3000
2500
2000
1500
1000
500
0
A
B
C
D
E
F
RETURN PRESSURE = 0
0
10
20
30
40
50
MILLIAMPERES
As Rec

FIGURE 1

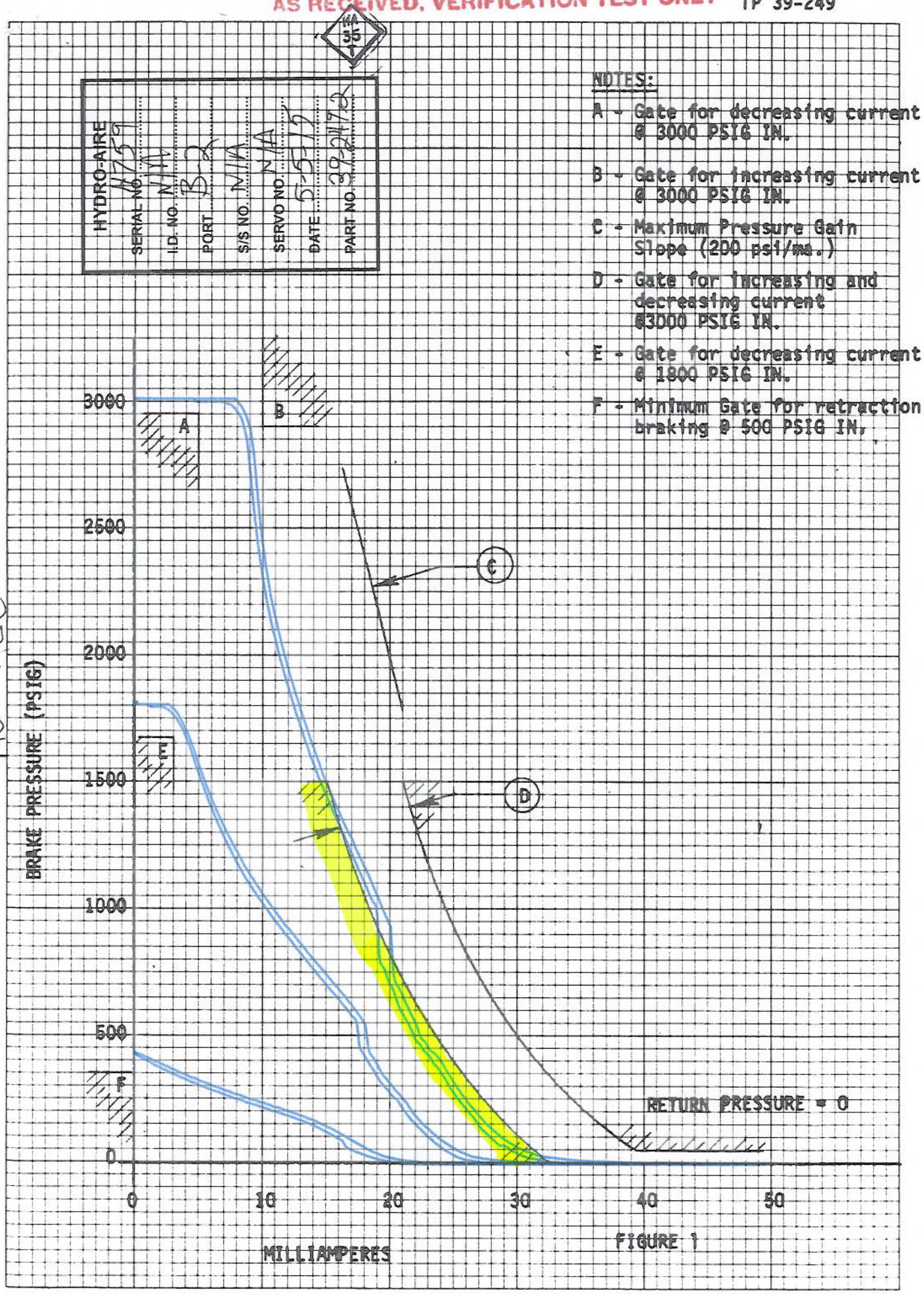
HYDRO-AIRE
SERIAL NO. 1176
I.D. NO. N/A
PORT B-2
S/S NO. N/A
SERVO NO. N/A
DATE 5-5-72
PART NO. 39-2172
NOTES:
A - Gate for decreasing current @ 3000 PSIG IN.
B - Gate for increasing current @ 3000 PSIG IN.
C - Maximum Pressure Gain Slope (200 psi/ma.)
D - Gate for increasing and decreasing current @3000 PSIG IN.
E - Gate for decreasing current @ 1800 PSIG IN.
F - Minimum Gate for retraction braking @ 500 PSIG IN.
BRAKE PRESSURE (PSIG)
3000
2500
2000
1500
1000
500
0
A
B
C
D
E
F
RETURN PRESSURE = 0
0
10
20
30
40
50
MILLIAMPERES

FIGURE 1

Left Inboard Position

Serial Number 754

COPY

CRANE HYDRO-AIRE

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Revision No. P
DATE 05/04/2015 S/N 754
OPER. Terry Newman
WO/RMDR. 5190245

P/N 39-249-2 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
2.1.1	Insul. Resistance	_____megohms	100 megohms min.
2.1.2	Dielectric	_____mA	0.5 mA max.
2.1.3	Insul. Resistance	_____megohms	100 megohms min.
2.2.1.1	Coil Resistance	196.8 ohms	190–200 ohms @ 70°F ±5°F
2.2.1.2	Coil Resistance	193.5 ohms	190–200 ohms @ 70°F ±5°F
2.2.1.3	Sol. Resistance	52.98 ohms	50 – 54 ohms @ 70°F ±5°F
2.2.1.4	Contact Resistance Pin J – K	_____ohms	1 megohm minimum
	Contact Resistance Pin J – K	_____ohms	2 ohms maximum
4.3.1	Proof Press.	Acc	No leakage/3500 PSIG
4.3.2	Proof Press.	Acc	No leakage/4500 PSIG
4.3.3	Proof Press.	Acc Accept	No evidence of distortion.
5.3.1	Leakage	Acc	Flow, when energized @ 3000 PSIG. No flow when de-energized.
5.3.2	Leakage	0 cc/min.	0.2 cc/min. within 10 minutes per Figure 3
5.3.3	Leakage	1.5 cc/total	38 cc max. in 10 min.
6.3.1	Leakage	1000 cc/min.	1800 cc/min. maximum
6.3.2	Leakage	620 cc/min.	1100 cc/min. maximum
6.3.3	Leakage	500 cc/min.	1100 cc/min. maximum
6.5.1	Shutoff Valve	Acc	Flow when energized @ 3500 PSIG. No flow when de-energized.
6.5.2	Shutoff Valve	12.2 cc/min.	70 cc/min. maximum
7.3.1	Switch On	6 VDC	2 VDC Min. (Lamp ON)
7.3.2	Switch Off	15.5 VDC	18 VDC Max. (Lamp OUT)

CRANE HYDRO-AIRE

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OPER. Terry Newman
WO/RMDR. 5190295

P/N 39-249-2 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
8.3.1	Differential Pressure to Port B1	326 PSI	400 PSI max.
9.1	Differential Pressure to Port B2	329 PSI	400 PSI max.
10.3.1	Differential Pressure Port B1 to Return	201 PSI	400 PSI max.
11.1	Differential Pressure Port B2 to Return	172 PSI	400 PSI max.
12.2.3	Stability	Acc Accept	No squeal or oscillation
12.3.1	Step Input B1 (3000)	0.008 sec.	Pressure reduction in .020 second max.
		0.032 sec.	63% decay in .060 second max.
13.1	Step Input B2 (3000)	0.010 sec.	Pressure reduction in .02 second max.
		0.028 sec.	63% decay in .06 second max.
13.2.1	Step Input B1 (1800)	0.004 sec.	Pressure reduction in .026 second max.
	Step Input B2 (1800)	0.004 sec.	Pressure reduction in .026 second max.
	Step Input B1 (600)	0.004 sec.	Pressure reduction in .041 second max.
	Step Input B2 (600)	0.004 sec.	Pressure reduction in .041 second max.

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OPER. Terry Newman
WO/RMDR. S1902945

P/N 39-249-2 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
14.3	Small Signal Track. B1	0-010 sec.	Lag. 025 sec. max.
14.4.1	Small Signal Track. B2	0-020 sec.	Lag. 025 sec. max.
15.3.1	Hysteresis B1	1.2 mA	2 mA max.
	Press.		
	Current B1 @ 3000	Reject Accept	Per Figure 1
	Current B1 @ 1800	Reject Accept	Per Figure 1
	Current B1 @ 500	Reject Accept	Per Figure 1
16.1	Hysteresis B2	10 mA	2 mA max.
	Press.		
	Current B2 @ 3000	Reject Accept	Per Figure 1
	Current B2 @ 1800	Reject Accept	Per Figure 1
	Current B2 @ 500	Acc Accept	Per Figure 1

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HYDRO-AIRE	254
SERIAL NO.	N/A
I.D. NO.	5-1
PORT	N/A
S/S NO.	N/A
SERVO NO.	5-515
DATE	39249-2
PART NO.	

NOTES:

A - Gate for decreasing current @ 3000 PSIG IN.

B - Gate for increasing current @ 3000 PSIG IN.

C - Maximum Pressure Gain Slope (200 psi/ma.)

D - Gate for increasing and decreasing current @3000 PSIG IN.

E - Gate for decreasing current @ 1800 PSIG IN.

F - Minimum Gate for retraction braking @ 500 PSIG IN.

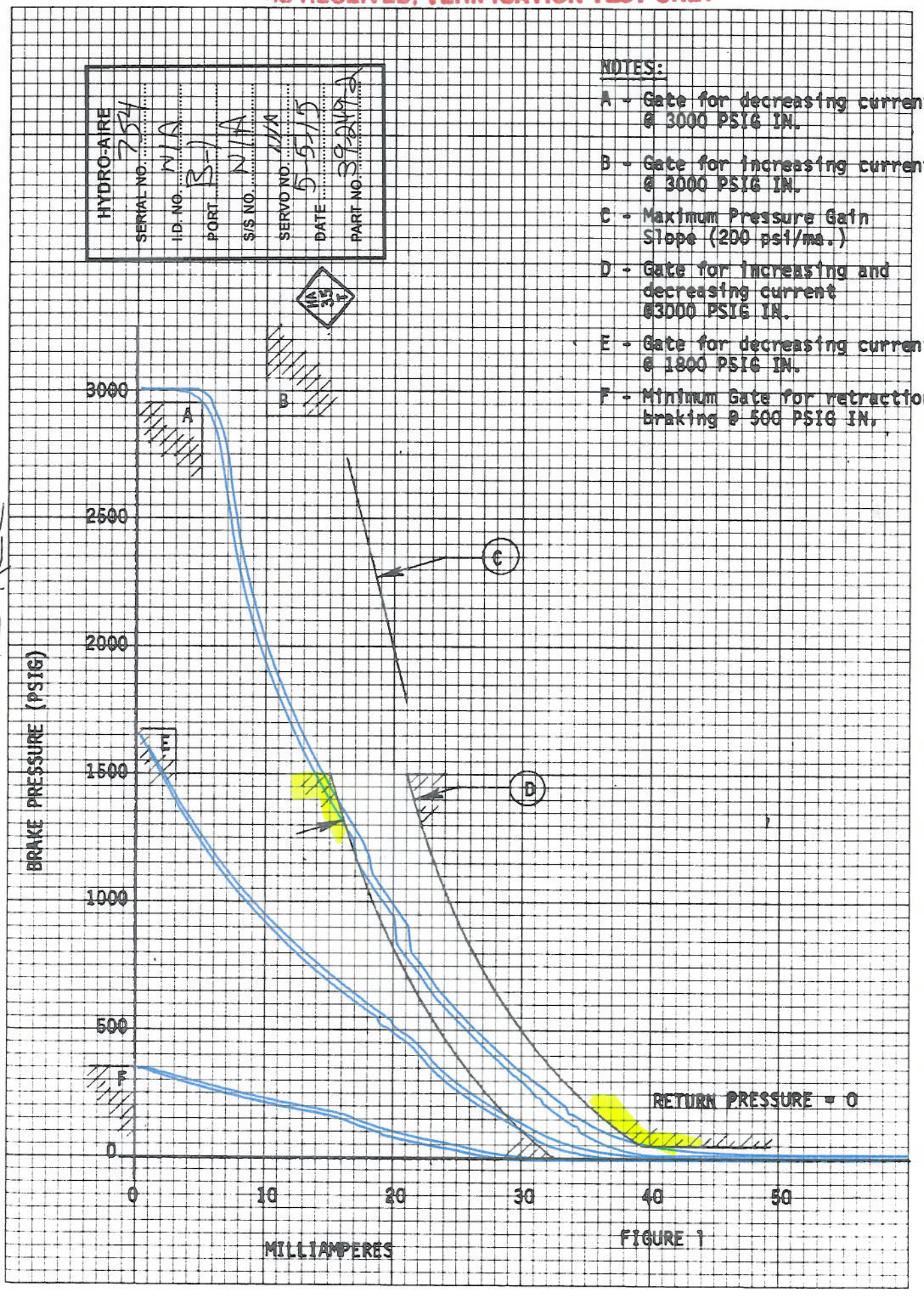

FIGURE 1

HSR

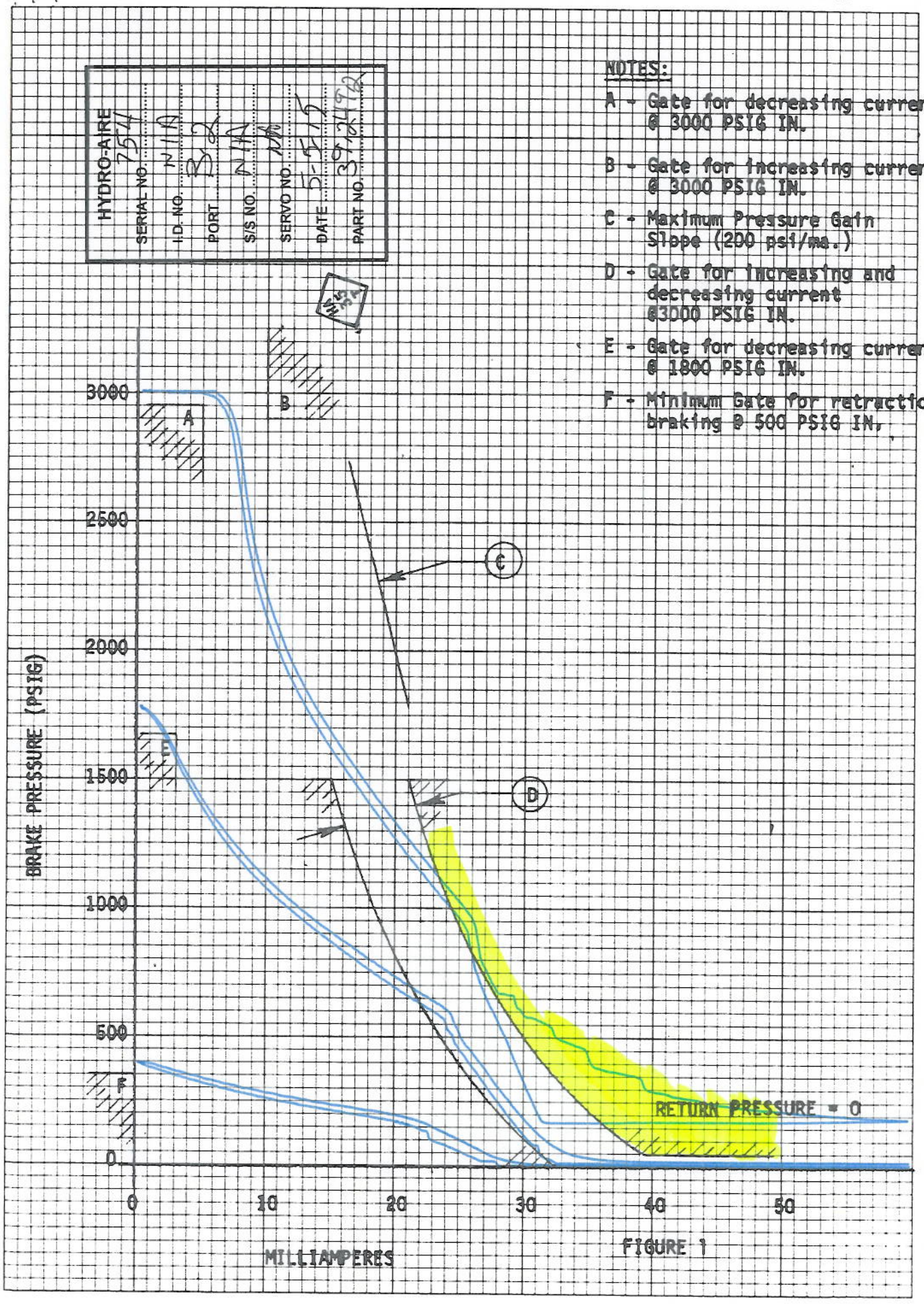

FIGURE 1

HYDRO-AIRE
SERIAL NO. 765
I.D. NO. N/A
PORT B-2
S/S NO. N/A
SERVO NO. N/A
DATE 05/20/15
PART NO. 39-249-2

NOTES:

- A - Gate for decreasing current @ 3000 PSIG IN.
- B - Gate for increasing current @ 3000 PSIG IN.
- C - Maximum Pressure Gain Slope (200 psi/ma.)
- D - Gate for increasing and decreasing current @3000 PSIG IN.
- E - Gate for decreasing current @ 1800 PSIG IN.
- F - Minimum Gate for retraction braking @ 500 PSIG IN.

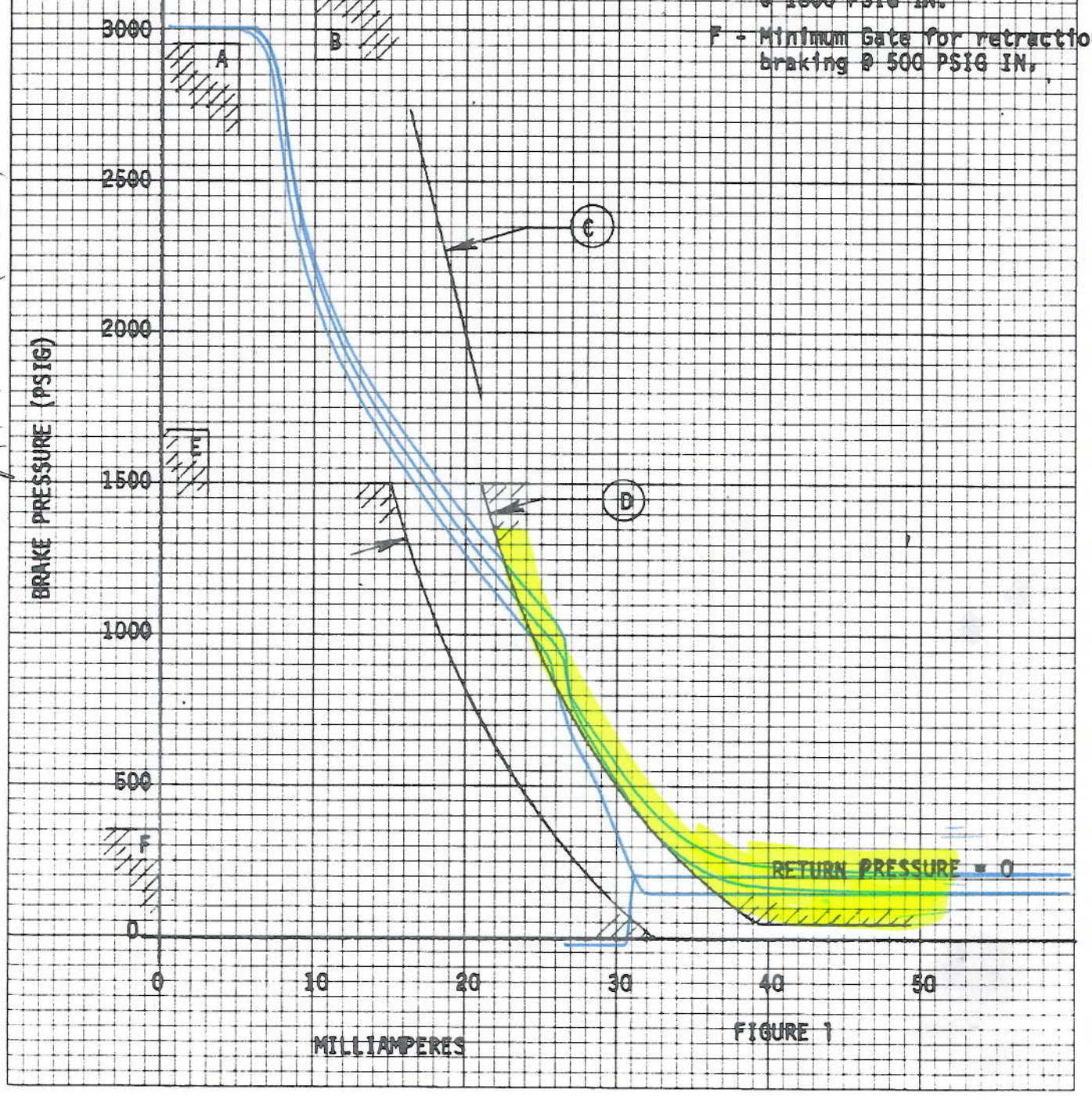

FIGURE 1

After Flush

Right Inboard Position

Serial Number 2651ABC

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Revision No. P

DATE 05/05/2015 S/N 265 ABC

OPER. Terry Newman

WO/RMDR. 51902946

P/N 39-249 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
2.1.1	Insul. Resistance	_____megohms	100 megohms min.
2.1.2	Dielectric	_____mA	0.5 mA max.
2.1.3	Insul. Resistance	_____megohms	100 megohms min.
2.2.1.1	Coil Resistance	197.7 ohms	190–200 ohms @ 70°F ±5°F
2.2.1.2	Coil Resistance	195.8 ohms	190–200 ohms @ 70°F ±5°F
2.2.1.3	Sol. Resistance	52.57 ohms	50 – 54 ohms @ 70°F ±5°F
2.2.1.4	Contact Resistance Pin J – K	_____ohms	1 megohm minimum
	Contact Resistance Pin J – K	_____ohms	2 ohms maximum
4.3.1	Proof Press.	Acc	No leakage/3500 PSIG
4.3.2	Proof Press.	Acc	No leakage/4500 PSIG
4.3.3	Proof Press.	Acc Accept	No evidence of distortion.
5.3.1	Leakage	Acc	Flow, when energized @ 3000 PSIG. No flow when de-energized.
5.3.2	Leakage	0 cc/min.	0.2 cc/min. within 10 minutes per Figure 3
5.3.3	Leakage	0.5 cc/total	38 cc max. in 10 min.
6.3.1	Leakage	1570 cc/min.	1800 cc/min. maximum
6.3.2	Leakage	940 cc/min.	1100 cc/min. maximum
6.3.3	Leakage	690 cc/min.	1100 cc/min. maximum
6.5.1	Shutoff Valve	Acc	Flow when energized @ 3500 PSIG. No flow when de-energized.
6.5.2	Shutoff Valve	21 cc/min.	70 cc/min. maximum
7.3.1	Switch On	6 VDC	2 VDC Min. (Lamp ON)
7.3.2	Switch Off	14 VDC	18 VDC Max. (Lamp OUT)

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CRANE HYDRO-AIRE

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OPER. Terry Newman
WO/RMDR. S1902946

P/N 39-249 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
8.3.1	Differential Pressure to Port B1	359 PSI	400 PSI max.
9.1	Differential Pressure to Port B2	~~410~~ 410 PSI	400 PSI max.
10.3.1	Differential Pressure Port B1 to Return	148 PSI	400 PSI max.
11.1	Differential Pressure Port B2 to Return	154 PSI	400 PSI max.
12.2.3	Stability	Acc Accept	No squeal or oscillation
12.3.1	Step Input B1 (3000)	0.006 sec.	Pressure reduction in .02 second max.
		~~0.005~~ 0.020 sec.	63% decay in .06 second max.
13.1	Step Input B2 (3000)	0.006 sec.	Pressure reduction in .02 second max.
		0.018 sec.	63% decay in .06 second max.
13.2.1	Step Input B1 (1800)	0.002 sec.	Pressure reduction in .026 second max.
	Step Input B2 (1800)	0.004 sec.	Pressure reduction in .026 second max.
	Step Input B1 (600)	0.004 sec.	Pressure reduction in .041 second max.
	Step Input B2 (600)	0.002 sec.	Pressure reduction in .041 second max.

10 PSI OVER LIMIT Will Not Affect Operation of Valve

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CRANE HYDRO-AIRE

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Page No. 24

Report No. TP39-249

Revision No. P

DATE 05/05/15 S/N 269 ABC

OPER. Terry Newman

WO/RMDR. 8190 2946

P/N 39-249 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
14.3	Small Signal Track. B1	0.008 sec.	Lag. 025 sec. max.
14.4.1	Small Signal Track. B2	0.016 sec.	Lag. 025 sec. max.
15.3.1	Hysteresis B1	50 mA	2 mA max.
	Press.		
	Current B1 @ 3000	Reject Accept	Per Figure 1
	Current B1 @ 1800	Reject Accept	Per Figure 1
	Current B1 @ 500	ACC Accept	Per Figure 1
16.1	Hysteresis B2	20 mA	2 mA max.
	Press.		
	Current B2 @ 3000	Reject Accept	Per Figure 1
	Current B2 @ 1800	Reject Accept	Per Figure 1
	Current B2 @ 500	Reject Accept	Per Figure 1

TRACE WAS 50 PSI OVER LIMIT @ ≈ 25 -40 PSI, WOULD NOT AFFECT OPERATION OF ANTI SKID

TRACE WAS slightly OUT OF LIMIT & WOULD HAVE OPERATED AS ANTI SKID VALVE

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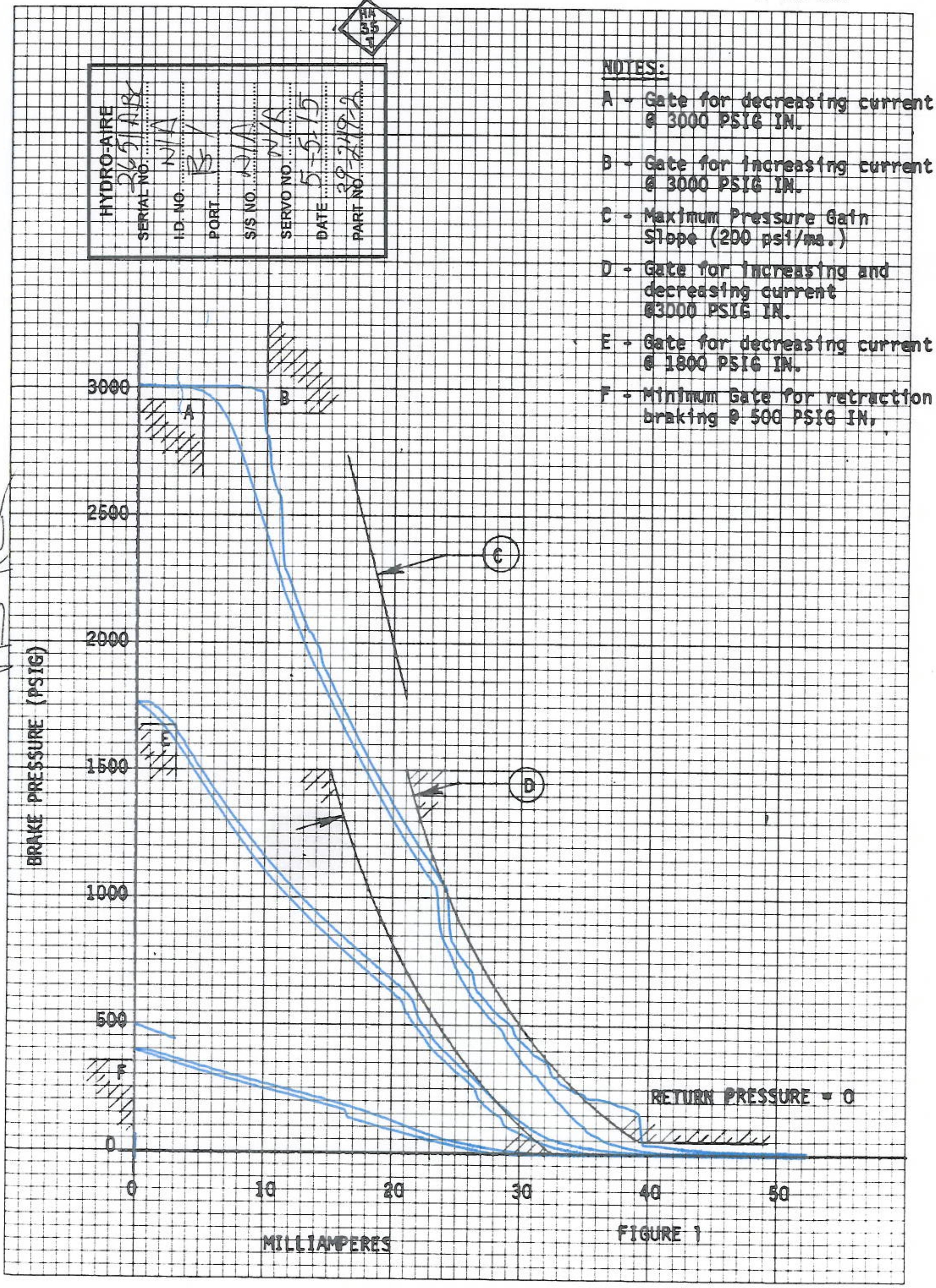
HYDRO-AIRE
SERIAL NO.
I.D. NO.
PORT
S/S NO.
SERVO NO.
DATE
PART NO.
NOTES:
A - Gate for decreasing current @ 3000 PSIG IN.
B - Gate for increasing current @ 3000 PSIG IN.
C - Maximum Pressure Gain Slope (200 psi/ma.)
D - Gate for increasing and decreasing current @3000 PSIG IN.
E - Gate for decreasing current @ 1800 PSIG IN.
F - Minimum Gate for retraction braking @ 500 PSIG IN.
BRAKE PRESSURE (PSIG)
3000
2500
2000
1500
1000
500
0
A
B
C
D
E
F
RETURN PRESSURE = 0
0
10
20
30
40
50
MILLIAMPERES

FIGURE 1

B2

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HYDRO-AIRE
SERIAL NO. 26144-2
I.D. NO. B-2
PORT N/A
S/S NO. N/A
SERVO NO. 05705515
DATE 7-31-64
PART NO. 39-249-2

NOTES:

A - Gate for decreasing current @ 3000 PSIG IN.

B - Gate for increasing current @ 3000 PSIG IN.

C - Maximum Pressure Gain Slope (200 psi/ma.)

D - Gate for increasing and decreasing current @3000 PSIG IN.

E - Gate for decreasing current @ 1800 PSIG IN.

F - Minimum Gate for retraction braking @ 500 PSIG IN.

Cycle #4

BRAKE PRESSURE (PSIG)

3000
2500
2000
1500
1000
500
0

0 10 20 30 40 50

MILLIAMPERES

RETURN PRESSURE = 0

FIGURE 1

Right Outboard Position

Serial Number 4384

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CRANE HYDRO-AIRE

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Revision No. P

HA 35 T

DATE 05/05/15 S/N 4384

OPER. Terry Newman

WO/RMDR. 5190298

P/N 39-249 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
2.1.1	Insul. Resistance	_____megohms	100 megohms min.
2.1.2	Dielectric	_____mA	0.5 mA max.
2.1.3	Insul. Resistance	_____megohms	100 megohms min.
2.2.1.1	Coil Resistance	192.3 ohms	190–200 ohms @ 70°F ±5°F
2.2.1.2	Coil Resistance	192.7 ohms	190–200 ohms @ 70°F ±5°F
2.2.1.3	Sol. Resistance	51.05 ohms	50 – 54 ohms @ 70°F ±5°F
2.2.1.4	Contact Resistance Pin J – K	_____ohms	1 megohm minimum
	Contact Resistance Pin J – K	_____ohms	2 ohms maximum
4.3.1	Proof Press.	NONE	No leakage/3500 PSIG
4.3.2	Proof Press.	NONE	No leakage/4500 PSIG
4.3.3	Proof Press.	Acc Accept	No evidence of distortion.
5.3.1	Leakage	Acc	Flow, when energized @ 3000 PSIG. No flow when de-energized.
5.3.2	Leakage	0 cc/min.	0.2 cc/min. within 10 minutes per Figure 3
5.3.3	Leakage	0.5 cc/total	38 cc max. in 10 min.
6.3.1	Leakage	820 cc/min.	1800 cc/min. maximum
6.3.2	Leakage	380 cc/min.	1100 cc/min. maximum
6.3.3	Leakage	530 cc/min.	1100 cc/min. maximum
6.5.1	Shutoff Valve	Acc	Flow when energized @ 3500 PSIG. No flow when de-energized.
6.5.2	Shutoff Valve	13 cc/min.	70 cc/min. maximum
7.3.1	Switch On	4 VDC	2 VDC Min. (Lamp ON)
7.3.2	Switch Off	13 VDC	18 VDC Max. (Lamp OUT)

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CRANE HYDRO-AIRE

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DATE 05/05/15 S/N 4384
OPER. Terry Newman
WO/RMDR. S1902948

P/N 39-249 REV. E NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
8.3.1	Differential Pressure to Port B1	280 PSI	400 PSI max.
9.1	Differential Pressure to Port B2	325 PSI	400 PSI max.
10.3.1	Differential Pressure Port B1 to Return	160 PSI	400 PSI max.
11.1	Differential Pressure Port B2 to Return	152 PSI	400 PSI max.
12.2.3	Stability	ACC Accept	No squeal or oscillation
12.3.1	Step Input B1 (3000)	0.008 sec.	Pressure reduction in .02 second max.
		0.018 sec.	63% decay in .06 second max.
13.1	Step Input B2 (3000)	0.008 sec.	Pressure reduction in .02 second max.
		0.018 sec.	63% decay in .06 second max.
13.2.1	Step Input B1 (1800)	0.004 sec.	Pressure reduction in .026 second max.
	Step Input B2 (1800)	0.004 sec.	Pressure reduction in .026 second max.
	Step Input B1 (600)	0.004 sec.	Pressure reduction in .041 second max.
	Step Input B2 (600)	0.004 sec.	Pressure reduction in .041 second max.

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Revision No. P
DATE 05/05/15 S/N 4384
OPER. TERRY N.
WO/RMDR. 51902948

P/N 39-249 REV. F NAME CONTROL VALVE

PARA	TEST	TEST RESULTS	TEST REQUIREMENTS
14.3	Small Signal Track. B1	0.012 sec.	Lag. 025 sec. max.
14.4.1	Small Signal Track. B2	0.012 sec.	Lag. 025 sec. max.
15.3.1	Hysteresis B1	2.5 mA	2 mA max.
	Press.		
	Current B1 @ 3000	Reject Accept	Per Figure 1
	Current B1 @ 1800	ACC Accept	Per Figure 1
	Current B1 @ 500	ACC Accept	Per Figure 1
16.1	Hysteresis B2	1.0 mA	2 mA max.
	Press.		
	Current B2 @ 3000	Reject Accept	Per Figure 1
	Current B2 @ 1800	Reject Accept	Per Figure 1
	Current B2 @ 500	Reject Accept	Per Figure 1

HYDRO-AIRE	
SERIAL NO.	4356
I.D. NO.	N/A
PORT	B-1
S/S NO.	N/A
SERVO NO.	N/A
DATE	5-5-15
PART NO.	39-2418-2

NOTES:

A - Gate for decreasing current @ 3000 PSIG IN.

B - Gate for increasing current @ 3000 PSIG IN.

C - Maximum Pressure Gain Slope (200 psi/ma.)

D - Gate for increasing and decreasing current @3000 PSIG IN.

E - Gate for decreasing current @ 1800 PSIG IN.

F - Minimum Gate for retraction braking @ 500 PSIG IN.

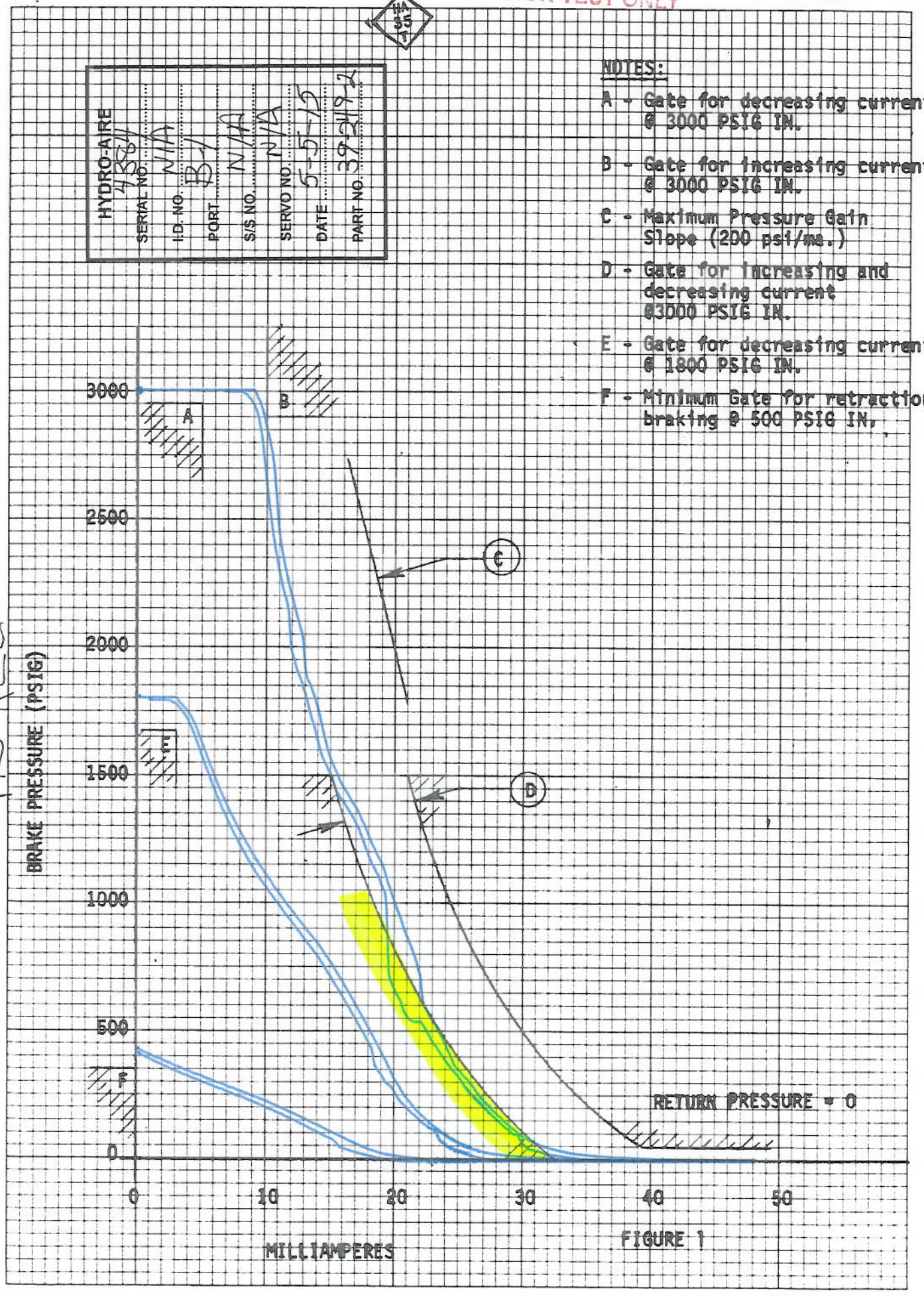

FIGURE 1

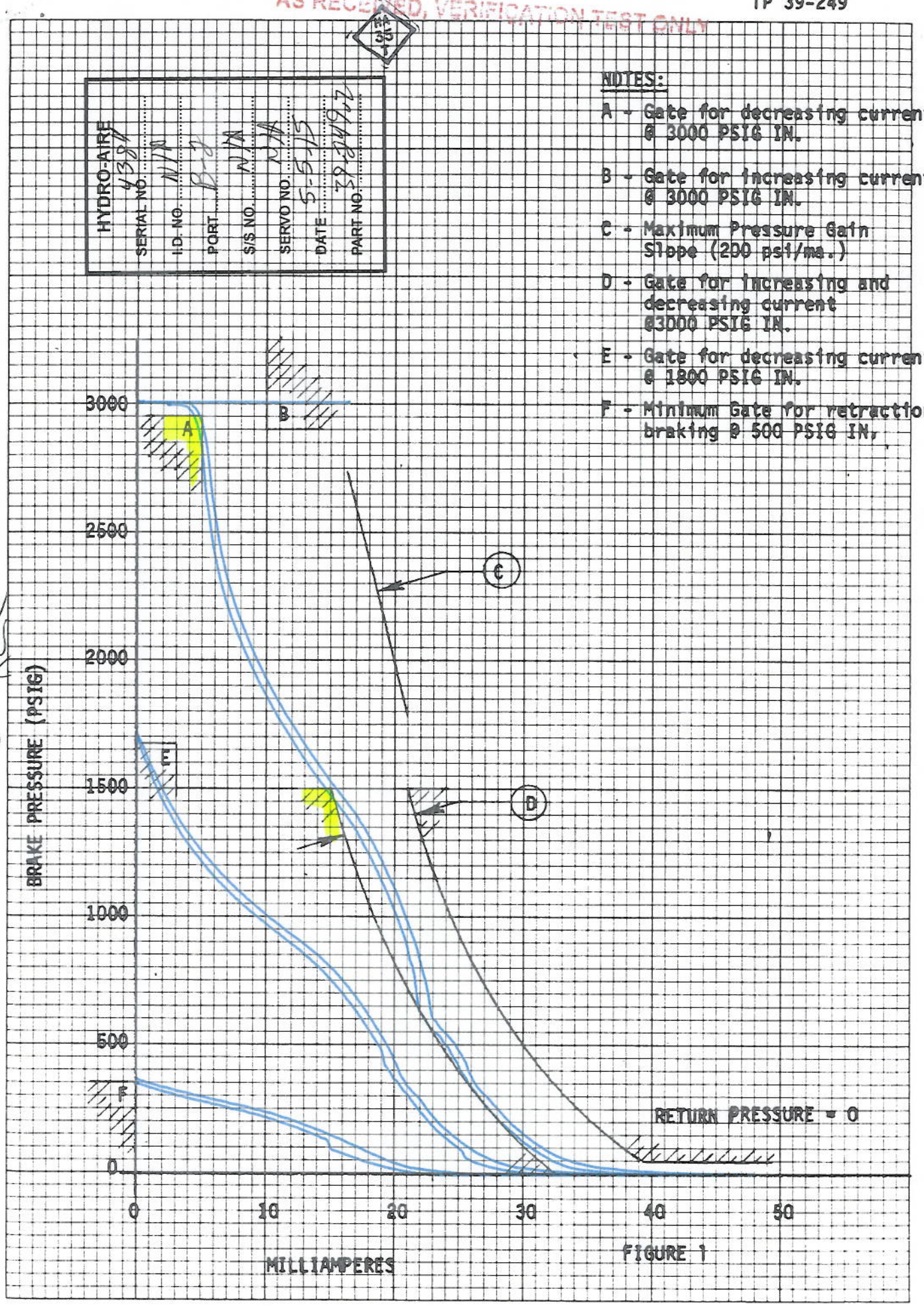

FIGURE 1