

REV NO.

1/2

TITLE

SPECIFICATIONS AND TEST INSTRUCTIONS

VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280*

K-AL-0395-A01

CONT ON SHEET

2

SH NO.

1

FIRST MADE FOR

EHC MARK II

1F1-F0



*G1=G2 except Section K2

REVISIONS

A. BOARD CONTENTS

1. Servoamplifier with meter drive.
2. 3 KHz oscillator
3. Phase-sensitive demodulator
4. Low-pass filter
5. Feedback amplifier
6. 6 each regulated power supplies

B. TEST SETUP

See Figure 1.

C. POWER SUPPLIES (INITIAL CHECK)

1. $V_{TP1} = 15.7 \pm 1.0$ VDC
2. $V_{TP2} = -15.7 \pm 1.0$ VDC
3. $V_{TP3} = 18.7 \pm 1.5$ VDC
4. $V_{TP4} = -18.7 \pm 1.5$ VDC
5. $V_{TP53} = 15.0 \pm 0.75$ VDC @ T_{room} ; < 16.5 VDC, hot
6. $V_{TP54} = -15.0 \pm 0.75$ VDC @ T_{room} ; > -16.5 VDC, hot

D. SERVOAMPLIFIER (IC5) - STEADY STATE

1. $|V_{TP5}| < 0.525$ VDC over full range of VR1.
2. VR2 fully CW, ~~VR2~~ grounded; zero V_{TP9} by adjusting V_{TP5} then:
 $-4.1V < TP9 < -3.9$
 $-2.2 < V_{TP9}/V_{TP5} < -2.2$ ($V_{TP5} = 0.205$ VDC)
3. ~~With VR2 fully CW~~, adjust VR1 so that ~~when~~ $V_{TP5} = 0$ ~~then~~ $V_{TP9} = 0$.
 a. Then the average gains are:
 $-4.2 < -4.0V < -3.5$
 V_{TP9}/V_{TP5}
 $-2.2 < V_{TP9}/V_{TP5} < -2.2$
 $V_{TP10}/V_{TP5} < 12$

- b. The Servo Amp current meter should read approximately 15ma @ $V_{TP55} = 0.2$ VDC.

VR2 Full CW $|V_{TP10} - V_{TP9}| \geq 1.9$ VDC after $|V_{TP55}| = 0.25$ VDC
 is applied for 1 min. VDC, change IC5
 If $|V_{TP10} - V_{TP9}| < 1.9$ VDC, change IC5

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J. Polacek Sept. 15, 1977

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Steam Turbine

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P3K-AL-0395-A01

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make sure VR2 is ^{full} CCW.

4) Set TP9 for 1.0V_{01T} DC (using 10Hz into Pin 11).

Read current across pin 12 to 18. ~~shd~~
should read about .025mA.

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P3K-AL-0395-A01		SPECIFICATIONS AND TEST INSTRUCTIONS		VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280			
CONT ON SHEET 3		SH NO. 2		FIRST MADE FOR EHC MARK II			
D. <u>SERVOAMPLIFIER - STEADY STATE</u> (continued)							REVISION 1 J. Polacek 28 1977 2 PAULISE OCT 27 1981 no check this int.
4. Adjust VR2 fully CCW. Then: $\begin{matrix} -4.1 < V_{TP9}/V_{TP55} < -3.9 \\ -4.6 < V_{TP10}/V_{TP55} < -4.3 \end{matrix}$ $ V_{TP55} \leq 3.0 \text{ VDC}$ <p>The servoamp meter should read approx. 14 ma at $V_{TP55} = 3.0 \text{ VDC}$. .2796 Fluke</p>							
E. <u>SERVOAMPLIFIER - TRANSIENT STATE</u>							
Adjust VR1 so that when $V_{TP55} = 0$ then $V_{TP9} = 0$; VR2 fully CCW. Apply a step input to TP55 where: $V_{STEP} \leq 0.25V$ <p>Then: $-18.6 < (V_{TP9}/V_{TP55})_{PEAK} < -14.5$ and: $0.65 \text{ ms} < t_{peak} < 0.8 \text{ ms}$</p>							
SEE FIGURE 2							
F. <u>CONTINUITY</u>							
Pin 23 to Pin 24.							
G. <u>3 KHZ OSCILLATOR</u>							
All tests, except that for temperature sensitivity, are to be done with the oscillator normally loaded.							
1. <u>Initial Starting</u>							
Adjust VR50 to mid range and observe TP12 with a scope (2 volt/div amplitude, 50 us/div. sweep.) If necessary readjust for a non-distorted sine wave.							
2. <u>Distortion</u>							
a. FET (2N3822) Distortion.							
Adjusting VR50 too far CW will cause the output TP12 to distort. Check distortion by centering the signal on both the amplitude and sweep coordinates as shown in Figure 3. Distortion occurs when $ T_1 - T_2 > 10 \text{ usec}$ and can be eliminated by backing down on VR50 (TP50).							
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P3K-AL-0395-A01	SPECIFICATIONS AND TEST INSTRUCTIONS
CONT ON SHEET 4 SH NO. 3	VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280
	FIRST MADE FOR EHC MARK II

G. 3 KHZ OSCILLATOR (continued)2. Distortion (continued)

b. Saturation Distortion

Saturation will occur when $V_{peak} TP12 > V_{zener}$ and is eliminated by decreasing VR51.

3. V_{GATE} (VTP50) Setting

Adjust VR50 so that the oscillator runs at the upper limit of linearity ($|T_1 - T_2| \approx 10 \text{ usec}$); ie:

$$|V_{GATE}| \approx |V_{GATE \text{ FET DIST}}| - .010$$

Operation around this point gives maximum temperature and load change stability. A sampling of 25 FET's has shown the upper limit to be:

$$-2.6 < V_{GATE} < -1.0$$

4. Amplitude Setting

Adjust VR51 for $V_{TP12} = 6.000 \pm .010V \text{ RMS}$.

5. Frequency

* $3000 < f < 3400 \text{ Hz}$ @ TP12

6. Regeneration

The oscillator must restart in all of the following situations:

- Simultaneously interrupt the +22 VDC and the -22 VDC power. Reconnect.
- Interrupt the +22 VDC power. Reconnect.
- 22 VDC power. Reconnect.
- Withdraw and insert the Valve Position Driver Board.

7. Temperature Stability

This test may be conducted with oscillator unloaded.

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OCT 27 1981

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* CHA made

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SH NO. 4

P3K-AL-0395-A01

SPECIFICATIONS AND TEST INSTRUCTIONS

VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280

CONT ON SHEET 5 SH NO. 4

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G. 3 KHZ OSCILLATOR (continued)7. Temperature Stability (continued)With V_G set as in Step 3 at ambient temperature (T_A) then: set

$$|\Delta V_{TP12}| \leq .060 \text{ V RMS } (T_A \leq T \leq 130^\circ\text{F})$$

A small change in V_G may be necessary to meet this spec. If $\Delta V_{TP12} > +.060$ for $T_A \leq T \leq 130^\circ\text{F}$, decrease V_{GATE} . If $\Delta V_{TP12} > -.060$, increase V_{GATE} .

8. Load VarianceNo transducer position should change V_{TP12} more than 15mv RMS.

$$\Delta V_{TP12} \leq .015 \text{ V RMS}$$

9. Envelope Modulation

Envelope modulation should not exceed .015V ptp.

H. POWER SUPPLIES

- Oscillator loaded at 6V RMS output
- VR1 and VR2 fully CW
- $V_{TP55} = 0$

1. Steady State

- +22 VDC: $I_{board} = 200 \pm 50 \text{ ma DC}$
- 22 VDC: $I_{board} = 215 \pm 50 \text{ ma DC}$

2. Transients

To check C5 and C7, connect +22V and -22V DC to the board. In both cases at:

TP54 and TP53:

$$t_{rise} > 0.5 \text{ m sec.}$$

Trigger on +22 for TP53 & -22 for TP54

MAY need to change
R51 to 2 meg To get
gain + Temp stability

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LOCATION

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SH NO. 4

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CONT ON SHEET 6 SH NO. 5

TITLE
SPECIFICATIONS AND TEST INSTRUCTIONS
VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280
FIRST MADE FOR EHC MARK II

I. DEMODULATOR

$$V_{TP12} = 6V \text{ RMS}$$

1. Fully extend the transducer to its linear limit (as in valves wide open position) and adjust VR3 so that

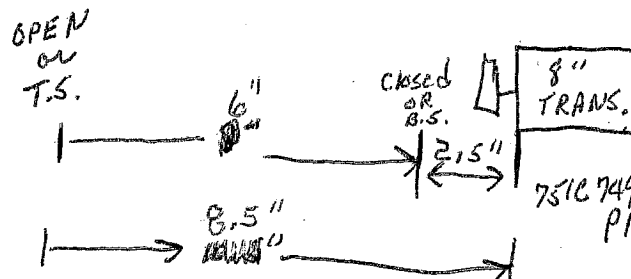
$$V_{TP8} = 0.000 \pm 0.010 \text{ VDC}$$

- a. Verify V_{TP7} by Figure 4.
- b. Verify V_{TP52} by Figure 5.

2. Insert the transducer by 8"

- a. Verify V_{TP7} by Figure 6.
- b. Verify V_{TP52} by Figure 7.

SCOPE MUST BE ON AC

J. FILTER

1. With the board inactive:

$$0.88 < V_{TP8}/V_{TP52} < 0.94 \quad (f \leq 100 \text{ Hz})$$

2. Under normal operating conditions with $V_{TP12} = 6V \text{ RMS}$:

- a. Transducer fully extended to its linear limit:

$$V_{TP8} = 0.000 \pm .010 \text{ VDC}$$

$$V_{TP8} < 10\text{mv ptp} ; 3 \text{ KHZ fundamental}$$

- b. Transducer inserted by 8"

$$4.5 < V_{TP8} < 5.2 \text{ VDC}$$

$$V_{TP8} < 10\text{mV ptp} ; 3 \text{ KHZ fundamental.}$$

K. FEEDBACK AMPLIFIER

1. Ground TP8 and null IC4. Insure that VR52 will drive V_{TP13} through zero. Remove TP8 From Ground And Adjust Transducer For 1VDC AT TP8.

$$-1.24 < V_{TP13}/V_{TP8} < -1.18, \quad \text{VR4 CCW} \quad (G1, G2)$$

$$-4.61 < V_{TP13}/V_{TP8} < -3.88, \quad \text{VR4 CW} \quad (G1)$$

$$-7.97 < V_{TP13}/V_{TP8} < -6.58, \quad \text{VR4 CW} \quad (G2)$$

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P3K-AL-0395-A01	SPECIFICATIONS AND TEST INSTRUCTIONS VALVE POSITION DRIVER (.25 GPM) CKT. BD. ASM. DWG. 115D2280				
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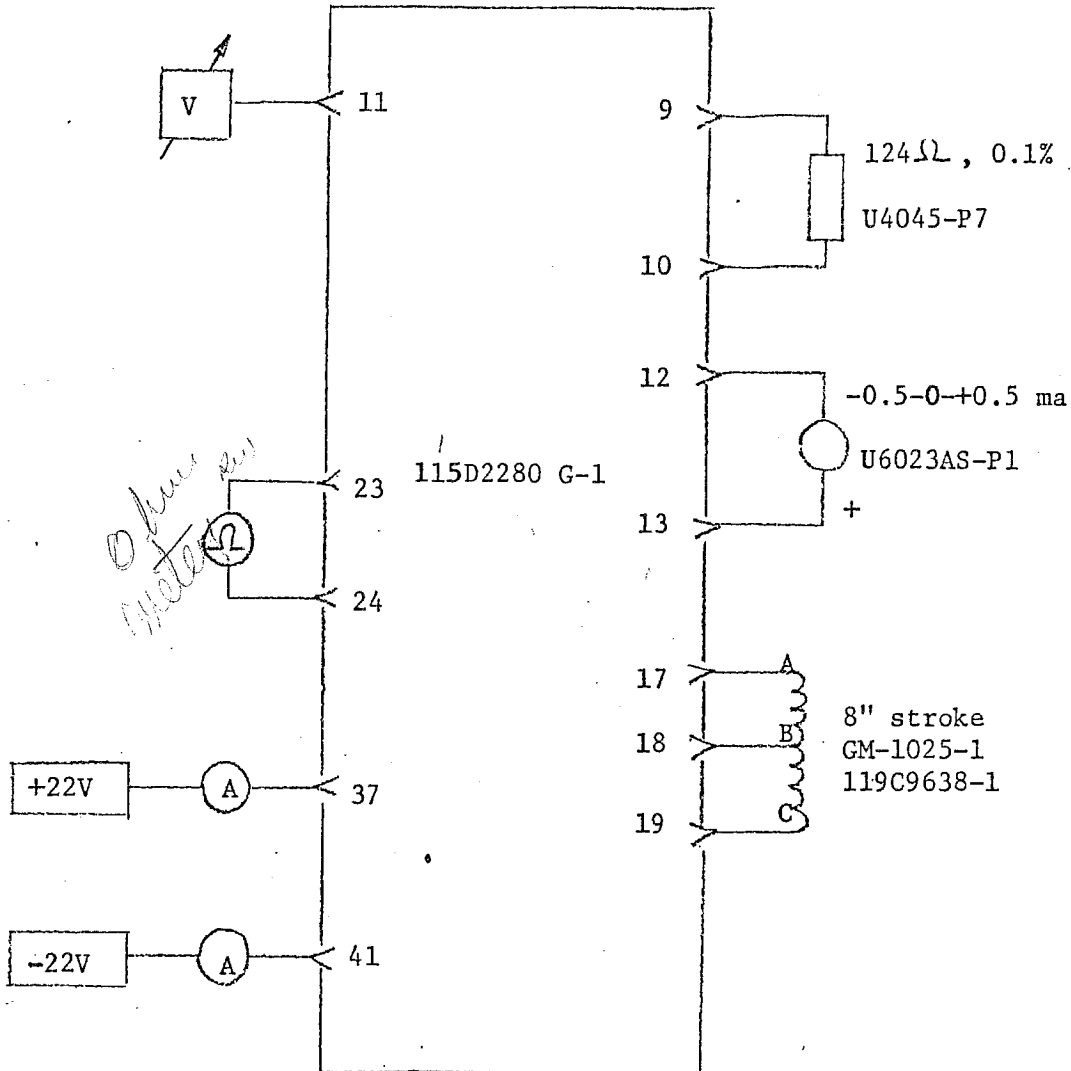


FIGURE 1: TEST SETUP

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115D2280
FEB 28 1978
J. Polacek
See NH 1 + F

OCT 27 1981
J. Polacek
no cap. this int

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P3K-AL-0395-A01

SPECIFICATIONS AND TEST INSTRUCTIONS

VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280

CONT ON SHEET 8

SH NO. 7

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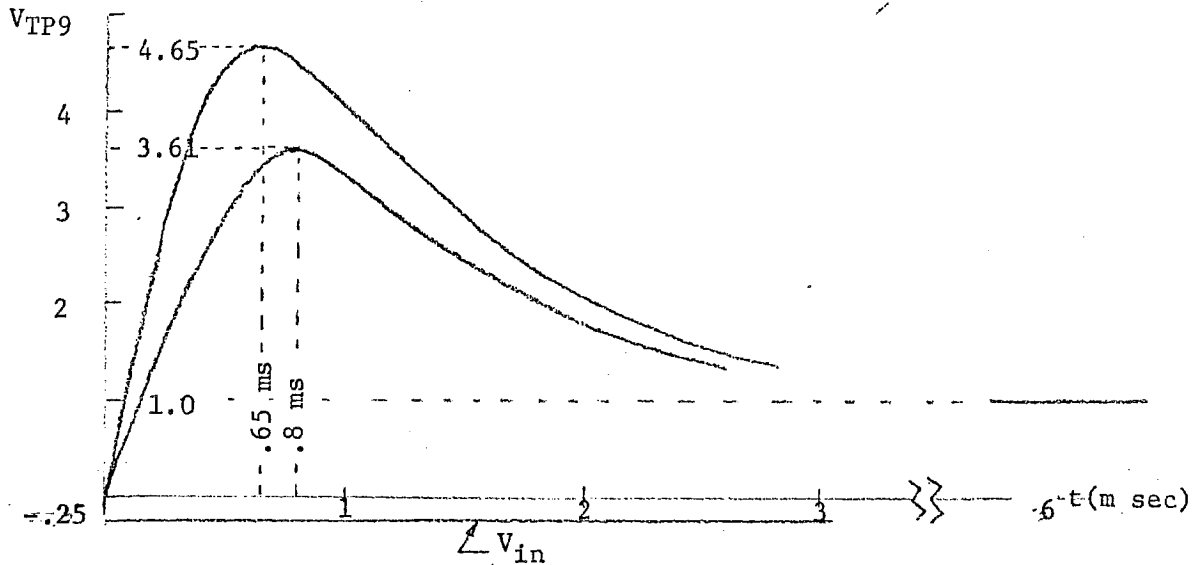


FIGURE 2: SERVOAMPLIFIER RESPONSE TO -0.25 STEP INPUT

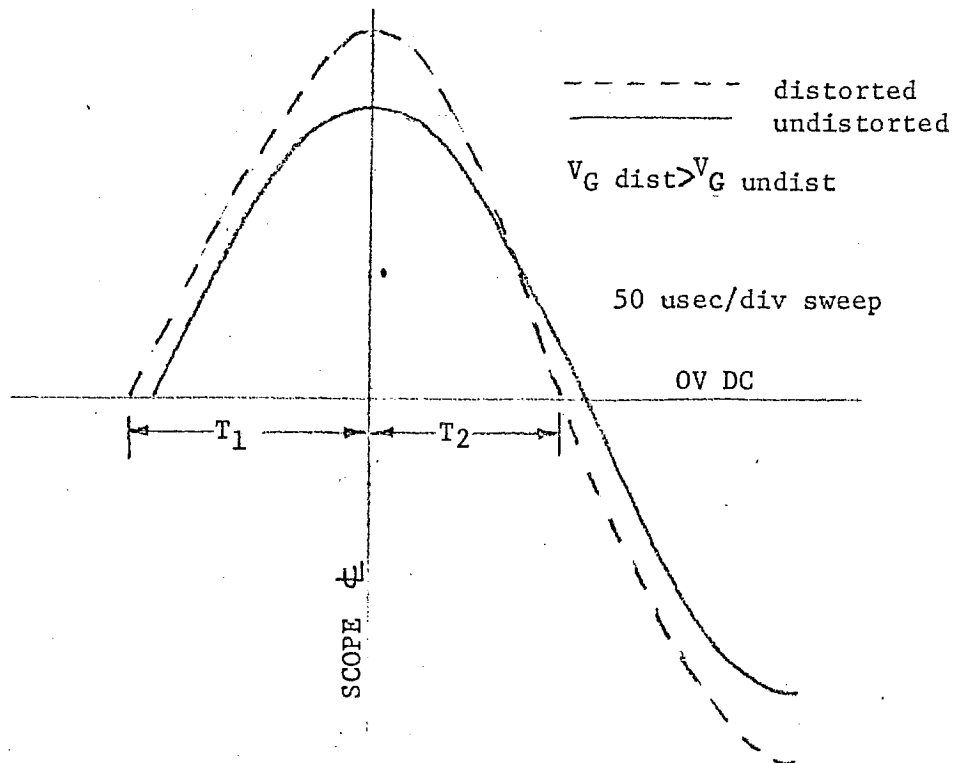


FIGURE 3: FET DISTORTION $|T_1 - T_2| > 10$ usec

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REV NO. *112*
P3K-AL-0395-A01
CONT ON SHEET 9 SH NO. 8

TITLE
SPECIFICATIONS AND TEST INSTRUCTIONS
VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280
FIRST MADE FOR EHC MARK II

CONT ON SHEET 9 SH NO. 8

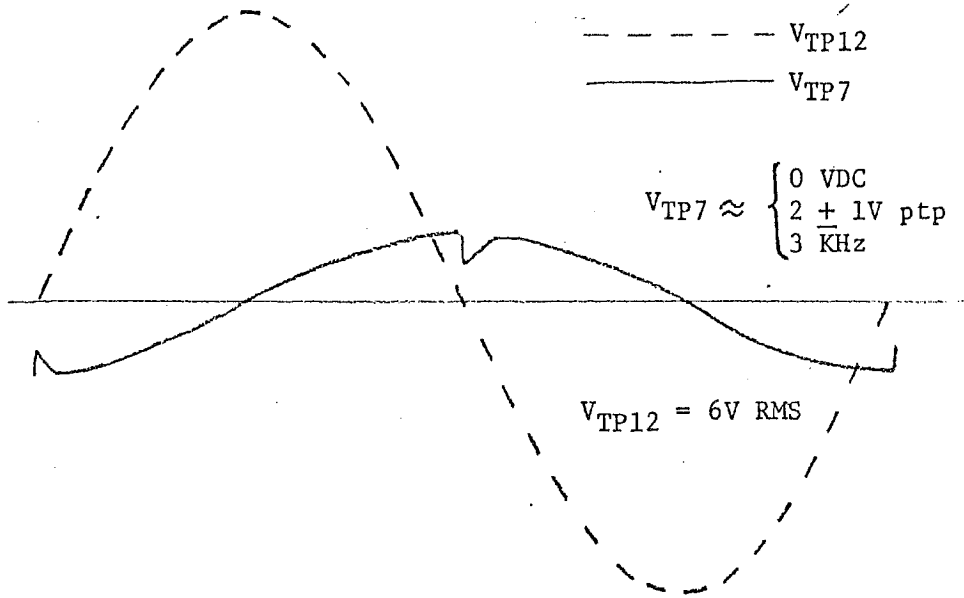


FIGURE 4: V_{TP7} - TRANSDUCER FULLY EXTENDED

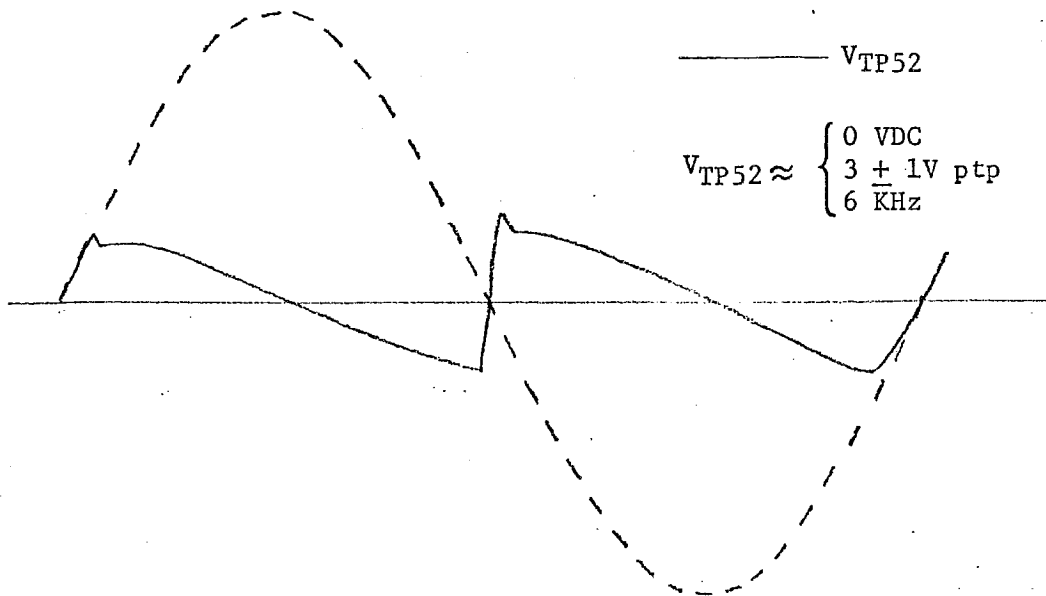


FIGURE 5: V_{TP52} - TRANSDUCER FULLY EXTENDED

REVISION

11 Polacek, Feb 28 1977
See AN 1 + 5

OCT 27 1981
@PAULIS
no chg. this skt

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MADE BY
J. Polacek Sept. 15, 1977
ISSUED
SEP 20 1977

APPROVALS

Steam Turbine
Schenectady, N.Y.

DIV OR
DEPT.
LOCATION

P3K-AL-0395-A01

CONT ON SHEET 9 SH NO. 8

REV NO. 10/2

TITLE

CONT ON SHEET 10 SH NO. 9

P3K-AL-0395-A01

SPECIFICATIONS AND TEST INSTRUCTIONS

VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280

CONT ON SHEET 10 SH NO. 9

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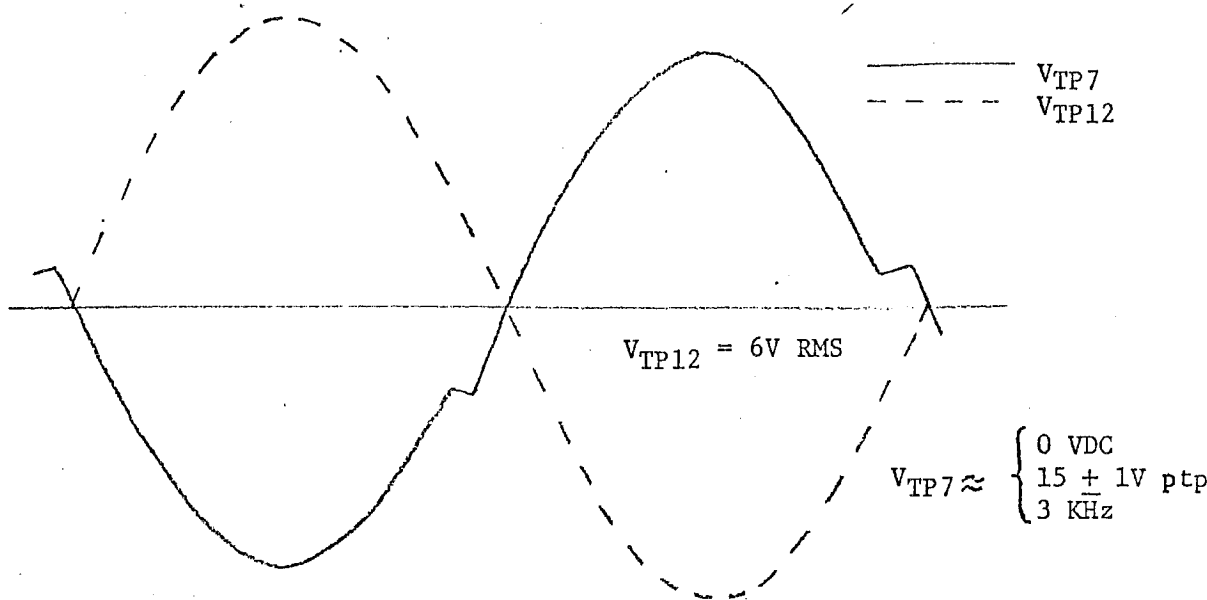


FIGURE 6: V_{TP7} - TRANSDUCER INSERTED 8"

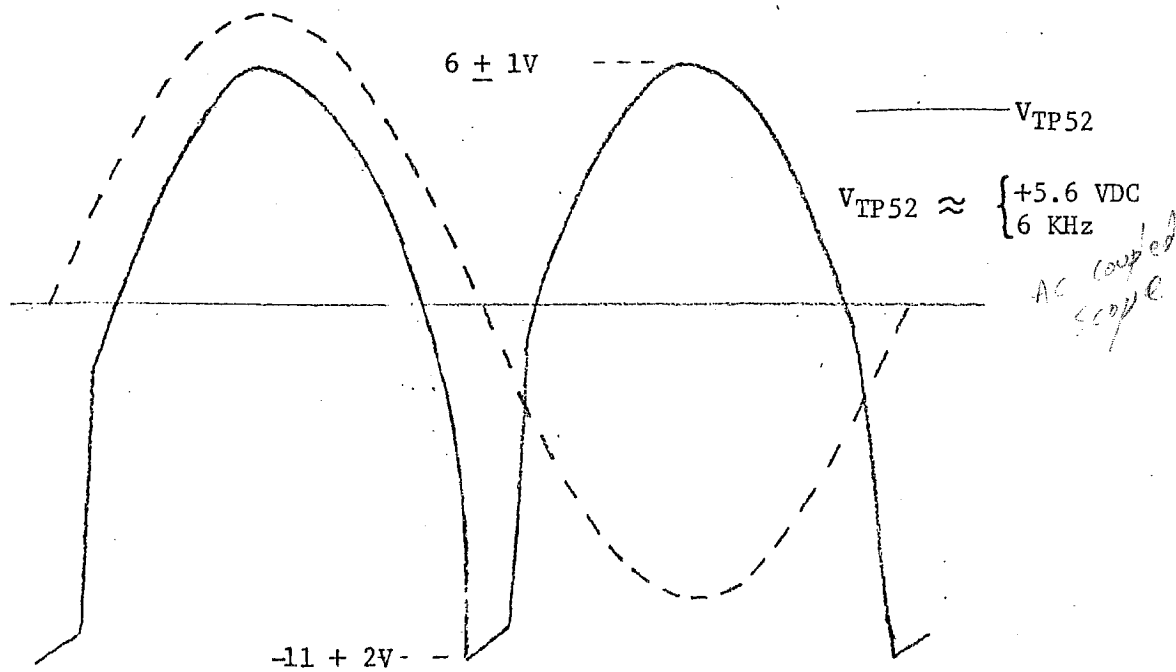


FIGURE 7: V_{TP52} - TRANSDUCER INSERTED 8"

1 J. Polacek FEB 28 1978
Sec. Ant 1 + 5

2 PAULIA OCT 27 1981
no chg. this Ant

PRINTS TO

MADE BY J. Polacek Sept. 15, 1977

APPROVALS

Steam Turbine

DIV OR DEPT.

P3K-AL-0395-A01

ISSUED SEP 20 1977

Schenectady, N.Y.

LOCATION

CONT ON SHEET 10 SH NO. 9

REV. NO. 012
P3K-AL-0395-A01
CONT ON SHEET SH NO. 10

TITLE
SPECIFICATIONS AND TEST INSTRUCTIONS
VALVE POSITION DRIVER (25 GPM) CKT. BD. ASM. DWG. 115D2280
FIRST MADE FOR EHC MARK II

REVISION:

115D2280
P3K-AL-0395-A01
See A11 + 5

Oct 27 1977
@ PAVLIS
no chg. this Amt

PRINTS TO

PREPARED BY S.S. Abelson
S.S. Abelson
EHC DESIGN ENGINEERING

DATE 3/2/74
9/24/81

SSA

APPROVED BY P.C. Callan
P.C. Callan - MANAGER
EHC DESIGN ENGINEERING

DATE 9-6-77

TEST PROCEDURE
REVIEWED BY R. Debertolis
R. Debertolis
EHC TEST ENGINEER

DATE 9-6-77

MADE BY
J. Polacek Sept. 15, 1977
ISSUED
SEP 20 1977

APPROVALS

Steam Turbine
Schenectady, N.Y.
DIV OR DEPT.
LOCATION

P3K-AL-0395-A01 10
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