

REV NO. 012

P3K-AL-0597-A01

CONT ON SHEET 2

SH NO. 1

TITLE

CIRCUIT BOARD TEST INSTRUCTIONS FOR
VALVE POS. DRIVER HP 1F1-F2 142D7271 G1

FIRST MADE FOR EHC MARK II

REVISION

A. BOARD CONTENTS

1. 2 regulated power supplies
2. servo amplifier with meter drive
3. 3 KHZ, 2 stage oscillator
4. phase sensitive demodulator
5. low pass filter

*updated
mll
5/20/88*

B. TEST SETUP

See Figure 1.

C. POWER SUPPLIES

1. $V_{TP1} = 15 \pm 1V$ DC, < 10 mv ptp ripple
2. $V_{TP2} = -15 \pm 1V$ DC, < 10 mv ptp ripple
3. $50 \text{ ma} < I_{pin 37} < 100 \text{ ma}$
4. $50 \text{ ma} < I_{pin 41} < 100 \text{ ma}$

Power Supply Current used.

D. SERVO AMPLIFIER - Steady State

1. $|V_{TP3}| < 0.525$ VDC, $CCW \leq VR1 \leq CW$

2. - Ground TP51

- VR2 CW Then: set TP3 for +0.2 VDC Read TP 5 = -1.54 to -1.64 VDC
-8.2 < V_{TP5}/V_{TP3} < -7.7 ($V_{TP3} < .05$ VDC) Remove GND at TP51.

3. Ground TP3 Then: Set TP2 for 0.00 VDC with VR1.
Set VR2 CCW. Put +0.1 VDC into pin 11. *

-83 < I_{SV}/V_{TP51} < -7.7 ma/V, ($V_{TP51} < 0.5$; (VR2 CCW)

Put -1 VDC into pin 11

Assure that $|I_{SV}| < 31$ ma DC * †

Leave +1 VDC in pin 11

-4.3 < I_{SV}/V_{TP51} < -3.4 ma/V, (VR2 CW) *

* I limit to protect servovalve coils



NOTE: VR2 pot rotation is CCW to increase servo amplifier gain.

1 CRP AUG 11 1980

2 CRP OCT 27 1981

no chg. this art

273-2

273-12

273-71

273-13

273-221

273-227

PRINTS 10

MADE BY J. Polacek Jan. 23, 1978

APPROVALS

Steam Turbine

DIV OR DEPT.

P3K-AL-0597-A01

ISSUED

Schenectady, N.Y.

LOCATION

CONT ON SHEET 2

SH NO. 1

REV
NO.

P3K-AL-0597-A01

TITLE

CIRCUIT BOARD TEST INSTRUCTIONS FOR
VALVE POS. DRIVER HP 1F1-F2, 142D7271 G1

CONT ON SHEET 3

SH NO. 2

FIRST MADE FOR EHC MARK II

REVISION

E. SERVO AMPLIFIER - Transient State

Ground TP3, VR2 CW *

Apply $V_{STEP} = 0.25V$ to TP51Then: $-18.6 < (V_{TP5}/V_{TP51})_{Peak} < -14.5$ and $0.65 \leq t_{peak} < 0.8 \text{ ms}$

See Figure 2

F. 3 KHZ OSCILLATOR

All tests, except that for temperature sensitivity, are to be done with the oscillator normally loaded.

1. Initial Starting

Adjust VR50 to mid range and observe TP7 with a scope (2 volt/div amplitude, 50 us/div. sweep.) If necessary, readjust for a non-distorted sine wave.

2. Distortion

a. FET (2N3822) Distortion

Adjusting VR50 too far CW will cause the output TP7 to distort. Check distortion by centering the signal on both the amplitude and sweep coordinates as shown in Figure 3. Distortion occurs when $|T_1 - T_2| \geq 10 \text{ usec.}$ and can be eliminated by backing down on VR50 (TP50).

b. Saturation Distortion

Saturation will occur when $V_{peak} TP7 > V_{regulated} \text{ supply}$ and is eliminated by decreasing VR51.3. V_{GATE} (VTP50) SettingAdjust 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:

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

1

PAUL

AUG 11 1980

2

PAUL

OCT 27 1981

3

PAUL

NOV 11 1981

4

PAUL

DEC 11 1981

5

PAUL

JAN 11 1982

6

PAUL

FEB 11 1982

7

PAUL

MAR 11 1982

8

PAUL

APR 11 1982

9

PAUL

MAY 11 1982

10

PAUL

JUN 11 1982

11

PAUL

JUL 11 1982

12

PAUL

AUG 11 1982

13

PAUL

SEP 11 1982

14

PAUL

OCT 11 1982

15

PAUL

NOV 11 1982

16

PAUL

DEC 11 1982

17

PAUL

JAN 11 1983

18

PAUL

FEB 11 1983

19

PAUL

MAR 11 1983

20

PAUL

APR 11 1983

21

PAUL

MAY 11 1983

22

PAUL

JUN 11 1983

23

PAUL

JUL 11 1983

24

PAUL

AUG 11 1983

25

PAUL

SEP 11 1983

26

PAUL

OCT 11 1983

27

PAUL

NOV 11 1983

28

PAUL

DEC 11 1983

29

PAUL

JAN 11 1984

30

PAUL

FEB 11 1984

31

PAUL

MAR 11 1984

32

PAUL

APR 11 1984

33

PAUL

MAY 11 1984

34

PAUL

JUN 11 1984

35

PAUL

JUL 11 1984

36

PAUL

AUG 11 1984

37

PAUL

SEP 11 1984

38

PAUL

OCT 11 1984

39

PAUL

NOV 11 1984

40

PAUL

DEC 11 1984

41

PAUL

JAN 11 1985

42

PAUL

FEB 11 1985

43

PAUL

MAR 11 1985

44

PAUL

APR 11 1985

45

PAUL

MAY 11 1985

46

PAUL

JUN 11 1985

47

PAUL

JUL 11 1985

48

PAUL

AUG 11 1985

49

PAUL

SEP 11 1985

50

PAUL

OCT 11 1985

51

PAUL

NOV 11 1985

52

PAUL

DEC 11 1985

53

PAUL

JAN 11 1986

54

PAUL

FEB 11 1986

55

PAUL

MAR 11 1986

56

PAUL

APR 11 1986

57

PAUL

MAY 11 1986

58

PAUL

JUN 11 1986

59

PAUL

JUL 11 1986

60

PAUL

AUG 11 1986

61

PAUL

SEP 11 1986

62

PAUL

OCT 11 1986

63

PAUL

NOV 11 1986

64

PAUL

DEC 11 1986

65

PAUL

JAN 11 1987

66

PAUL

FEB 11 1987

67

PAUL

MAR 11 1987

68

PAUL

APR 11 1987

69

PAUL

MAY 11 1987

70

PAUL

JUN 11 1987

71

PAUL

JUL 11 1987

72

PAUL

AUG 11 1987

73

PAUL

SEP 11 1987

74

PAUL

OCT 11 1987

75

PAUL

NOV 11 1987

76

PAUL

DEC 11 1987

77

PAUL

JAN 11 1988

78

PAUL

FEB 11 1988

79

PAUL

MAR 11 1988

80

PAUL

APR 11 1988

81

PAUL

MAY 11 1988

82

PAUL

JUN 11 1988

83

PAUL

JUL 11 1988

84

PAUL

AUG 11 1988

85

PAUL

SEP 11 1988

86

PAUL

OCT 11 1988

87

PAUL

NOV 11 1988

88

PAUL

DEC 11 1988

89

PAUL

JAN 11 1989

90

PAUL

FEB 11 1989

91

PAUL

MAR 11 1989

92

PAUL

APR 11 1989

93

PAUL

MAY 11 1989

94

PAUL

JUN 11 1989

95

PAUL

JUL 11 1989

96

PAUL

AUG 11 1989

97

PAUL

SEP 11 1989

98

PAUL

OCT 11 1989

99

PAUL

NOV 11 1989

100

PAUL

DEC 11 1989

101

PAUL

JAN 11 1990

102

PAUL

FEB 11 1990

103

REV. NO. 012

TITLE

CONT ON SHEET 4

SH NO 3

P3K-AL-0597-A01

CIRCUIT BOARD TEST INSTRUCTIONS FOR
VALVE POS. DRIVER HP 1F1-F2 142D7271 G1

CONT ON SHEET 4

SH NO. 3

FIRST MADE FOR EHC MARK II

F. 3 KHZ OSCILLATOR (continued)4. Amplitude SettingAdjust VR51 for $V_{TP7} = 6.000 \pm .010V$ RMS.5. Frequency3000 $\leq f < 3400$ Hz6. 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.

With V_G set as in Step 3 at ambient temperature (T_A) then:

$$|\Delta V_{TP7}| \leq .060 \text{ V RMS} \quad (T_A \leq T \leq 130^\circ\text{F})$$

A small change in V_G may be necessary to meet this spec. If $\Delta TP7 > +.060$ for $T_A \leq T \leq 130^\circ\text{F}$, decrease V_{GATE} . If $\Delta TP7 > -.060$, increase V_{GATE} .

8. Load VarianceNo transducer position should change V_{TP7} more than 15mv RMS.

$$\Delta V_{TP7} \leq .015 \text{ V RMS}$$

9. Envelope Modulation

Envelope modulation should not exceed .015V ptp.

REVISION

1

PAULIS

AUG 11 1980

1

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

OCT 27 1980

2

PAULIS

MADE BY
J. Polacek Jan. 23, 1978

APPROVALS

Steam Turbine

DIV OR
DEPT.

P3K-AL-0597-A01

ISSUED
JAN 23 1978

Schenectady, N.Y.

LOCATION

CONT ON SHEET 4

SH NO 3

PRINTS

REV NO. 012

TITLE

CONT ON SHEET 5

SH NO. 4

P3K-AL-0597-A01

CIRCUIT BOARD TEST INSTRUCTIONS FOR
VALVE POS. DRIVER HP 1F1-F2 142D7271 G1

CONT ON SHEET 5

SH NO. 4

FIRST MADE FOR EHC MARK II

G. DEMODULATOR

$V_{TP7} = 6V \text{ RMS}$

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

$V_{TP6} = 0.000 \pm 0.010 \text{ VDC}$

← Transducer TO TOP STOP (8.5" from body).

a. Verify V_{TP57} by Figure 4.

b. Verify V_{TP52} by Figure 5.

2. Insert the transducer by 8". TO Bottom STOP (2.5" from body).

a. Verify V_{TP57} by Figure 6.

b. Verify V_{TP52} by Figure 7.

H. FILTER

1. With the board inactive:

$0.88 < V_{TP6}/V_{TP52} < 0.94$ ($f \leq 100 \text{ HZ}$)

2. Under normal operating conditions with $V_{TP7} = 6V \text{ RMS}$:

a. Transducer fully extended to its linear limit:

$V_{TP6} = 0.000 \pm .010 \text{ VDC}$

$V_{TP6} < 10 \text{ mv ptp; } 3 \text{ KHZ fundamental}$

b. Transducer inserted by 8". ← yes

$4.5 < V_{TP6} < 5.2 \text{ VDC}$

$V_{TP6} < 10\text{mV ptp; } 3 \text{ KHZ fundamental.}$

REVISION

1

CHAPMAN AUG 11 1980

2

OCT 27 1981

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

8

CHAPMAN

MADE BY

J. Polacek Jan. 23, 1978

APPROVALS

Steam Turbine

DIV OR DEPT.

P3K-AL-0597-A01

ISSUED

Jan. 30 1978

Schenectady, N.Y.

LOCATION

CONT ON SHEET 5

SH NO. 4

REV NO. 012
 P3K-AL-0597-A01
 CONT ON SHEET 6 SH NO. 5

TITLE
 SPECIFICATIONS AND TEST INSTRUCTIONS
 VALVE POSITION DRIVER HP 1F1-F2 142D7271 G1
 FIRST MADE FOR EHC MARK II

CONT ON SHEET 6 SH NO. 5

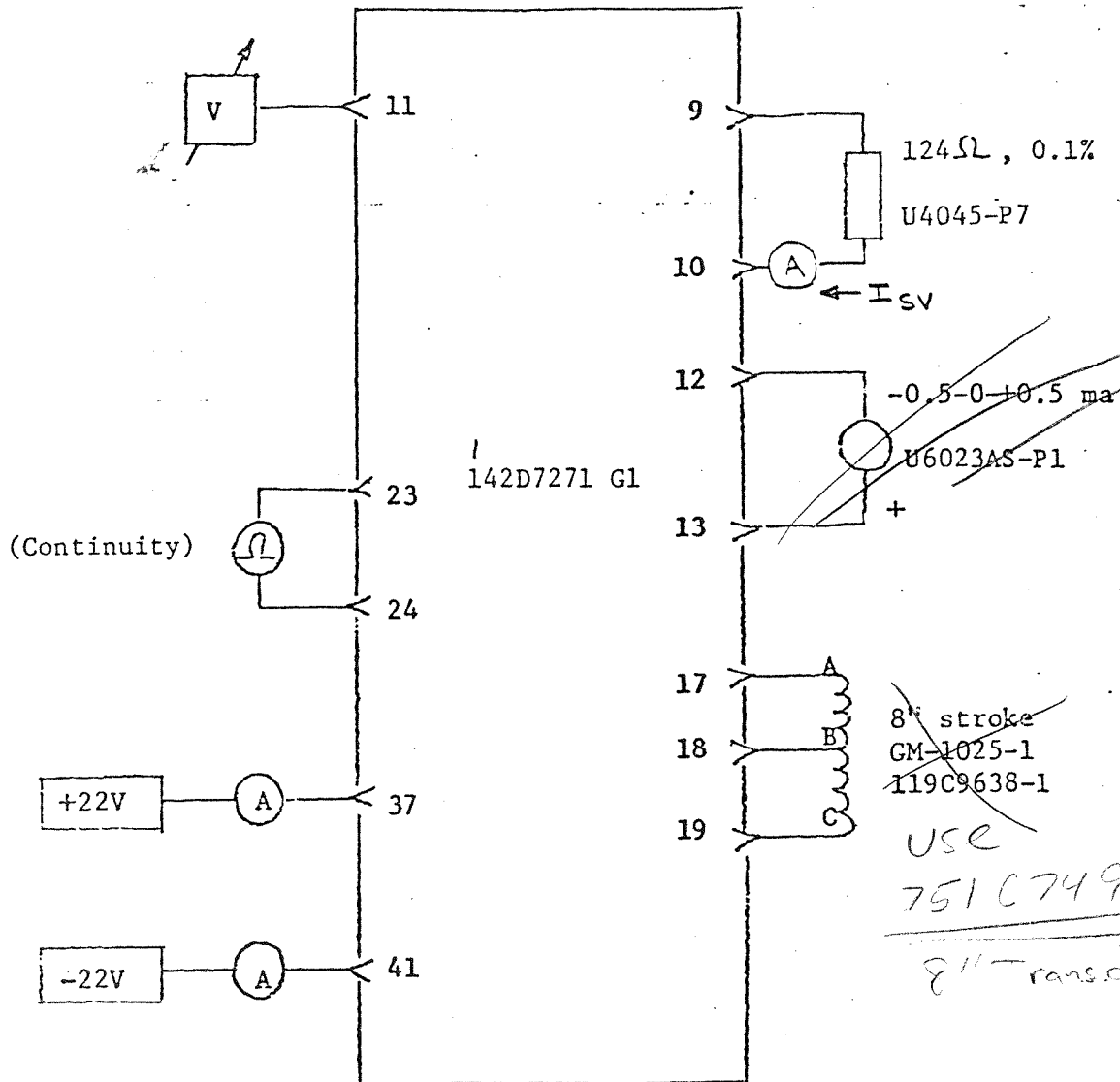


FIGURE 1: TEST SETUP

MADE BY J. Polacek Jan. 23, 1978

ISSUED JAN 23 1978

APPROVALS

Steam Turbine

Schenectady, N.Y.

DIV OR DEPT.

P3K-AL-0597-A01

LOCATION CONT ON SHEET 6 SH NO.

RECEIVED
 AUG 11 1980
 OCT 27 1981
 8
 PRI

REV NO. 012

TITLE

SPECIFICATIONS AND TEST INSTRUCTIONS

VALVE POSITION DRIVER HP 1F1-F2 142D7271 G1

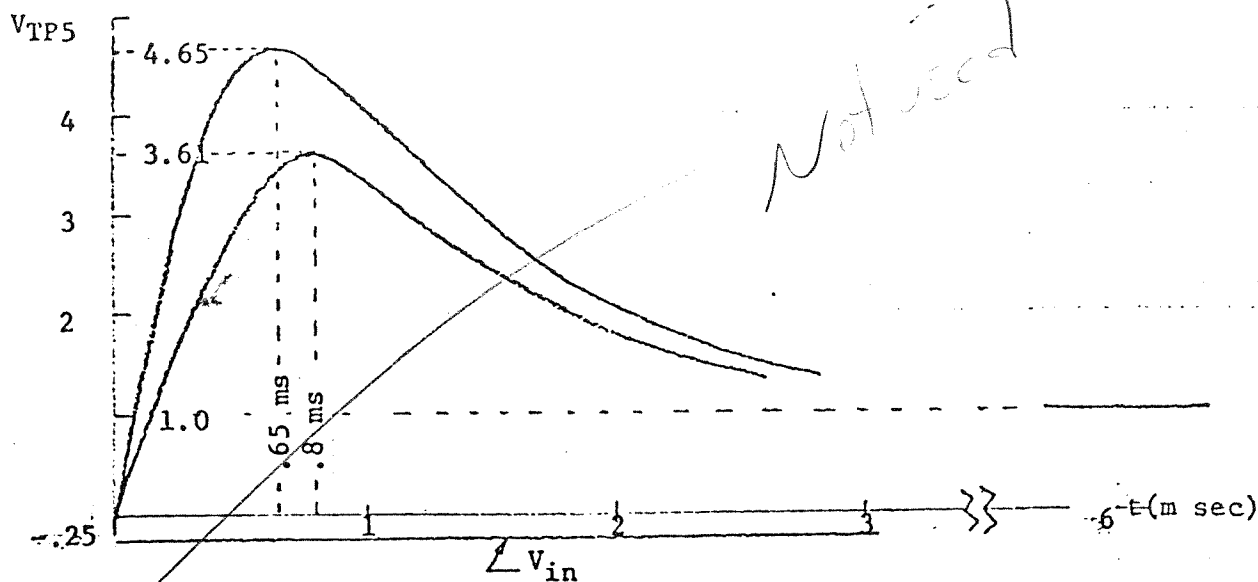
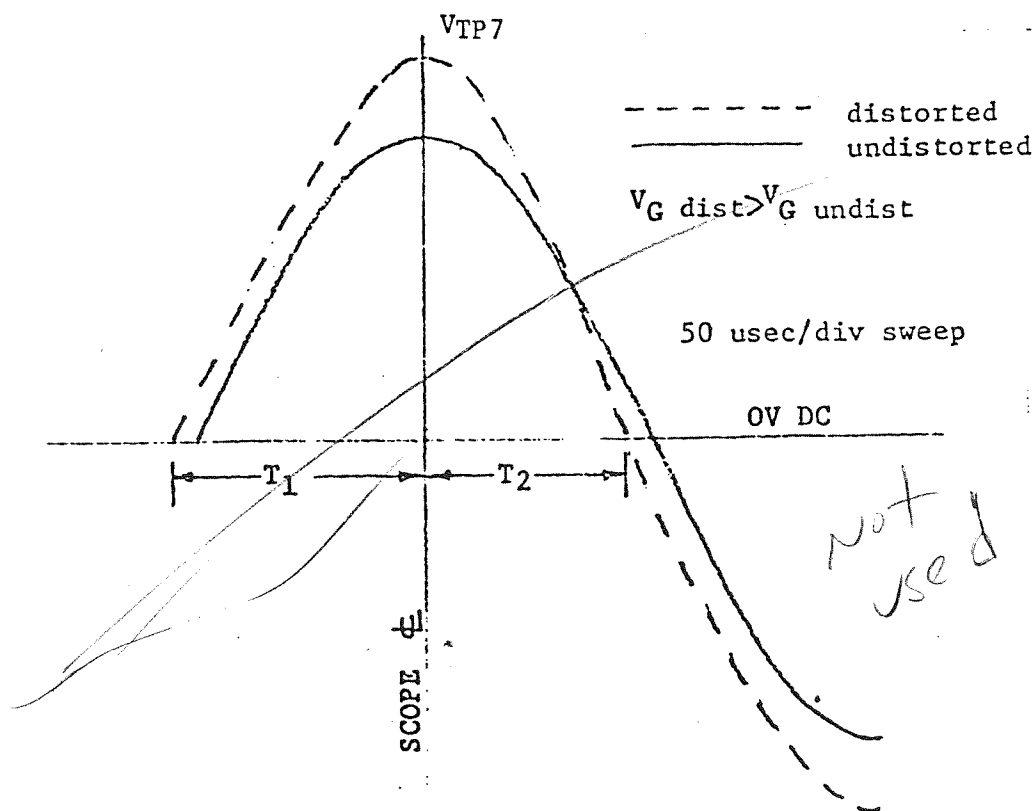
FIRST MADE FOR EHC MARK II

P3K-AL-0597-A01

CONT ON SHEET 7

SH NO. 6

REVIS

FIGURE 2: SERVOAMPLIFIER RESPONSE TO -0.25 STEP INPUTFIGURE 3: FET DISTORTION $|T_1 - T_2| > 10 \text{ usec}$

MADE BY

J. Polacek Jan. 23, 1978

APPROVALS

Steam Turbine

Schenectady, N.Y.

DIV OR DEPT.

P3K-AL-0597-A01

ISSUED

JAN 23 1978

LOCATION

CONT ON SHEET

7

SH NO. 6

CODE

REV NO. <u>012</u>	TITLE	P3K-AL-0597-A01
P3K-AL-0597-A01	SPECIFICATIONS AND TEST INSTRUCTIONS	SH NO. 7
CONT ON SHEET 8	VALVE POSITION DRIVER HP 1F1-F2 142D7271 G1	
SH NO. 7	FIRST MADE FOR EHC MARK II	

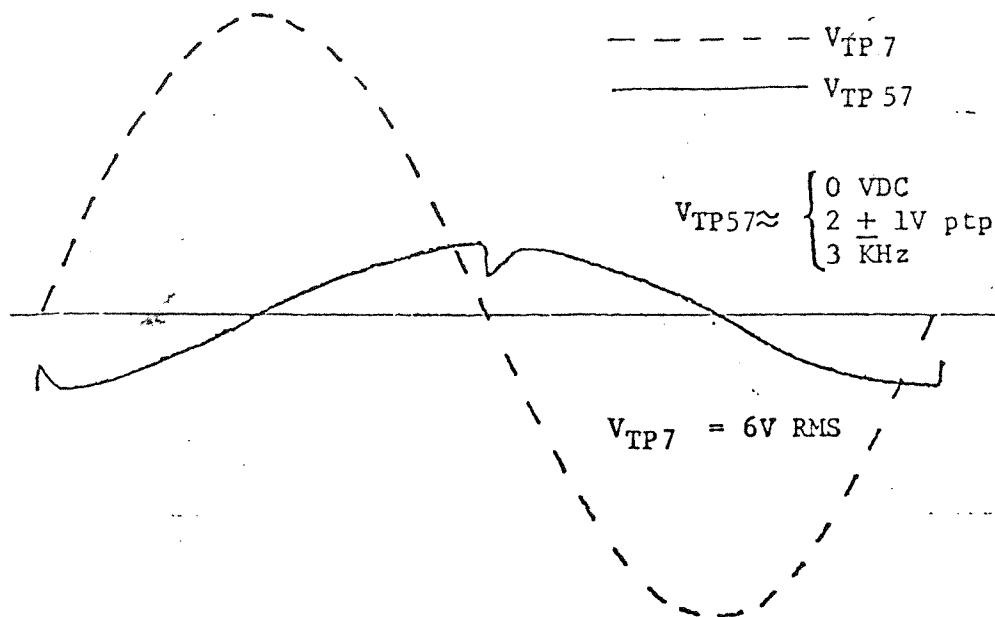


FIGURE 4: V_{TP57} TRANSDUCER FULLY EXTENDED

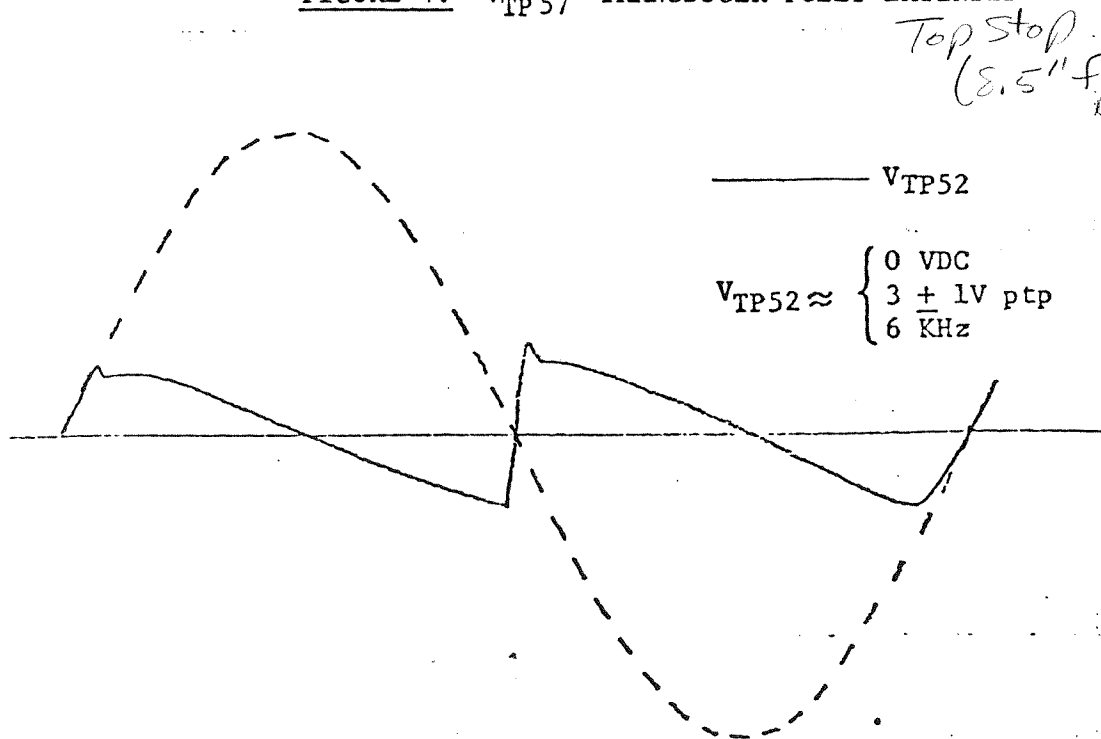


FIGURE 5: V_{TP52} - TRANSDUCER FULLY EXTENDED

MADE BY J. Polacek Jan. 23, 1978	APPROVALS	Steam Turbine	DIV OR DEPT.	P3K-AL-0597-A01
ISSUED JAN 23 1978		Schenectady, N.Y.	LOCATION	CONT ON SHEET 8 SH NO.

PAULI AUG 11 1980
 PAULI OCT 27 1981
 PAULI

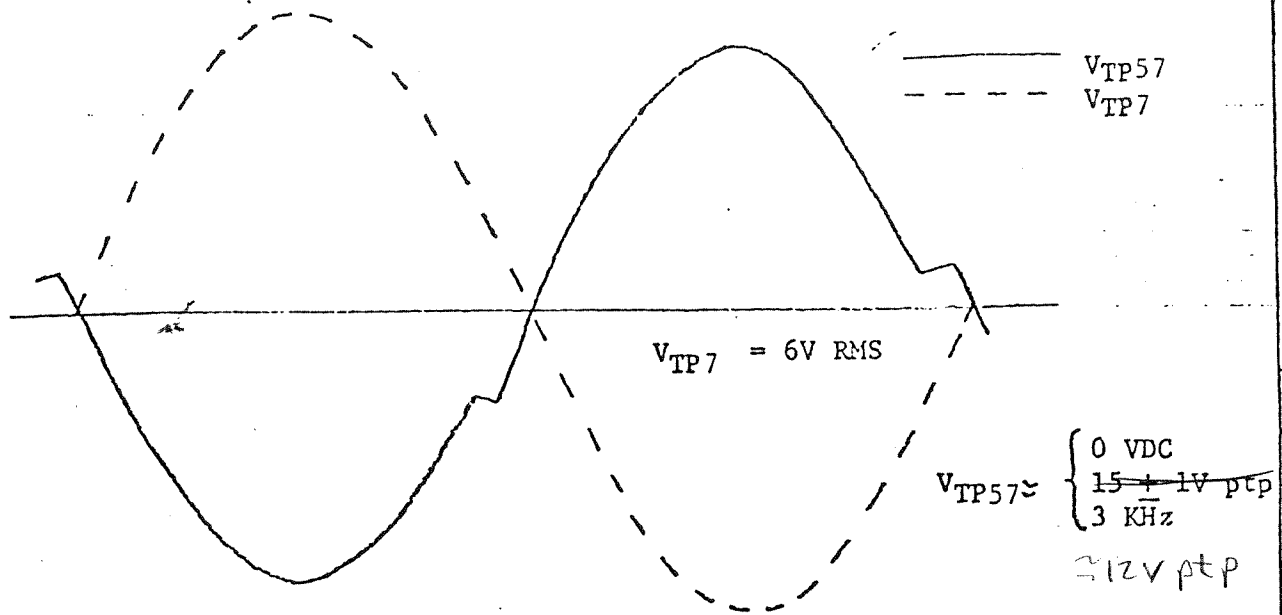


FIGURE 6: V_{TP57} - TRANSDUCER INSERTED $\approx 2.5''$ from body (Bottom Stop)

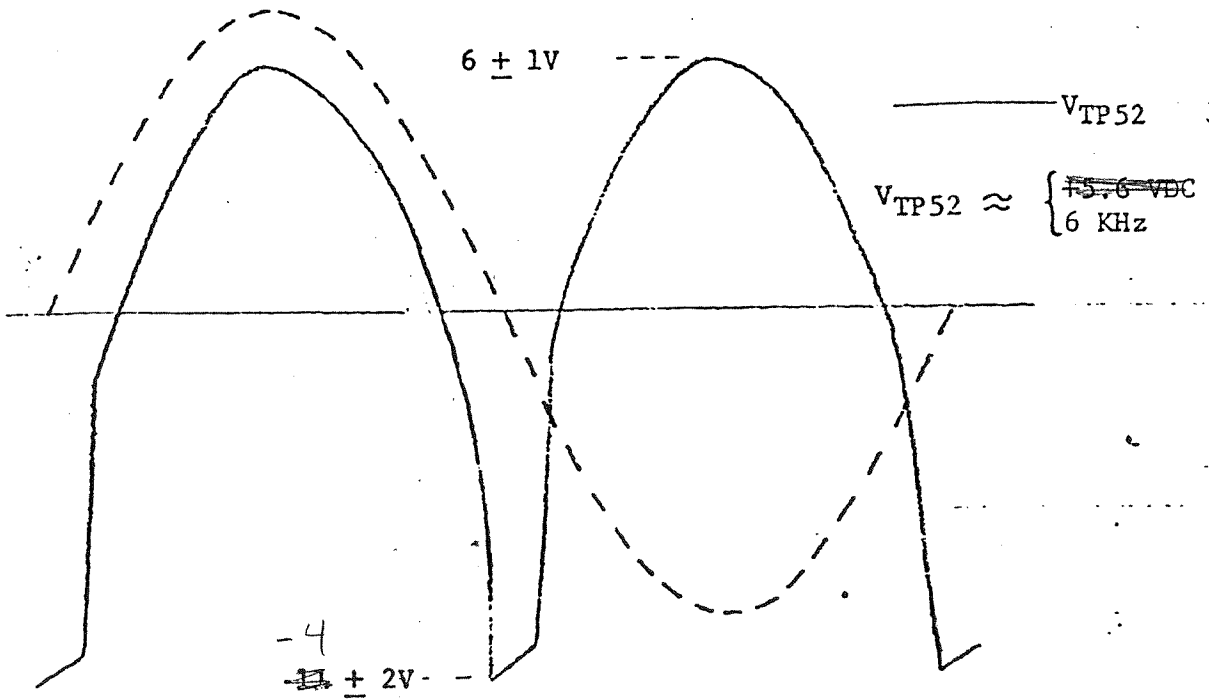


FIGURE 7: V_{TP52} - TRANSDUCER INSERTED $\approx 2.5''$ from body (Bottom Stop)

REVISED
 11/1/80
 2/27/80
 11/1/80

REV NO. 012
P3K-AL-0597-A01
CONT ON SHEET - SH NO. 9

TITLE
CIRCUIT BOARD TEST INSTRUCTIONS FOR
VLV. POS. DRIVER HP 1F1-F2 142D7271 G1
FIRST MADE FOR EHC MARK II
SH NO. 9

PREPARED BY: S.S. Abelson DATE 1/19/78
S.S. Abelson
EHC DESIGN ENGINEERING

APPROVED BY: R.L. Olson DATE _____
R.L. Olson - Manager
EHC DESIGN ENGINEERING

REVISION
1 PAULIS AUG 11 1980
2 PAULIS OCT 27 1981
PRINTS

MADE BY J. Polacek Jan. 23, 1978	APPROVALS	Steam Turbine	DIV OR DEPT.	P3K-AL-0597-A01
ISSUED Jan 23 1978		Schenectady, N.Y.	LOCATION	