REV NO. Ø1

P3K-AL-0656-A01

CONT ON SHEET 2 SH NO. 1

TITLE
CIRCUIT BOARD SPECIFICATIONS
VALVE POSITION DRIVER 169C4773, 1F1-F3
VALVE POSITION DRIVER - AMS 186C8105, 1F1-F4
FIRST MADE FOR EHC MARK II 148D1647G4

REVISIONS

changes in red were made 12-19-88 By H. Bernard and to 148D1647G4 ... MC

A. BOARD CONTENTS

1. Two (2) regulated power supplies, (IC4, IC5)
2. Servoamplifier, (IC3)
3. 3 KHz oscillator, (IC1, IC2)
4. Demodulator
5. Low pass filter
6. Feedback amplifier, (IC6) (1F1-F3 Only)

B. TEST SETUP

See Figure 1.

C. POWER SUPPLIES

Internal Buss
1. V_{TP1} = 15 ± 1 VDC, < 15 mv ptp ripple
2. V_{TP2} = -15 ± 1 VDC, < 15 mv ptp ripple
3. ~~50~~ < Ipin 37 < 100 ma READ AT P.S. CURRENT METER 44.1 39.9
4. ~~50~~ < Ipin 41 < -100 ma

Com 39 (TP1)

22 ON 37 / 22 ON 41 / P.S. on 39

D. SERVO AMPLIFIER

1. Assure that ~~VR52~~ null ~~gives V~~ ON Pin 9 V_{TP6} = 0V ~~(V... = 0) for~~: (.010) OR LESS WITH PIN 11 = 0 .005 .002
(Pin 11 to Com, Pin 9 to 0)
a. R_{SV} = 124Ω Persch-6
b. R_{SV} = 249Ω

2. ~~-4.3~~ < ~~Isv/V~~ < -3.4 ~~mav~~ (VR2 CCW, VR54, CCW, ~~V_{TP5} < 10 VDC~~) -4.11 TP59 PIN 10 -3.95 V -4.01 -3.98 POTS -3.99 Pin 11 = 1V DC

(1 VDC on Pin 11 Read Pin 10 -4.11 to 3.95 with VR2 ccw VR5 ccw)

for: -3.98

a. R_{SV} = 124Ω } CHANG VALUE NO
b. R_{SV} = 249Ω } CHANGE AT TP59

~~c. Ascertain that the SV I_{meter}, U6023AS, is operational.~~

C. MEASURE CURRENT PIN 12 TO PIN 13
READ CURRENT = -.092 MA TO -.097 MA DC .0931
(WHEN USING FLUKE TO READ USE 2 MA SCALE INTERNAL Shunt Resistor IS A Factor)

273-2
273-12
273-71
273-11
273-21
273-2

PRINTS

MADE BY J. Aulisi 14 Sept. 1981 | APPROVALS | Steam Turbine DIV OR DEPT. | P3K-AL-0656-A01
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2910

REV NO.

P3K-AL-0656-A01

CONT ON SHEET 3 SH NO. 2

TITLE
CIRCUIT BOARD SPECIFICATIONS
VALVE POSITION DRIVER 169C[illegible], 1F1-F3
VALVE POSITION DRIVER - AMS 186C8105, 1F1-F4
FIRST MADE FOR EHC MARK II

REVISIONS

1 D. Aulisi MAY 16 1983

D. SERVO AMPLIFIER (continued)

3. ~~-5.4 < I_{SV}/V_{TP55} < -4.2 ma/V~~ -5.22V TP59 -5.01 TP59 -4.83V -5.00 -4.93 (VR2 CCW, VR54 CW, $|V_{TP55}|$ ≤ ~~3 VDC~~) (P.W.11) +1.000VDC

for:

a. R_{SV} = 124Ω
b. R_{SV} = 249Ω

VERY LITTLE OR NO CHANGE AT TP59 (GREY)

C. MEASURE CURRENT P.N. 12 TO P.N 13 = -0.114 MA TO -0.124 MA .1164

4. ~~-78 < I_{SV}/V_{TP55} < -82 ma/V (VR2 CW, VR54 CCW, $|V_{TP55}|$ ≤ 3 VDC)~~

~~for:~~

a. R_{SV} = 124Ω
b. R_{SV} = 249Ω

4. INPUT 1VDC TO P.N 11
VR54=CW
ADJUST VR2 FOR -0.400VDC AT TP6
READ CURRENT 12 TO 13 = -.202 TO -.206
-.198 -.199 -.200
NO CHANGE IN CURRENT

5. ~~Current Limit~~

~~$|I_{SV_{MAX}}|$ < 30 ± 1 ma for $|V_{TP55}|$ > .5 VDC (VR2 CW)~~

VERIFY THIS READING IS ALWAYS LOW ON ALL CARDS

~~for:~~

~~a. R_{SV} = 124Ω~~
~~b. R_{SV} = 249Ω~~

E. ~~SERVO AMPLIFIER Transient State~~

~~With VR2 CCW, VR54 CCW, apply V_{TP55} = -1V step and observe V_{TP59} (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 TP12 with a scope (2 volt/div. amplitude, 50 us/div sweep). If necessary, readjust for a non-distorted sine wave.~~

PRINTS

REV NO. 0

P3K-AL-0656-A01

CONT ON SHEET 4 SH NO. 3

TITLE
CIRCUIT BOARD SPECIFICATIONS
VALVE POSITION DRIVER 169C4773, 1F1-F3
VALVE POSITION DRIVER - AMS 185C8105, 1F1-F4

FIRST MADE FOR EHC MARK II

REVISIONS

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F. 3 KHZ OSCILLATOR (continued)

2. ~~Distortion~~

~~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 $|T_1 - T_2| > 10$ usec, and can be eliminated by backing down on VR50 (TP50).~~

b. Saturation Distortion

~~Saturation will occur when $|V_{peak\ TP12}| > V_{TP1}$ or V_{TP2} and is eliminated by decreasing VR51.~~

3. ~~V_{Gate} (V_{TP50}) Setting~~

~~Adjust VR50 so that the oscillator runs at the upper limit of linearity ($|T_1 - T_2| \simeq 10$ usec); i.e.:~~

~~$|V_{GATE}| \simeq |V_{GATE\ FET\ DIST}| - .010$~~

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

~~$-2.6 < V_{GATE} < -1.0$~~ ADJUST VR 50 FOR -2.5VDC AT TP 50 WITH VR51 CCW. (VIOLET TOP)

NOTE VR 50 CCW SHUTS DOWN CARD

4. Amplitude Setting

Adjust VR51 for $V_{TP12} = 6.000 \pm .010$ VRMS. 16.97v P-P

5. Frequency

$3000 < f < 3400$ Hz @ TP12 (3062, 3152, 3030)

6. Regeneration

The oscillator must restart in all of the following situations:

a. Simultaneously interrup the +22 VDC and the -22 VDC power. Reconnect.

b. Interrupt the +22 VDC power. Reconnect.

PRINTS

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F. 3 KHZ OSCILLATOR (continued)

6. Regeneration (continued)

c. Interrupt the -22 VDC power. Reconnect.

d. Withdraw and insert the Valve Position Driver Board.

7. Temperature Stability MAKE SURE AT AMBIENT TEMP ΔVTP12 DOES NOT DRIFT ≥ .060 VRMS

~~This test may be conducted with oscillator unloaded.~~

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

~~$|\Delta V_{TP12}| \leq .060$ VRMS ($T_A \leq T \leq 130^\circ F$).~~

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

8. Load Variance

~~No transducer position should change V_{TP12} more than 15 mv RMS.~~

~~$\Delta V_{TP12} \leq .015$ VRMS~~

8. MONITOR TP12 WITH AC Meter RUN TRANSDUCER FROM TOP to Bottom NOTE THAT WAVEFORM GAIN DOES NOT CHANGE MORE THAN .015 MV RMS

9. Envelope Modulation

Envelope modulation should not exceed .015V ptp.

G. DEMODULATOR

NOTE! Region OF TRANSDUCER USED IS (BS) 2.5" FROM BODY to 6" FROM BS TOTS 8.5"

V_{TP12} = 6 VRMS

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

V_{TP8} = 0.000 ± 0.010 VDC TOP STOP

a. Verify V_{TP7} by Figure 4. (USE SCOPE) 50μs SCOPE 2v/DIV

b. Verify V_{TP52} by Figure 5. (USE SCOPE)

PRINTS

REVISIONS

G. DEMODULATOR (continued)

2. Insert the transducer ~~by 8"~~ to Bottom Shop (2.5" From Body)

a. Verify V_{TP7} by Figure 6.

b. Verify V_{TP52} by Figure 7.

H. FILTER

1. ~~With the CB inactive, apply V_{TP52} = 1 VRMS @ 100 Hz. Then:~~

~~0.88 < V_{TP8} (V_{TP13})/V_{TP52} < 0.94 (1F1-F3, 1F1-F4)~~

2. ~~Under normal operating conditions with V_{TP12} = 6 VRMS:~~

~~a. Transducer fully extended to its linear limit:~~

~~V_{TP8} = 0.000 ± .010 VDC~~

~~V_{TP8} < 10 mv ptp, 3 KHz fundamental~~

~~b. Transducer inserted by 8"~~

~~4.5 < V_{TP8} < 5.2 VDC~~

~~V_{TP8} < 10 mv ptp, 3 KHz fundamental~~

I. FEEDBACK AMPLIFIER (1F1-F3 Only)

1. Assure that VR53 nulls IC6 when V_{TP8} = 0. TP13 = 0 Set TP8 to Zero with Transducer.

2. -7.97 < V_{TP13}/~~V_{TP8}~~ < -6.58 (VR4 CW, ~~$|V_{TP8}| < 1.5$~~ Between) Set TP8 = +1 VDC -7.35 -7.53 -7.29 Set 1V. with Transducer

-1.24 < V_{TP13}/~~V_{TP8}~~ < -1.18 (VR4 CCW, ~~$|V_{TP8}| < 8.0$~~ Between) TP8 = +1 VDC -1.209 -1.214 -1.204

PRINTS

TITLE
CIRCUIT BOARD SPECIFICATIONS
VALVE POSITION DRIVER - 169C4773, 1F1-F3
VALVE POSITION DRIVER - AMS 186C8105, 1F1-F4
FIRST MADE FOR EHC MARK II

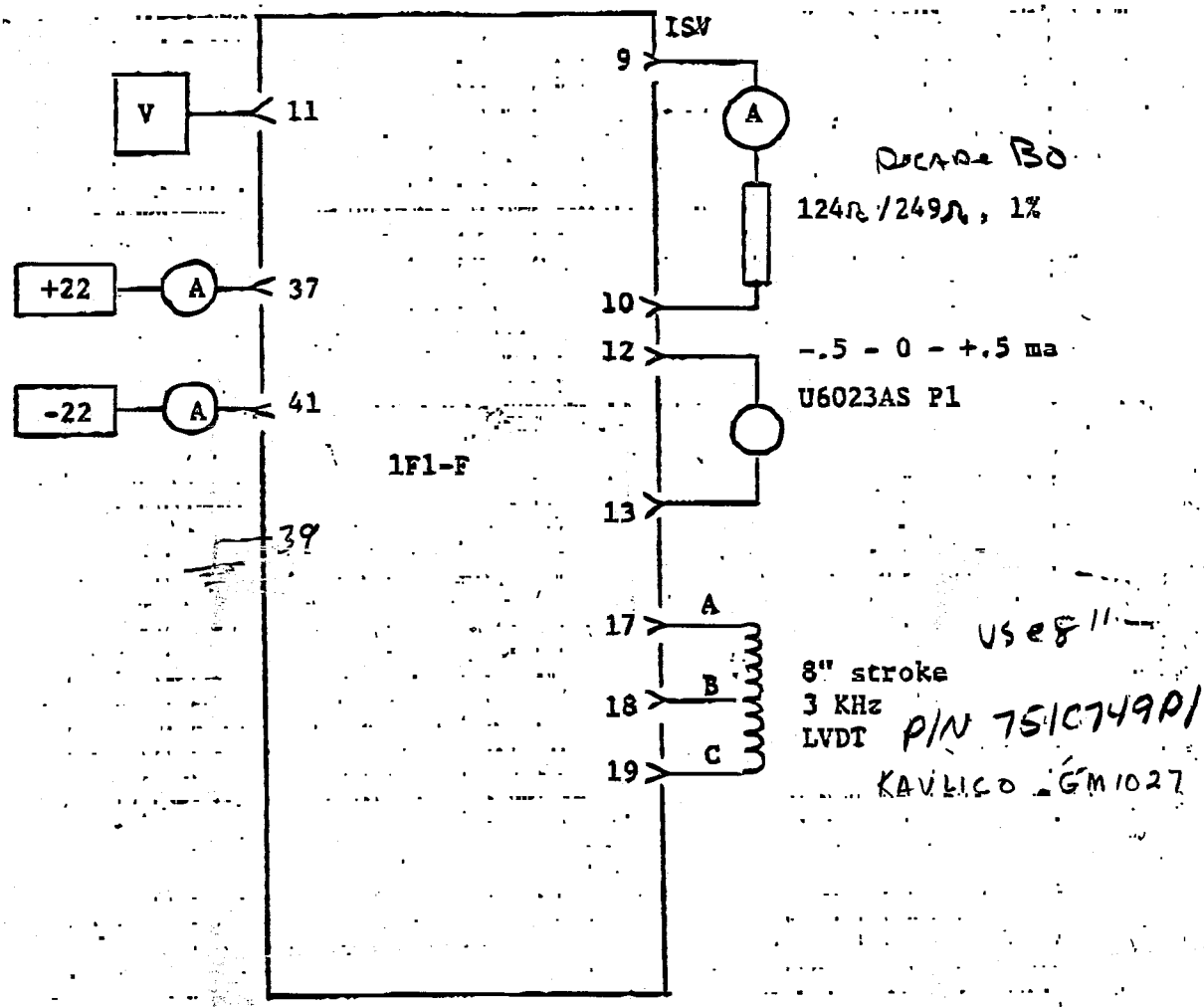

FIGURE 1: TEST SETUP

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REF NOS. 1

P3K-AL-0656-A01

CONT ON SHEET 8 SH NO. 7

TITLE
CIRCUIT BOARD SPECIFICATIONS
VALVE POSITION DRIVER -L62C4773, 1F1-F3
VALVE POSITION DRIVER - AMS 186C8105, 1F1-F4
FIRST MADE FOR EHC MARK II

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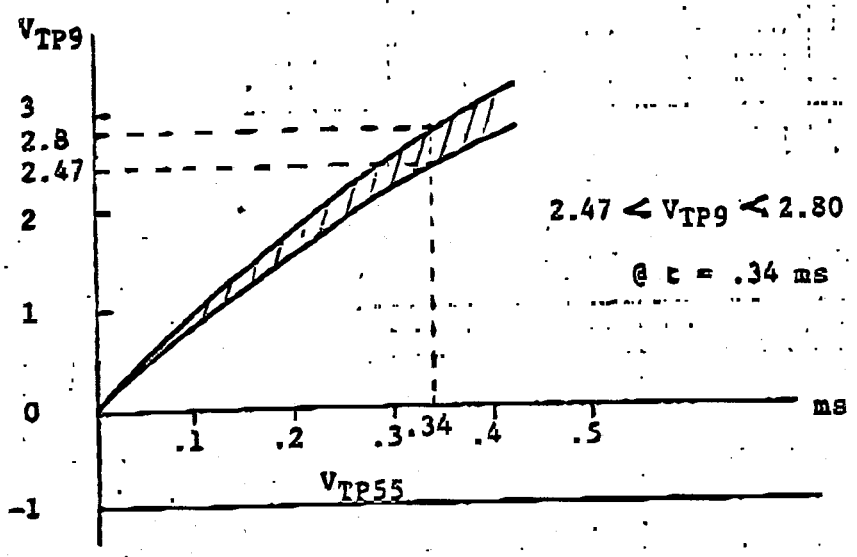

FIGURE 2: Servoamp response to unit step input (Section E)

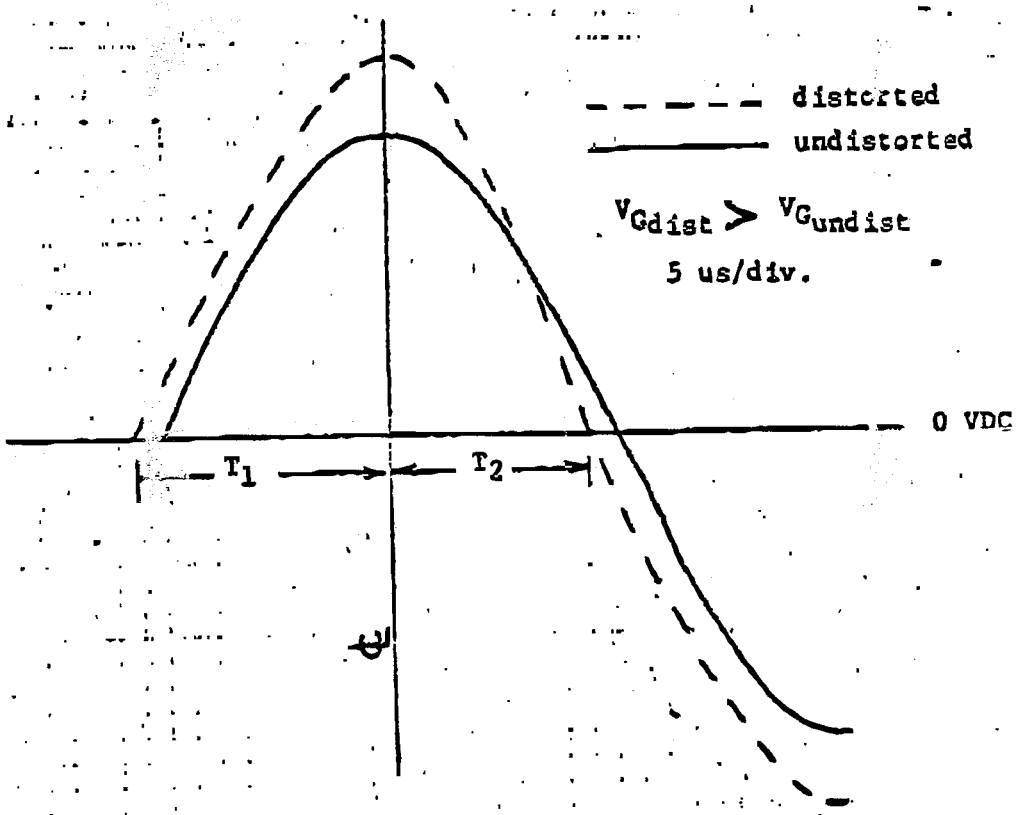

FIGURE 3: FET distortion $|T_1 - T_2| > 10$ us

PRINTS

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CODE IDENT

DEV NO. 01

P3K-AL-0656-A01

CONT ON SHEET 9 SH NO. 8

TITLE
CIRCUIT BOARD SPECIFICATIONS
VALVE POSITION DRIVER - 169C4773, 1F1-F3
VALVE POSITION DRIVER - AMS 186C8105, 1F1-F4
FIRST MADE FOR EHC MARK II

CONT ON SHEET 9 SH NO. 8

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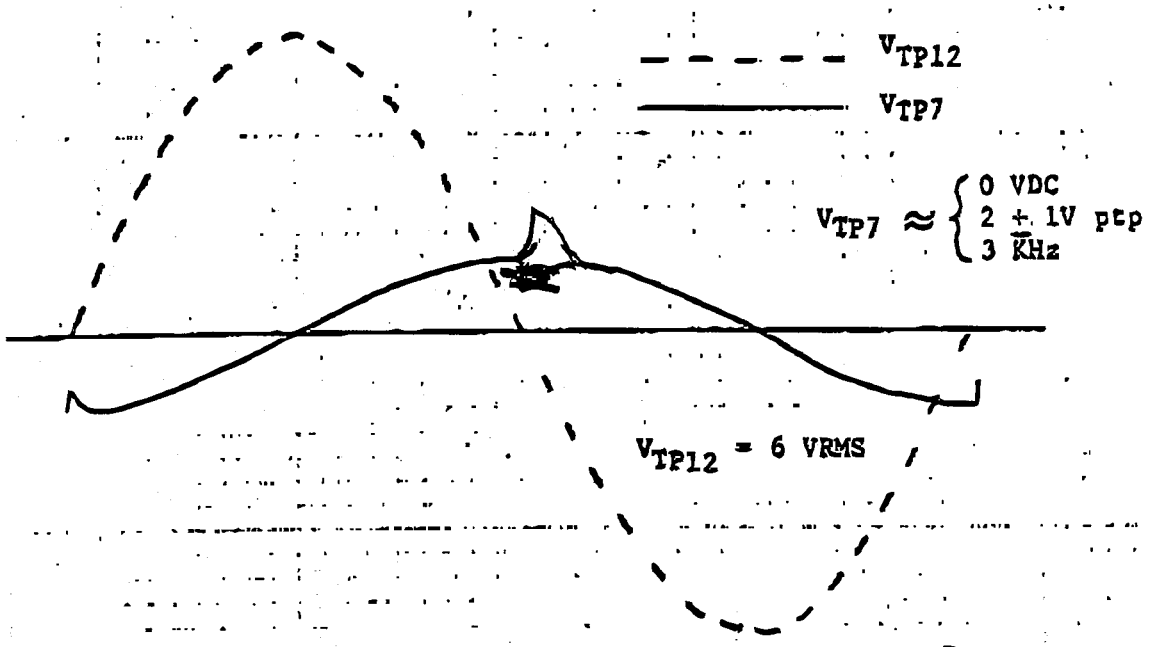

FIGURE 4: V_{TP7} - Transducer fully extended top stop TS

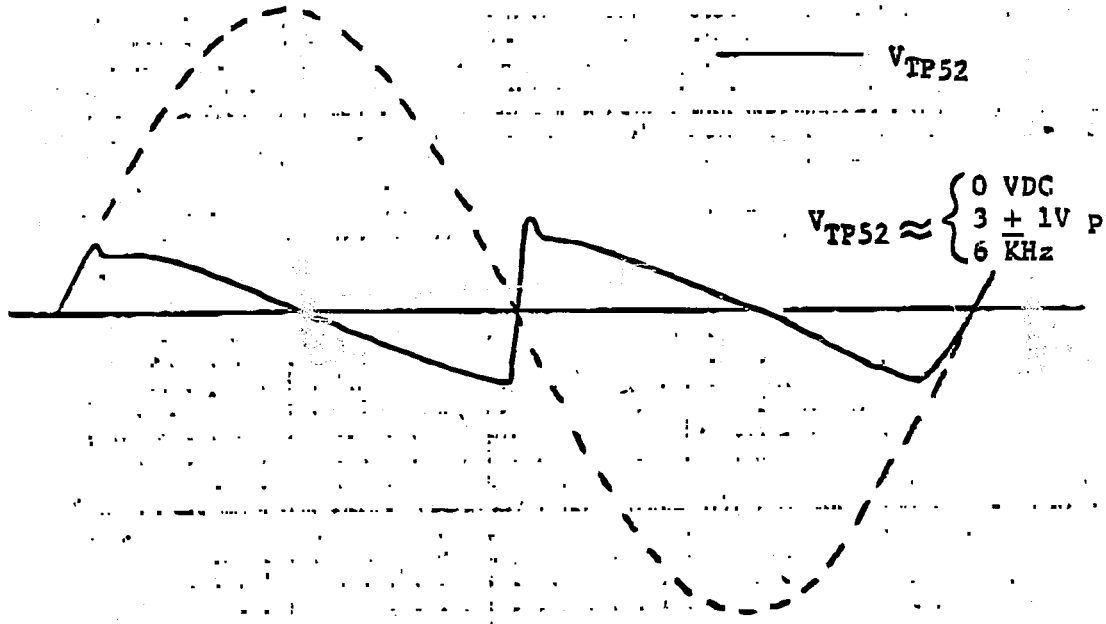

FIGURE 5: V_{TP52} - Transducer fully extended top stop TS

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Schenectady N.Y. LOCATION
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CONT ON SHEET 9 SH NO 8

FP-803-WA (3-80)

REV NO. #1

P3K-AL-0656-A01

CONT ON SHEET 10 SH NO. 9

TITLE
CIRCUIT BOARD SPECIFICATIONS
VALVE POSITION DRIVER 169C4773, 1F1-F3
VALVE POSITION DRIVER - ALT 186C8105, 1F1-F4

FIRST MADE FOR EHC MARK II

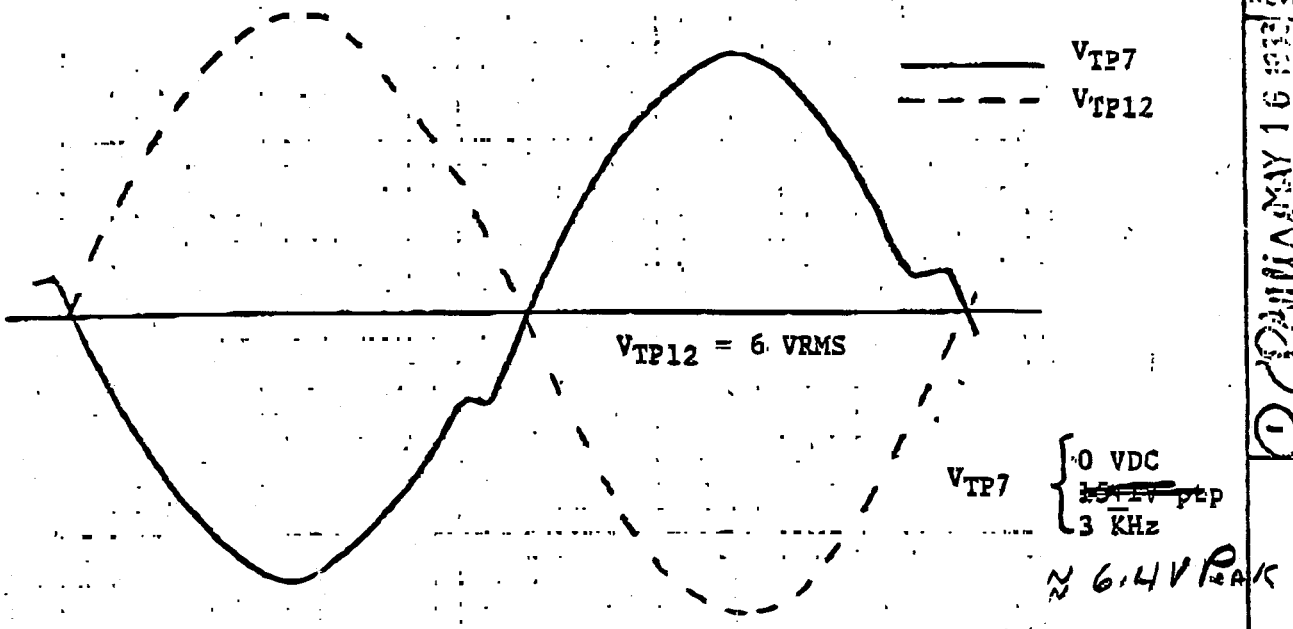


FIGURE 6: V_{TP7} - Transducer Inserted 8"
Bottom Stop
BS

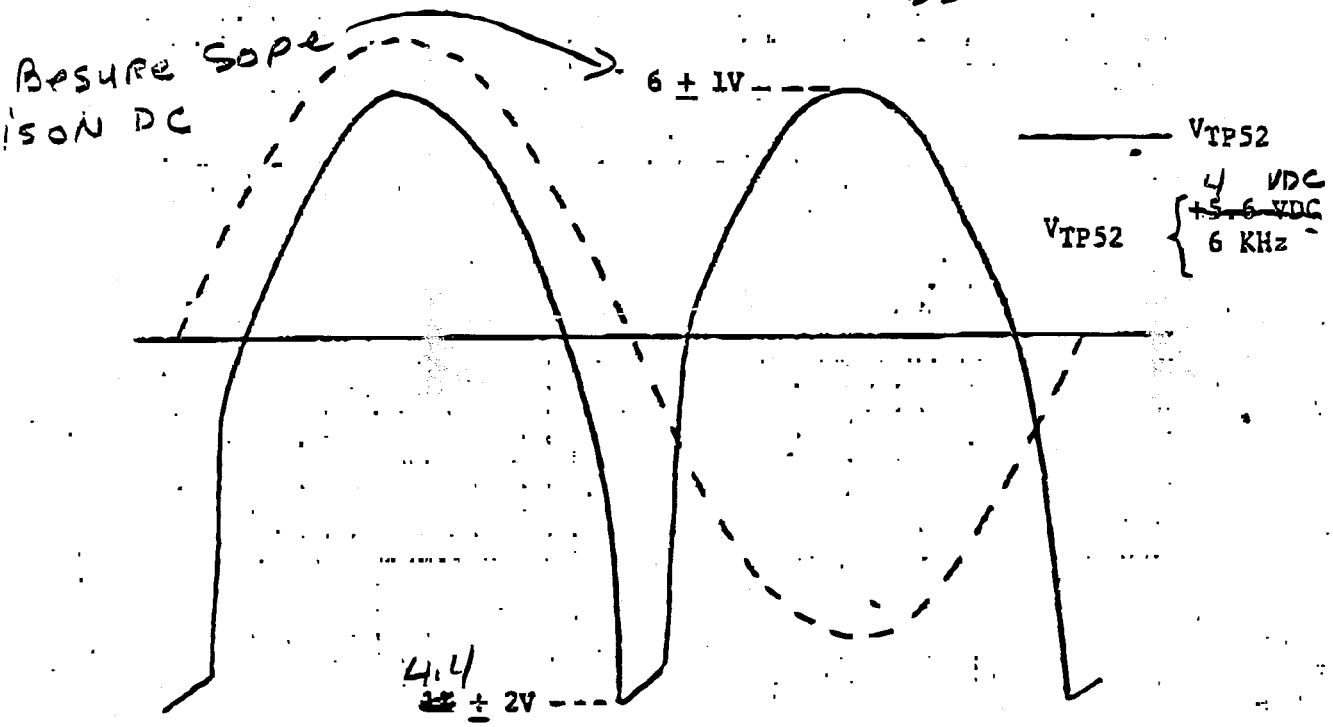
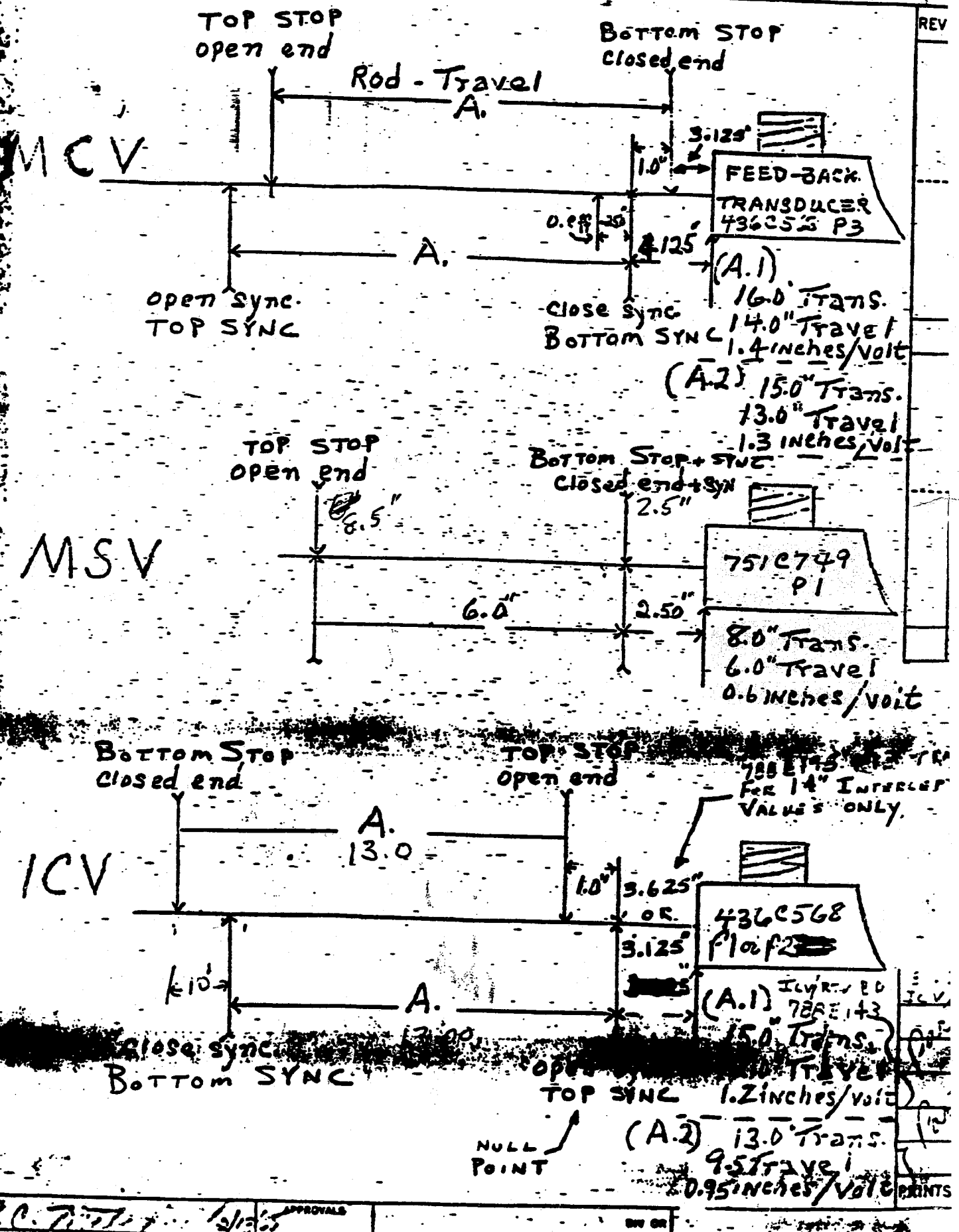


FIGURE 7: V_{TP52} - Transducer Inserted 8"
Bottom Stop
BS

MK III INDUSTRIAL

FIRST MADE FOR E.H.C.

SERVO INPUT 0 TO 10V



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ISSUED		1-77 T.U.T	LOCATION	CONT ON SHEET

REV NO. 01

P3K-AL-0656-A01

CONT ON SHEET — SH NO. 10

TITLE
CIRCUIT BOARD SPECIFICATIONS
VALVE POSITION DRIVER 169C4773, 1F1-F3
VALVE POSITION DRIVER - AMS 186C8105, 1F1-F4
FIRST MADE FOR EHC MARK II

CONT ON SHEET — SH NO. 11

REVISIONS

EXPANDED MAY 16 1983

SSA 5/12/83

PREPARED BY: S S Abelson DATE 9/10/81

S.S. Abelson
EHC DESIGN ENGINEERING
Building 285 Room 231

APPROVED BY: R L Olson DATE 9/10/81

R.L. Olson, Manager
EHC DESIGN ENGINEERING
Building 285 Room 231

PRINT

MADE BY J. Aulisi 14 Sept. 1981	APPROVALS	Steam Turbine — BIV OR DEPT.	P3K-AL-0656-A01
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FE-801-MA (2-80)