dbx model 150x test and alignment procedure.

I. Pre-calibration procedure.

Plug the unit to be tested into a rated source of ac mains voltage and frequency.

Cycle the noise reduction in/out switches and confirm that the noise reduction "in" led-indicators illuminate when the switch is pushed to the "in" position and extinguish when the switch is in the "out" position. Verify that the operation of the switches is smooth and free of any unusual binding etc. Verify that the power indicator is illuminated.

monitor the output voltages at TP 3 and TP 4 and verify that they are within +/- 600 mV of the nominal +/- 15 vdc, respectively.

Place all calibration trim pots to the center of their rotation. Rotate each front panel level match control through its entire range and verify that the operation of the control is smooth and free of any unusual binding, etc. Place each front panel control to its center position.

II. Decoder calibration proceedure

2.1 Connect a low output impedance signal generator to the J1 input of the unit to be tested. Set the output of the signal generator to a magnitude of 2 vrms ac at a frequency of 50 hz. Monitor the output of U4 at pin 7, (TP 1) using a suitable oscilloscope having a minimum vertical sensitivity of 5 mV/c.m. Adjust R41 for the best possible symmetry of the 100 hz waveform at TP 1. set the signal generator to a frequency of 1 Khz and Decrement the output level of the signal generator in 10 db steps from 2.0 v rms to 200 mV rms. Verify that proper rms detector tracking follows at +6 mV/db. verify that the output of U3 is within +/- 12 mv dc of 0.000 volts dc at an input amplitude of 200 mV rms. Continue to decrement the output of the signal generator from 200 mV rms to 2 mV rms and again verify that the rms detector properly tracks at 6 mV/db.

2.2 Dis-connect the oscilloscope from TP 1 and connect TP 1 to TP 5 with a suitable clip lead (thus shorting the output of U4 to ground). Monitor the output of U3 and U5 at J2 using a suitable a.c. voltmeter. Perform spot checks of the frequency response at test frequencies of 30 hz, 300 hz, and 3 khz and verify that the measured response is within +/- 1.5 db of the tabulated nominal response indicated in table 1.

-20dB = 0.076V

2.3 Dis-connect the signal generator from the input of the unit under test. Set the output of the signal generator to an amplitude of 84 mV rms at a frequency of 100 hz and re-connect the signal generator to TP 6. (* the dc output offset of the signal generator used for this part of the proceedure must be less than 3 mV) Monitor the output of U3 with respect to ground at J2 using an ac coupled oscilloscope set to a minimum vertical sensitivity of 5 mV/c.m. Adjust R15 for minimum control voltage feedthrough. Remove the cliplead from TP 1 to TP 5. measure the dc ouput offset voltages at the outputs of U3 and U5 with respect to ground and verify that they are less than +/- 10 mV dc.

TO 5KHZ ∞

2.4 Set the output of the signal generator to an amplitude of 316 mV rms. Adjust R9 for 316 mV rms at the output of U3 at J2 with respect to ground.

(R54)

2.5 Repeat paragraphs 2.1 through 2.4 for the alternate decode channel.

III. Encoder calibration proceedure

3.1 Connect a low output impedance signal generator to the J1 input of the unit to be tested. Set the output of the signal generator to a magnitude of 2 vrms ac at a frequency of 50 hz. Monitor the output of U4 at pin 7, (TP 1) using a suitable oscilloscope having a minimum vertical sensitivity of 5 mV/c.m. Adjust R41 for the best possible symmetry of the 100 hz waveform at TP 1. (TP2) set the signal generator to a frequency of 1 Khz and Decrement the output level of the signal generator in 10 db steps from 1.0 v rms to 100 mV rms. Verify that proper rms detector tracking follows at + 3 mV/db. verify that the output of U3 is within +/- 12 mv dc of 0.000 volts dc at an input amplitude of 100 mV rms. Continue to decrement the output of the signal generator from 100 mV rms to 1 mV rms and again verify that the rms detector properly tracks at 3 mV/db.

→ R4, R90

3.2 Dis-connect the oscilloscope from TP 1 and connect TP 1 to TP 5 with a suitable clip lead (thus shorting the output of U4 to ground). Monitor the output of U3 and U5 at J2 using a suitable a.c. voltmeter. Perform spot checks of the frequency response at test frequencies of 30 hz, 300 hz, and 3 khz and verify that the measured response is within +/- tk db of the tabulated nominal response indicated in table 1.

3.3 Dis-connect the signal generator from the input of the unit under test. Set the output of the signal generator to an amplitude of 84 mV rms at a frequency of 100 hz and re-connect the signal generator to TP 6. (* the dc output offset of the signal generator used for this part of the proceedure must be less than 3 mV) Monitor the output of U3 with respect to ground at J2 using an ac coupled oscilloscope set to a minimum vertical sensitivity of 5 mV/c.m. Adjust R15 for minimum control voltage feedthrough. Remove the cliplead from TP 1 to TP 5. measure the dc ouput offset voltages at the outputs of U3 and U5 with respect to ground and verify that they are less than +/- 10 mV dc. 5KHz @

3.4 Set the output of the signal generator to an amplitude of 316 mV rms. Adjust R9 for 316 mV rms at the output of U3 at J2 with respect to ground.

R11 (R58)

3.5 Repeat paragraphs 3.1 through 3.4 for the alternate encode channel.

IV. Back-to-back Performance tests, reference encoder/decoder performance tests.

4.1 the following connections will be made utilizing standard 1/4 " two conductor phone jacks and cabling. Connect the encoder outputs designated J2 and J4 to a reference decoder. Connect the encoder inputs designated J1 and J3 to the output of a tone burst generator. Apply a toneburst of 8 cylcles on (at 0 dbV) followed by 128 cycles off (less than -40 dbV) at a test frequency of 1 Khz. Monitor the outputs of the reference decoder and verify that there is not more than 20 % overshoot on the first cycle of the decoded waveform and no overshoot on the remaining cycles.

4.2 Connect the decoder inputs designated J1 and J3 to the output of a reference encoder. Connect the input of the reference encoder to the tone burst generator as described in paraqgraph 4.1. Monitor the outputs of the decoder under test at J2 and J4. Verify that there is not more than 20 % overshoot of the output waveform for the first cycle, and no overshoot on the remaining cycles

4.3 Connect the encoder output designated J2 to the decoder input designated J1. Connect the encoder output designated J4 to the decoder input designated J3. Connect the encoder inputs to a suitable low distortion signal generator. Monitor the decoder output designated J2 with a sui table distortion analyzer. Measure the

thd at test frequencies of 100 hz and 10 kHz and verify that it is not greater than .15 % at a test amplitude of 1.0 v rms. Repeat this measurement for the decoder output designated J4.

4.4 Temporarily bypass the noise reduction circuitry utilizing the noise reduction in/out switches and verify that the signal bypasses both the encoder and decoder functions. Re-instate the noise reduction circuitry to the "in" mode. Sweep the signal generator from 40 hz to 20 kHz and verify that the amplitude vs frequency response is flat within +/- 1 dB.

4.5 Terminate the encoder inputs designated J1 and J3 with 1 K ohm resistors to ground. Measure the output noise of the decoder channels at J2 and J4 in a 20 to 20kHz "A" weighted bandwidth and verify that it is not greater than -90 dBv, RE: .775 VRMS

150X TEST PROCEDURE
TABLE 1

+.75
-.25

le: 150X.ENC 18:29:28 04-22-1986 ENCODER
tput node: 0

Part	Nodes	Val	Tol

Freq, Hz	Mag, dB			Phase, deg		
	Calc	Des	Err	Calc	Des	Err
30	11.61	11.61	0.00	64.90	64.90	0.00
300	12.98	12.98	0.00	32.34	32.34	0.00
3000	22.48	22.48	0.00	11.78	11.78	0.00

s = 0 dB Best = 0 dB Itera = 0

3.8 +.342/-.107
9.96 +.402/-.126
13.3 +1.2/-.377

le: 150X.DEC 18:30:02 04-22-1986 DECODER
tput node: 0

Part	Nodes	Val	Tol

Freq, Hz	Mag, dB			Phase, deg		
	Calc	Des	Err	Calc	Des	Err
30	10.73	10.73	0.00	5.52	5.52	0.00
300	8.78	8.78	0.00	-27.34	-27.34	0.00
3000	-0.78	-0.78	0.00	-17.01	-17.01	0.00

s = 0 dB Best = 0 dB Itera = 0

: 150x.enc 15:53:55 04-22-1986
tput node: 0

Part	Nodes	Val	Tol

Freq, Hz	Mag, dB			Phase, deg		
	Calc	Des	Err	Calc	Des	Err
20	9.96	9.96	0.00	105.20	105.20	0.00
25	11.28	11.28	0.00	80.92	80.92	0.00
31.5	11.63	11.63	0.00	61.30	61.30	0.00
40	11.57	11.57	0.00	47.34	47.34	0.00
50	11.44	11.44	0.00	38.58	38.58	0.00
63	11.35	11.35	0.00	32.54	32.54	0.00
80	11.32	11.32	0.00	28.64	28.64	0.00
100	11.35	11.35	0.00	26.67	26.67	0.00
125	11.46	11.46	0.00	26.03	26.03	0.00
160	11.69	11.69	0.00	26.62	26.62	0.00
200	12.01	12.01	0.00	28.12	28.12	0.00
250	12.48	12.48	0.00	30.29	30.29	0.00
315	13.14	13.14	0.00	32.90	32.90	0.00
400	14.02	14.02	0.00	35.50	35.50	0.00
500	15.02	15.02	0.00	37.35	37.35	0.00
630	16.19	16.19	0.00	38.24	38.24	0.00
800	17.47	17.47	0.00	37.71	37.71	0.00
1000	18.65	18.65	0.00	35.77	35.77	0.00
1250	19.74	19.74	0.00	32.49	32.49	0.00
1600	20.79	20.79	0.00	27.58	27.58	0.00
2000	21.55	21.55	0.00	22.32	22.32	0.00
2500	22.13	22.13	0.00	16.61	16.61	0.00
3150	22.56	22.56	0.00	10.47	10.47	0.00
4000	22.83	22.83	0.00	4.00	4.00	0.00
5000	22.95	22.95	0.00	-2.18	-2.18	0.00
6300	22.97	22.97	0.00	-8.83	-8.83	0.00
8000	22.86	22.86	0.00	-16.14	-16.14	0.00
10000	22.63	22.63	0.00	-23.55	-23.55	0.00
12500	22.25	22.25	0.00	-31.64	-31.64	0.00
16000	21.62	21.62	0.00	-41.43	-41.43	0.00
20000	20.82	20.82	0.00	-50.99	-50.99	0.00

s = 0 dB Best = 0 dB Itera = 0

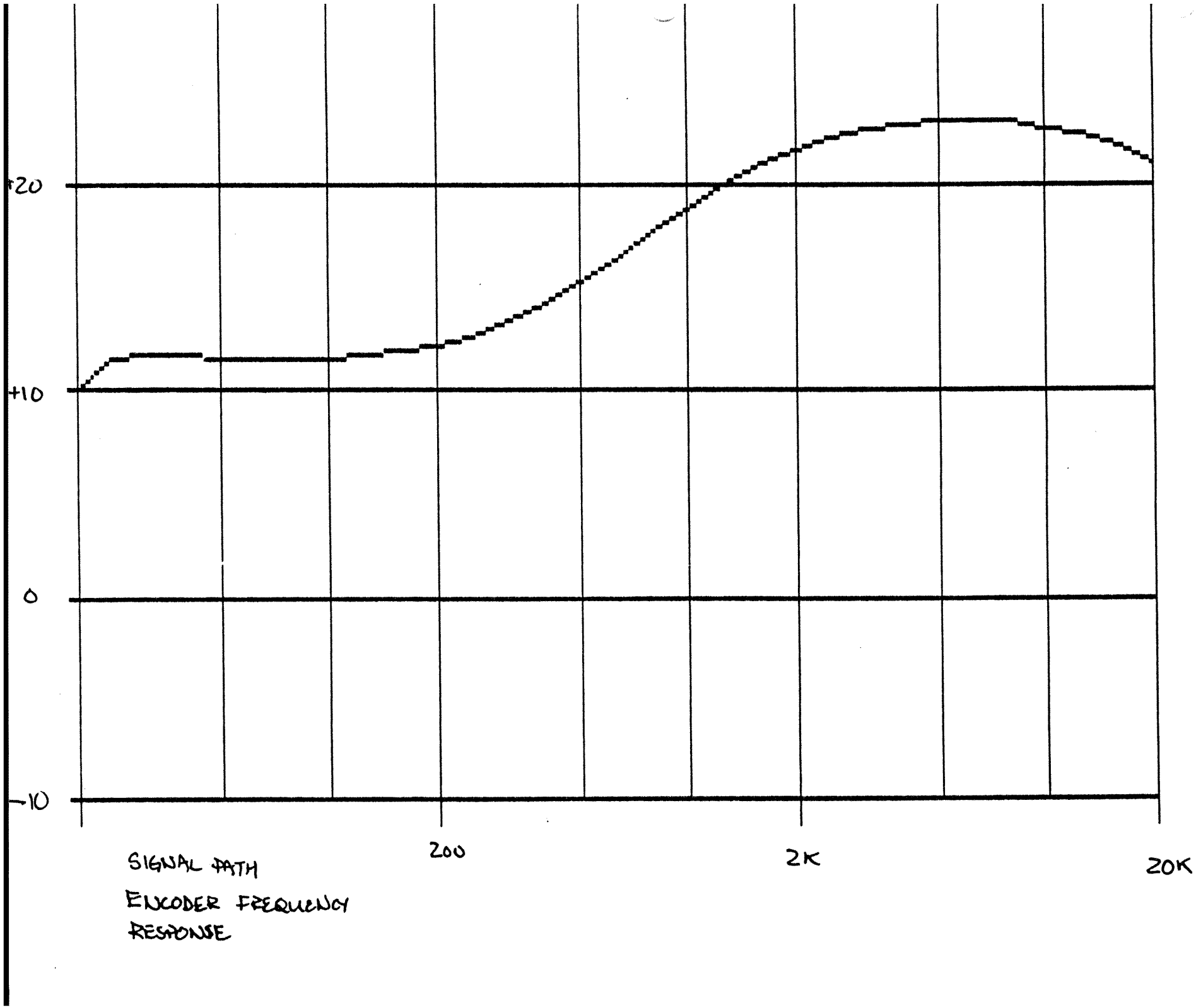
ENCODER SIGNAL PATH
FREQUENCY RESPONSE

RMS OUTPUT SHORTED TO GROUND

FAX TO: CAPETRONIC TAIWAN
FROM: DBX
DATE: APRIL 22, 1986
ATTN: SUZUKI-SAN
CC: MESSRS. TSAN, WEI, MINOWA
SUBJ: 150X TEST PROCEEDURE

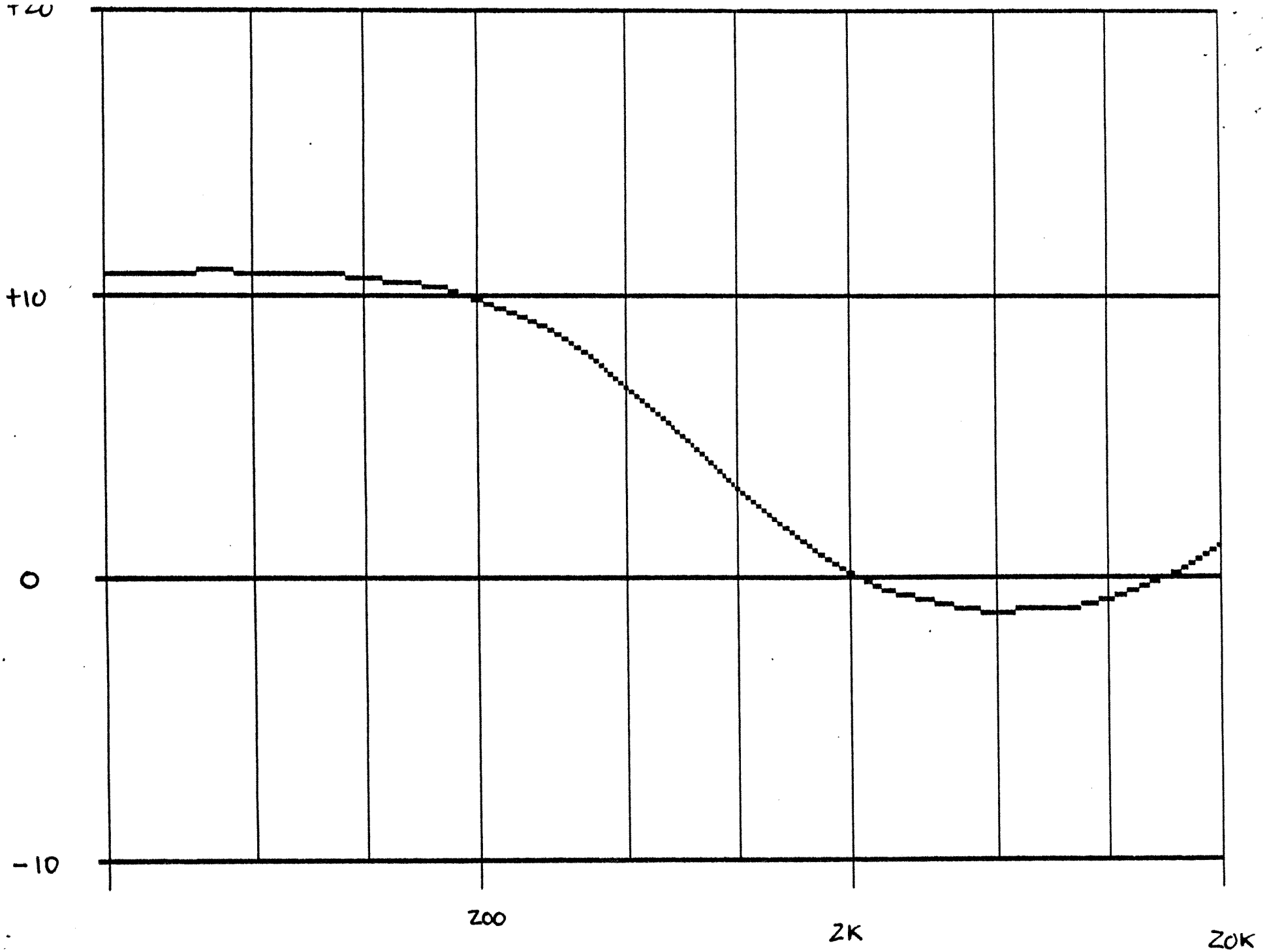
SUZUKI-SAN
ATTACHED PLEASE FIND ADDITIONAL DATA FOR 150X AS WELL AS TABLE 1 FOR TEST PROCEDURE WHICH WAS OMITTED IN PREVIOUS FAX

BEST REGARDS
R. AYLWARD

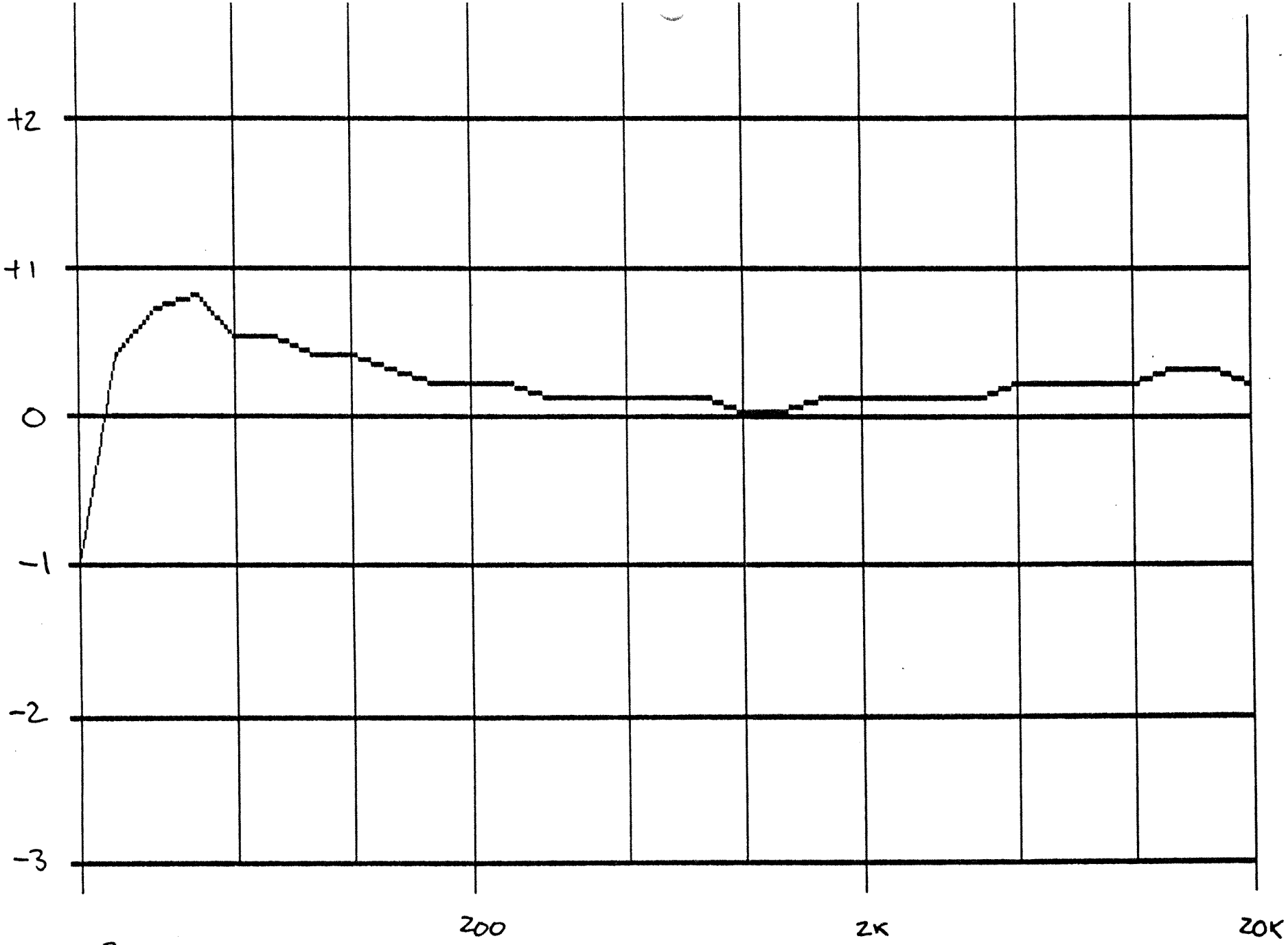


SIGNAL PATH

ENCODER FREQUENCY RESPONSE



DECODER SIGNAL PATH
FREQUENCY RESPONSE



BACK TO BACK

SIGNAL PATH FREQUENCY RESPONSE

e: 150x.dec 15:31:08 04-22-1986
tput node: 0

Part	Nodes	Val	Tol			
Freq, Hz	Mag, dB			Phase, deg		
	Calc	Des	Err	Calc	Des	Err
20	10.61	10.61	0.00	11.10	11.10	0.00
25	10.69	10.69	0.00	7.88	7.88	0.00
31.5	10.73	10.73	0.00	4.91	4.91	0.00
40	10.75	10.75	0.00	2.09	2.09	0.00
50	10.75	10.75	0.00	-0.43	-0.43	0.00
63	10.72	10.72	0.00	-3.06	-3.06	0.00
80	10.66	10.66	0.00	-5.91	-5.91	0.00
100	10.56	10.56	0.00	-8.80	-8.80	0.00
125	10.40	10.40	0.00	-11.99	-11.99	0.00
160	10.14	10.14	0.00	-15.93	-15.93	0.00
200	9.80	9.80	0.00	-19.84	-19.84	0.00
250	9.31	9.31	0.00	-23.96	-23.96	0.00
315	8.62	8.62	0.00	-28.22	-28.22	0.00
400	7.72	7.72	0.00	-32.20	-32.20	0.00
500	6.70	6.70	0.00	-35.13	-35.13	0.00
630	5.52	5.52	0.00	-36.97	-36.97	0.00
800	4.24	4.24	0.00	-37.32	-37.32	0.00
1000	3.05	3.05	0.00	-36.15	-36.15	0.00
1250	1.95	1.95	0.00	-33.66	-33.66	0.00
1600	0.90	0.90	0.00	-29.68	-29.68	0.00
2000	0.14	0.14	0.00	-25.38	-25.38	0.00
2500	-0.44	-0.44	0.00	-20.78	-20.78	0.00
3150	-0.86	-0.86	0.00	-16.01	-16.01	0.00
4000	-1.12	-1.12	0.00	-11.29	-11.29	0.00
5000	-1.22	-1.22	0.00	-7.16	-7.16	0.00
6300	-1.21	-1.21	0.00	-3.18	-3.18	0.00
8000	-1.06	-1.06	0.00	0.60	0.60	0.00
10000	-0.79	-0.79	0.00	3.75	3.75	0.00
12500	-0.37	-0.37	0.00	6.36	6.36	0.00
16000	0.29	0.29	0.00	8.23	8.23	0.00
20000	1.05	1.05	0.00	8.51	8.51	0.00

s = 0 dB Best = 0 dB Itera = 0

DECODER SIGNAL PATH FREQUECY RESPONSE

RMS OUTPUT SHORTED TO GROUND

e: 150x.sig 16:11:11 04-22-1986
put node: 0

Part Nodes Val Tol

Freq, Hz	Mag, dB			Phase, deg		
	Calc	Des	Err	Calc	Des	Err
20	-1.00	-1.00	0.00	116.00	116.00	0.00
25	0.40	0.40	0.00	89.00	89.00	0.00
31.5	0.70	0.70	0.00	66.00	66.00	0.00
40	0.80	0.80	0.00	49.00	49.00	0.00
50	0.50	0.50	0.00	39.00	39.00	0.00
63	0.50	0.50	0.00	30.00	30.00	0.00
80	0.40	0.40	0.00	23.00	23.00	0.00
100	0.40	0.40	0.00	18.00	18.00	0.00
125	0.30	0.30	0.00	14.00	14.00	0.00
160	0.20	0.20	0.00	11.00	11.00	0.00
200	0.20	0.20	0.00	8.00	8.00	0.00
250	0.20	0.20	0.00	6.00	6.00	0.00
315	0.10	0.10	0.00	5.00	5.00	0.00
400	0.10	0.10	0.00	3.00	3.00	0.00
500	0.10	0.10	0.00	2.00	2.00	0.00
630	0.10	0.10	0.00	1.00	1.00	0.00
800	0.10	0.10	0.00	1.00	1.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00
1250	0.00	0.00	0.00	-2.00	-2.00	0.00
1600	0.10	0.10	0.00	-2.00	-2.00	0.00
2000	0.10	0.10	0.00	-3.00	-3.00	0.00
2500	0.10	0.10	0.00	-4.00	-4.00	0.00
3150	0.10	0.10	0.00	-6.00	-6.00	0.00
4000	0.10	0.10	0.00	-7.00	-7.00	0.00
5000	0.20	0.20	0.00	-9.00	-9.00	0.00
6300	0.20	0.20	0.00	-12.00	-12.00	0.00
8000	0.20	0.20	0.00	-15.00	-15.00	0.00
10000	0.20	0.20	0.00	-20.00	-20.00	0.00
12500	0.30	0.30	0.00	-26.00	-26.00	0.00
16000	0.30	0.30	0.00	-33.00	-33.00	0.00
20000	0.20	0.20	0.00	-42.00	-42.00	0.00

s = 0 dB Best = 0 dB Itera = 0

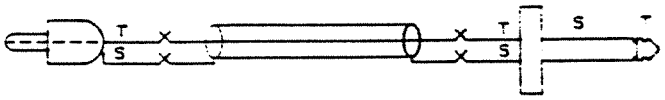
BACK TO BACK SIGNAL PATH FREQUENCY RESPONSE

150X

Field Service Alignment Procedure

Equipment required:

Oscillator	Krohn Hite	4200 or equivalent
Voltmeter	Simpson	464 or equivalent
Oscilliscope	Philips	PM 3232 or equivalent

From Oscillator output  To 150X Input

Single-ended operation with 150X inputs only

1. Power Supply Test

   +15vdc +/- 600 mv at TP3
   -15dvc +/- 600 mv at TP4

2. RMS Symmetry Alignment
   Set Oscillator to 316 mv rms (-10dbv) at 50 Hz

   Connect Oscillator to J1 and J3 of the play (decode) board.
   Engage both channel A and channel B play switches.

   Connect Oscilloscope to TP1.
   Adjust R41 for even RMS waveform peaks. (see figure A)

   Connect Oscilloscope to TP2.
   Adjust R86 for even RMS waveform peaks.

   Connect Oscillator to J1 and J3 of the record (encode) board.
   Engage both chanel A and channel B play switches.

   Connect Oscilloscope to TP1.
   Adjust R43 for even RMS waveform peaks.

   Connect Oscilloscope to TP2.
   Adjust R90 for even RMS waveform peaks

DWG. 350074-00

3. Level Match Alignment

Set Oscillator to 316 mv RMS (-10dbV) at 1K Hz

Connect Oscillator to J1 and J3 of the play board.
Adjust channel A play level pot (R9) for 316 mv RMS at pin 7 of U3.
Check that the signal at pin 6 of U5 is 316 mv RMS +/- 15mv.

Adjust channel B play level pot (R54) for 316 mv RMS at pin 7 of U7.
Check that the singal at pin 6 of U9 is 316 mv RMS +/- 15mv.

Connect Oscillator to J1 and J3 of the record board.
Adjust channel A record level pot (R11) for 316 mv RMS at pin 7 of U3.
Check that the signal at pin 6 of U5 is 316 mv RMs +/-15mv.

Adjust channel B record level pot (R58) for 316 mv RMS at pin 7 of U8.
Check that the signal at pin 6 of U10 is 316mv RMS +/- 15mv.

4. VCA Symmetry Alignment

NOTE: The dc output offset of the Oscillator used for this part of the procedure must be less than 3mv.

Disconnect the Oscillator from the unit.
Set Oscillator to 84 mv rms at 100 Hz.
-21.5 DBV

Play board

Connect a jumper between TP1 and TP5.
Connect Oscillator to TP6.
Connect Oscilloscope to pin 7 of U3.
Adjust R15 for flattest possible waveform. (see figure B)
Remove jumper between TP1 and TP5.
Check that the dc offset at pin 7 of U3 is 0vdc +/-10mv.

Connect a jumper between TP2 and TP5.
Connect Oscillator to TP7.
Connect Oscilloscope to pin 7 of U7.
Adjust R60 for flattest possible waveform.
Remove jumper between TP2 and TP5.
Check that the dc offset at pin 7 of U7 is 0vdc +/-10mv.

Record board

Connect a jumper between TP1 and TP5.
Connect Oscillator to TP6.
Connect Oscilloscope to pin 7 of U3.
Adjust R16 for flattest possible waveform.
Remove jumper between TP1 and TP5.
Check that the dc offset at pin 7 of U3 is 0vdc +/-10mv.

Connect a jumper between TP2 and TP5.
Connect Oscillator to TP7 of U8.
Adjust R63 for flattest possible waveform.
Remove jumper between TP2 and TP5.
Check that the dc offset at pin 7 of U8 is 0vdc +/-10mv.

DWG. 350074-00

DIAGRAM A

UNCALIBRATED RMS WAVEFORM

PROPERLY CALIBRATED RMS WAVEFORM

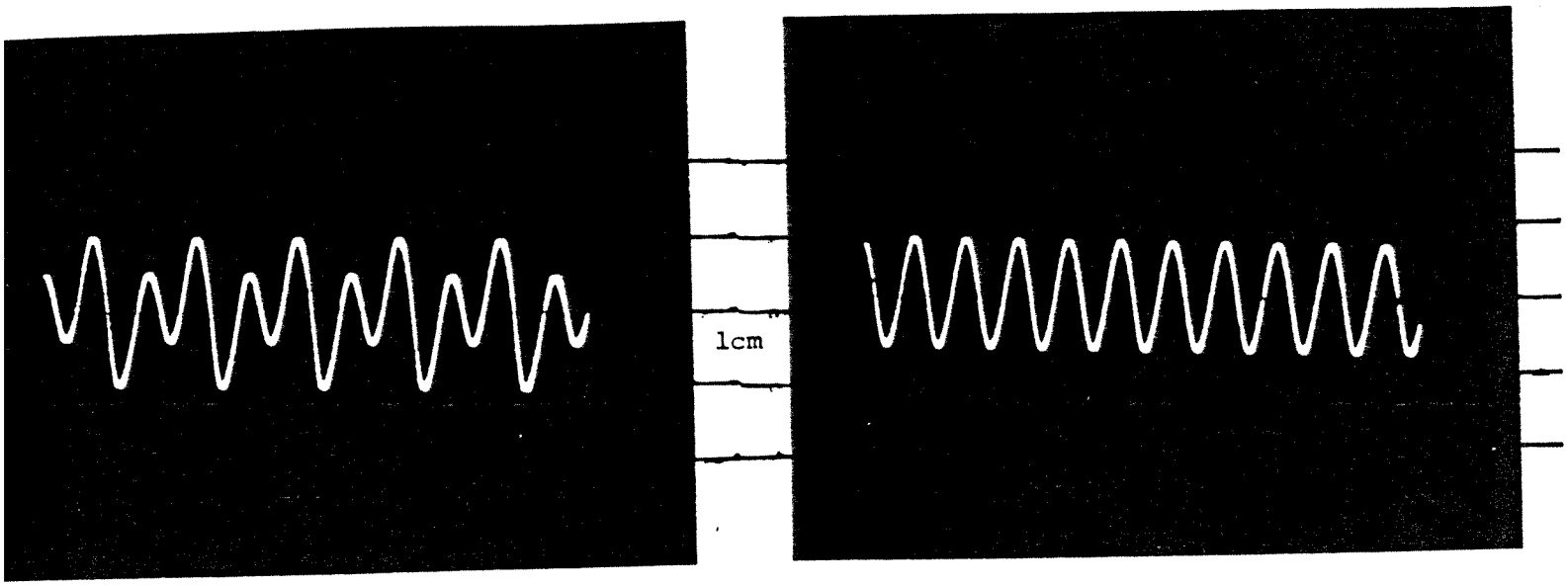
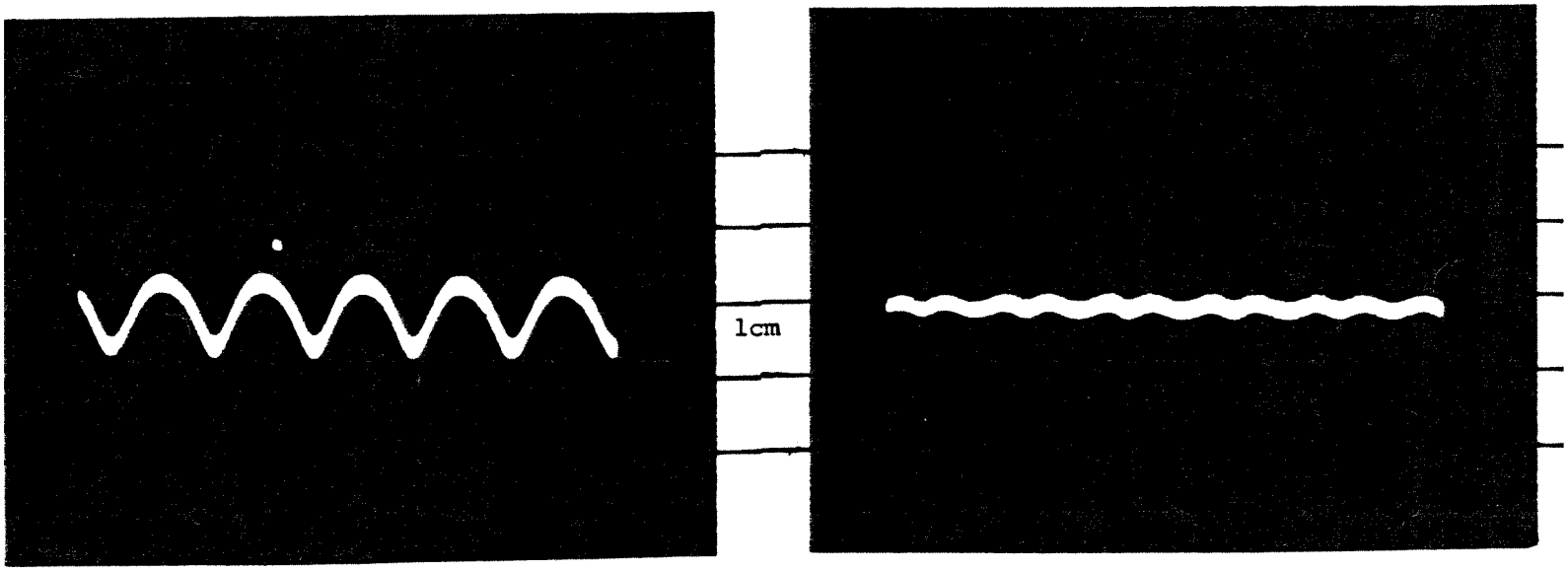


DIAGRAM B

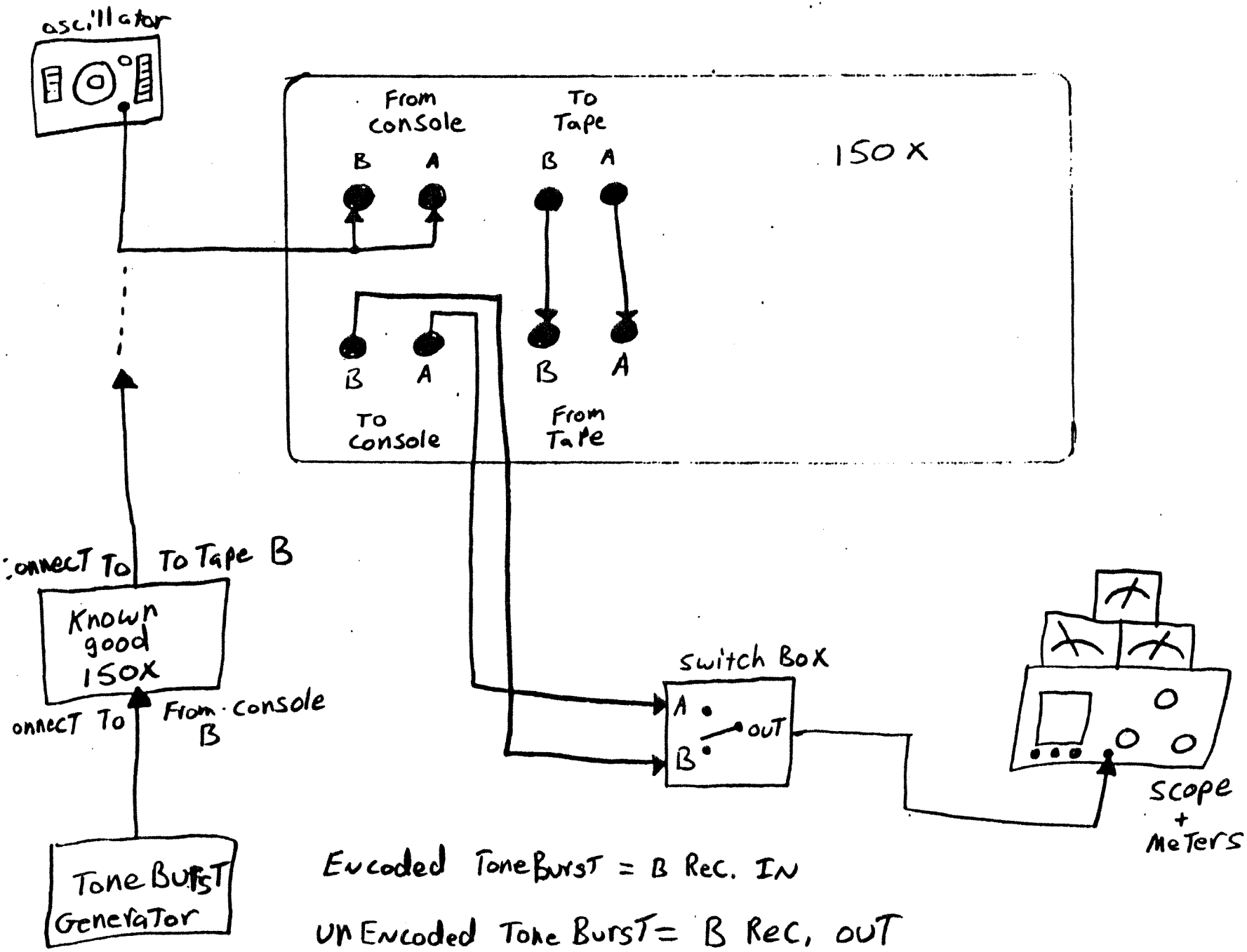
UNCALIBRATED VCA SYMMETRY

PROPERLY CALIBRATED VCA SYMMETRY



OSCILLOSCOPE SETTINGS FOR
VCA SYMMETRY ADJUSTMENTS
TIME = 5ms/cm
AMPL = 2mv/cm

150X Lynch Testing



Encoded Tone Burst = B Rec. IN

UnEncoded Tone Burst = B Rec, OUT