SPECTRE

VIDEO SYNTHESISER

TECHNICAL MANUAL

SPECTRE VIDEO SYNTHESISER | TECHNICAL MANUAL

VIDEO CIRCUITS DESIGNED BY R.S.C. MONKHOUSE
AUDIO CIRCUITS DESIGNED BY D.H. COCKERELL
POWER SUPPLY + MECHANICAL DESIGN BY T. ORR
} FOR E.M.S (LONDON) LTD

THIS MANUAL BY RICHARD MONKHOUSE

INDEX

SPECTRE - CIRCUIT DIAGRAMS

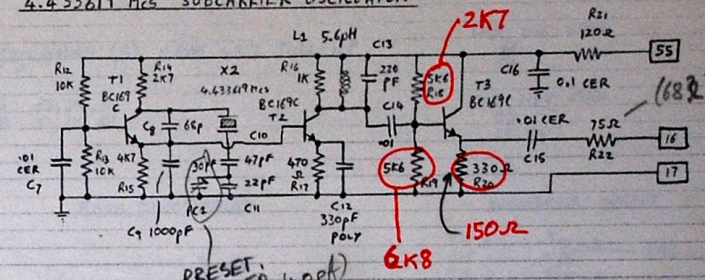
C1

BOARD A

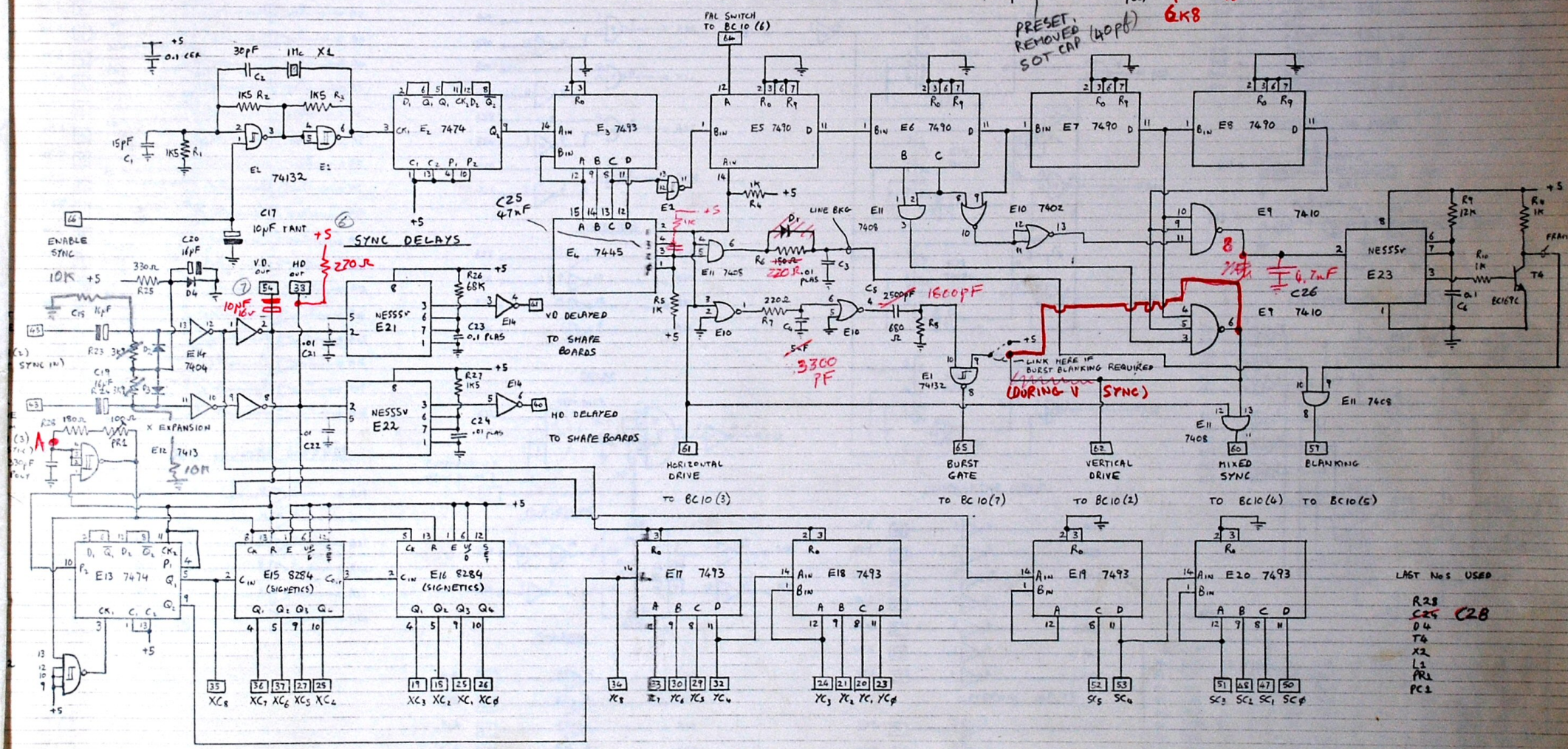
- SYNC GEN
- SYNC DELAYS
- COUNTERS

ICs	TYPE	+5	GND
E1	74132	14	7
E2	7474	14	7
E3	7493	5	10
E4	7445	16	8
E5	7490	5	10
E6	7490	5	10
E7	7490	5	10
E8	7490	5	10
E9	7410	14	7
E10	7402	14	7
E11	7408	14	7
E12	7413	14	7
E13	7474	14	7
E14	7404	14	7
E15	8284	14	7
E16	8284	14	7
E17	7493	5	10
E18	7493	5	10
E19	7493	5	10
E20	7493	5	10
E21	NE555V	8	1
E22	NE555V	8	1
E23	NE555V	8	1

4.433619 Mcs SUBCARRIER OSCILLATOR



SYNC GENERATOR



LAST Nos USED

R28
~~C25~~ C28
D4
T4
X2
L1
PR1
PC1

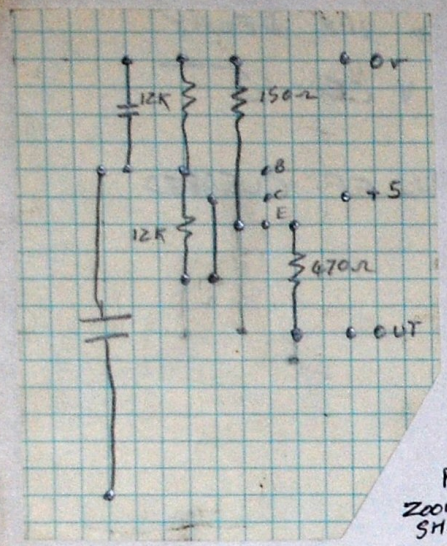
R.S.C. Hawkins Feb '75

HORIZONTAL (X) COUNTER

VERTICAL (Y) COUNTER

SLOW COUNTER

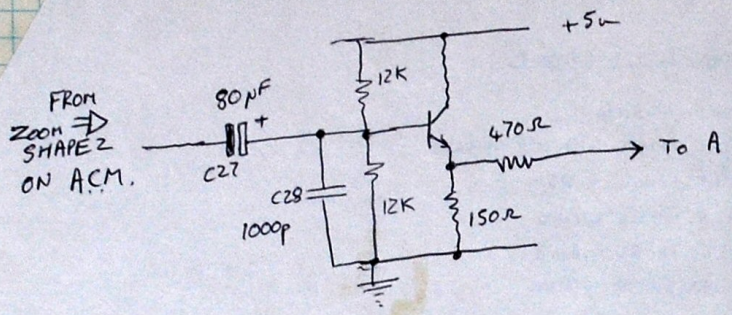
COSTRONICS ELECTRONICS



BOARD A

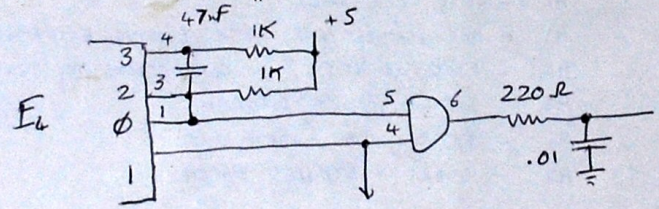
MODS

	REASON
1) ADD FOLLOWING CIRCUIT AT POINT A	THIS ALLOWS MODULATION OF X GENERATOR



N.B. ON SOME SONY SETS S.C. FREQUENCY NEEDS TO BE ADJUSTED TO OBTAIN CORRECT COLOUR

2) MODIFY E_4 & E_{11} CIRCUITRY AS:—	MAKES BLANKING PERIOD NEARER PAL SPEC.



3) C_4 NOW 3300pF C_5 NOW 1800pF	MAKES BURST PERIOD NEARER PAL SPEC
4) C_{26} (4.7μ) ADDED)	STOPS FALSE TRIG OF FRAME BLANKING MONOSTABLE.
5) R23, R24 REPLACED BY 10K's TO GND	BETTER H+V DRIVE INPUT.
6) + 7) IMPROVED DRIVE FOR MORE RECENT SONY CAMERAS	

SPECTRE - CIRCUIT DIAGRAMS

BOARD B - PATCHBOARD LOGIC & DRIVERS

PATCHBOARD ROWS —o A
PATCHBOARD COLUMNS B o—

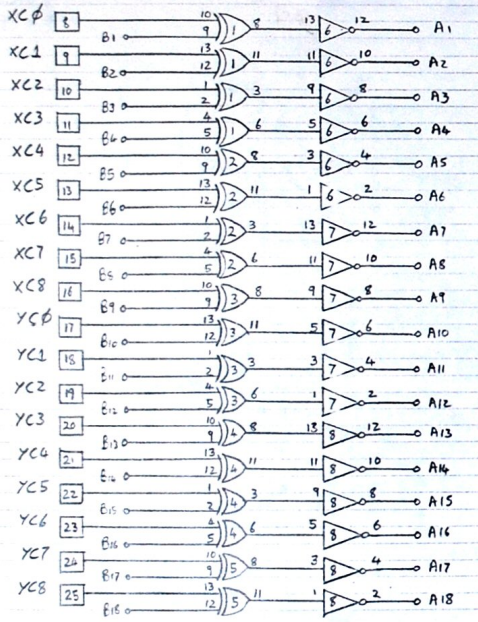
N.B. - NOT SHOWN -
ALL PATCHBOARD COLUMNS (B) HAVE 4K7 PULL UP RESISTORS TO +5 V.

POWER CONNECTIONS +5 33, 34, 35
GND 37, 38, 39

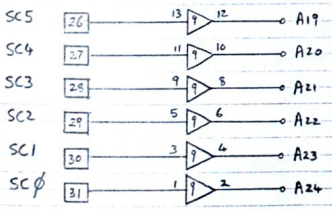
LAST Nos USED
R6
C8

Nos NOT USED
R3
C5, C6

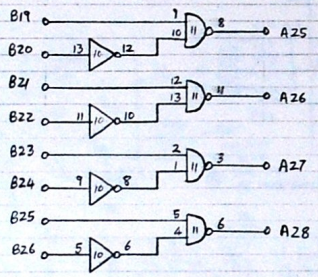
X & Y INVERT LOGIC



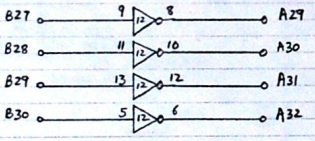
SLOW COUNTER BUFFERS



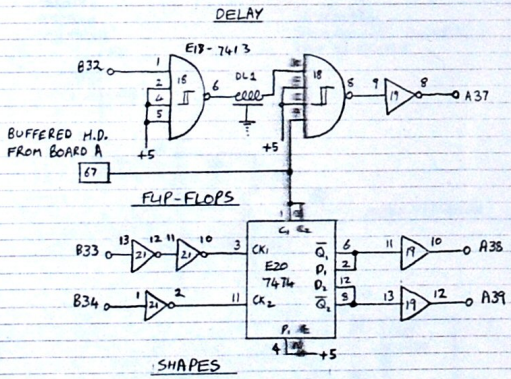
OVERLAY GATES



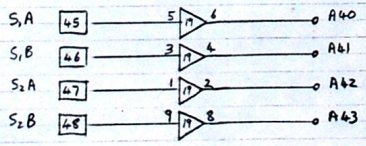
INVERTERS



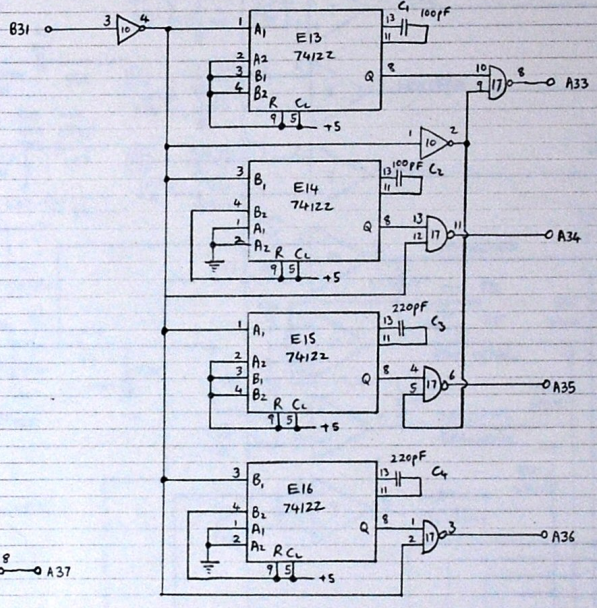
DELAY



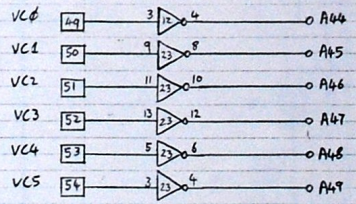
SHAPES



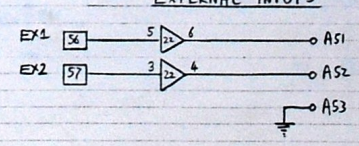
EDGE MONOSTABLES



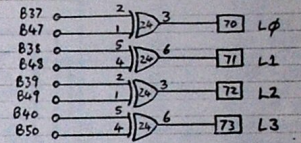
COMPARATOR INPUT



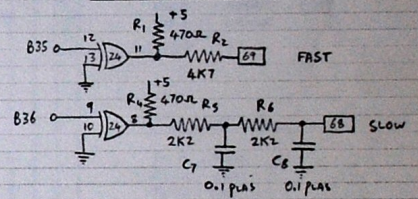
EXTERNAL INPUTS



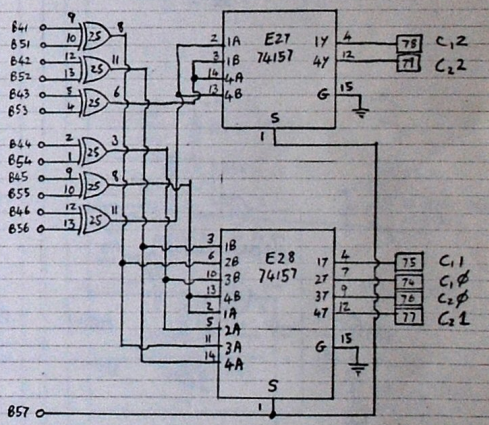
LUMINANCE OUTPUT



OUTPUTS TO ACM



CHROMINANCE OUTPUTS



IC LIST

No	TYPE	+5	GND	No	TYPE	+5	GND	No	TYPE	+5	GND
E1	7486	14	7	E10	7404	14	7	E19	7417	14	7
E2	7486	14	7	E11	7403	14	7	E20	7474	14	7
E3	7486	14	7	E12	7416	14	7	E21	7404	14	7
E4	7486	14	7	E13	74122	14	7	E22	7417	14	7
E5	7486	14	7	E14	74122	14	7	E23	7416	14	7
E6	7416	14	7	E15	74122	14	7	E24	7486	14	7
E7	7418	14	7	E16	74122	14	7	E25	7486	14	7
E8	7416	14	7	E17	7403	14	7	E26	7486	14	7
E9	7417	14	7	E18	7413	14	7	E27	74157	14	7

R.S.C. Mollison
Feb '75

SPECTRE

C3

C9 D BOARD (PART 1)

TEST POINTS SHOWN CIRCLED

TAKE CONTROL INPUTS VCØ - VC7 ACCEPT ≈ ± 3v.

SUPPLY CONNECTIONS NOT SHOWN :—

E1	+12 PIN7	-12 PIN4
E4	+12 PIN7	-12 PIN4
E7-E10	+5 PIN14	-5 PIN13 GND PIN7
E11	+5 PIN14	GND PIN7
E12	+5 PIN14	GND PIN7

SHAPE EXPLANATION

MØ	MOONLIGHT
M1	CRISS CROSS INVERTED
M2	LANTERN BEHIND CUTOUT
M3	RING
M4	AMAZON
M5	CUT OUT
M6	CRISS CROSS
M7	GEAR + CIRCLE
M8	HORIZONTAL SEGMENTS
M9	VERTICAL SEGMENTS
M10	PALM LEAVES
M11	TRIANGLES
M12	FRIZZ
M13	LANTERN
M14	GEAR
M15	CIRCLE

COMPONENT Nos

R1 – R101
C1 – C44
T1 – T20
E1 – E12
D1 – D14
Z1 – Z4

NOISE SOURCE

AT SUPPLY PINS OF E1

HORIZONTAL PARABOLA GENERATOR

1K OR 470Ω

HORIZONTAL RAMP GENERATOR

CIRCLE SIZE VC4

GEAR SIZE X5 VC5

LANTERN SIZE VC6

FRIZZ SIZE VC7

SOT FOR GOOD CIRCLE (10K MAY BE NECESSARY)

SOT (MAY NEED TO BE 100K)

CIRCLE

GEAR

LANTERN

FRIZZ

TRIANGLES

PALM LEAVES

VERTICAL SEGMENTS

HORIZONTAL SEGMENTS

HD DELAYED

VCØ HORIZONTAL POSITION

VARIABLE TRIGGER DELAY

E3 – SIGNETICS (OTHER TYPES MAY LATCH)

VC1 HORIZONTAL 'ZOOM'

HORIZONTAL SYNCHRONOUS MULTIPLE RAMP GENERATOR

VERTICAL RAMP GENERATOR

VERTICAL PARABOLA GENERATOR

MIXED PARABOLAS

VD DELAYED

VC2 VERTICAL POSITION

VC3 VERTICAL 'ZOOM'

E18 (SEE PART 2)

E12 74132

TO PART 2

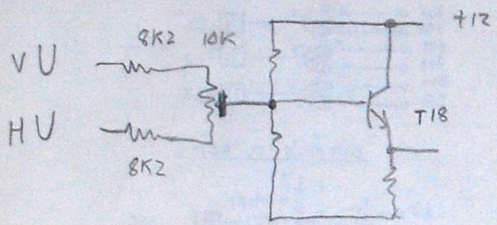
MODS

REASON

TYPICAL SOT VALUES

R7	R41
8K2	220K
10K//100K	270K

1)



NTSC → R54 NOW 180K
R50 NOW 180K

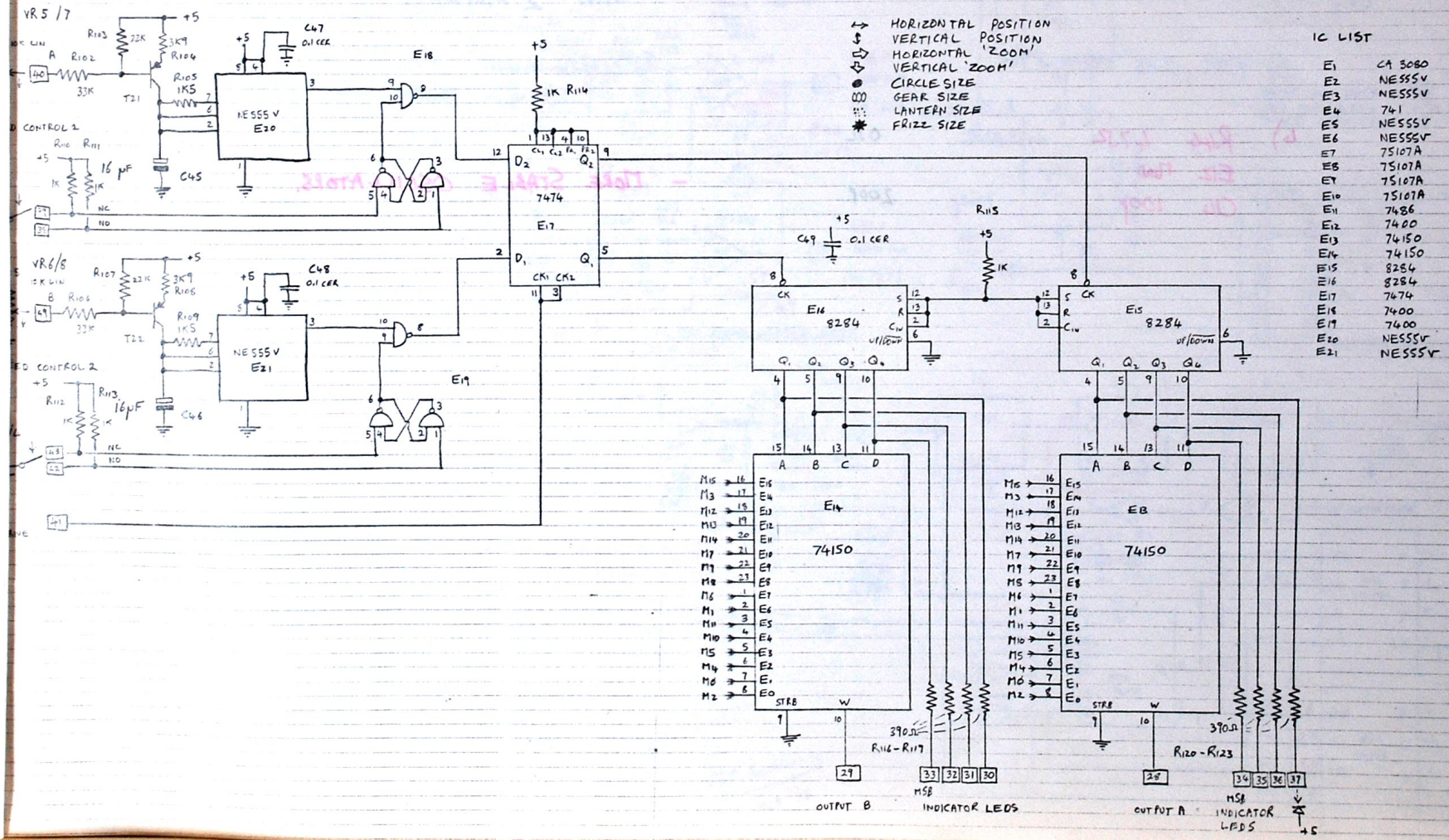
SPECTRE

C + D BOARD (PART 2)

Component Nos
R102 – R123
C45 – C49
T21 – T22
E13 – E21

FINAL ORDER OF SHAPES

BINARY INDICATION	NØ	NAME
0 0 0 0	0	CIRCLE
0 0 0 1	1	RING
0 0 1 0	2	FRIZZ
0 0 1 1	3	LANTERN
0 1 0 0	4	GEAR
0 1 0 1	5	CIRCLE + GEAR
0 1 1 0	6	VERTICAL SEGMENTS
0 1 1 1	7	HORIZONTAL SEGMENTS
1 0 0 0	8	CRISS CROSS
1 0 0 1	9	CRISS CROSS INVERTED
1 0 1 0	10	TRIANGLES
1 0 1 1	11	PALM LEAVES
1 1 0 0	12	CUT OUT
1 1 0 1	13	AMAZON
1 1 1 0	14	MOONLIGHT
1 1 1 1	15	'LANTERN' BEHIND 'CUT OUT'



IC LIST

E1	CA 3080
E2	NE555V
E3	NE555V
E4	741
E5	NE555V
E6	NE555V
E7	75107A
E8	75107A
E9	75107A
E10	75107A
E11	7486
E12	7400
E13	74150
E14	74150
E15	8284
E16	8284
E17	7474
E18	7400
E19	7400
E20	NE555V
E21	NE555V

SPECTRE - CIRCUIT DIAGRAMS

BOARD E
- AUDIO CIRCUITS
- BUFFERS
- RANDOM GENERATOR
- 12 MHz PHASE LOCKED LOOP

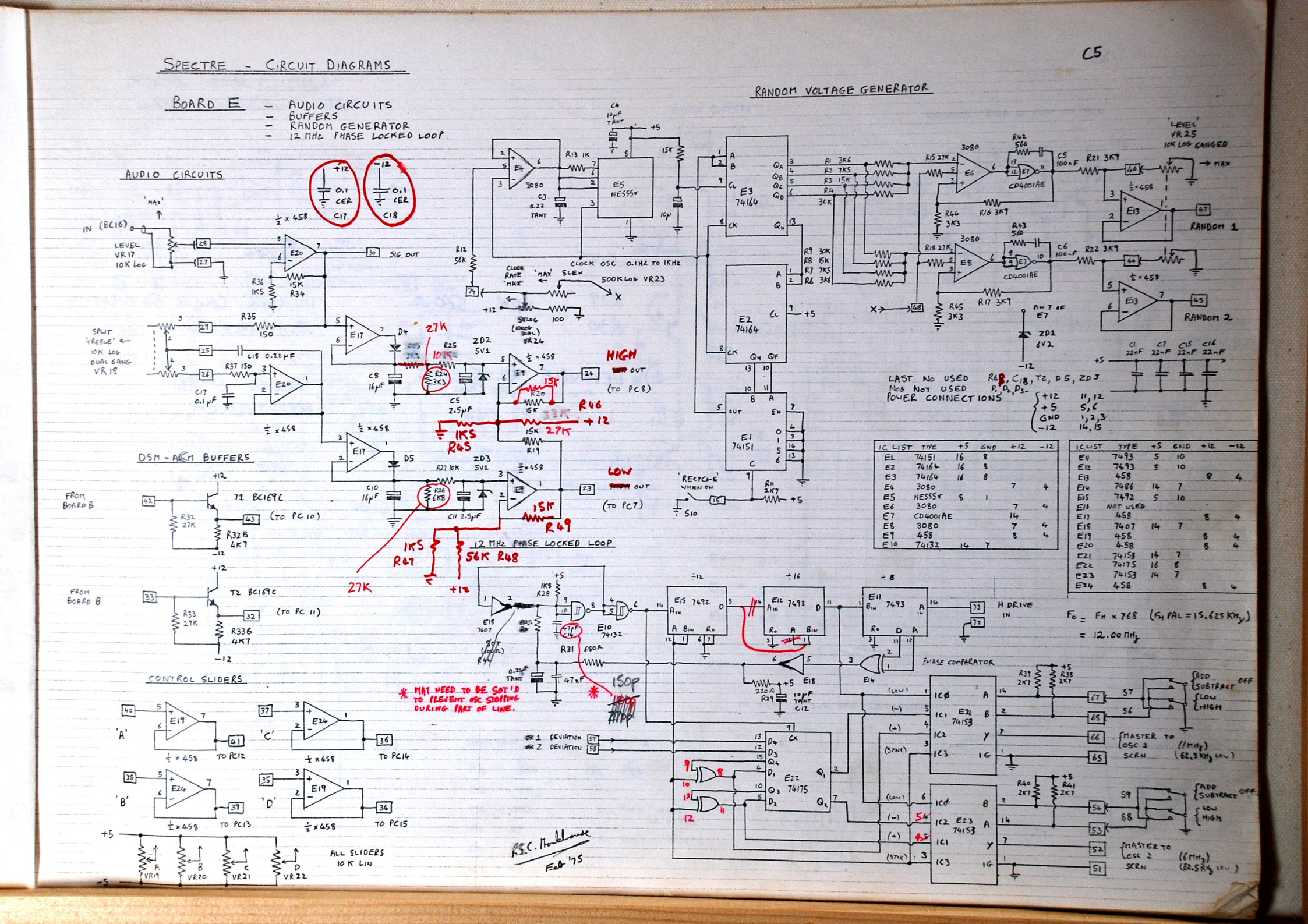
AUDIO CIRCUITS

DSM - ACM BUFFERS

CONTROL SLIDERS

RANDOM VOLTAGE GENERATOR

12 MHz PHASE LOCKED LOOP



IC LIST	TYPE	+5	GND	+12	-12
E1	74151	16	8		
E2	74164	16	8		
E3	74164	16	8		
E4	3080			7	4
E5	NE555V	8	1		
E6	3080			7	4
E7	CD4001AE			14	
E8	3080			7	4
E9	458			8	4
E10	74132	14	7		

IC LIST	TYPE	+5	GND	+12	-12
E11	7493	5	10		
E12	7493	5	10		
E13	458			8	4
E14	7486	14	7		
E15	7492	5	10		
E16	NOT USED				
E17	458			8	4
E18	7407	14	7		
E19	458			8	4
E20	458			8	4
E21	74153	14	7		
E22	74175	16	8		
E23	74153	14	7		
E24	458			8	4

	+12	+5	GND	-12
	11, 12	5, 6	1, 2, 3	14, 15

$F_O = F_H \times 768$ (F_H PAL = 15.625 KHz)
$= 12.00$ MHz

R44 SOT VALUES

120Ω

BOARD E MODS

1) ENSURE C17 & C18 ARE IN PLACE

REMOVES RF PICKUP ON AUDIO FILTERS ETC

2) R45 - R49 ADDED

→ ONLY MADE ON 1 MACHINE

MUCH IMPROVES AUDIO CONTROL

– REALLY NEED REDESIGN WITH 2 FILTERS.

3) R24, R26 NOW 27K

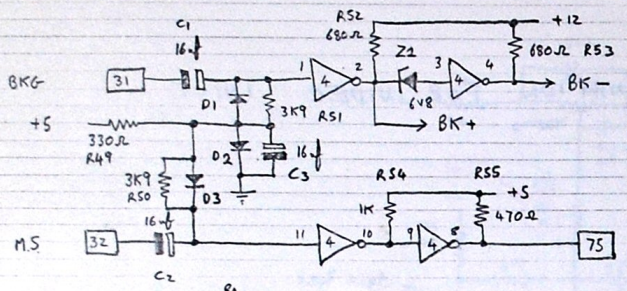
– BETTER AUDIO CONTROL, → SLOWER ENVELOPE DECAY

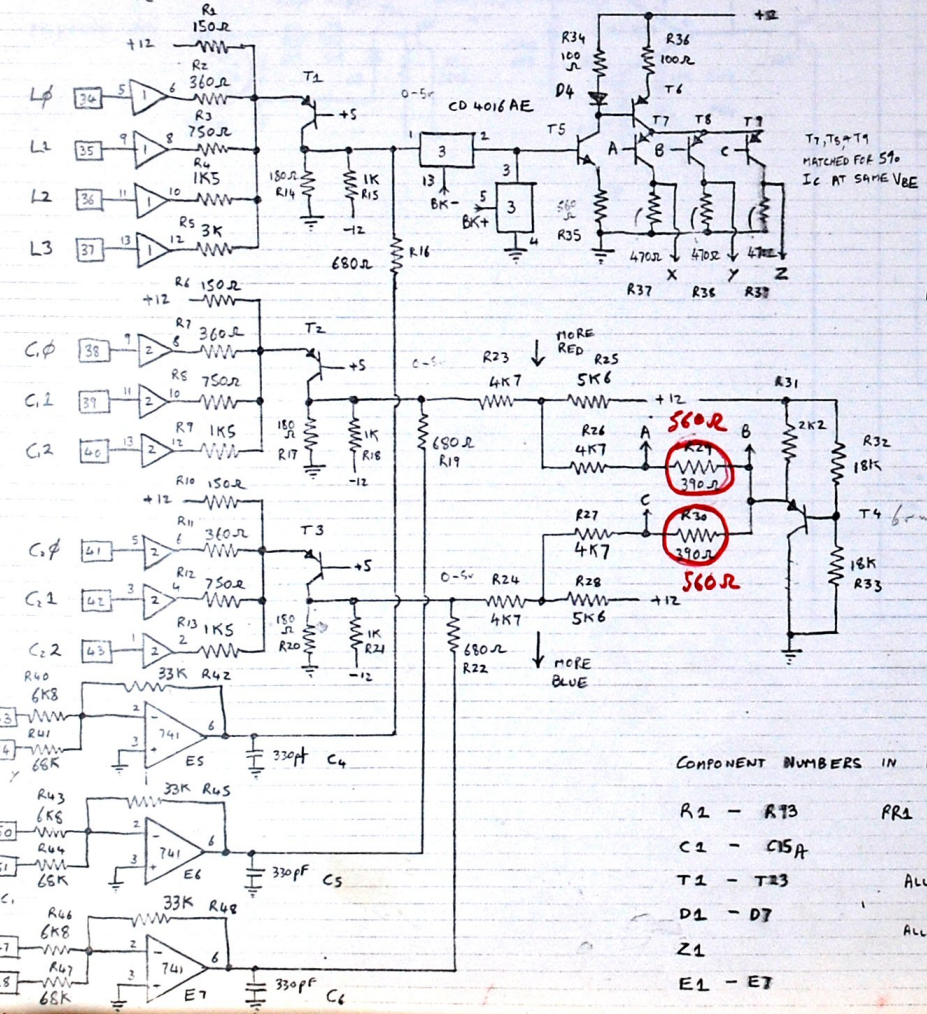
4)			ALSO TRIED	
	R44	47Ω	0Ω	0Ω
	E12 Mod	→		
	C14	100p	150p	200p

– MORE STABLE OSCILLATORS.

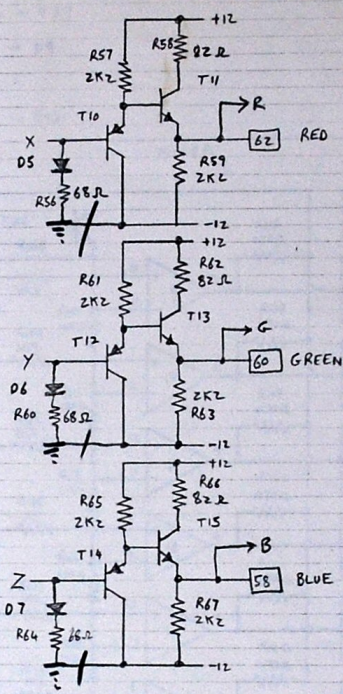
SPECTRE BOARD F (PART I)

OUTPUT DACS & MATRIX

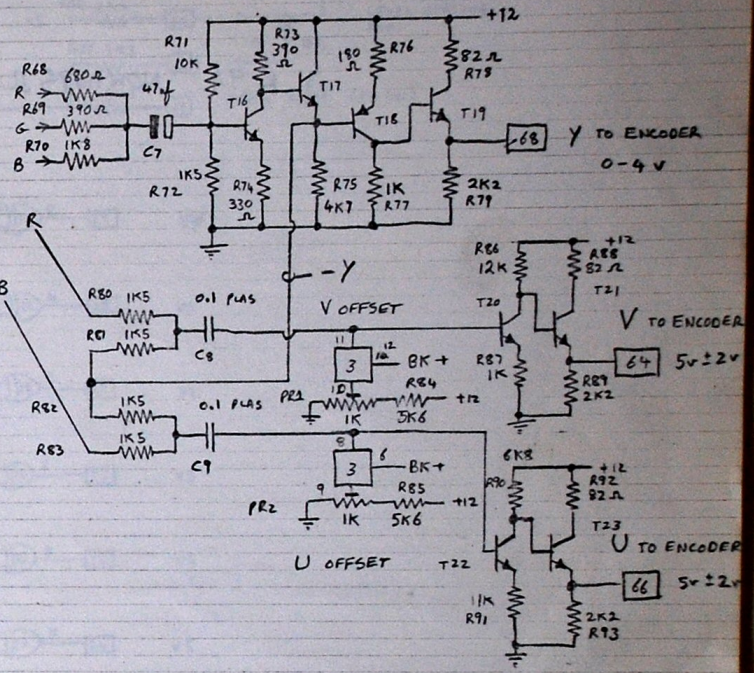




OUTPUT BUFFERS



ENCODER RGB → YUV MATRIX

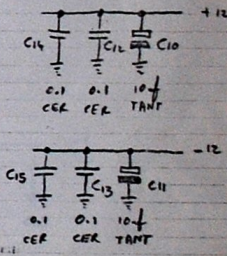


EQUATIONS FOR PAL SYSTEM I

$$E_Y = 0.299\,E_R + 0.587\,E_G + 0.114\,E_B$$

$$E_U = 0.493\,(E_B - E_Y) \quad \text{(UNSWITCHED AXIS)}$$

$$E_V = 0.877\,(E_R - E_Y) \quad \text{(SWITCHED AXIS)}$$



COMPONENT NUMBERS IN PART 1

R1 – R93

C1 – C15A

T1 – T23

D1 – D7

Z1

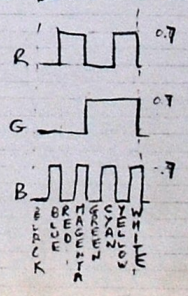
E1 – E7

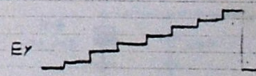
PR1 – PR2

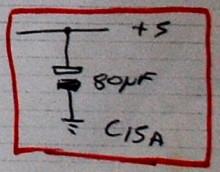
ALL PNP'S 4288 OR BCZ58

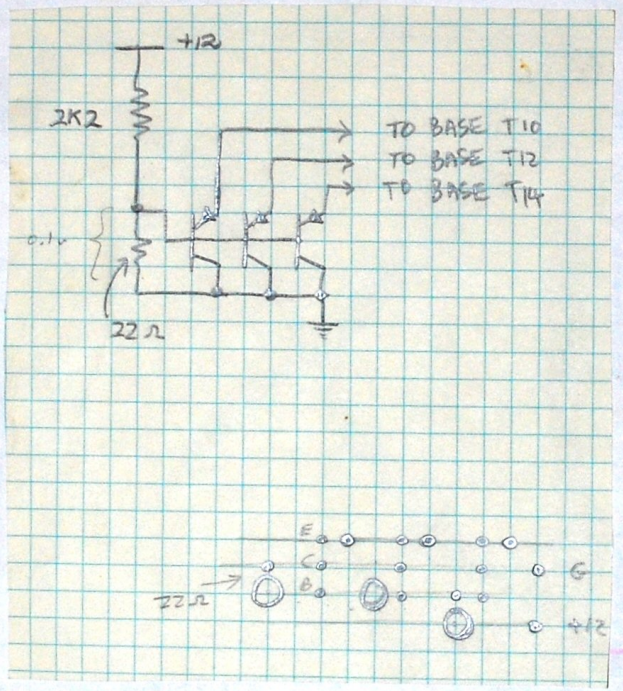
ALL NPN'S BC169C

TO GET COLOUR BAR SEQUENCE









BOARD F MODS

1) R29 } NOW 560Ω
   R30 }

2) DECOUPLE E1 & E2 +S RAIL WITH 80pF CISA

3) CIRCUIT TO LEFT REPLACES LIMITING BY DIODES D5, D6, D7.

REASON

IMPROVES COLOUR SATURATION OBTAINABLE.

REMOVES CAMERA BREAKTHROUGH.

HIGHER, NEARER SPEC OUTPUT LEVEL

SPECTRE - BOARD F - (PART II)

VIDEO COMPARATOR

COMPONENT NUMBERS IN PART II

R 94 - R128

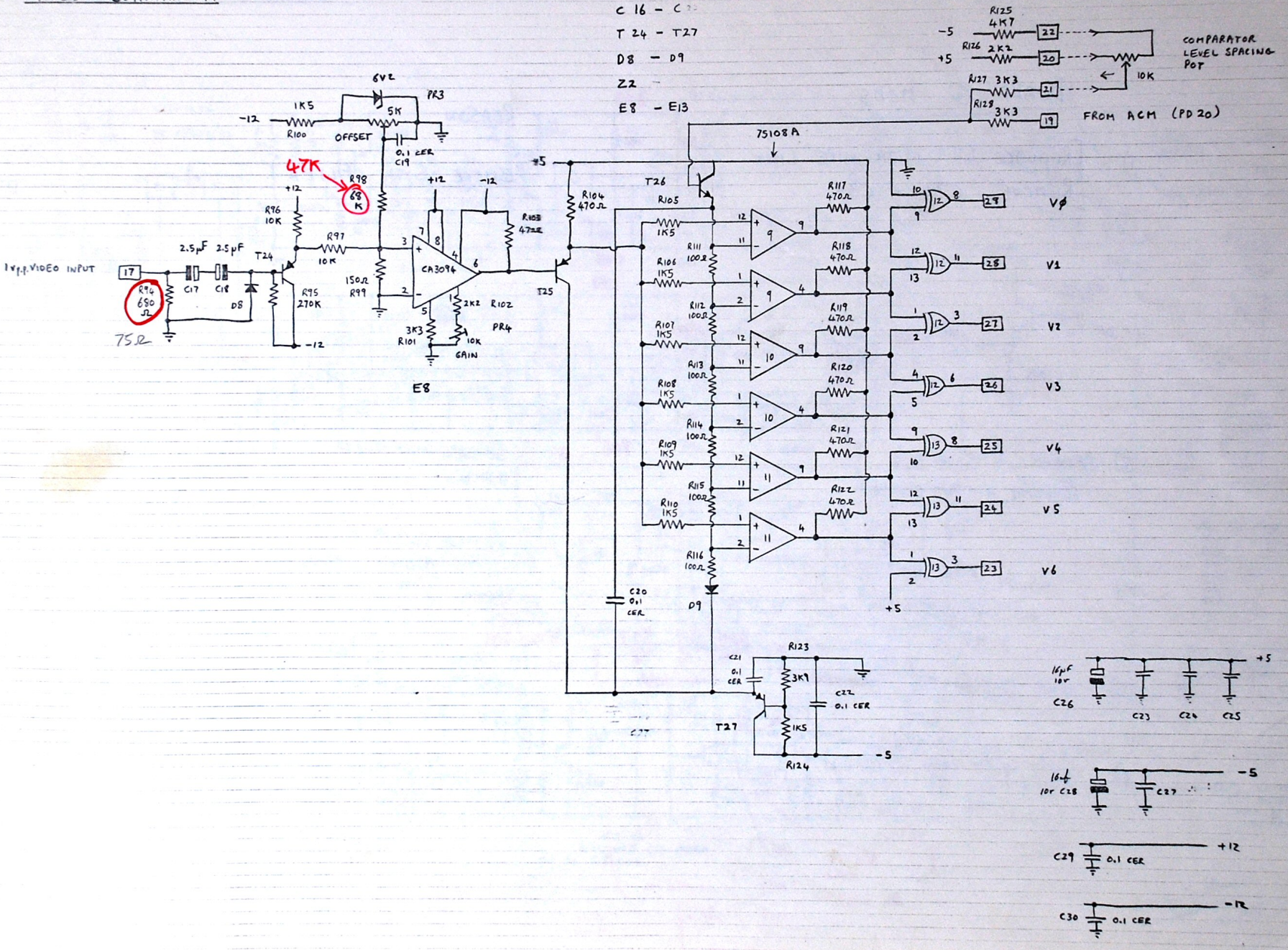
C 16 - C30

T 24 - T27

D8 - D9

Z2

E8 - E13



BOARD F II MODS

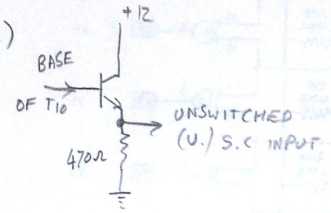
1) R 94 NOW 75Ω

PROPER 75Ω TERMINATION FOR VIDEO INPUT

BOARD G MODS

1) [REPLACE L11 WITH WIRE LINK
REMOVE C34 & C35

2)



3) REMOVE R93 & C38
(CHROMA OUTPUT STAGE)

4) SC IN R96, R97
NOW 33Ω
& 47Ω

5) PINS 8-13 OF E6

6) E4 PIN 7 — 180Ω — PIN 8

NTSC
CONNECT PAL LINK
ALSO TO +5V

C5 → 68pF
R58 → 390Ω
REMOVE R2 & R3
R32 → 27K
R34 → 27K

REASON

REMOVE SYNC FILTER

SEPERATE BUFFER
FOR U MODULATOR
S.C. INPUT

B LOWER CHROMA
GAIN

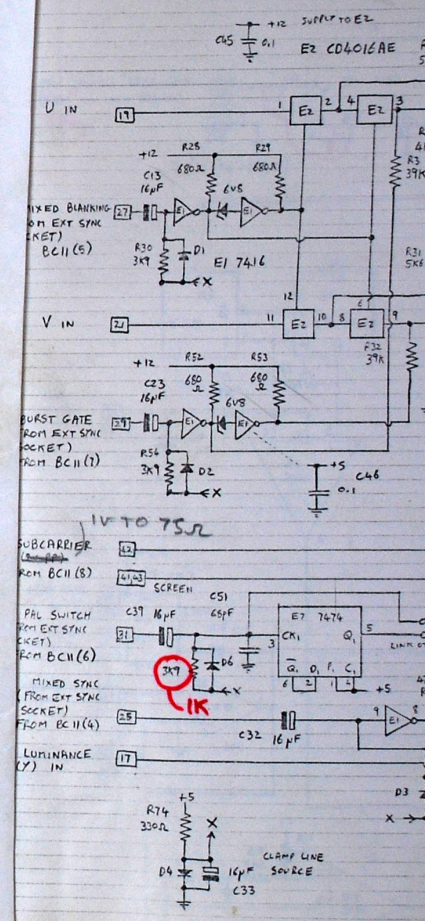
TERMINATE S.C.
INPUT, HIGHER FEED
LEVEL

TO ALLOW P.S. INPUT
OVER INCREASED RANGE
(0.8V – 3V)

EQUALISE MODULATOR
GAINS

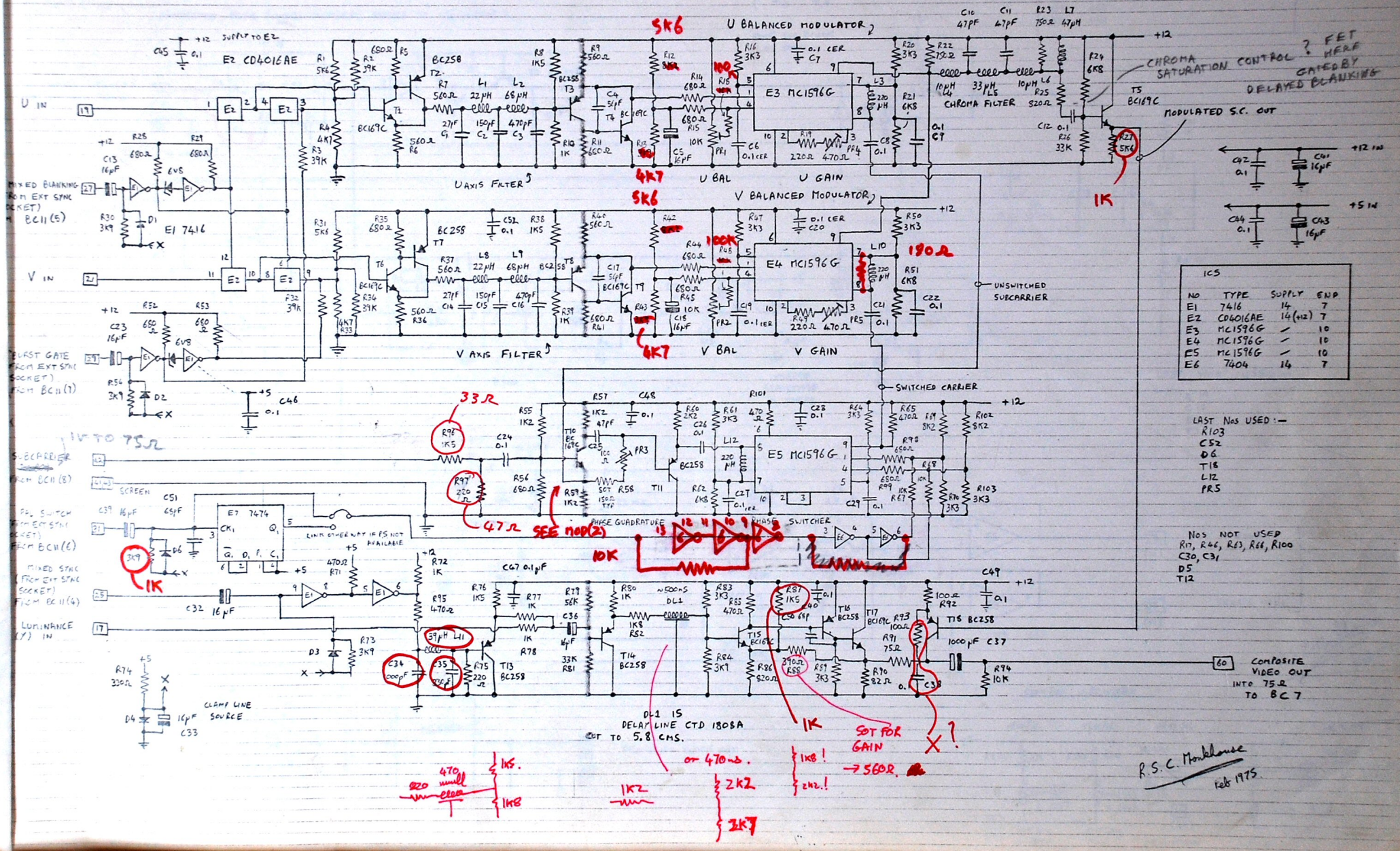
SPECTRE - CIRC

BOARD G - PAL



SPECTRE - CIRCUIT DIAGRAMS

BOARD G - PAL ENCODER



ICS			
NO	TYPE	SUPPLY	END
E1	7416	14	7
E2	CD4016AE	14 (+12)	7
E3	MC1596G	/	10
E4	MC1596G	/	10
E5	MC1596G	/	10
E6	7404	14	7

LAST NOS USED :—
R103
C52
D6
T18
L12
PR5

NOS NOT USED
R11, R46, R63, R66, R100
C30, C31
D5
T12

R.S.C. Monkhouse
Feb 1975

SPECTRE - CIRCUIT DIAGRAMS

BOARD H - OSCILLATOR DIVIDERS, FILTERS, & DEVIATION OSCILLATORS

BOARD H HAS TWO IDENTICAL CIRCUITS EACH AS SHOWN BELOW

BRACKETED EDGE FINGER NUMBERS REFER TO OSCILLATOR 2.

SUPPLY CONNECTIONS { +5 6,5 ; 0v 3,2,1,60,59,58 ; -5 9,8

ICs			
E1	3080	E11	7406
E2	3080	E12	7490
E3	7474	E13	3080
E4	7474	E14	7493
E5	3080	E15	7490
E6	CD4001AE	E16	NE555V
E7	NE555V		
E8	NE555V		
E9	458		
E10	458		

M - MASTER FREQUENCY (CAN BE ON HIGH RANGE) 3MHz

÷16

M/16 (m+100n)

FINE STAIRCASE m STEPS

÷100

COARSE STAIRCASE n STEPS

LAST NOS USED:-
R19
C18
D3
T3

LEVEL CONTROL -5 TO +5

COARSE FREQ (C-4v)

FINE FREQ (C-4v)

DEVIATION POT

END TO POTS

DEVIATION POT

DEVIATION OSCILLATOR

N.B.

DEVIATION CLOCK OUT

SINE OUT

SQUARE OUT

TO PATCHBOARD

E9 - 458

R.S.C. Moollaree Est 1975

CONTROL CIRCUITRY

VR10/14 VR11/15 VR12/16 VR9/13

10K LIN COARSE

10K LIN FINE

DEVIATION

LEVEL

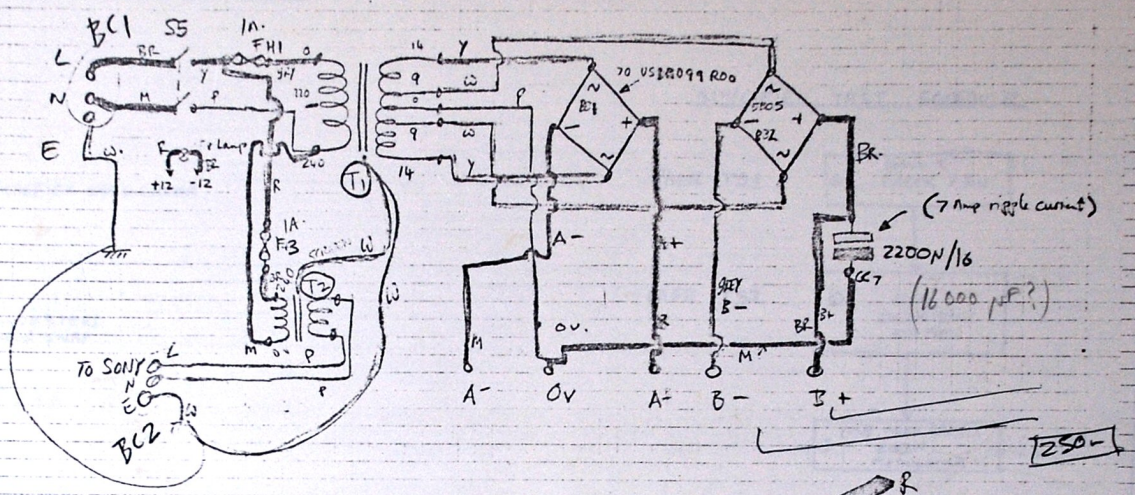
5K LOG (TWO 10K LOGS IN PARALLEL)

POWER SUPPLY ACCESSORIES

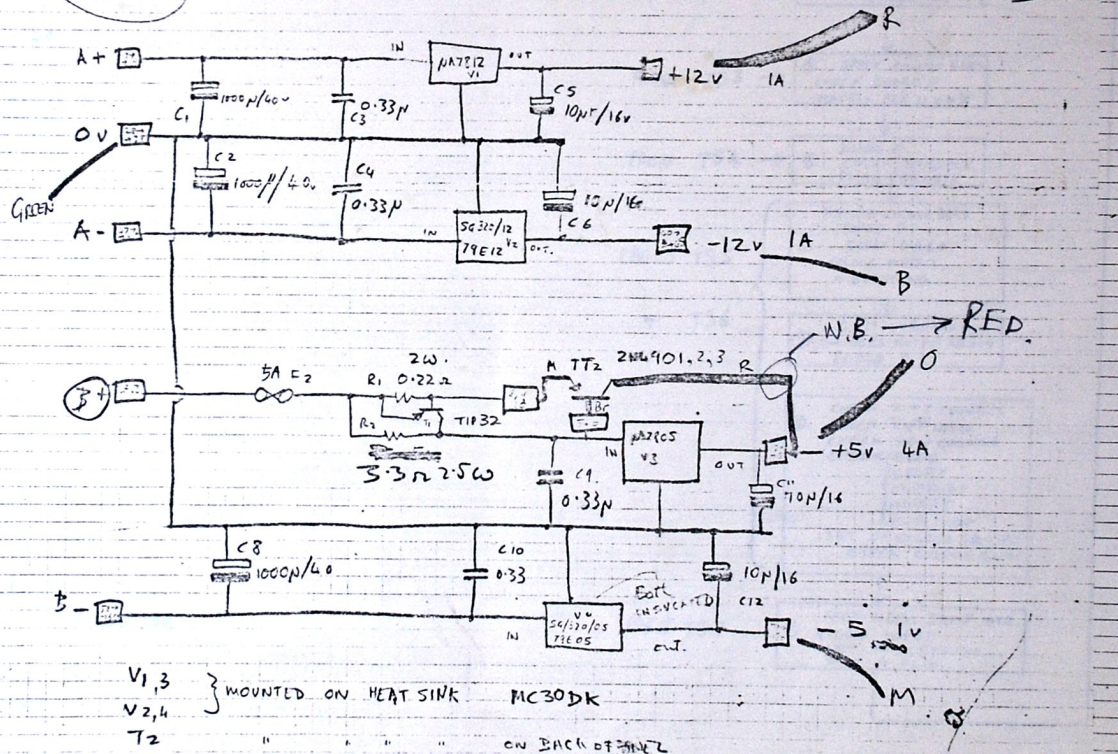
BOARD I.

Pc Board 155/PCB.

C10



R.S. AUTO TRANSFORMER
207-087



SPECTRE

TEST SCHEDULE.

TS ϕ

BOARD FUNCTIONS

A – SYNC GENERATOR, SUBCARRIER OSCILLATOR
X & Y COUNTERS

B – PATCHBOARD BUFFERS
INVERT X & Y LOGIC
EDGE MONOSTABLES, INVERTERS
DELAY, FLIP FLOPS, COLOUR SWAP

C – SHAPE GENERATOR 1
SHAPE SELECTION 1A & 1B

D – SHAPE GENERATOR 2
SHAPE SELECTION 2A & 2B

E – PHASE LOCKED LOOP FOR BOARD H
RANDOM VOLTAGE GENERATOR
AUDIO SPECTRUM SPLITTER & ENVELOPE FOLLOWERS
CONTROL VOLTAGE BUFFERS

F – VIDEO INPUT COMPARATORS
OUTPUT D.A.C.s
RGB OUTPUT MATRIX & BUFFERS
UVY MATRIX FOR ENCODER

G – P.A.L. ENCODER

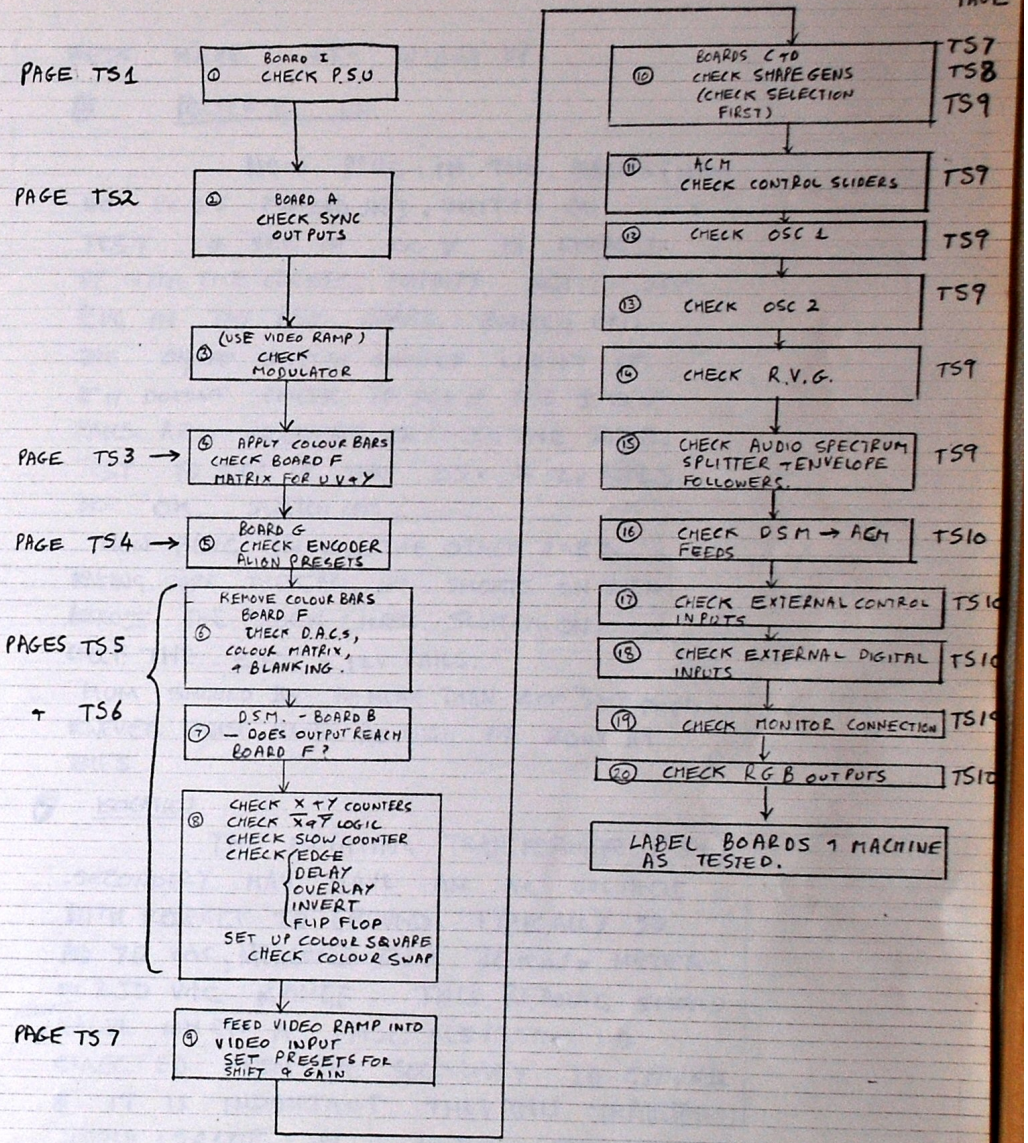
H – PHASE LOCKED OSCILLATORS

I – POWER SUPPLY REGULATION

J – MODIFICATION BOARD FOR
CONVERSION OF SONY
INTO HIGH RESOLUTION RGB MONITOR.

K – BOARD FOR INDICATOR LEDS

SIMPLIFIED TEST SCHEDULE



POWER UP WITHOUT TEARS.

① INSPECT WIRING OF PSU AREA.

② USING A BUZZER, CONNECT IT TO THE BACK PANEL (INPUT MAINS BC1) across LIVE & NEUTRAL. CONNECT A JUMPER BETWEEN TERMINALS 0v and 240v OF T1. NOW SWITCH ON SPECTRES POWER SWITCH. THE BUZZER WILL BUZZ. UNDO FH1, THE BUZZER WILL STOP. DO UP FH1.

NOW PUT THE JUMPER ON T2 0v and 240v (INPUT). REPEAT USING FH3 THIS TIME. ALSO TEST THAT EARTH ON BC1 GOES TO CHASSIS. Remove The Jumper. TEST THAT THE SECONDARY OF T2 ONLY GOES TO BC2.

③ NOW TEST THE CONNECTIONS TO EDGE CONNECTOR I (THE PSU CONNECTOR). MAKE SURE THAT THERE IS NO DIRECT SHORT (other than through bridge rectifiers and smoothing capacitors) BETWEEN THESE CONNECTIONS AND GROUND, OTHER THAN THE 0v, GROUND CONNECTION ITSELF.

NOTE. WHEN TESTING THE ±5v ±12v CONNECTIONS IT IS NECESSARY TO MAKE THE TESTS WITH ALL THE SLIDERS IN BOTH THE MAX AND MIN POSITIONS. (POWER LINES ARE FED TO THE SLIDERS!). ALSO, WHEN TESTING THE +5v LINE FOR SHORTS TO GROUND, IT IS NECESSARY TO OPERATE ALL THE SWITCHES (ON THE FRONT PANEL), BECAUSE THESE HAVE +5v WIRED UP.

④. POWERING UP

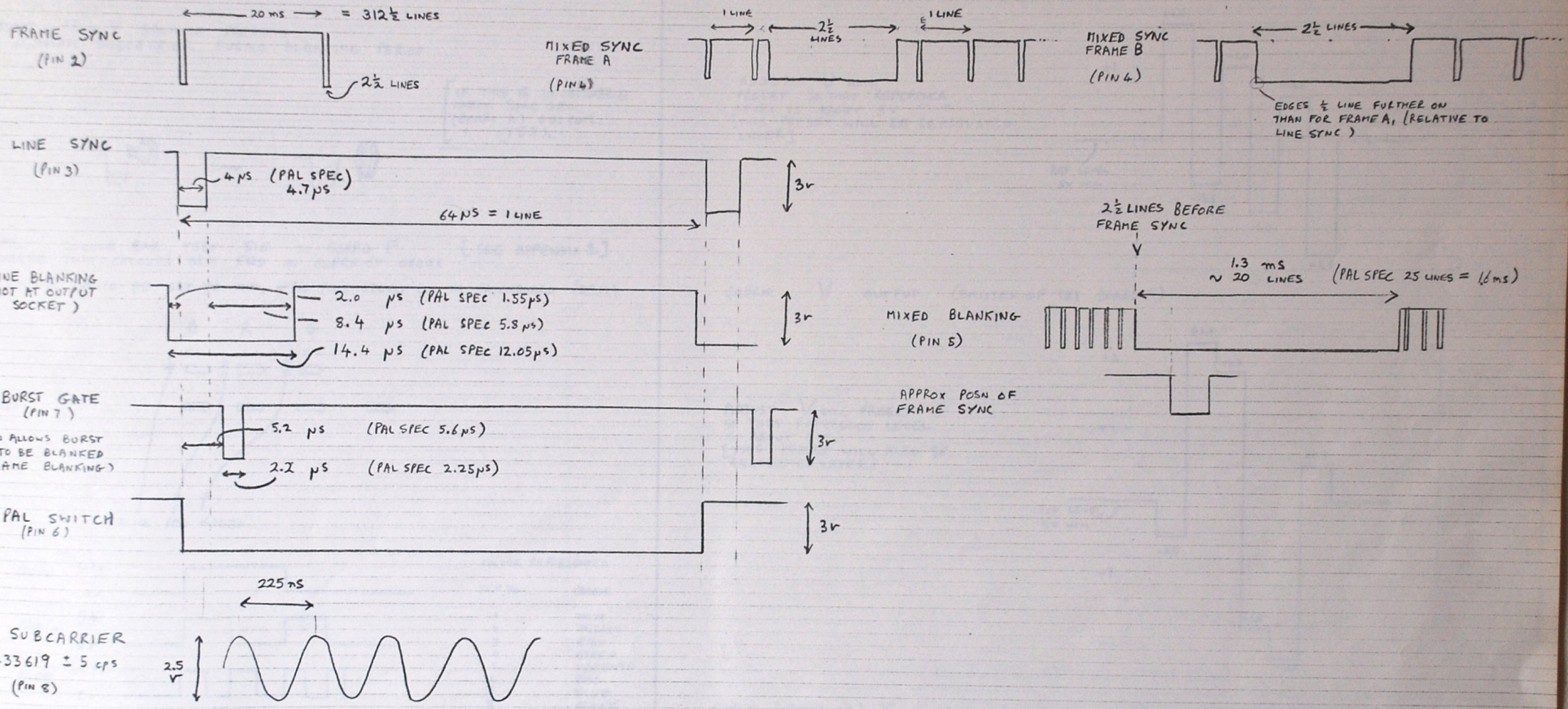
NOW PLUG IN THE MAINS (WITH NO PCB'S PLUGGED IN), SWITCH ON. TEST TO SEE IF CC7 IS CHARGED UP WITH THE CORRECT POLARITY. SWITCH OFF. PLUG IN THE PSU BOARD. SWITCH ON. THE ON/OFF SWITCH SHOULD LIGHT UP. IF IT DOESNT CHECK TO SEE IF THE ±12V RAILS ARE PRESENT, OR CHECK THE BULB. TEST TO SEE IF THE ±5v ±12v RAILS ARE OK. SWITCH OFF.

NOW PLUG IN ALL THE OTHER PCB's, MAKING SURE THERE ARE NO SHORTS ON THEM ACROSS THE POWER LINES. SWITCH ON. CHECK THE ±5v ±12v RAILS. HUM SHOULD BE NO MORE THAN 2 or 3mV pkpk. HOWEVER NOISE MAYBE AS HIGH AS 20mV AT TIMES.

⑤ ISOLATION

THE ISOLATING TRANSFORMER (T2) SECONDARY MAY HAVE AN AC VOLTAGE WITH RESPECT TO GROUND. TYPICALLY 50 TO 70 VAC, MEASURED ON A 20kΩ/v METER ON 250 VAC RANGE. THIS READING SHOULD ATLEAST A HALVE WHEN A 1MΩ RESISTOR IS CONNECTED FROM THE SECONDARY TO GROUND. IT IS IMPORTANT THAT THIS TRANSFORMER SHOULD ISOLATE. ALSO NEITHER TRANSFORMER SHOULD RUN HOT, ABOVE 40°C IN OPERATION.

SPECTRE SYNC GENERATOR - OUTPUT TIMING DIAGRAM

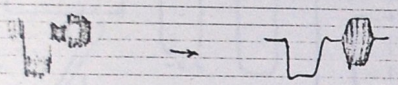


SWITCH ON (CONNECT SYNC LINK, BNC - BNC LINK)

CHECK OUTPUT OF ENCODER (COMP VID OUTPUT SHOULD BE CONNECTED TO 75Ω LOAD - OR MOD INPUT)

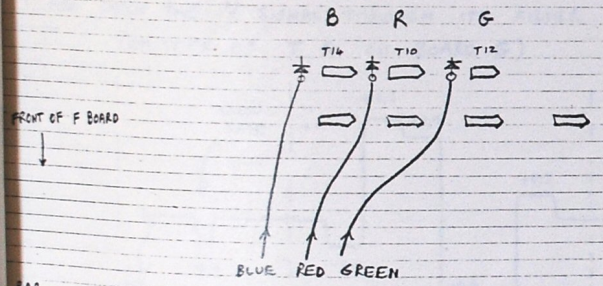
ADJUST U & V BALANCE PRESETS FOR MINIMUM SUBCARRIER DURING BLANKING PERIOD.

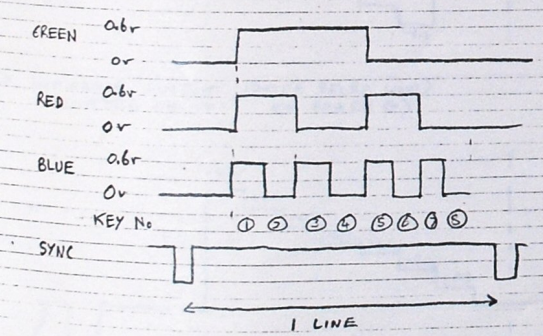
[IF THIS IS UNOBTAINABLE CHECK SYNC GEN (BOARD A) OUTPUTS. (TS2).



APPLY COLOUR BAR TEST SIG TO BOARD F [SEE APPENDIX 1]
ENSURE THAT COLOURS ARE FED IN CORRECT ORDER

Y CONTROL SHOULD BE SET TO MIN, & NO PINS SHOULD BE IN PATCHBOARD (DSM)





COLOUR REPRESENTED

KEY No	COLOUR
1	WHITE
2	YELLOW
3	CYAN
4	GREEN
5	MAGENTA
6	RED
7	BLUE
8	BLACK

CHECK THAT THESE SIGNALS ARE FED IN CORRECTLY

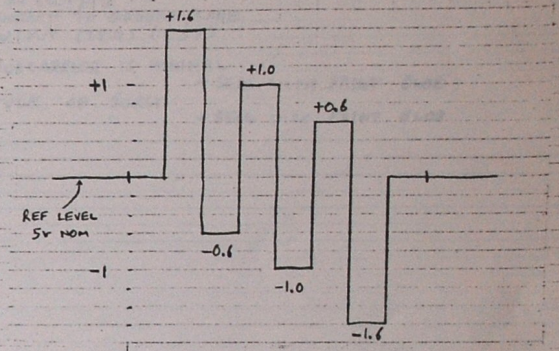
CHECK THAT BUFFERED VERSIONS APPEAR AT THE R-G-B SOCKETS ON THE BACK PANEL.

CONNECT R G B MONITOR & ISOLATED MAINS
CHECK THAT CORRECT COLOUR SEQUENCE IS OBTAINED.

SYNC SCOPE ON H DRIVE (N.B. VOLTAGES SHOWN W.R.T. REF LEVEL)

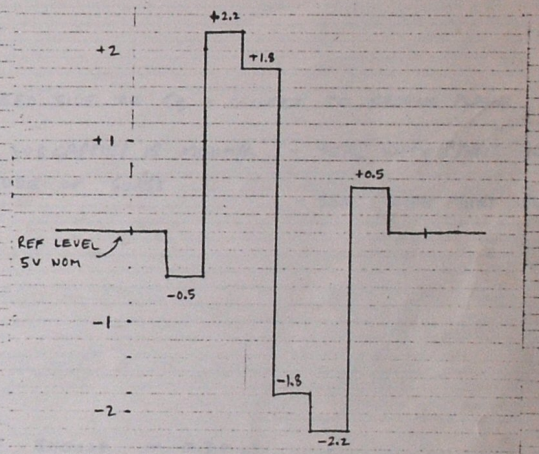
CHECK U OUTPUT (EMITTER OF T23 BOARD F)

ADJUST U NULL PRESET SO THAT REFERENCE LEVEL IS ABOUT 5V
[THIS PRESET WILL BE READJUSTED LATER]

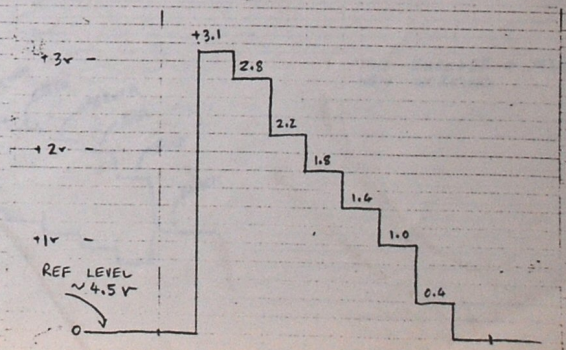


CHECK V OUTPUT (EMITTER OF T21 BOARD F)

ADJUST V NULL PRESET SO THAT REFERENCE LEVEL IS ABOUT 5V
[THIS PRESET WILL ALSO BE READJUSTED LATER]



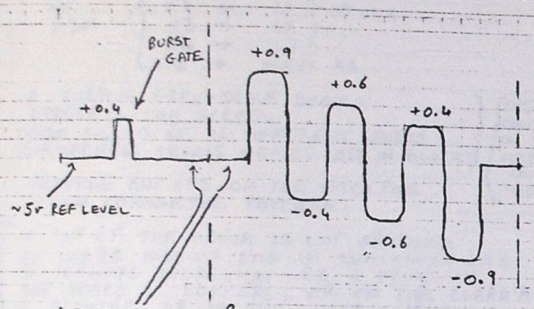
CHECK (LUMINANCE) Y OUTPUT (EMITTER OF T19)



SPECTRE TEST SCHEDULE

NOW CHECK THAT THE U SIGNAL REACHES THE END OF THE FILTER CHAIN ON THE ENCODER BOARD :-

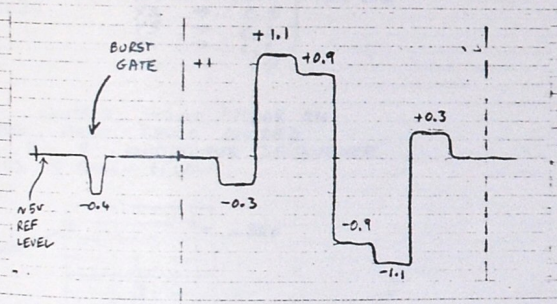
(EMITTER OF T3 ON BOARD G)



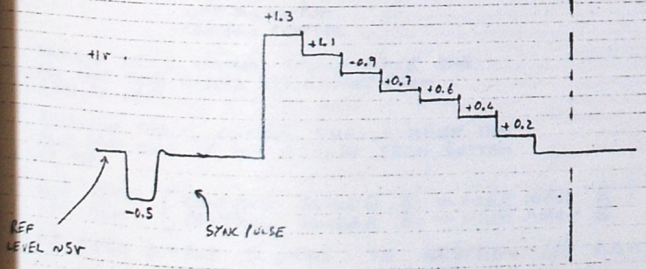
ADJUST U NULL PRESET ON BOARD F TO MAKE THESE LEVELS EQUAL — SEAL WITH PAINT SPOT.

ALSO CHECK THE V SIGNAL THROUGH ITS FILTER

(EMITTER OF T 8 ON BOARD G)



CHECK LUMINANCE OUTPUT (AFTER DELAY LINE)
(EMITTER OF T ON BOARD G)



CHECK U CHROMINANCE OUTPUT

- TEMPORARILY REMOVE THE FEED SIDE OF C 21 (0.1 μF) (NOT THE SIDE CONNECTED TO E4), & CONNECT TO GROUND PLANE. VIEW WITH SCOPE AT TERMINATED OUTPUT (75Ω) (C37)

U MODULATOR PRESETS
- ADJUST U ZERO SO THAT RESIDUAL SUBCARRIER IS MINIMAL — SEAL WITH PAINT BLOB
- ADJUST U GAIN SO THAT P.P. AMPLITUDE OF BURST AT OUT PUT (C37) IS 0.21 V — SEAL WITH PAINT BLOB

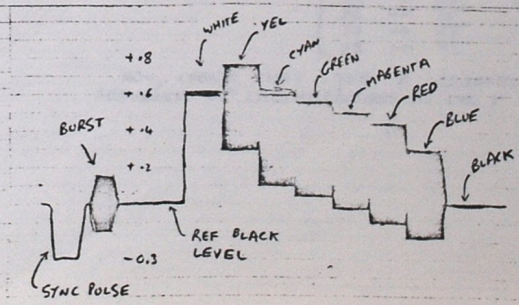
CHECK V CHROMINANCE OUTPUT

- RECONNECT C37, NOW REMOVE FEED SIDE OF C8 & CONNECT TO GROUND PLANE

V MODULATOR PRESETS
- ADJUST V ZERO SO THAT RESIDUAL SUBCARRIER IS MINIMAL — SEAL WITH PAINT BLOB
- ADJUST V GAIN SO THAT P.P. AMPLITUDE OF BURST AT OUTPUT (C37) IS 0.21 V — SEAL WITH PAINT BLOB

NOW RECONNECT C8, BURST AMPLITODE SHOULD ~ 0.3 V,

ADJUST PRESET PR3 & SOT RESISTOR R58 FOR MINIMUM LINE TO LINE VARIATION OF BURST AMPLITUDE — THIS SETS PHASE QUADRATURE.



THE ENCODER & MATRIX ARE NOW WORKING

SPECTRE TEST SCHEDULE

VIDEO OUTPUT DACS, DSM OUTPUTS

REMOVE R-G-B CONNECTIONS

(PATCH 1)

PATCH ON DSM

X1	→	L0	O/P CH A
X2	→	L1	
X3	→	L2	
X4	→	L3	
GND	→	INVERT X1	

A PURPLE GREY-SCALE SHOULD APPEAR ON THE SCREEN
THERE SHOULD BE 16 DIFFERENT LEVELS (THE DARKEST LEVELS MAY BE LOST IN BLACK)

CHECK THAT THE VIDEO OUT Y CONTROL & THE VIDEO Y INPUT ON THE ACM (CONTROL SLIDER A TO VIDEO OUT Y) N.B :- VOLTAGE CONTROL OF Y WILL WORK THE 'WRONG' WAY ROUND

REMOVING ANY ONE OF THE PATCH PINS SHOULD CHANGE THE PATTERN

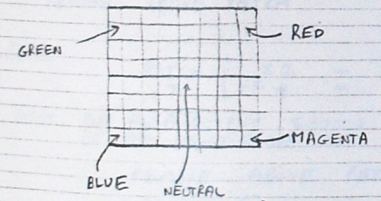
[IF ANY OF THE ABOVE IS NOT OBTAINED GO CHASE MISSING BITS IN LUMINANCE D.A.C. OR PERHAPS THERE MAY BE A FAULT ON THE BOARD B BUFFERS, OR ON THE BOARD A X COUNTER, OR IN THE INTERCONNECTIONS]

REMOVE ABOVE PATCH

NOW PATCH ON DSM (PATCH 2)

X2	→	$C_1 0$	O/P CH A
X3	→	$C_1 1$	
X4	→	$C_1 2$	
Y2	→	$C_2 0$	
Y3	→	$C_2 1$	
Y4	→	$C_2 2$	
GND	→	L0	

6 COMPLEX SQUARES SHOULD APPEAR ON THE SCREEN, EACH BEING DIVIDED INTO THE 8 x 8 CONTINUOUS SEQUENCE OF COLOURS AS SHOWN BELOW



ADVANCING THE C_1 CONTROL SHOULD MAKE THE RED AREA MOVE ACROSS THE SQUARE FROM RIGHT TO LEFT

ADVANCING THE C_2 CONTROL SHOULD MAKE THE BLUE AREA MOVE UP THE SQUARE FROM BOTTOM TO TOP

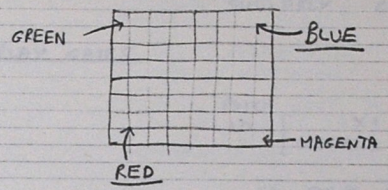
NOW PATCH ON ACM
CONTROL SLIDER A → VIDEO INPUT R
CONTROL SLIDER B → VIDEO INPUT B

PUT VIDEO OUTPUT SLIDERS TO NEUTRAL (5) POSITION

ADVANCING SLIDER A SHOULD MOVE RED AREA LEFT
ADVANCING SLIDER B SHOULD MOVE BLUE AREA UP

PATCH ON DSM X0 → COLOUR SWAP

THE ORDER OF COLOURS IN THE LEFT 2/3 OF THE PICTURE SHOULD BE REVERSED, SO THE 8x8 COLOUR SEQUENCE ON THE LEFT OF THE PICTURE NOW READS:—



REMOVE PATCH

TRY PATCH 1 + PATCH 2 USING OUTPUT CHANNEL B INSTEAD OF OUTPUT CHANNEL A.
TRACE 'DEAD BITS' AS NECESSARY.

COUNTER OUTPUTS & INVERT LOGIC.

PATCH ON DSM (PATCH 3)

X0	→	$\overline{Y0}$
X1	→	$\overline{Y1}$
X2	→	$\overline{Y2}$
X3	→	$\overline{Y3}$
X4	→	$\overline{Y4}$
X5	→	$\overline{Y5}$
X6	→	$\overline{Y6}$
X7	→	$\overline{Y7}$
X8	→	$\overline{Y8}$

A BAR DENOTES INVERT X OR INVERT Y

NOW, CHECK THAT EACH Y COUNTER OUTPUT IS A CHECKERBOARD EACH HALF THE SIZE OF THE PREVIOUS ONE BY PATCHING EACH Y OUTPUT IN TURN TO OUTPUT CH A, L0.
→ Y0 SHOULD GIVE LARGEST CHECKER, Y8 THE SMALLEST (THIS WILL ONLY BE VISIBLE ON THE RGB MONITOR).

NOW, WITH THE Y2 OUTPUT ONLY PATCHED TO CH A, L0; ADJUST THE GREEN PRESET ON BOARD A SO THAT THE FIVE DARK SQUARES NEAR THE MIDDLE OF THE SCREEN ARE CENTRALLY PLACED — SEAL WITH PAINT BLOB.

REMOVE ABOVE PATCH

PATCH ON DSM (PATCH 4)

Y0	→	$\overline{X0}$
Y1	→	$\overline{X1}$
Y2	→	$\overline{X2}$
Y3	→	$\overline{X3}$
Y4	→	$\overline{X4}$
Y5	→	$\overline{X5}$
Y6	→	$\overline{X6}$
Y7	→	$\overline{X7}$
Y8	→	$\overline{X8}$

NOW, CHECK THAT THE X COUNTER OUTPUTS GIVE THE SAME SEQUENCE OF CHECKERBOARDS AS THE Y COUNTER OUTPUTS DID IN PATCH 4.

SPECTRE TEST SCHEDULE

SLOW COUNTER OUTPUTS

SET UP THE FOLLOWING PATCH ON THE DSM

PATCH 5

X2	INVERT A	
X3	"	
X4	"	
X5	"	
X6	"	
X7	"	
SLOW COUNT OUTPUTS: 6Hz	$\overline{X7}$	INVERT INPUTS
3Hz	$\overline{X6}$	
1.5Hz	$\overline{X5}$	
.8	$\overline{X4}$	
.4	$\overline{X3}$	
.2	$\overline{X2}$	
INVERT A	LØ, L1	CH A

TWO OR THREE LINES SHOULD BE SEEN MOVING HORIZONTALLY IN A SERIES OF SMALL STEPS LEFT TO RIGHT.
IF THE MOVEMENT IS DISCONTINUOUS, TRACE FAULTY SLOW COUNTER BIT(S).

DELAY

PATCH 6 IN ADDITION TO PATCH 5

INVERT A	—	DELAY
DELAY	—	LØ, L1 CH B

IF THE DELAY IS O.K., A SECOND SET OF MOVING LINES SHOULD APPEAR ~1cm TO THE RIGHT OF THOSE IN PATCH 5.

REMOVE ABOVE PATCH

FLIP FLOP

PATCH 7

X1	—	FLIP-FLOP +
F.F +	—	LØ, L1 CH A.

FIRST FLIP FLOP OUTPUT SHOULD CHANGE STATE (TO ACTIVE, → WHITE) ON LEFT HAND SIDE OF SCREEN

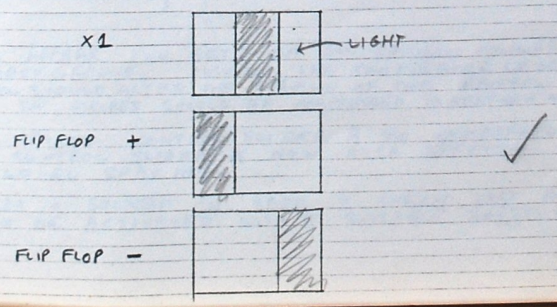
REMOVE ABOVE PATCH

PATCH 8

X1	→	F.F. —
F.F. —	→	LØ, L1 CH A

FLIP FLOP — OUTPUT SHOULD CHANGE STATE ON RHS OF SCREEN.

PATCH X1 TO CH A LØ ALONE FOR COMPARISON :—



INVERTERS

PATCH 9

X1	→	INVERT A
INVERT A	→	CH A LØ, L1

A LIGHT BAND (INVERSE OF X1) SHOULD APPEAR

SIMILARLY CHECK OUT INVERTERS B, C & D

OVERLAY GATES

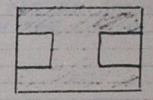
PATCH 10

X1	→	OVERLAY 1 - SIG
OVERLAY 1	→	CH A LØ, L1

X1 STRIPE SHOULD APPEAR ON SCREEN

NOW PATCH Y1 → OVERLAY 1 - DIS

SCREEN SHOULD APPEAR THUS :—



SIMILARLY CHECK OUT OVERLAY GATES 2, 3 & 4.

TO BE SURE ALL THE OVERLAY GATES ARE O.K SET UP THE FOLLOWING PATCH THAT SHOULD DISPLAY A RESOLUTION CHART :—

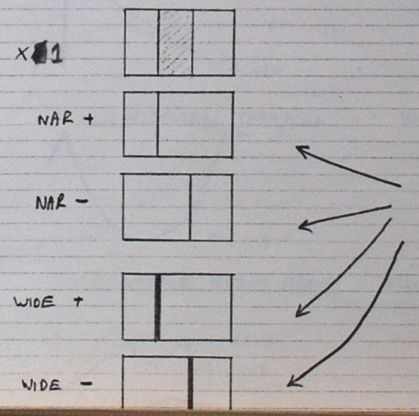
PATCH 11

X5	—	OV 4 SIG
X6	—	3 SIG
X7	—	2 SIG
X8	—	1 SIG
Y1	—	OV 2 DIS, OV 3 DIS, INVERT A
Y2	—	OV 1 DIS, OV 3 DIS, INVERT B
INVERT A	—	OV 1 DIS, OV 4 DIS
INVERT B	—	OV 2 DIS, OV 4 DIS
OV 1	—	CH A LØ
OV 2	—	" "
OV 3	—	" "
OV 4	—	" "
GND	—	CH A C1Ø, C2Ø.

EDGE GENERATOR

PATCH 12 X1 [redacted] → EDGE

NOW PATCH EACH EDGE OUTPUT TO OUTPUT CH A LØ IN TURN; THE FOLLOWING PICTURES SHOULD BE OBTAINED



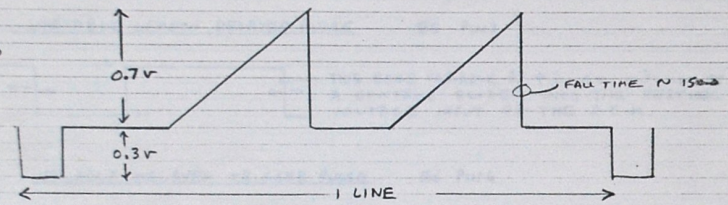
NAR WIDTH ~ 0.5 cm
WIDE WIDTH ~ 1cm.

IDEO INPUT COMPARATOR — SYNC SCOPE ON LINE DRIVE.

CONNECT VIDEO TEST RAMP (FROM TEST BOARD) TO VIDEO INPUT (PIN 1 OF THE 6 PIN DIN SOCKET ON THE BACK PANEL

CHECK THAT H & V DRIVES APPEAR ON PINS 5 & 2

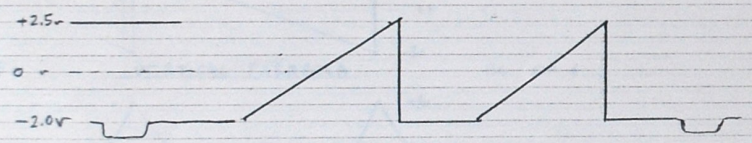
CHECK THAT SIGNAL REACHES C



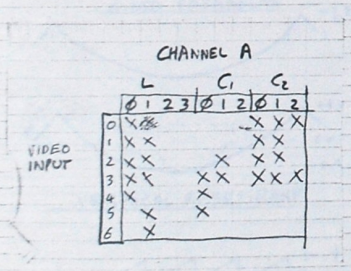
CONNECT SCOPE TO OUTPUT OF VIDEO AMP (EMITTER OF T25)

ADJUST GAIN PRESET (GREEN) & SHIFT PRESET (MULTITURN) TO OBTAIN THE D.C. LEVELS SHOWN BELOW :—

SEAL PRESETS WITH PAINT BLOBS.



SET THE VIDEO COMPARATOR CONTROL SLIDER TO ~7 & PATCH THE FOLLOWING COLORISATION PATCH ON THE DSM:—



'AINBOW'
ATCH 13 ✓

THERE SHOULD APPEAR TWO SETS OF SIX RAINBOW COLOURS ON A PURPLE BACKGROUND, MOVING THE COMPARATOR LEVEL SPACING CONTROL SHOULD ALTER THE SPACING OF THE RAINBOW ITH CONTROL AT ABOUT '2' THE STRIPES SHOULD BE COMPRESSED TOGEATHER & 'FIZZ' OUT.

ON A.C.M. PATCH CONTROL SLIDER A TO COMPARATOR, CHECK THAT CONTROL SLIDER A NOW ALSO AFFECTS COMPARATOR LEVEL SPACING. ✓

F POSSIBLE CONNECT CAMERA TO SOCKET ON BACK & CHECK THAT ALL 7 LEVELS CAN BE ACTIVATED WITH A SUITABLE SUBJECT. ✓

SHAPE GENERATORS — THE FOLLOWING PROCEDURE MUST BE REPEATED FOR SHAPE GENERATORS 1 & 2 (BOARDS C & D)

WITH BOTH CLOCK SLIDERS AT Ø CHECK THAT EACH ADVANCE BUTTON CLOCKS UP INDICATED COUNT BY 1 & THAT COUNT INDICATION COUNTS Ø–15 IN BINARY.

IF A LED FAILS, CHECK THAT IT IS NOT SHORTED DIRECTLY TO GROUND ANYWHERE.

ADVANCE CLOCK RATE SLIDER 'A' TO '4'. SHAPE SELECTION 'A' SHOULD CLOCK UP ABOUT ONCE A SECOND

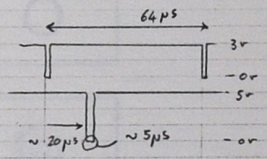
SIMILARLY CHECK SLIDER 'B'.

REMOVE ALL PINS FROM THE A.C.M.

NOW CHECK THAT THE GENERATOR WAVEFORMS ARE AS SHOWN BELOW (TP NUMBERS REFER TO THE TEST POINTS SHOWN ON THE CIRCUIT DIAGRAM)

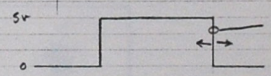
TP 1 COLLECTOR OF T 1, OR PIN 2 OF E2

DELAYED HORIZONTAL SYNC TRIGGER



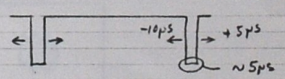
HORIZONTAL DRIVE (SYNC SCOPE ON THIS)

TP2 VARIABLE LENGTH DELAYED PULSE, PIN 3 OF E2

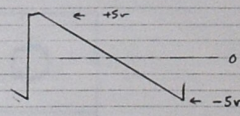


THIS EDGE VARIABLE BY +5μs & −10μs BY PATCHING A CONTROL SLIDER INTO THE HORIZONTAL POSITION VOLTAGE INPUT (↔) ON THE A.C.M.

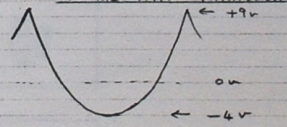
TP3 VARIABLY DELAYED TRIGGER PULSE, PIN 4 OF E3



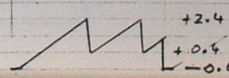
TP4 VARIABLE POSITION RAMP - SOURCE OF T 8



TP5 HORIZONTAL PARABOLA - EMITTER OF T 9

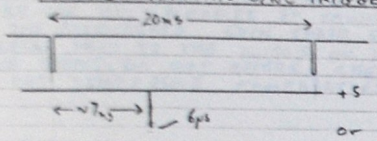


TP6 MULTIPLE RESET RAMP - EMITTER OF T 5



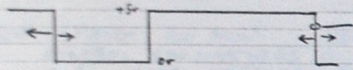
Nº OF RAMPS DONE PER LINE CAN BE VARIED BY PATCHING A CONTROL SLIDER INTO THE HORIZONTAL ZOOM INPUT (↔) ON THE A.C.M.
(E3 MAY LATCH UP, OR FAIL AT HIGH SPEED, USE SIGNETICS 555)

TP7 DELAYED VERTICAL SYNC TRIGGER ES PIN2



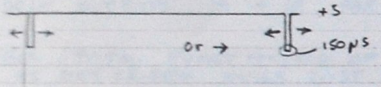
VERTICAL DRIVE (SYNC SCOPE ON THIS)

TP8 VARIABLE LENGTH DELAYED PULSE ES PIN3

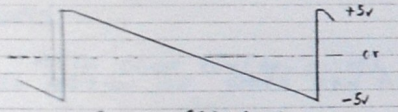


THIS EDGE VARIABLE BY +2 ns TO −3 ns BY PATCHING A CONTROL SLIDER INTO THE VERTICAL POSITION (↕) VOLTAGE INPUT ON THE A.C.M.

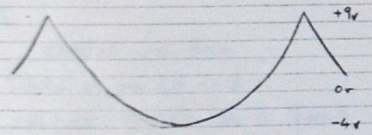
TP9 VARIABLY DELAYED TRIGGER PULSE E6 PIN4



TP10 VARIABLE POSITION RAMP SOURCE OF T17

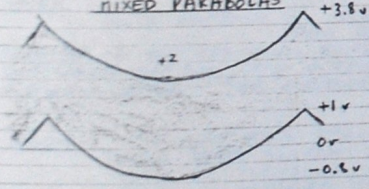


TP11 VERTICAL PARABOLA E4 PIN 6

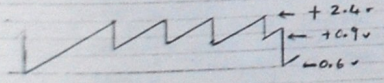


MIXED PARABOLAS

TP12 EMITTER OF T18

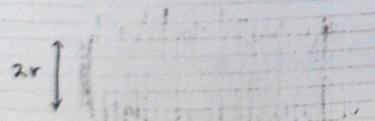


TP13 VERTICAL RESET RAMP EMITTER OF T14



No OF RAMPS PER FRAME CAN BE VARIED BY PATCHING A CONTROL SLIDER INTO THE VERTICAL ZOOM INPUT (↕2) ON THE A.C.M.

TP14 NOISE SOURCE COLLECTOR OF T20



MEAN DC LEVEL ≈ −2v

SLEW RATE ≈ 1v / 300ns

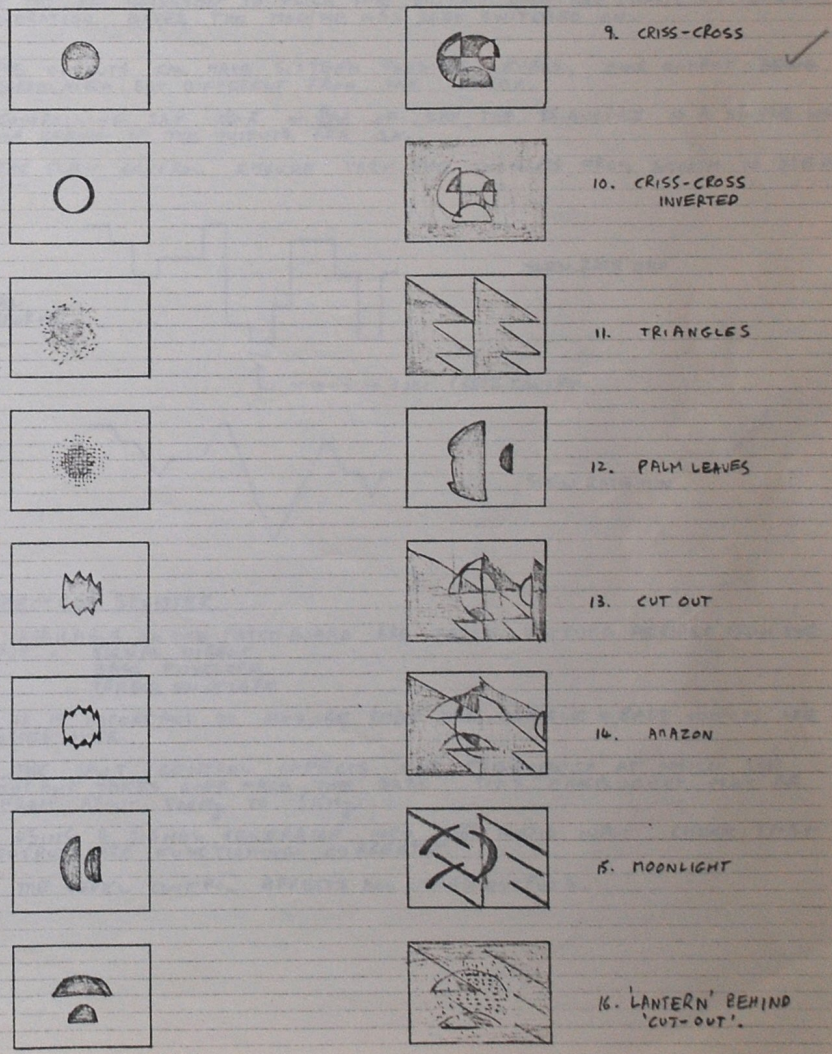
IF ANY WAVEFORMS ARE DISTORTED OR MISSING CHECK ASSOCIATED CIRCUITRY NOW, ASSUMING ALL IS SO FAR CORRECT, PATCH ON DSM SHAPE 1A (2A) TO CH A $L\phi, C_1\phi, C_2\phi$. (PATCH 14)

BY USING THE 'ADVANCE' BUTTON, THE SHAPES SHOULD APPEAR IN THE ORDER SHOWN ON PART 2 OF THE C+D BOARD CIRCUIT

APPROXIMATE APPEARENCE OF THESE SHAPES IS SHOWN BELOW:−

(NB THESE ARE NEGATIVES, i.e BLACK REPRESENTS WHITE ON SCREEN)

1. CIRCLE
2. RING
3. FRIZZ
4. LANTERN
5. GEAR
6. CIRCLE + GEAR
7. VERTICAL SEGMENTS
8. HORIZONTAL SEGMENTS
9. CRISS-CROSS ✓
10. CRISS-CROSS INVERTED
11. TRIANGLES
12. PALM LEAVES
13. CUT OUT
14. AMAZON
15. MOONLIGHT
16. 'LANTERN' BEHIND 'CUT-OUT'.



SPECTRE TEST SCHEDULE PAGE TS9

IF NO SHAPES APPEAR, THEN THE WIRING TO BOARD B, OR THE 74150 SHAPE SELECT MULTIPLEXER ARE FAULTY. CHECK THE INDIVIDUAL SHAPE LINES BEFORE THE MULTIPLEXERS BY CONNECTING A TEST PROBE TO THE L⌀ CH A COLUMN ON THE PATCHBOARD. EACH SHAPE SHOULD APPEAR ON ONE OF THE SIXTEEN PARALELL TRACKS NEXT TO THE 74150's ON THE SHAPE BOARD.
IF SOME SHAPES DO NOT APPEAR, CHECK THAT THE BASIC SHAPES AT THE OUTPUTS OF THE 75107/75108 COMPARATORS ARE O.K.

(PATCH 15)

VOLTAGE CONTROL OF SHAPES DSM; - SHAPE 1A (1B, 2A OR 2B) → L⌀ CH A.

NO ACM PINS THE CIRCLE OUTPUT SHOULD BE CENTRAL ON THE SCREEN, IF THIS IS NOT THE CASE, S.O.T. RESISTORS R7 (HORIZONTAL POSN) AND R41 (VERTICAL POSN)

NOW PATCH (ON ACM) CONTROL SLIDER A - TO EACH OF THE VOLTAGE CONTROL PARAMETERS IN TURN.
N.B. ONLY VERTICAL POSITION (↕) AND HORIZONTAL POSITION (↔) AFFECT ALL SHAPES, OTHER PARAMETERS ONLY AFFECT SOME SHAPES (SEE TABLE ON PART 2 OF CIRCUIT DIAGRAM)

CHECK BOTH OUTPUTS 1A & 1B FOR CORRECT SELECTION & INDICATION. ✓

NOW CHECK TOTAL FUNCTIONING OF SHAPE GENERATOR B IN SIMILAR MANNER AS DESCRIBED OVER LAST TWO PAGES FOR SHAPE GENERATOR A.

CONTROL SLIDERS

PATCH EACH CONTROL SLIDER IN TURN ON ACM TO CONTROL (SAY) HORIZONTAL POSITION OF SHAPE GEN A. CHECK THAT ALL FUNCTION OK. ✓

OSCILLATORS

	PATCH ON DSM	PATCH ON ACM
(PATCH 16)	SHAPE 1A → L⌀ CH A	OSC 1 ∿ → ⇨Z

SELECT SHAPE No 6 (0110)

LOW RANGE

ACTIVE CONTROLS :- COARSE FREQ, FINE FREQ, LEVEL
FREQ RANGE 0.2Hz – 25Hz
BECAUSE OF THE TRACKING FILTER ARRANGEMENT FOR OBTAINING THE SINE WAVE OUTPUT, THE OUTPUT WILL ONLY STABILISE SEVERAL SECONDS AFTER THE MOVEMENT OF ANY OF THE CONTROLS.

HIGH RANGE

ALL CONTROLS SHOULD FUNCTION. FREQ RANGE ~ 25Hz – 45KHz
WITH MODE SWITCH TO 'SYNC', DEVIATION CONTROL WILL BE INACTIVE, AND OUTPUT FREQUENCY SHOULD BEAR AN INTEGER RATIO RELATIONSHIP TO THE LINE DRIVE FREQUENCY
WITH THE MODE SWITCH TO + OR – THE DEVIATION CONTROL ENABLES ONE TO ADD OR SUBTRACT A SMALL FREQUENCY DEVIATION.
THIS IS MOST USEFUL ON THE HIGHEST FREQUENCY RANGE (COARSE FREQ SLIDER AT THE TOP OF ITS RANGE).
TRY MODULATING THE CIRCLE SIZE AT THIS HIGH FREQUENCY RANGE.

THE DEVIATION SHOULD BE SMOOTH IN BOTH DIRECTIONS; IF NOT S.O.T. R44 ON BOARD E.

DEVIATION '–' JERKY, OR COMPLETELY WRONG FREQ
⇒ DECREASE VALUE OF R44

DEVIATION '+' JERKY
⇒ INCREASE VALUE OF R44

TYPICAL FAULTS
- IF OSCILLATORS DO NOT WORK AT ALL, CHECK PHASE LOCK LOOP (BOARD E)
- IF DIVISION WRONG, CHECK STAIRCASE GENERATION
- IF WAVEFORM DISTORTED, CHECK TRACKING FILTER
- NO DEVIATION – CHECK SWITCH WIRING, AND DEVIATION OSCILLATOR.

RANDOM VOLTAGE GENERATOR

THE TWO RANDOM VOLTAGE OUTPUTS ON THE ACM ARE PRODUCED BY A DIGITAL PSEUDO RANDOM GENERATOR. WITH THE CONTROL SWITCH AT CONTINUOUS THE REPEAT LENGTH IS 4096 EVENTS.
WITH THE CONTROL SWITCH SET TO REPEAT, THE SEQUENCE IS THE LAST 16 EVENTS

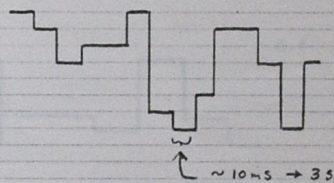
IT MAY BE NECESSARY TO FLICK THE SWITCH BACK AND FORTH TO START OPERATION AFTER THE MACHINE HAS BEEN SWITCHED ON.

THE OUTPUTS CAN HAVE SIXTEEN POSSIBLE LEVELS, ONE OUTPUT BEING CORRELATED BUT DIFFERENT FROM THE OTHER.

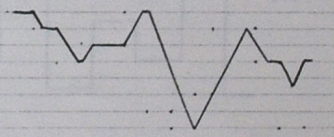
CONTROLLING SAY ⇨Z & ⇩Z OF, SAY, THE TRIANGLES IS A SIMPLE WAY OF SEEING IF THE OUTPUTS ARE O.K.

THE SLEW CONTROL SHOULD VARY THE CHANGES FROM SMOOTH TO STEPLIKE :—

TYPICAL WAVEFORMS



~ 10ms → 3 sec (RATE CONTROL



✓

AUDIO SPECTRUM SPLITTER

AVAILABLE ON THE PATCH BOARD ARE THREE OUTPUTS DERIVED FROM THE AUDIO INPUT -
- SIGNAL DIRECT
- BASS ENVELOPE
- TREBLE ENVELOPE

IT IS IMPORTANT TO ENSURE THAT THE TREBLE & BASS OUTPUTS ARE NOT CROSSED OVER.

THE SPLIT CONTROL AFFECTS THE FREQUENCY AT WHICH THE TREBLE OUTPUT TAKES OVER FROM THE BASS. THIS FREQUENCY MAY BE VARIED FROM ABOUT 500Hz TO 5KHz.

USING A SIGNAL GENERATOR INTO THE AUDIO INPUT CHECK THAT THESE OUTPUTS ARE FUNCTIONING CORRECTLY.

THE LEVEL CONTROL AFFECTS ALL THREE OUTPUTS.

- ACM FEEDS

PATCH ON DSM (PATCH 17)
(CIRCLE) SHAPE 1A → CHA LØ, $C_2Ø$; 'TO ACM FAST'
GROUND → CHA L2
PATCH ON ACM
FROM DSM (HIGH) → VIDEO INPUT Y

THE ADDITION OF THE ACM PIN SHOULD CAUSE THE CIRCLE TO TAKE ON SHADING, GIVING IT THE APPEARENCE OF A SPHERE. IF THIS IS NOT THE CASE, CHECK THE SIGNAL PATH OF THE 'FAST' DSM – ASM FEED

REMOVE ABOVE PATCH

PATCH ON DSM (PATCH 18)
SHAPE 1A (CIRCLE) → CHA LØ, $C_1Ø$, $C_2Ø$
Y5 → 'TO ACM SLOW'
PATCH ON ACM
SLIDER A → ● SHAPE GEN 1
FROM DSM (SLOW) → ● SHAPE GEN 1

ADVANCE SLIDER UNTIL SHAPE IS WELL VISIBLE
SIGNAL FROM DSM SHOULD MODULATE CIRCLE WIDTH i.e.
IF THIS DOES NOT OCCUR, TRACE DSM – ASM SLOW FEED.

EXTERNAL CONTROL INPUT

CONNECT SIGNAL GENERATOR, 1 VOLT, 500 c/s TO CONTROL VOLTAGE INPUT. THIS SHOULD APPEAR (UNBUFFERED) ON THE BOTTOM ROW OF THE ACM.

EXTERNAL DIGITAL INPUTS

FEED ANY SUITABLE DIGITAL (0v LOW, 3v HIGH) SIGNAL SOURCE INTO THE EXT 1 SOCKET ON THE BACK. THIS SIGNAL SHOULD APPEAR ON THE SPARE 1 ROW ON THE DSM.

SIMILARLY EXT 2 SHOULD FEED (VIA A NON INVERTING BUFFER) TO SPARE 2.

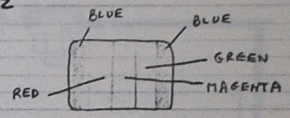
MONITOR CONNECTIONS

PATCH ON DSM (CHA OUTPUTS ONLY) (PATCH 19)

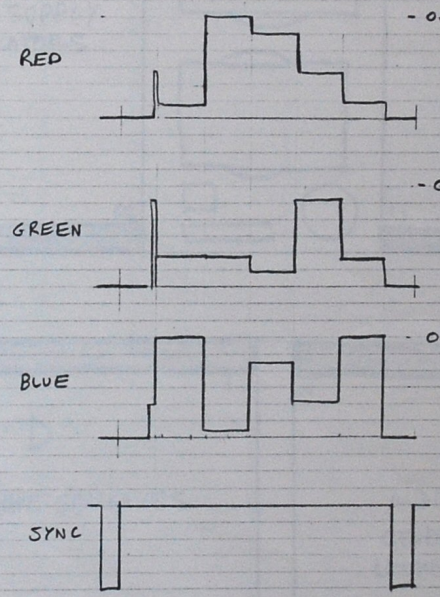
GND → LØ
X1 → $C_1Ø$, C_11, C_12
X2 → $C_2Ø$, C_21, C_22

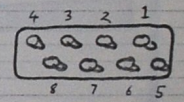
USE SHORTING PINS (WHITE)

APPEARENCE ON SCREEN :–



THIS WILL SET UP EASILY RECOGNISABLE WAVEFORMS FOR THE RED, GREEN & BLUE WAVEFORMS





MONITOR SOCKET AS VIEWED FROM BACK.

1. GND
2. RED
3. GND
4. GREEN
5. BLUE
6.
7. MIXED SYNC
8. GND

RGB OUTPUTS

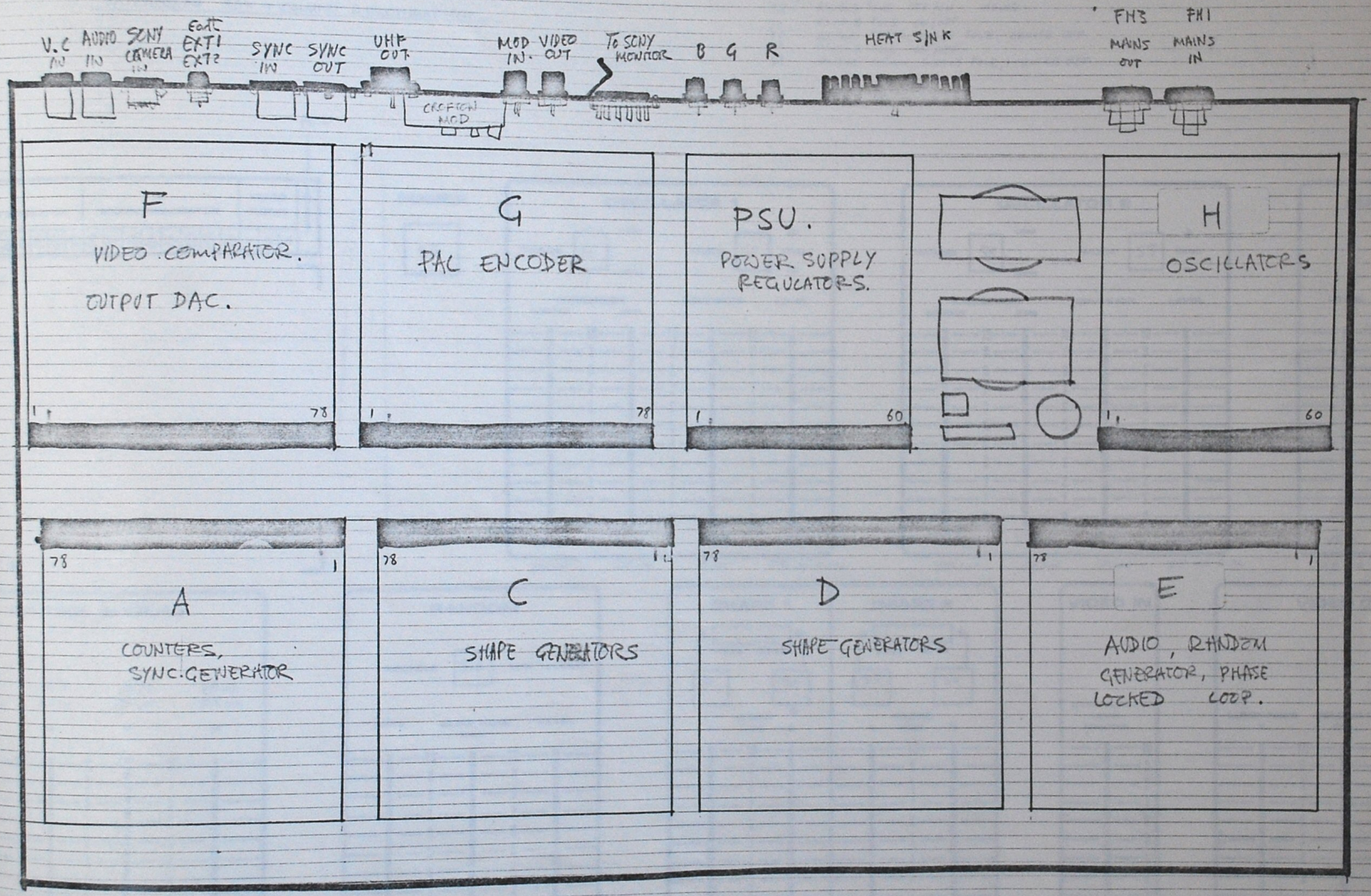
CHECK THAT THE ABOVE COLOUR SIGNALS ALSO APPEAR ON THE CORRECT BNC SOCKETS ON THE BACK PANEL.

———— * ————

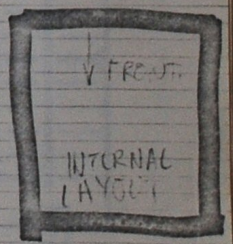
SPECTRE

LAYOUT

L4



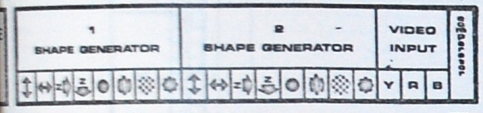
B. Board is connected to PSM (UNDERSIDE)
[PATCH BOARD LOGIC]



SPECTRE - FRONT PANEL 1 - ACM + SLIDERS (RHS).
SLIDER VALUES
PATCHBOARD ROW & COLUMN DENOMINATION.

S1, S2, S3, S4 } SINGLE POLE CHANGE OVER
S5 DOUBLE POLE OFF/ON MAINS
S6 DOUBLE POLE ON/OFF
S7 DOUBLE THROW, SINGLE POLE, CENTRE OFF
S8 DOUBLE POLE ON/OFF
S9 DOUBLE THROW, SINGLE POLE, CENTRE OFF.

PD1 PD20



→ PC1
→ PC16

POWER
S5

OSCILLATOR 1
RANGE S6 LOW HIGH
MODE S7 + SYNC −
FREQUENCY COARSE FINE
DEVIATION
LEVEL
VR10 VR11 VR12 VR9
10K LIN 10K LIN 1K LIN 10K LOG DUAL

OSCILLATOR 2
RANGE S8 LOW HIGH
MODE S9 + SYNC −
FREQUENCY COARSE FINE
DEVIATION
LEVEL
VR14 VR15 VR16 VR13
10K LIN 10K LIN 1K LIN 10K LOG DUAL

AUDIO IN
LEVEL
SPLIT TREBLE
VR17 VR19
10K LOG 10K LOG DUAL
BASS

CONTROL SLIDERS
VR19 10K LIN A
VR20 10K LIN B
VR21 10K LIN C
VR22 10K LIN D

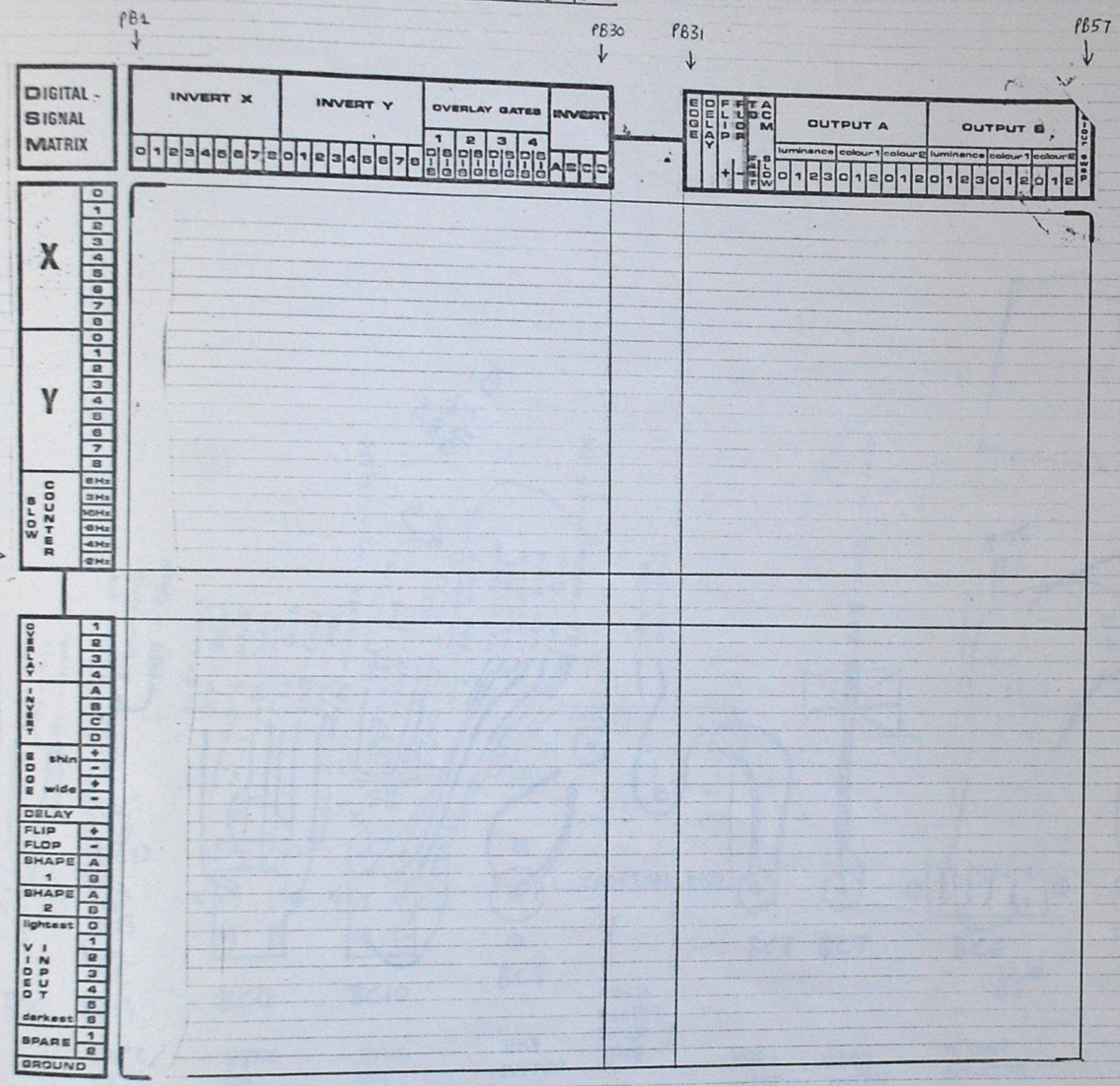
RANDOM
RECYCLE S10 CONTINUOUS
RATE
SLEW RATE MAX MIN
LEVEL
VR24 10K LOG DUAL
VR23 500K LOG
VR25 10K LOG DUAL

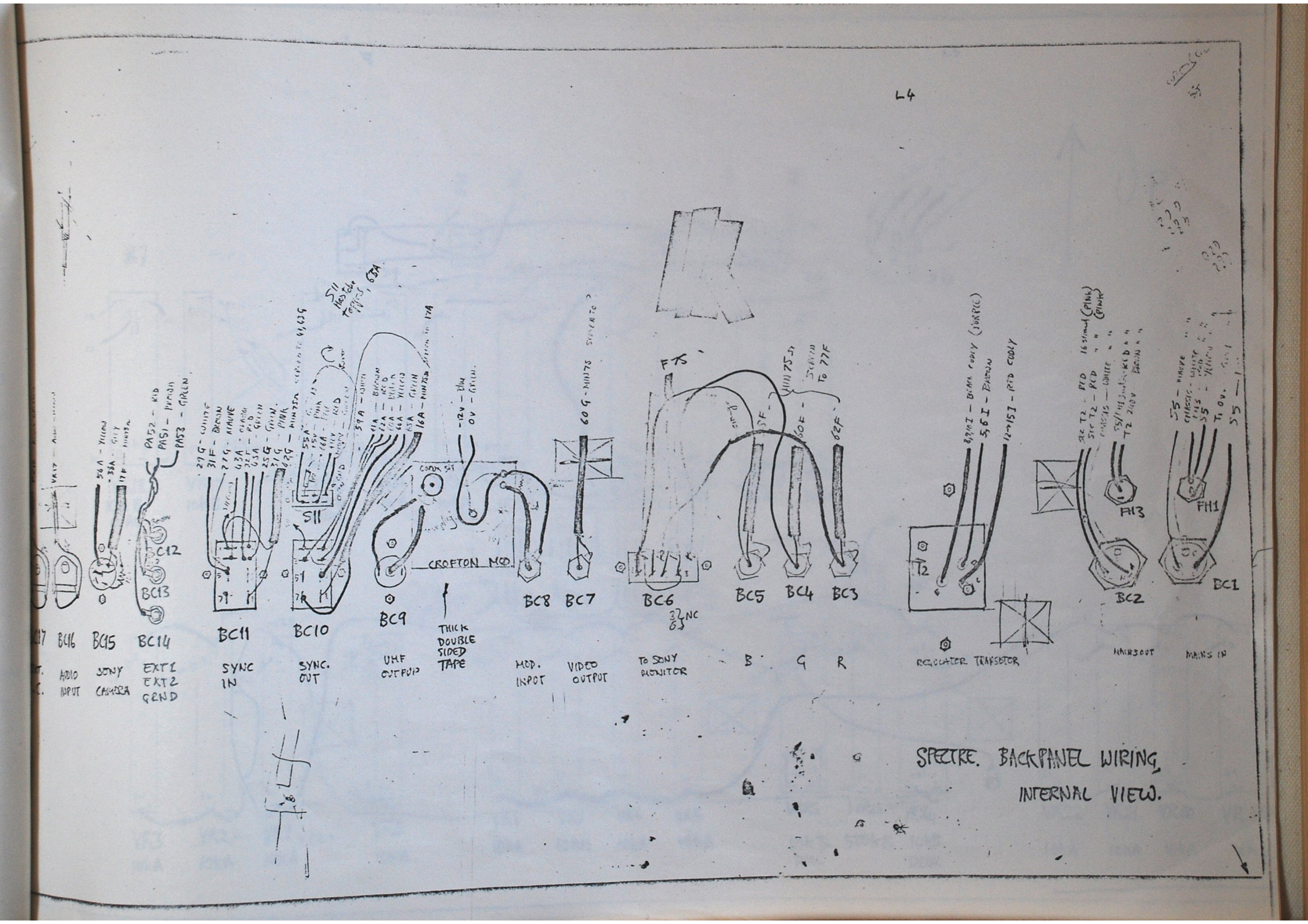
SHAPE 1
S1 S2
CLOCK A FAST B
OFF
SHAPE 2
S3 S4
CLOCK A FAST B
OFF
VR5 VR6 VR7 VR8
10K LIN 10K LIN 10K LIN 10K LIN

VIDEO IN
COMPARATOR LEVEL SPACING
MIN
VR4
10K LIN

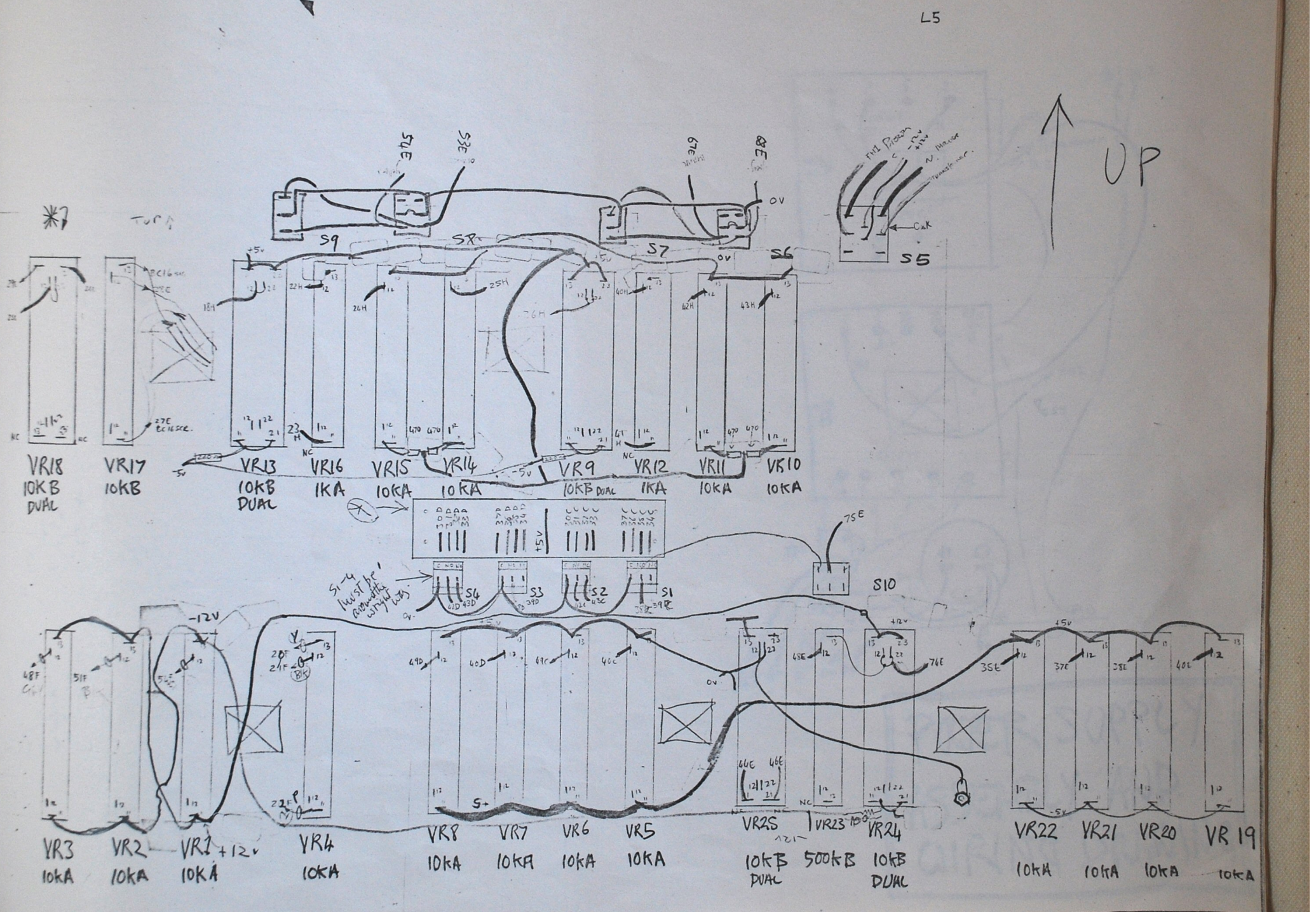
VIDEO OUT
LUMINANCE Y
COLOUR 1 RED
COLOUR 2 BLUE
GREEN GREEN
VR1 VR2 VR3
10K LIN 10K LIN 10K LIN

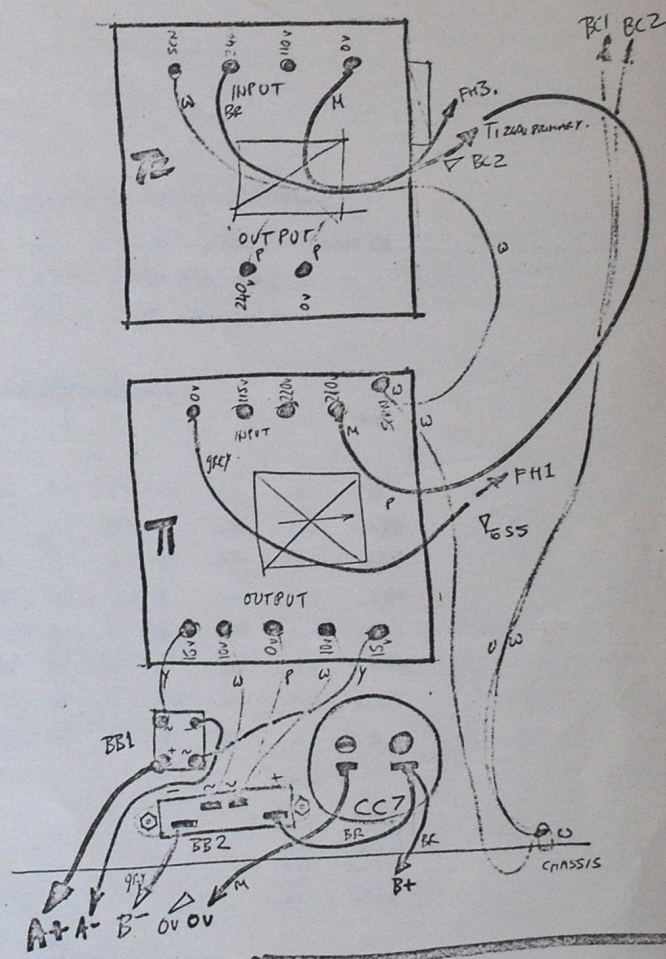
SPECTRE - FRONT PANEL 2 - DSM





SPECTRE. BACKPANEL WIRING,
INTERNAL VIEW.


UP
TOP
S9
S8
S7
S6
S5
S4
S3
S2
S1
S10
VR18 10KB DUAL
VR17 10KB
VR13 10KB DUAL
VR16 1KA
VR15 10KA
VR14 10KA
VR9 10KB DUAL
VR12 1KA
VR11 10KA
VR10 10KA
VR3 10KA
VR2 10KA
VR1 10KA
VR4 10KA
VR8 10KA
VR7 10KA
VR6 10KA
VR5 10KA
VR25 10KB DUAL
VR23 500KB
VR24 10KB DUAL
VR22 10KA
VR21 10KA
VR20 10KA
VR19 10KA
+5V
-5V
+12V
-12V
0V
S+
S1-4 must be mounted straight up.

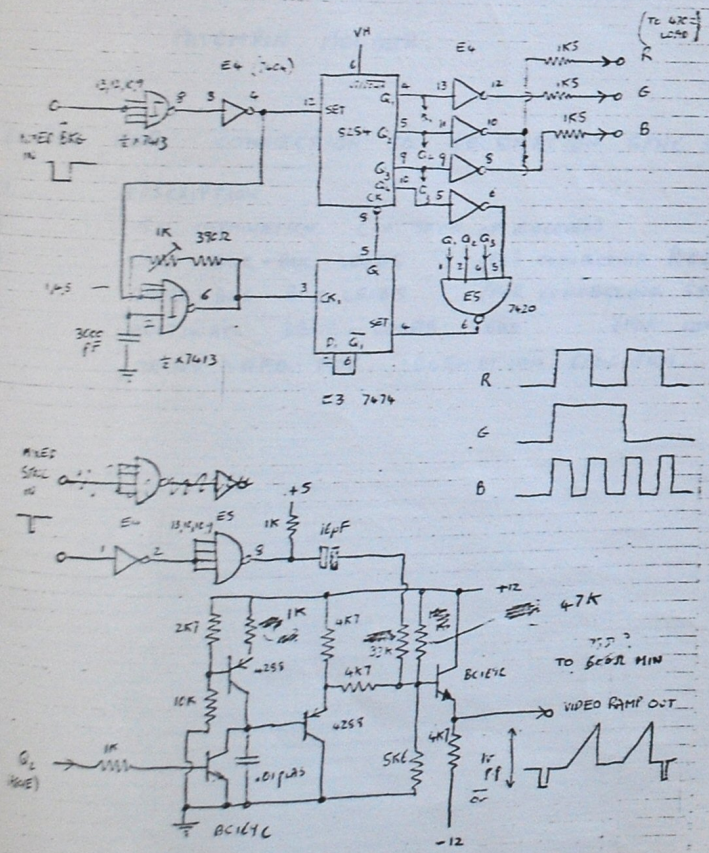


POWER SUPPLY ASSEMBLY AND WIRING DRAWING

SPECTRE - TEST GENERATOR

- COLOUR BAR EQUATIONS.

COLOUR BAR GENERATOR (100% BARS)
& COMPOSITE VIDEO RAMP GENERATOR
FOR ALIGNMENT OF CAMERA INPUT AND
ENCODER OF SPECTRE.



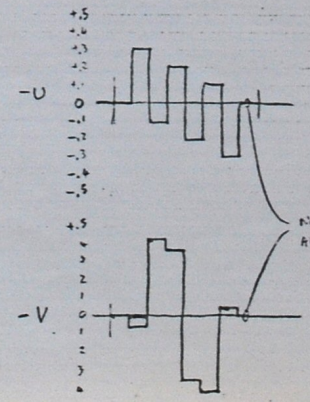
EQUATIONS FOR ENCODING MATRIX

LUMINANCE	$E_Y = 0.299\,E_R + 0.587\,E_G + 0.114\,E_B$
B-Y	$E_U = 0.493\,(E_B - E_Y)$
R-Y	$E_V = 0.877\,(E_R - E_Y)$

100% COLOUR BAR VALUES

COLOUR	R	G	B	Y	-U	-V
WHITE	0.7	0.7	0.7	0.7	0	0
YEL	0.7	0.7	0	.620	.306	-.070
CYAN	0	0.7	0.7	.491	-.103	.430
GREEN	0	0.7	0	.411	.202	.360
MAGENTA	0.7	0	0.7	.289	-.202	-.360
RED	0.7	0	0	.209	.103	-.430
BLUE	0	0	0.7	.080	-.306	+.07
BLACK	0	0	0	0	0	0

R-Y	B-Y
.62	-.06
-.209	.491
.411	.411
-.411	-.411
.209	-.491
-.62	+.06
0	0



NB. -U & -V IN SPECTRE HAVE 5.9 TIMES THIS MAGNITUDE AND ARE CENTRED ABOUT +5V.

NOTE THAT BOTH U & V ARE ZERO DURING BLACK & WHITE BARS.

CONTENTS OF SPECTRE LEAD ACCESSORIES

A2

QTY	DESCRIPTION	
1	SHORT BNC-BNC LEAD	(FOR CONNECTING VIDEO OUTPUT TO MODULATOR)
1	MAINS LEAD	
1	JONES - JONES LEAD	(FOR CONNECTING SYNC OUT TO SYNC IN)
1	COAX - COAX	(FOR CONNECTING UHF OUTPUT TO TV RECEIVER)
50	BLUE DIODE PINS	} FOR DSM
50	WHITE SHORTING PINS	} FOR DSM
25	2K7 RESISTOR PINS	- FOR ACM

1 BNC CONNECTOR
1 JONES PLUG

2 JACK PLUGS - FOR AUDIO & CONTROL INPUTS
3 4mm PLUGS - FOR EXTERNAL DIGITAL SIGNALS

1 PATCHPIN HOLDER.

MSL EXTRAS FOR CONNECTION TO TELEMATION SYNC GEN & ENCODER

QTY	DESCRIPTION	
3	75Ω TERMINATION	(ON BACK OF ENCODER)
4	LONG BNC-BNC LEADS	(FOR CONNECTING RGB SIGNALS TO ENCODER, & OUTPUT OF ENCODER TO MODULATOR INPUT)
4	SHORT BNC-BNC LEADS	(FOR CONNECTING SYNC GEN TO ENCODER)
1	MULTIWAY 3BNC-JONES LEAD	(FOR CONNECTING SYNCS TO SPECTRE)
1	MAINS LEAD FOR TELEMATION SYNC GEN.	

SPECTRE

MODIFICATIONS FOR NTSC

A3

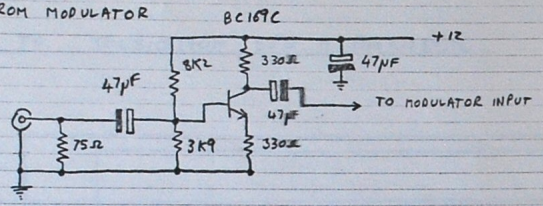
INTERNAL MODS

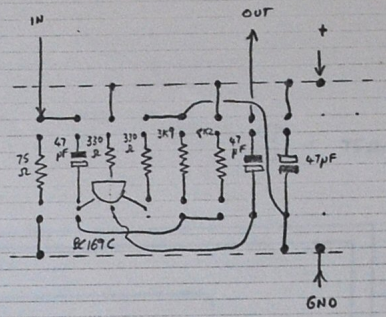
TO CONVERT TO NTSC

1) REMOVE 75Ω TERMINATION FROM MODULATOR

ADD FOLLOWING CIRCUIT

THIS INVERTS VIDEO INPUT TO MODULATOR SO THAT MODULATION IS OTHER WAY UP





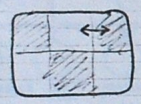
DIP BOARD LAYOUT

2) READJUST PRESET ON BOARD A

PATCH X1 → $\overline{Y1}$

Y1 → LØ CHA

ADJUST FOR SYMMETRY OF SQUARES :—



3) R54 BOARDS C+D WAS 220K NOW 180K

(INPUT TO VERTICAL PARABOLA GENERATOR)

4) ALTER VERTICAL TIMING DELAY ON BOARD A

R4 WAS 68K NOW 47K

5) ALTER LABELS ON BACK PANEL

240V IN TO READ 110V IN

ISOLATED MAINS OUTPUT TO READ 250V

LABEL TO READ N.T.S.C. CONVERSION

TO CONVERT BACK TO 625 LINE PAL

REMOVE INVERTER MOD

CONNECT "MOD-IN" DIRECTLY TO TAG ON MODULATOR MOUNTED ON INSIDE OF BACK PANEL

CONNECT SYNC OUT TO SYNC IN

CONNECT COMPOSITE VIDEO OUT TO MOD IN IF UHF OUTPUT REQD

REVISE MODS 3) & 4)

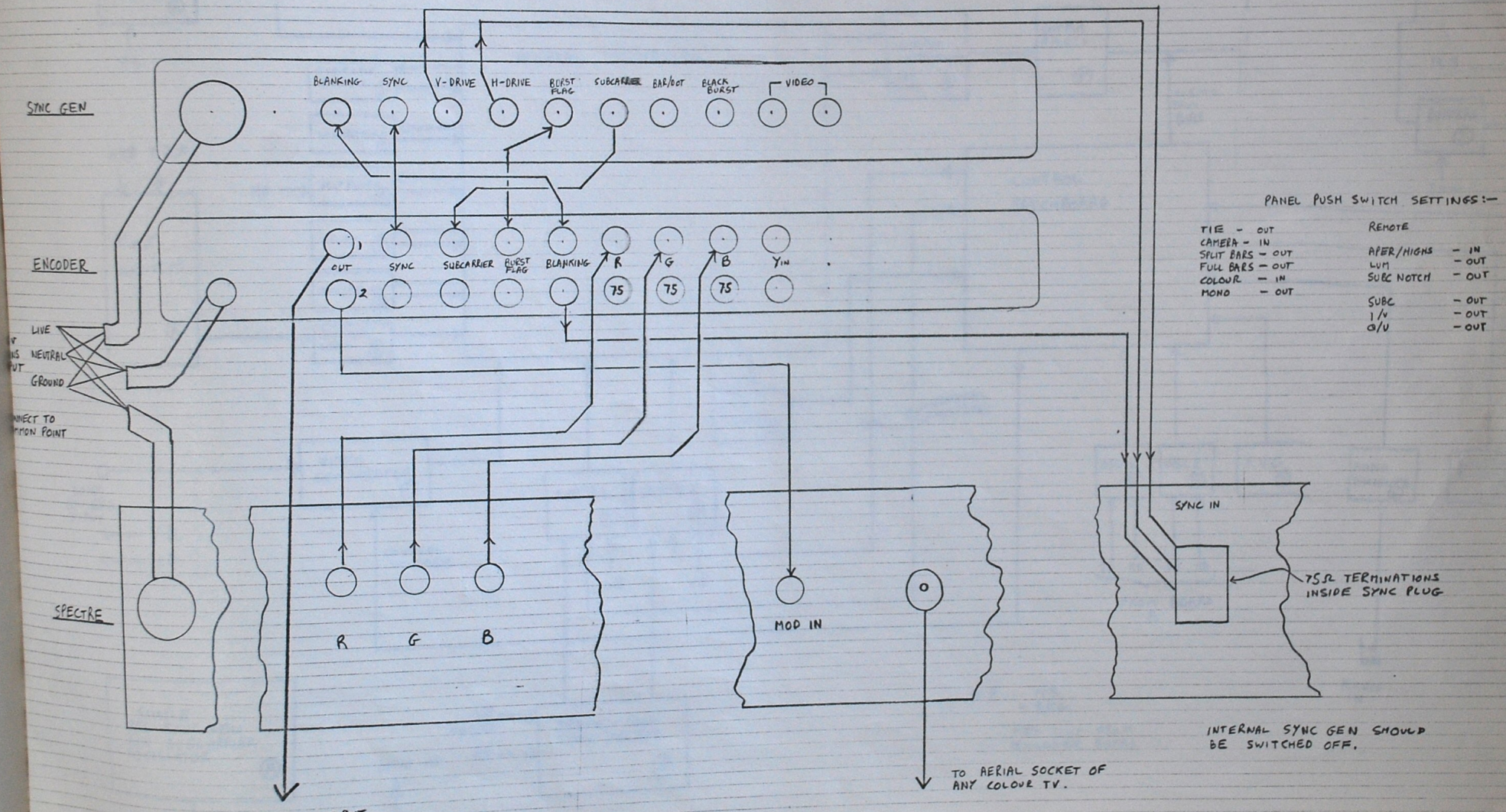
SPECTRE

MODIFICATIONS FOR NTSC

A4

1) EXTERNAL CONNECTIONS TO TELEMATION SPG + ENCODER

(75) - 75Ω BNC TERMINATION



PANEL PUSH SWITCH SETTINGS:-

TIE	- OUT
CAMERA	- IN
SPLIT BARS	- OUT
FULL BARS	- OUT
COLOUR	- IN
MONO	- OUT

REMOTE

APER/HIGHS	- IN
LUM	- OUT
SUBC NOTCH	- OUT
SUBC	- OUT
I/V	- OUT
Q/U	- OUT

INTERNAL SYNC GEN SHOULD BE SWITCHED OFF.

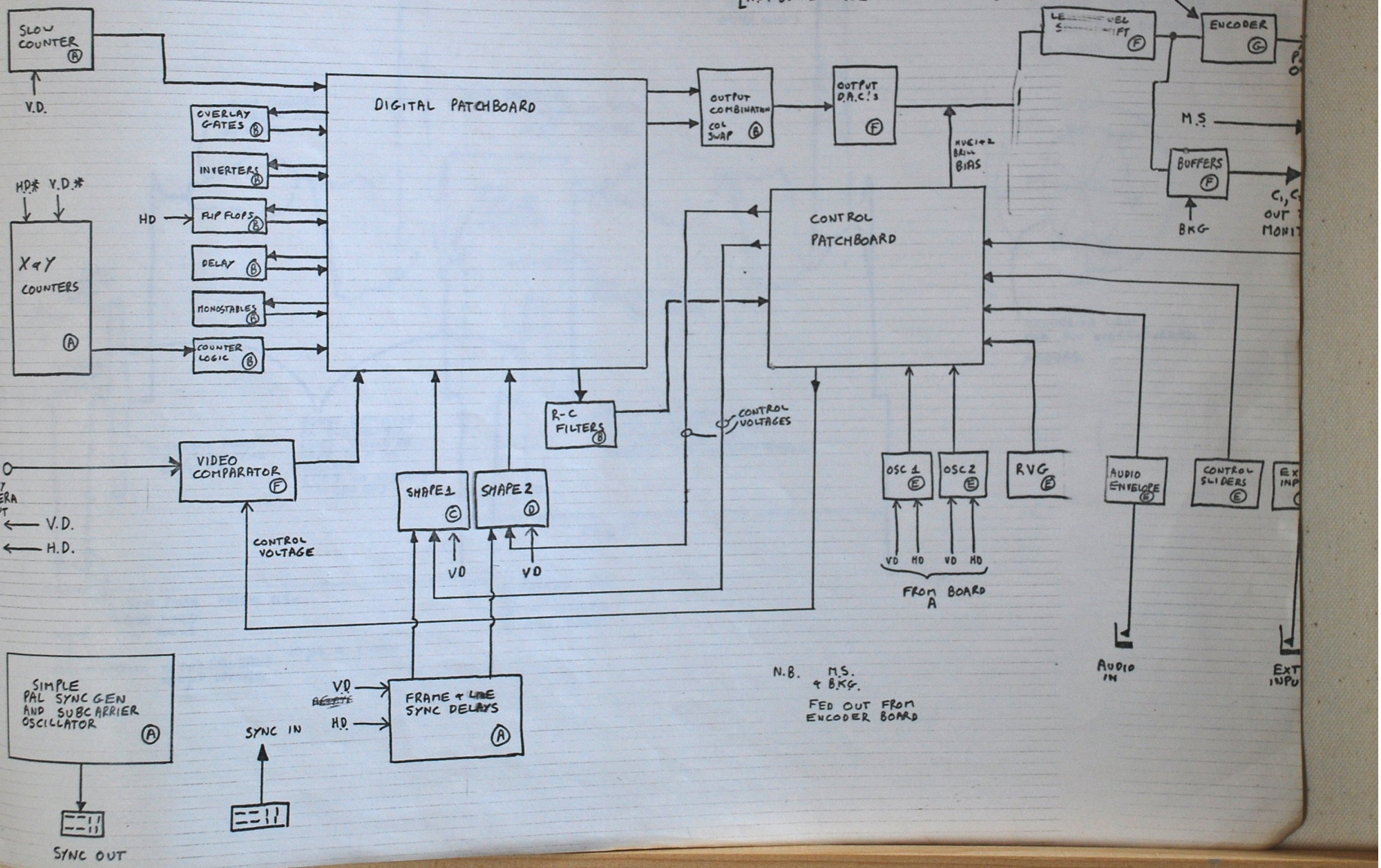
SPECTRE - PROPER MODEL

GRAND BLOCK DIAGRAM

A5

SYNC SIGNALS :—

FRAME DRIVE	– VD	PAL SWITCH	– P.S.
LINE DRIVE	– HD	BURST GATE	– BST
MIXED SYNCS	– MS	SUBCARRIER	– S.C.
MIXED BLANKING	– BKG	[A.C. BUFFER	*]

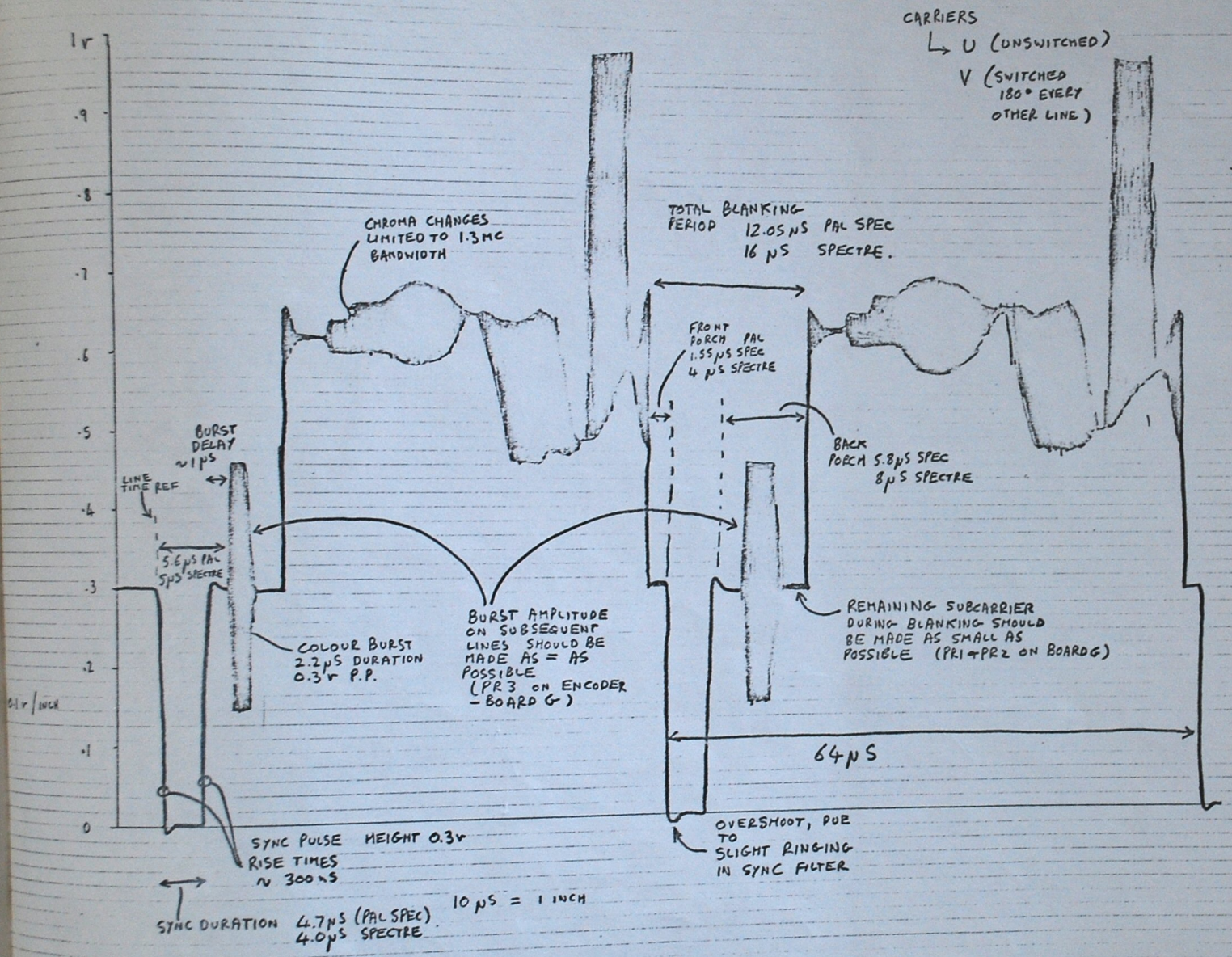


N.B. M.S. & BKG. FED OUT FROM ENCODER BOARD

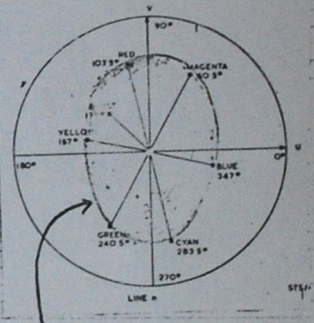
SPECTRE

A6

TYPICAL PAL OUTPUT SIGNAL (2 LINES)



CHROMA AMPLITUDES & PHASES. (INVERT FOR ODD LINES) :—



EXCURSION LIMIT FOR NON OVERSATURATED COLOURS.

SPECTRE - STARS & STRIPES PATCH

X1	INVERT A (S), INVERT B, INVERT C
X2	INVERT B
X6	OV 1 DIS
X7	OV 1 DIS
Y1	INVERT A (S), INVERT B
Y2	INVERT B
Y5	$\overline{X7}$
Y6	OV 1 DIS, INVERT A, INVERT D
Y7	OV 1 DIS
OV1	OV 2 DIS, CH A $L\phi/C_1\phi/C_2\phi$
OV 2	CH A L1 C_1
INVERT A	CH A $L\phi/C_1\phi/C_2\phi$
INVERT B	OV 1 SIG, OV 2 SIG, INVERT A, INVERT C
INVERT C	CH A L1 / $C_1$1 / $C_1\phi$ / $C_2$1
INVERT D	INVERT C
GND	(S) → $\overline{X2}$, $\overline{X6}$, $\overline{Y2}$, $\overline{Y6}$..