

COPY 1

OPERATING NOTES

DIRECT VIDEO INSTRUMENT

1

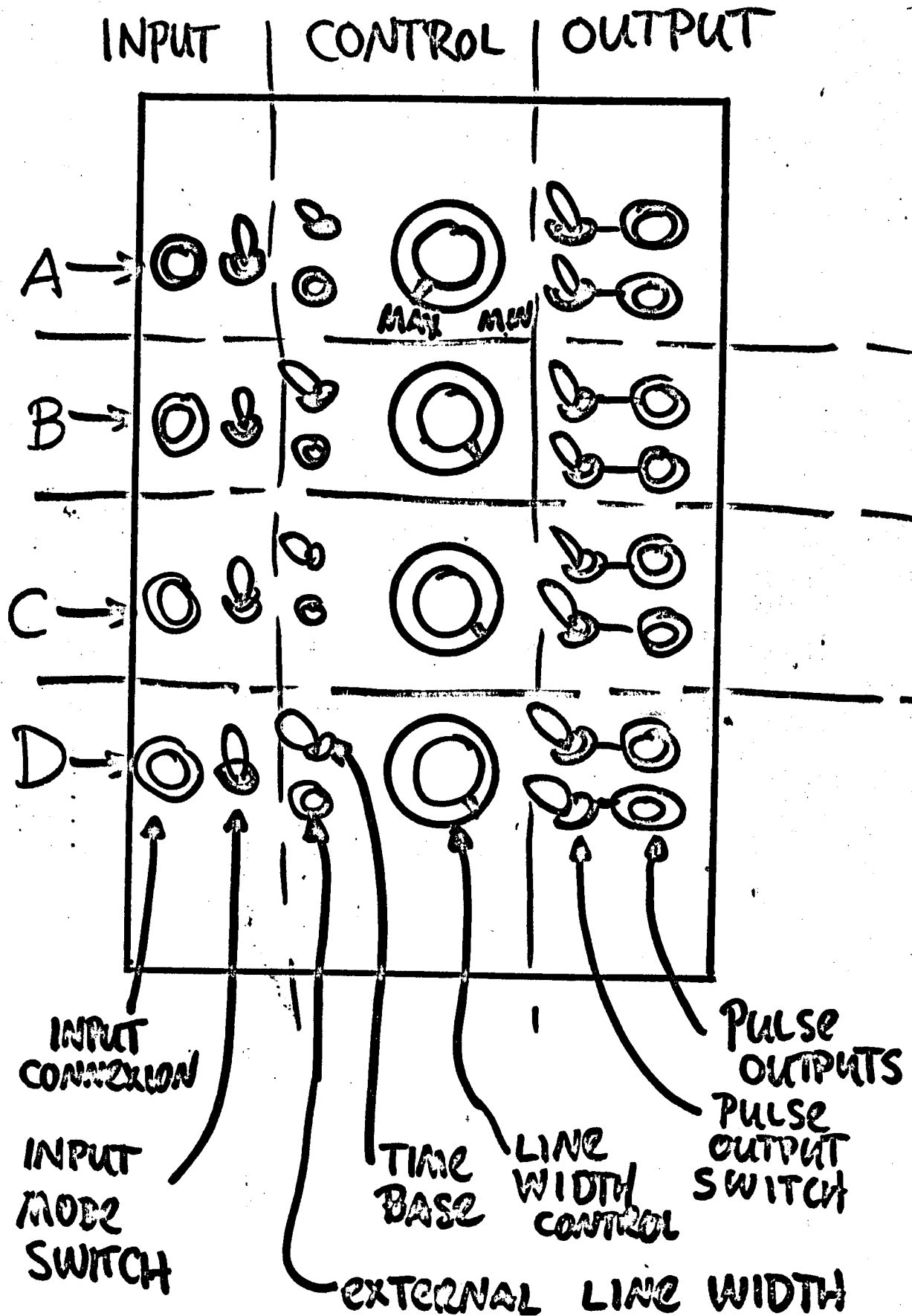
PROTOTYPE

NOV 1971

STEPHEN C. Beck

N. C. e. t.

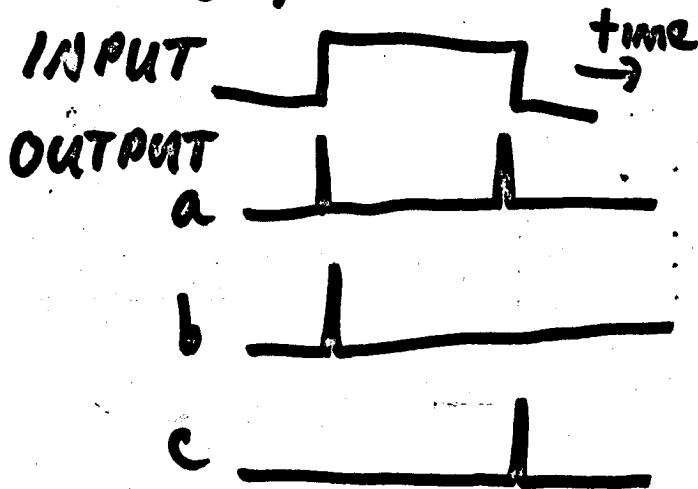
OUTLINE GENERATOR LAYOUT 4 - UNITS



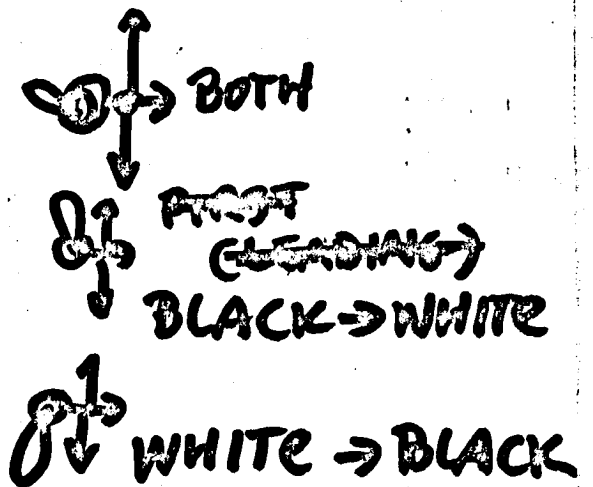
CONTROL FUNCTIONS

INPUT PULSE INPUT (FROM CAMERA-PROC LEVEL SENSE; OR FROM FORM, VOLTAGE- \rightarrow POSITION CONVERTERS; ETC.)

INPUT MODE : DETERMINES IF ONE SIDE OF THE REGION IS TO BE OUTLINED, OR THE OTHER OR BOTH :



SWITCH



TIME BASE

LINES \rightarrow FIELD ?
(VERT) (HORIZ)

ESTABLISHES IF OUTLINES SHOULD BE FORMED VERTICALLY OR HORIZONTAL

DIRECT VIDEO INSTRUMENT

1- GENERAL FRAME LAYOUT
OPERATIONAL SET-UP
COLOR-BARS, BLACK

2- VIDEO & DIRECT VIDEO

3- MODULE DESCRIPTIONS

3A. MIXER-MODULE

4A. COLOR CHORD MODULES

5A. CAMERA PROCESSOR &
ANALOG SIGNAL AMPLIFIER
MODULE

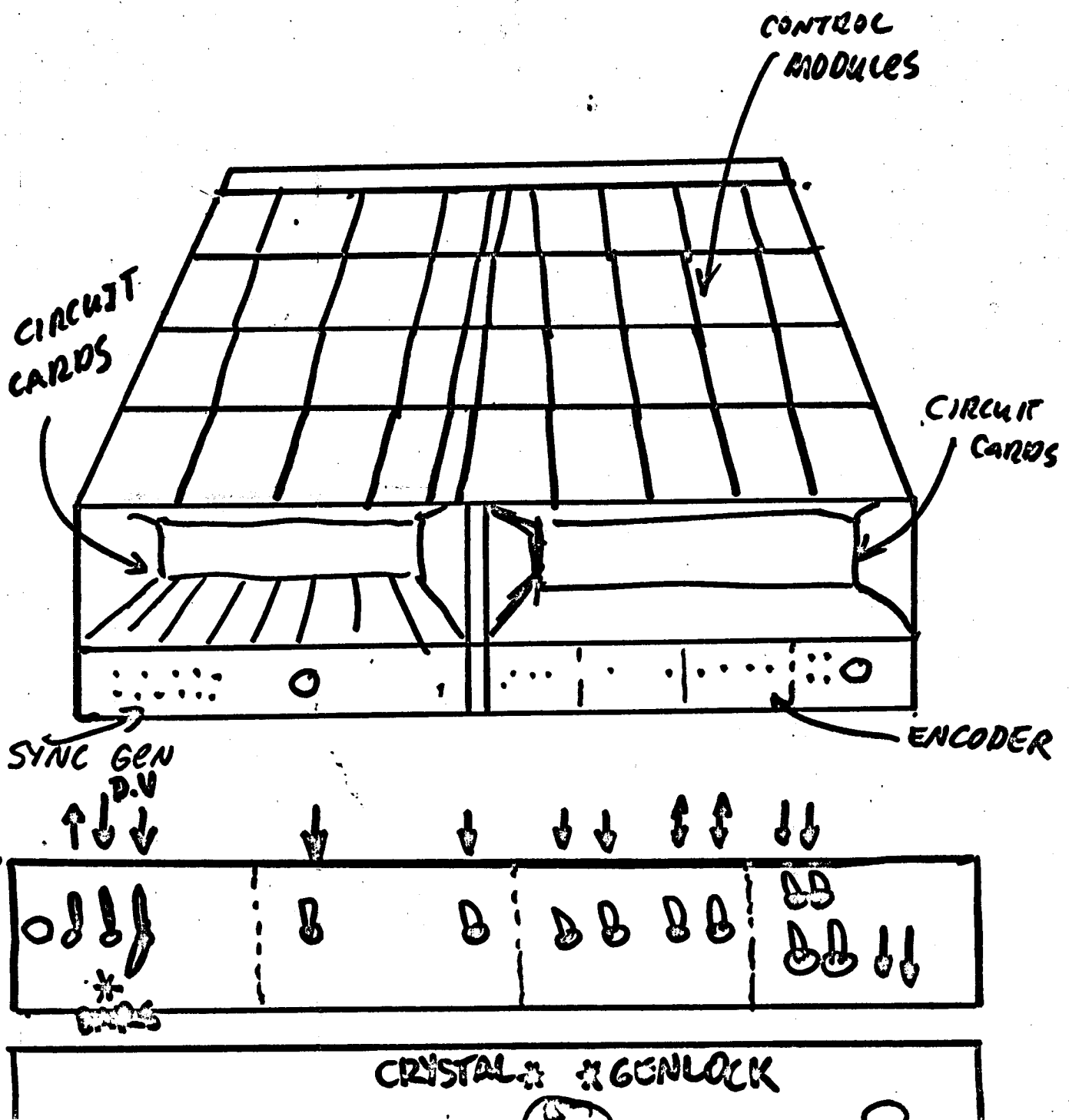
6A. OUTLINE-AND PULSE DELAY
MODULE.

7A. VOLTAGE-TO-POSITION
CONVERTER

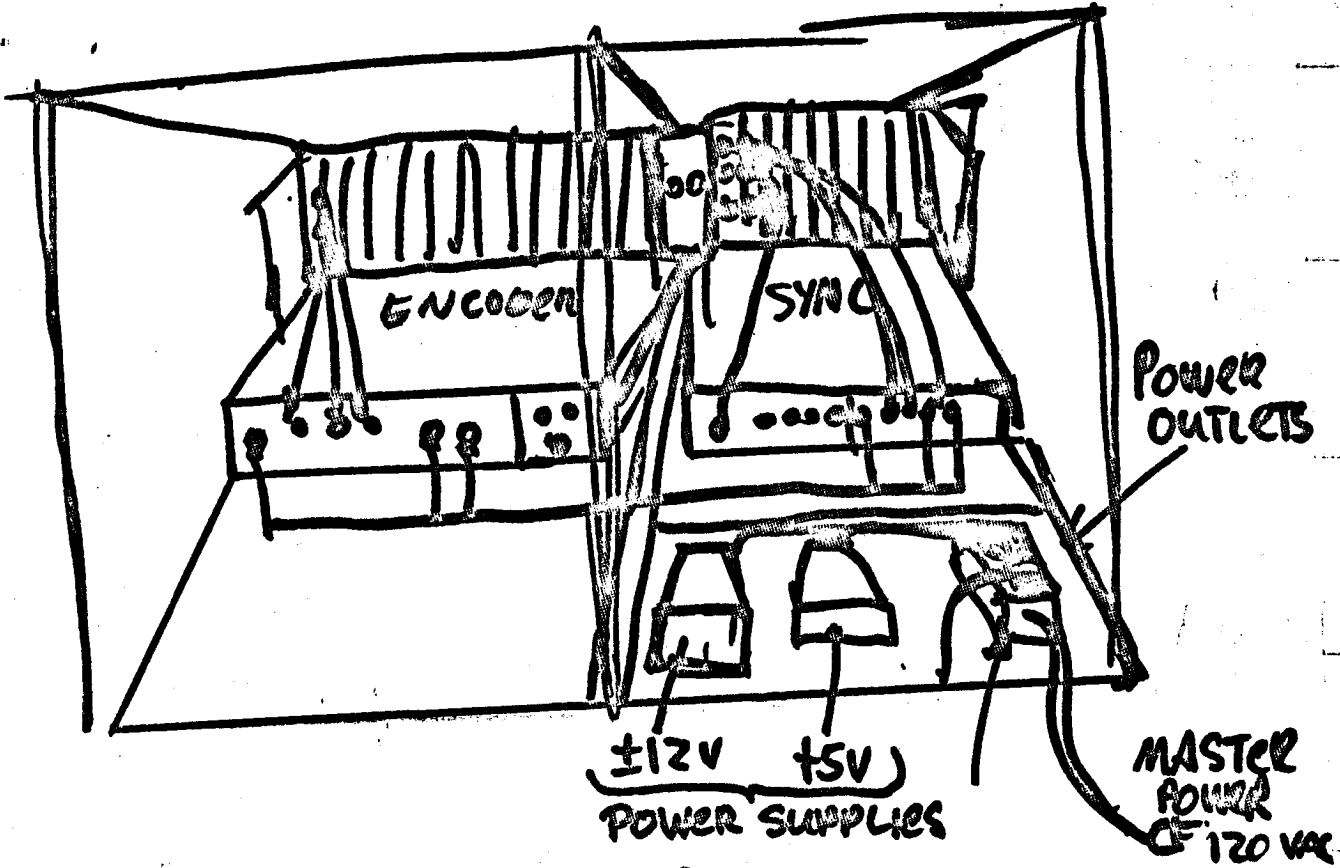
8A. REFERENCE SIGNAL SOURCES

9A. 2-DIMENSIONAL JOYSTICK
CONTROLLER MANIPULATOR

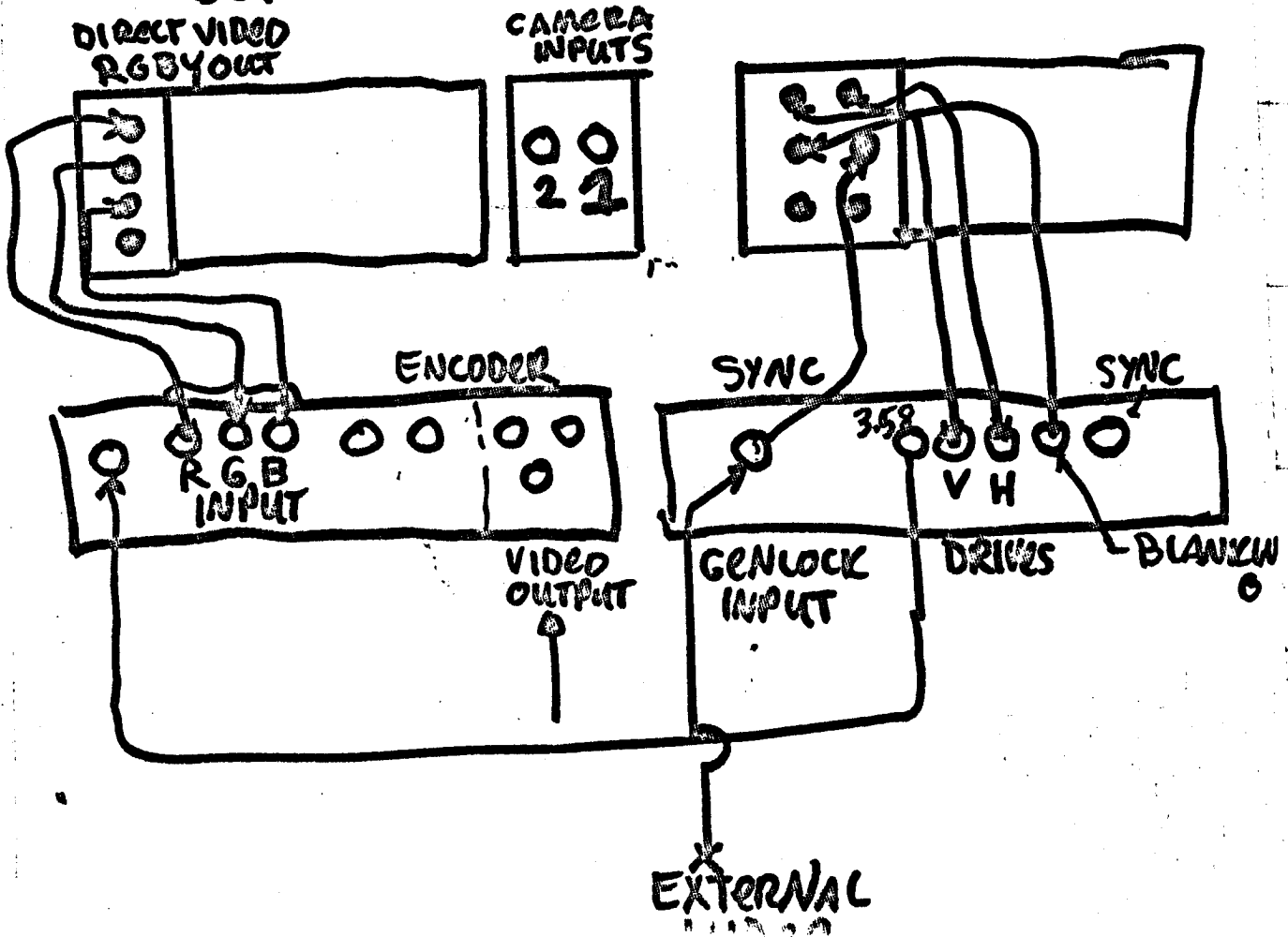
1. GENERAL FRAME LAYOUT - FRONT



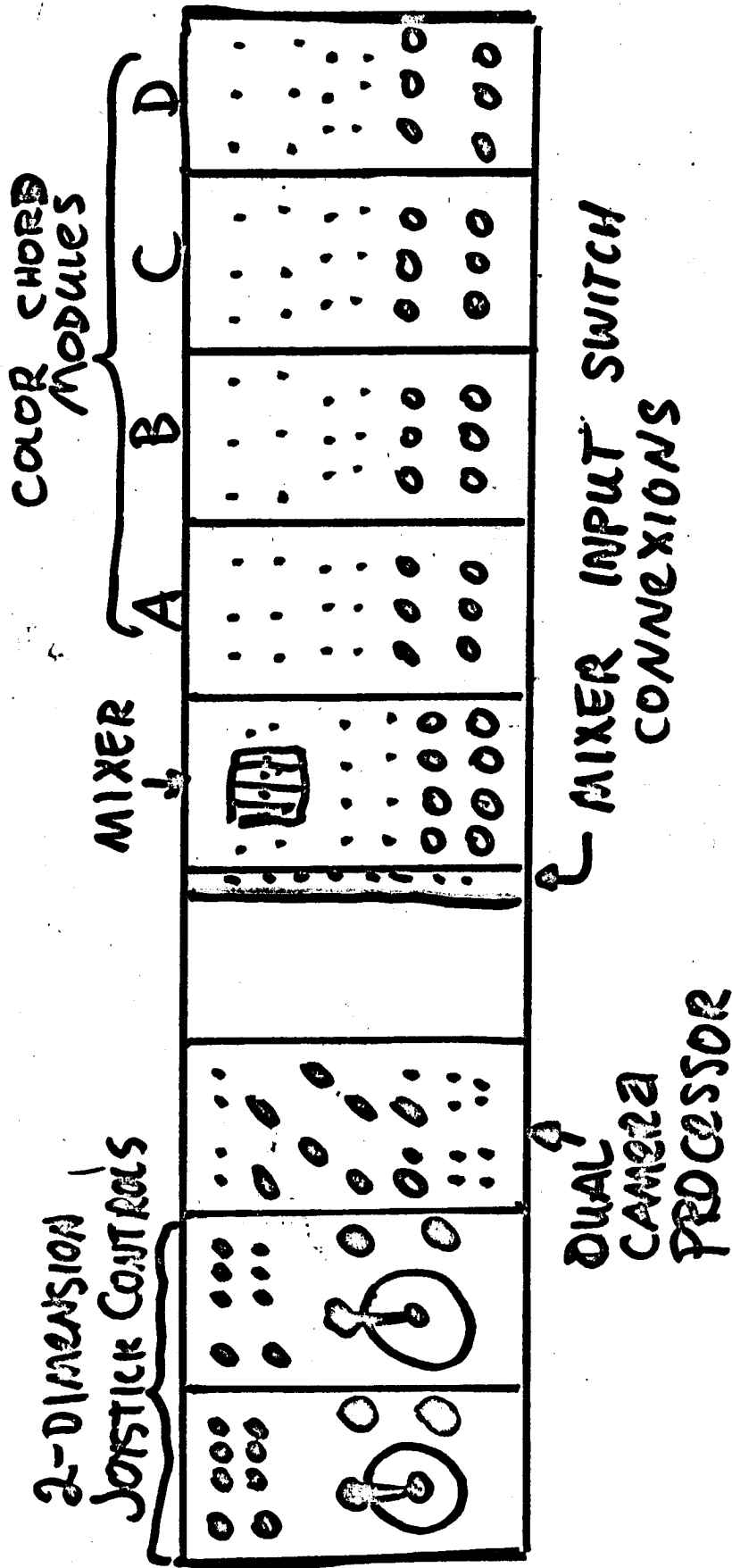
FRAME LAYOUT REAR



DETAIL OF REAR CONNECTIONS



MODULE LAYOUT - BOTTOM ROW



U-R

1. TURNING ON

A. PLUG ALL UNITS
INTO POWER OUTLETS.
OBSERVE PILOT LIGHTS.

B. TO OBTAIN COLOR BARS

(a) PLACE ENCODER IN BARS.

(b) TO OBTAIN BLACK BURST
DO (a) AND PLACE WHITE
TEST SWITCH ON

(c) TO OBTAIN DIRECT VIDEO
PLACE BARS SWITCH IN
CAMERA POSITION AND
WHITE TEST = OFF.

2. VIDEO and DIRECT VIDEO

DIRECT VIDEO ALLOWS IMAGES TO BE COMPOSED IN REAL TIME BY DRAWING FROM A VOCABULARY OF ELEMENTS OF FORM; MOTION (TIME RATE OF CHANGE OF FORM); TEXTURE (ACTUALLY A DESCRIPTION OF LOCAL BRIGHTNESS VARIATIONS OR THE "BRIGHTNESS GRADIENT" OF IMAGE FORMS); AND COLOR.

A SUMMARY OF THE ELEMENTS CONTAINED IN EACH OF THESE CATEGORIES IS POSTED HEREIN TO SERVE AS A GUIDE IN DEALING WITH THE PRESENT DIRECT VIDEO INSTRUMENT. WAS MUCH AS THIS STRUCTURE HAS BEEN USEFUL IN THINKING ABOUT HOW TO BUILD THIS MACHINE IT IS REASONABLE

VIDEO AND ~~ANAL~~ VIDEO

TO USE IT IN AN OPERATIONAL SENSE AS LONG AS IT DOES NOT PROVE TO BE CUMBERSOME:

I. FORM:

A. "ORDER OF GEOMETRY"

1. POINTS
2. LINES
3. PLANES
4. ELEMENTS OF PERSPECTIVE
~~ANALYSIS~~

B. STRUCTURE OF SPACE

1. LINEAR - RECTILINEAR
2. CURVED - ANGLES AND ARCS; RADIAL;

C. RELATIVITY OF FORMAL ELEMENTS

1. OCCLUDED;

II. MOTION

A. TRANSLATION ALONG RECTILINEAR COORDINATES

B. ROTATION ABOUT A POINT

C. REDUCTION OF PROPORTIONS

D. DIFFERENTIAL DISPLACEMENT

video & direct video

III. TEXTURE

A. CONTRAST RATIO

(not a well defined
category at this
time)

IV. COLOR

A. HUE

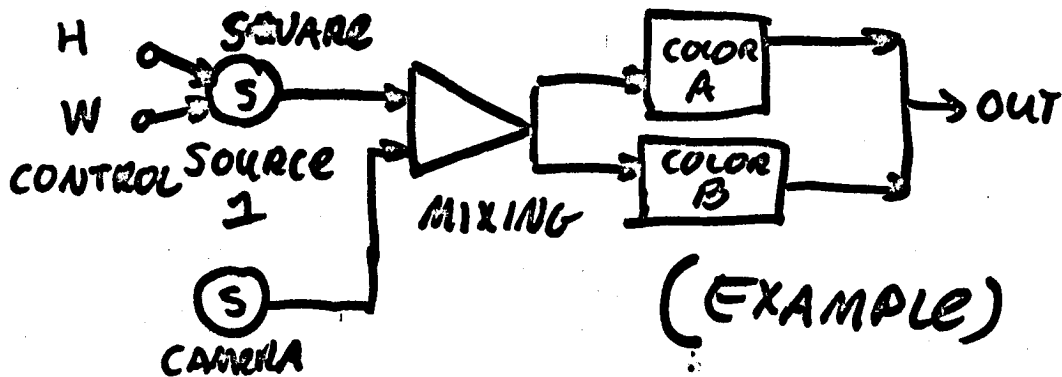
B. SATURATION OF HUE

C. ASSOCIATED BRIGHTNESS (ALSO CALLED LUMINANCE)



IN THE DIRECT VIDEO INSTRUMENT
VARIOUS CONTROL MODULES ARE
ASSOCIATED WITH DIFFERENT FUNCTIONS
OF THE ABOVE CATEGORIES. WHAT
YOU ARE DOING IS ASSEMBLING A
SIGNAL PATH AND THE MEANS TO
VARY THE SIGNAL BY MAKING APPROPRIATE
PATCHCORD INTERCONNECTIONS BETWEEN
CONTROL MODULE NODES.

IT MAY BE USEFUL FOR YOU TO VISUALIZE AND SKETCH MODELS OF THE INTERCONNECTIONS USING BLOCKS AND LINES TO SYMBOLIZE MODULES AND INTERCONNECTIONS :



THIS CONVENTION IS FREELY USED IN THE NOTES.

TYPES OF SIGNALS :

ONLY A FEW TYPES OF SIGNALS ARE ENCOUNTERED IN PATCHING-UP IMAGES, AND THERE IS FREQUENTLY NO RIGID DISTINCTION BETWEEN TYPES : FOR CLARITY HOWEVER THINK OF :

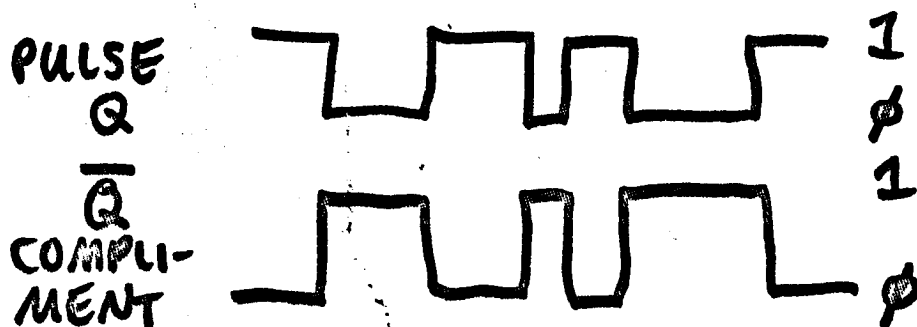
SIGNALS WHICH ACT TO CONTROL OR VARY OTHER SIGNALS :
CONTROL VOLTAGES

SIGNALS WHICH CONSTITUTE IMAGE ELEMENTS, EITHER CONTINUOUS OR DISCRETE,
 SIGNAL

2-3
COPIOUS PATCHING IS ALLOWED BETWEEN MODULES, ALTHOUGH ONE SHOULD BEWARE OF DANGLING PATCH CORDS WHICH CAN SHORT CIRCUIT TO THE FRAME METAL.

PULSES

DISCRETE SIGNALS CAN HAVE ONLY TWO POSSIBLE VALUES; HIGH AND LOW - CALLED 1 AND 0. THE COMPLEMENT OF A PULSE SIGNAL \bar{Q} IS A PULSE SIGNAL WHICH IS ALWAYS IN THE OPPOSITE STATE:



CONTINUOUS

SIGNAL VOLTAGES CAN HAVE ANY VALUE BETWEEN +5 VOLTS AND -5 VOLTS: EXCESSIVE VOLTAGES GREATER THAN 5 VOLTS

IN MAGNITUDE CAN BE FATAL!!



Exercise due caution!

PROCEDURE:
EQUIPMENT FAILURE

IF SOMETHING GOES SERIOUSLY
WRONG PULL OUT MASTER
POWER - DO NOT CHANGE
INSTRUMENT SETTINGS, AS
THEY WILL BE USED TO ASCERTAIN
THE FAILURE.

3. MIXER MODULE

THIS MODULE FORMS CENTER OF CONTROL OF IMAGE ELEMENT AMPLITUDE AND TEXTURE. A GATING PULSE INPUT ALLOWS ONE SIGNAL TO ETCH-OUT OR "KEY" ANOTHER.

THE MIXER MODULE IS ACTUALLY 4 IDENTICAL UNITS, DESIGNATED A, B, C, D.

INPUTS TO THE MODULE ARE SELECTED BY SWITCH POSITIONS.

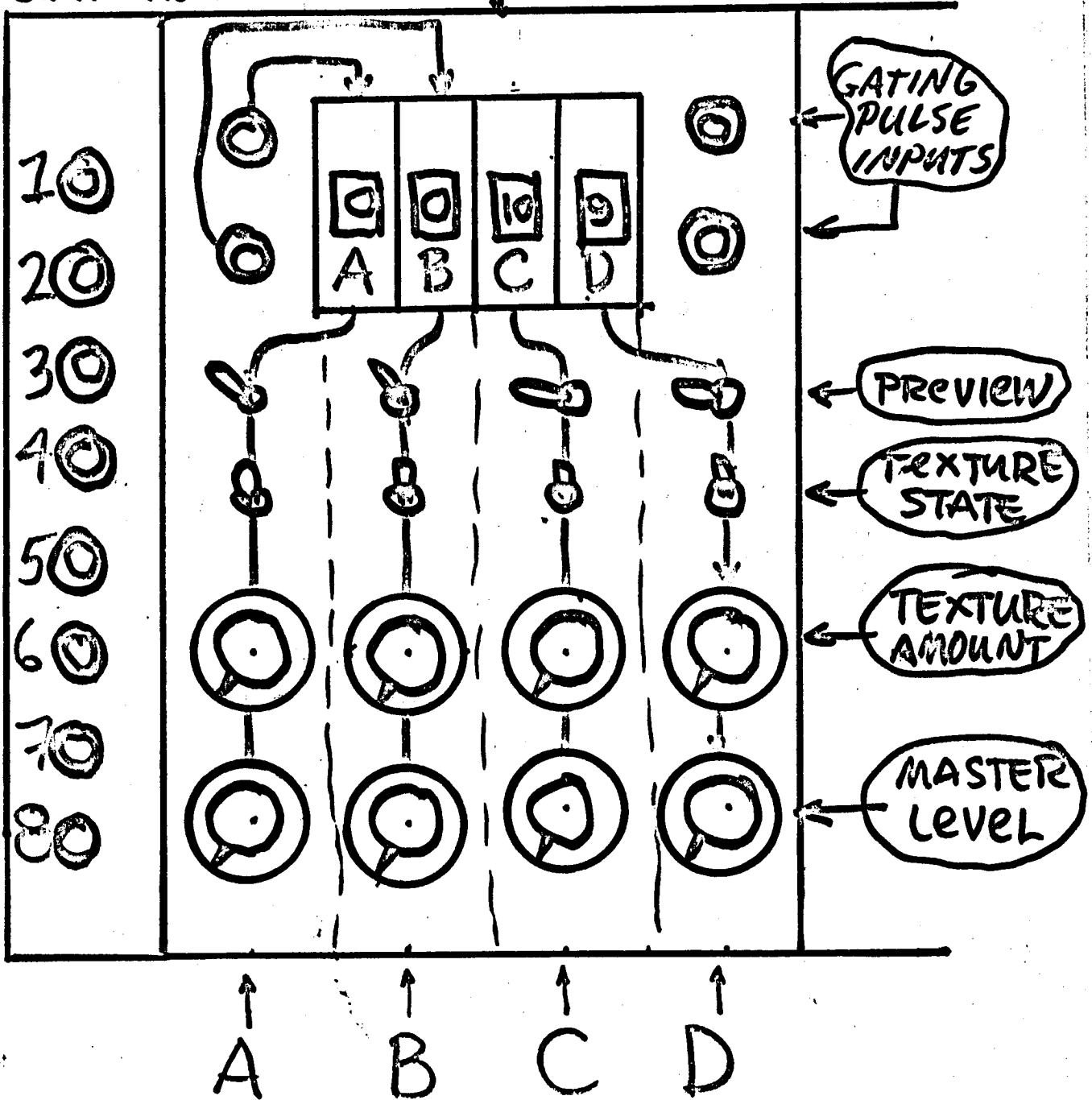
MODULE OUTPUTS FEED DIRECTLY TO THE FOUR COLOR CHORD MODULES, A, B, C, D RESPECTIVELY.

PREVIEW, GATING, ELEMENTARY TEXTURE, AND MASTER LEVEL CONTROL FUNCTIONS ARE PROVIDED IN THIS MODULE.

MIXER MODULE LAYOUT FOUR IDENTICAL UNITS

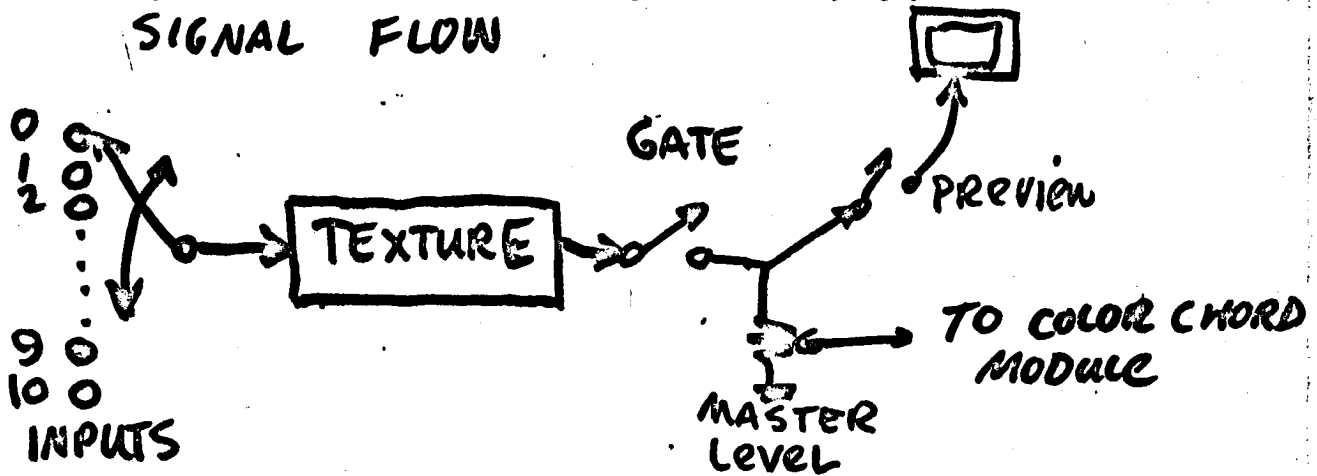
SWITCH
POSITION
CONNECTIONS*

INPUT SWITCH



* SWITCH POSITION #0 IS USED TO OBTAIN A COLOR FIELD;
 #9 AND #10 CONNECT INTERNALLY TO CAMERA MODULE;

MIXER MODULE : DIAGRAM OF SIGNAL FLOW



CONTROL FUNCTIONS

INPUT SWITCH : SELECTS IMAGE SIGNAL, PATCHED INTO 2 → 8, TO BE PROCESSED BY THE ASSOCIATED CHANNEL

PREVIEW : ALLOWS SIGNAL TO BE MONITORED ON BLACK + WHITE PREVIEW

MONITOR : OFF  ON

TEXTURE STATE DETERMINES WHICH OF 3 TEXTURE CONDITIONS CAN BE ESTABLISHED :

- (1) NO SMEARING
- (2) SMEARING HORIZONTALLY
- (3) SMEARING VERTICALLY



TEXTURE AMOUNT



MASTER LEVEL : REGULATES SIGNAL
LEVEL OF TEXTURIZED AND
GATED VIDEO TO COLOR CHORD
MODULES :



GATING PULSE : ALLOWS OUTPUT
TO BE TURNED ON AND OFF
IN ACCORDANCE WITH FOLLOWING
RULE :

$$\text{GATE} = 0 \quad \text{OUTPUT} = [\text{INPUT} + \text{TEXTURE}] \times (\text{LEVEL})$$

$$= 1 \quad \text{OUTPUT} = \text{BLACK}$$

FOR EACH CHANNEL.

SINCE THIS MODULE IS ALWAYS
USED DIRECTLY WITH COLOR CHORD
MODULES PROCEED THERE TO

4. COLOR CHORD MODULE

THESE 4 MODULES ALLOW
COLOR TO BE EFFECTED, EITHER
MANUALLY OR BY CONTROL
VOLTAGES,

IN ADDITION, A NEGATIVE COLOR
FUNCTION ALLOWS INTERACTION
BETWEEN TWO OR MORE IMAGE
LEVELS IN THE FORM OF
COLOR ETCHING:

TO SET UP THIS MODULE,

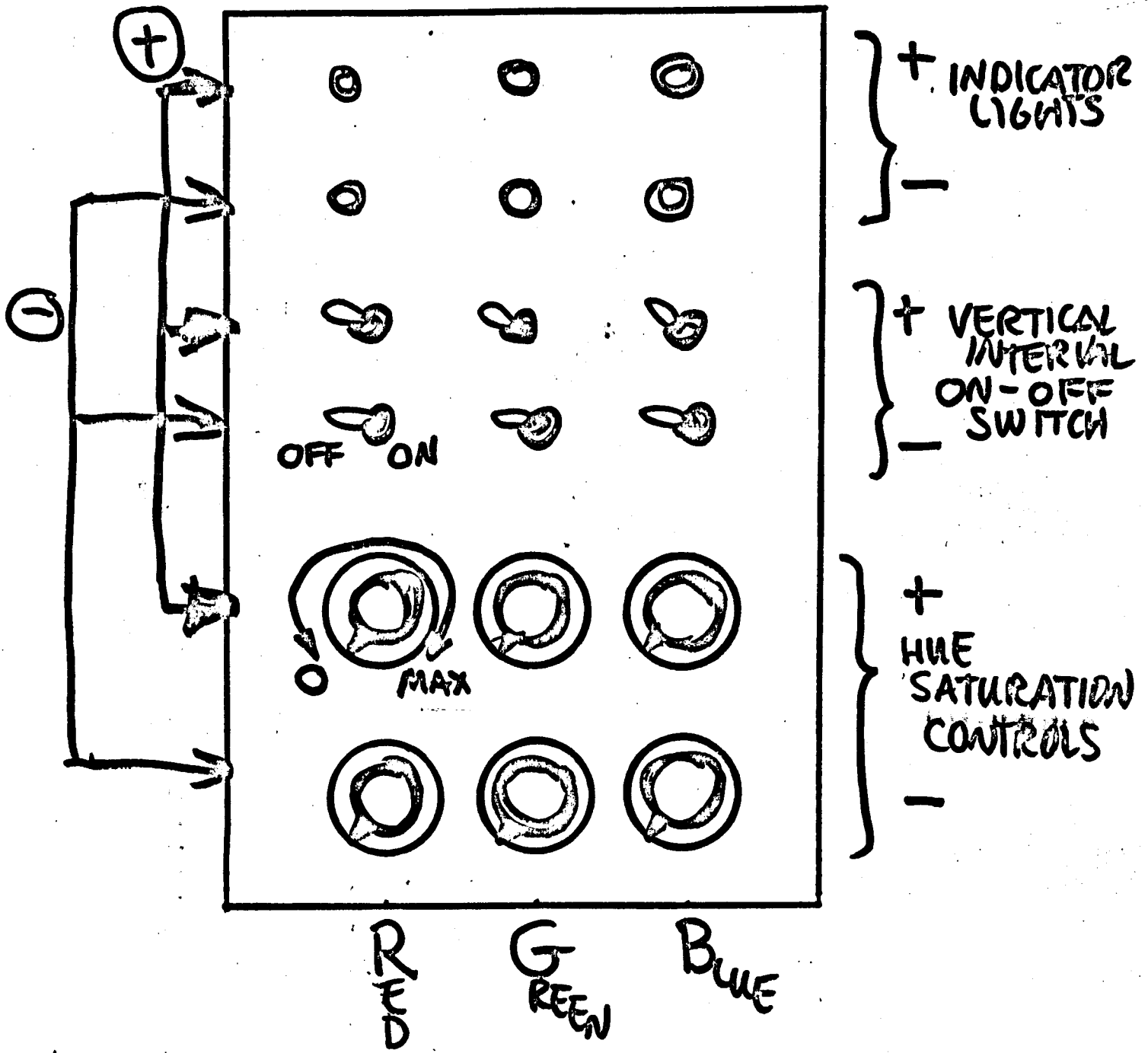
(1) SET ALL SATURATION
CONTROLS TO ZERO

(2) ASCERTAIN STATE
OF ON-OFF SWITCH

WHEN USING ONLY ONE
COLOR, NEGATIVE COLOR
MUST NOT BE USED *

* A COMPLETE TREATMENT
OF COLOR IS CONTAINED
IN A LATER SECTION


COLOR CHORD MODULE LAYOUT



4.3

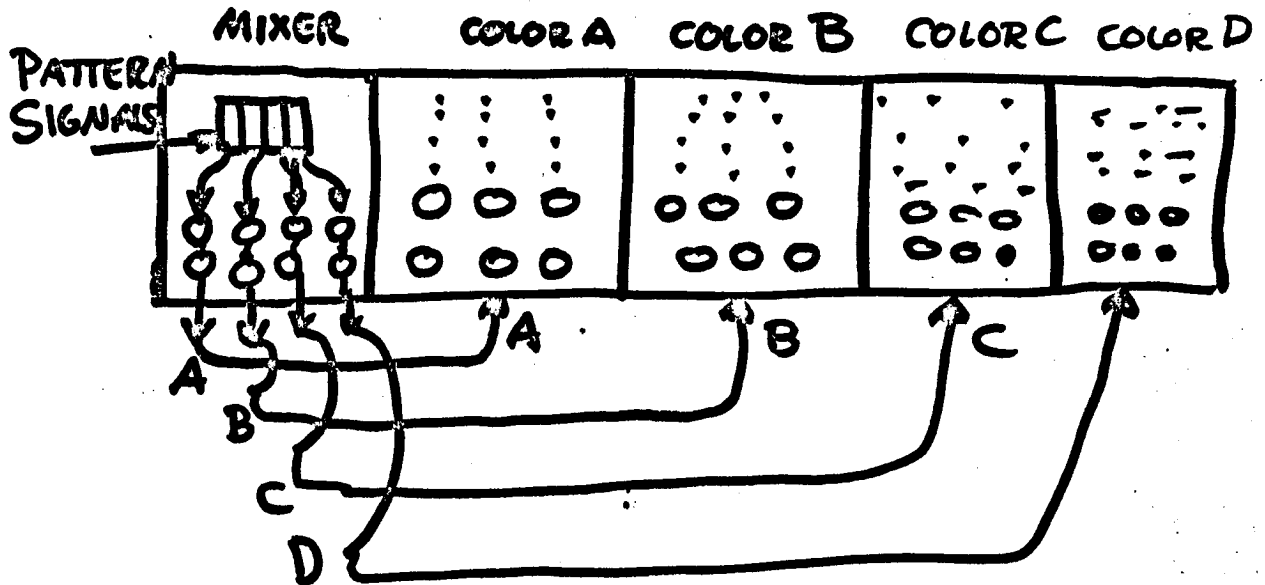
USE OF COLOR MODULES
WITH MIXER MODULE TO
ACHIEVE COLOR FIELDS.

AN EXERCISE TO BE PER-
FORMED WITH EACH CHANNEL
A, B, C, D.

- (1) DIAL UP COLOR FIELD
ON INPUT SWITCH (#0).
- (2) KEEP TEXTURE OFF and MIN;
- (3) TURN MASTER LEVEL UP
 $\frac{1}{2}$
- (4) USE (+) SATURATION CONTROLS
OF ASSOCIATED COLOR CHORD
MODULE; OBTAIN HUES,
- (5) MIX WHITE ON ONE CHANN
- (6) USE A SECOND COLOR CHORD
CHANNEL  (-) SATURATION
CONTROLS TO GO OUT OF
WHITE TO BLACK

4-4

THE SIGNAL FLOW FROM THE SIGNAL INPUT SWITCH-ON IS GRAPHICALLY:



THE COLOR CHORD MODULES FEED DIRECTLY INTO THE SYSTEM ENCODER SO THERE IS NO CONCERN ABOUT PATCHING THEM.

DUE WORDS OF CAUTION WHEN RECORDING DIRECT VIDEO COLOR: BEWARE O.D. (OVER-DRIVE).

NOW LET US LOOK AT SOURCES OF SIGNALS

EL

5. DUAL CAMERA PROCESSOR AND ANALOG SIGNAL AMPLIFIER MODULE.

THIS MODULE CONTAINS TWO IDENTICAL UNITS - IT ALLOWS CONTROL OVER BRIGHTNESS AMPLITUDE AND CONTRAST RANGE OF BLACK + WHITE CAMERA INPUTS .

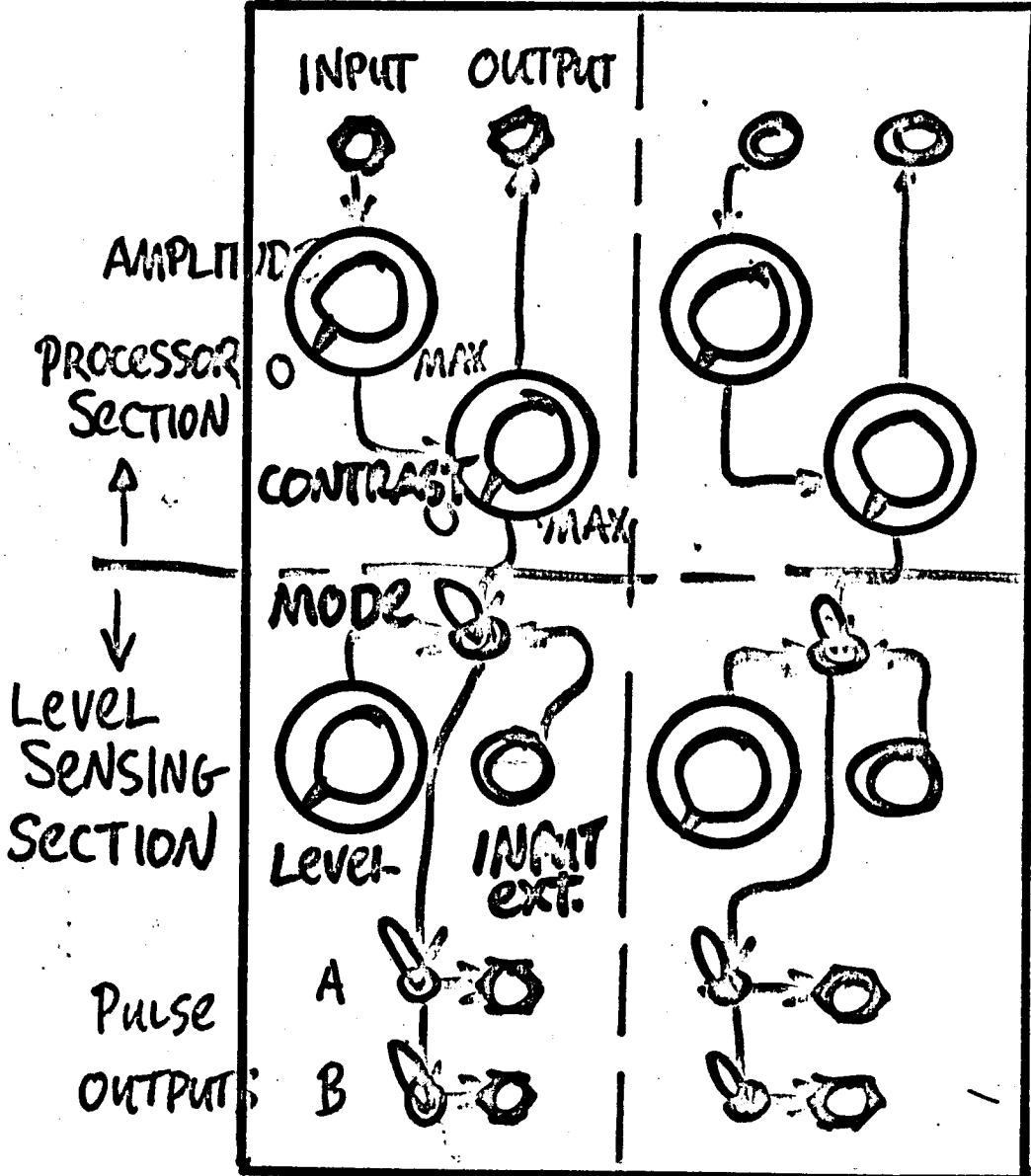
IN ADDITION, A LEVEL SENSING CONTROL PROVIDES A PULSE OUTPUT WHICH INDICATES IF THE PROCESSED INPUT SIGNAL IS ABOVE OR BELOW A CERTAIN THRESHOLD.

MAY BE USED WITH OTHER ANALOG INPUTS (AUDIO SIGNALS, FOR EXAMPLE) TO PUT THEM AT A SIGNAL LEVEL USEABLE BY THE DIRECT VIDEO INSTRUMENT

CAMERA PROC. MODULE LAYOUT

1

2



EL
PD
S
C
A
S
S
DE
TR
IN
IN
SI
T
E

INPUTS

INPUTS COME FROM
REAR OR FRONT:

REAR CAM PROC 2 INPUT
IS #2

CAMP PROC 1 INPUT
IS #1, ALSO FROM
GENLOCK LINE TO "BLUE"
DOT UHF INPUT.

DO NOT USE #1 AND
"BLUE" SIMULTANEOUSLY

FRONT JACK OVERRIDES
REAR INPUTS; CAN ACCEPT
SIGNALS FROM BUCHLA
ELECTRONIC MUSIC SYSTEM

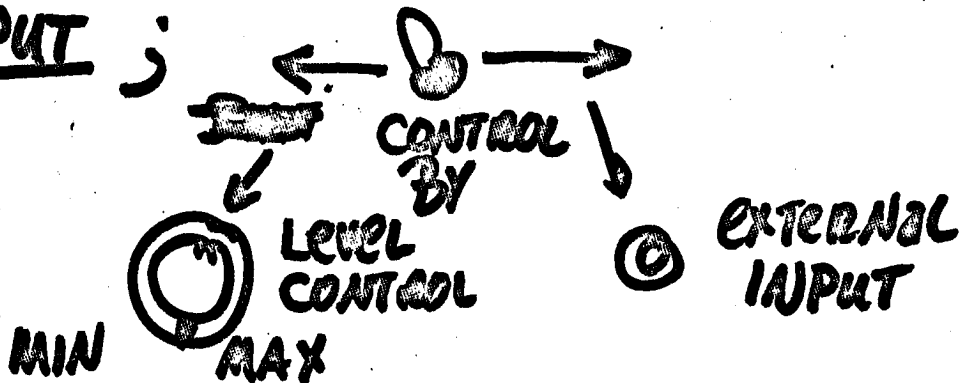
OUTPUTS

PROC 1 → SWITCH #9

PROC 2 → SWITCH #10

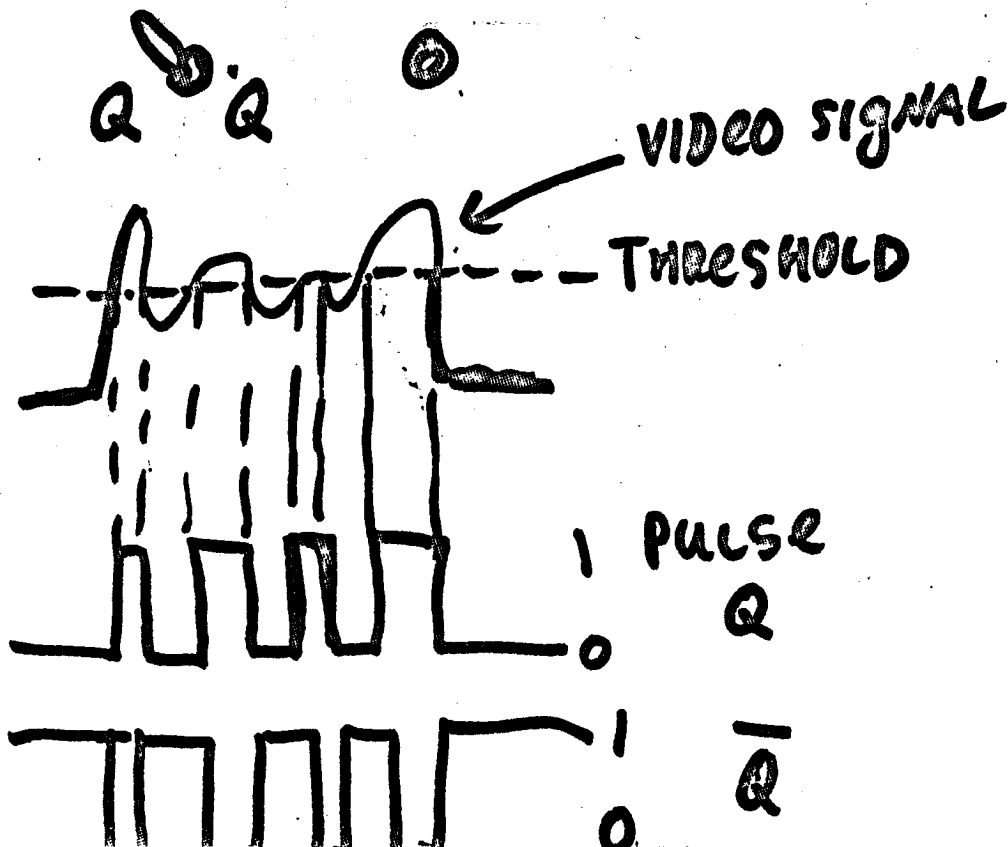
ALSO FRONT PANEL JACK

MODE DETERMINES LEVEL SET
 EITHER BY CONTROL OR EXTERNAL
INPUT ;



LEVEL CONTROL SETS THRESHOLD
 LEVEL.

PULSE OUTPUTS COMPLEMENTARY
 PULSE OUTPUTS AS THIS :



6-1

6- OUTLINE GENERATOR

THIS MODULE ACCEPTS PULSE
SIGNALS INPUTS AND PRODUCES

NARROW PULSES (OF VARIABLE
WIDTH) WHEN THE INPUT
CHANGES ITS LEVEL FROM
0 → 1 OR 1 → 0 OR BOTH.

