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I put a lot of time into producing these files which is why you are met with this page when you open the file.

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It is my hope that you find the file of use to you personally – I know that I would have liked to have found some of these files years ago – they would have saved me a lot of time !

Colin Hinson
In the village of Blunham, Bedfordshire.

DISPLAY UNIT TYPE 5.

GENERAL DESCRIPTION.

D.U.5 is a universal display unit which is the culmination of all other ground radar (search)displays.Circuits are arranged for operation with :-

C.H.L. G.C.I. A.M.E.S. Type 11, Type 13, Type 14,without addition of further units.

This universal application is made possible by the use of a monitor receivor,located close to the aerial system,normally in the aerial vehicle cabin.The monitor receivor receives signals at the particular radar transmitter frequency,and converts them to an I.F. of 45 Mc/s,irrespective of the transmitter frequency.This 45 Mc/s output is then fed through co-axial cable to the D.U.5.

BASIC CONSOLES.

Displays consist of :-

(1) Signal channel with detector,video amplifiers,signal limiters,anti-jamming circuits.Signals fed to C.R.T. grid or "Y" plates to give either "brilliance" or "amplitude" modulation.

(2) Synchronising circuits,brilliance,time-base,and calibration circuits.

(3) Power units.

SALIENT FEATURES.

Designed for convoy use as well as fixed stations.
All units accessible from the front.(Vehicle space limited).
Temperature control and air conditioning.
Easy meter and 'scope facilities.
Main valves limited to three types.
Power supplies stabilised and regulated.
Servicing made easy by facility that all units can be withdrawn with power on.

APPLICATION OF D.U.5.

Most important one is the Type 21 Convoy.This consists of :-

(1) Transmitter Type 13.(T.R.3561 or N.T.277).
This transmitter feeds into a vertical "cheese" aerial,which "nods" through an angle of 26 degrees.The returning echoes are displayed on Console 15 from which the operator reads height and range.

(2) Transmitter Type 14.(T.R.3561 or N.T.277).
A similar transmitter to one mentioned above but feeding into a horizontal "cheese" aerial,capable of being rotated through 360 degrees.
Returning echoes displayed as a P.P.I. on Console Type 16.

(3) Operations Vehicle.
Usually houses two Consoles Type 16 and one Type 15,
One Console Type 16 together with the Type 15,used to provide complete "raid" reporting information.(i.e. range,bearing and height).
The other Type 16 is used to report all signals displayed to a main control centre.
The Type 14 transmitter with its aerial rotates continuously.
The Type 13 transmitter is rotated as required to point in the direction of the target.The aerial is kept "nodding" continuously at a speed of 6 times per minute.

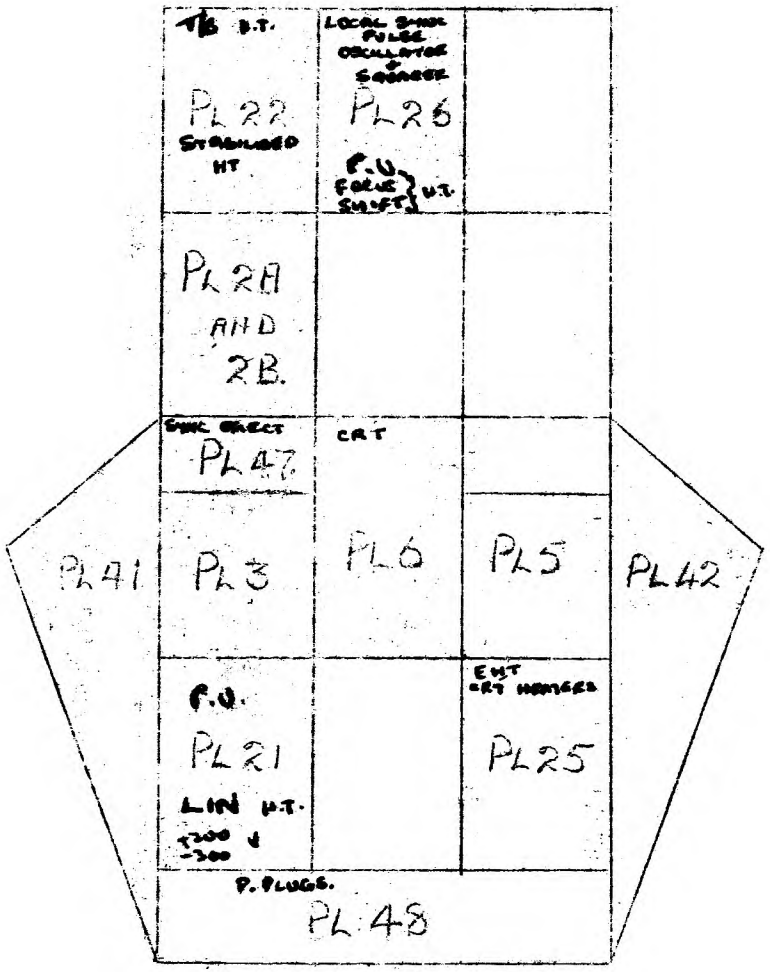
D.U. 5

NOTES

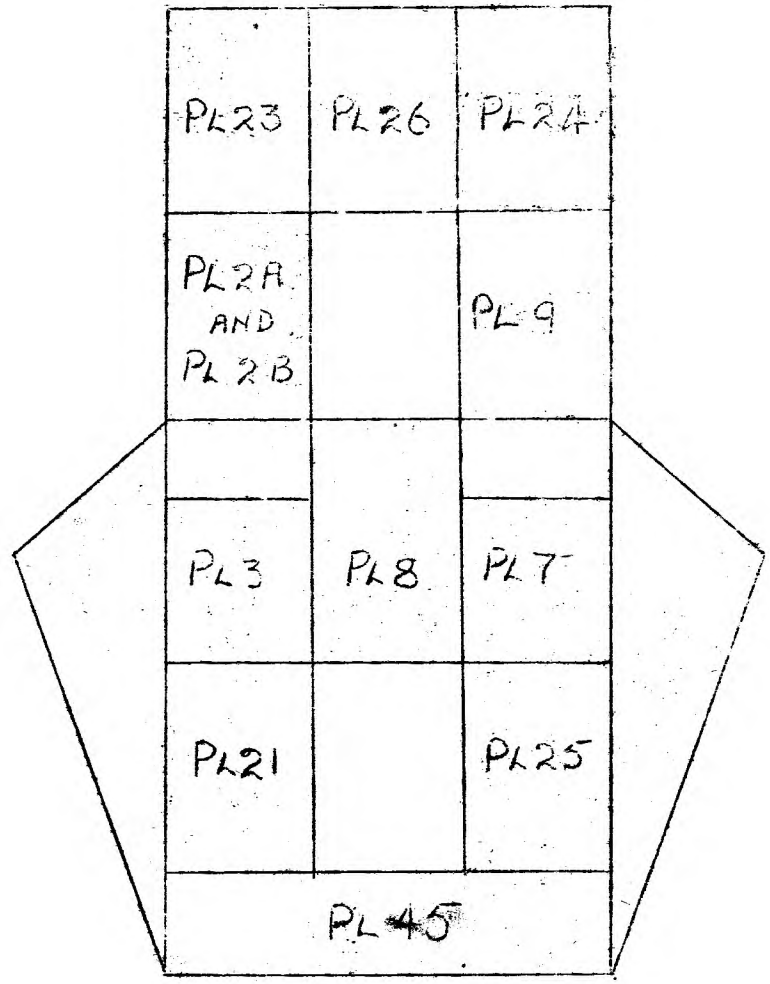
585573 S/A ARNOLD.J.
CLASS 68A.

2/

PANEL LAY-OUT CONSOLE 15 AND 16

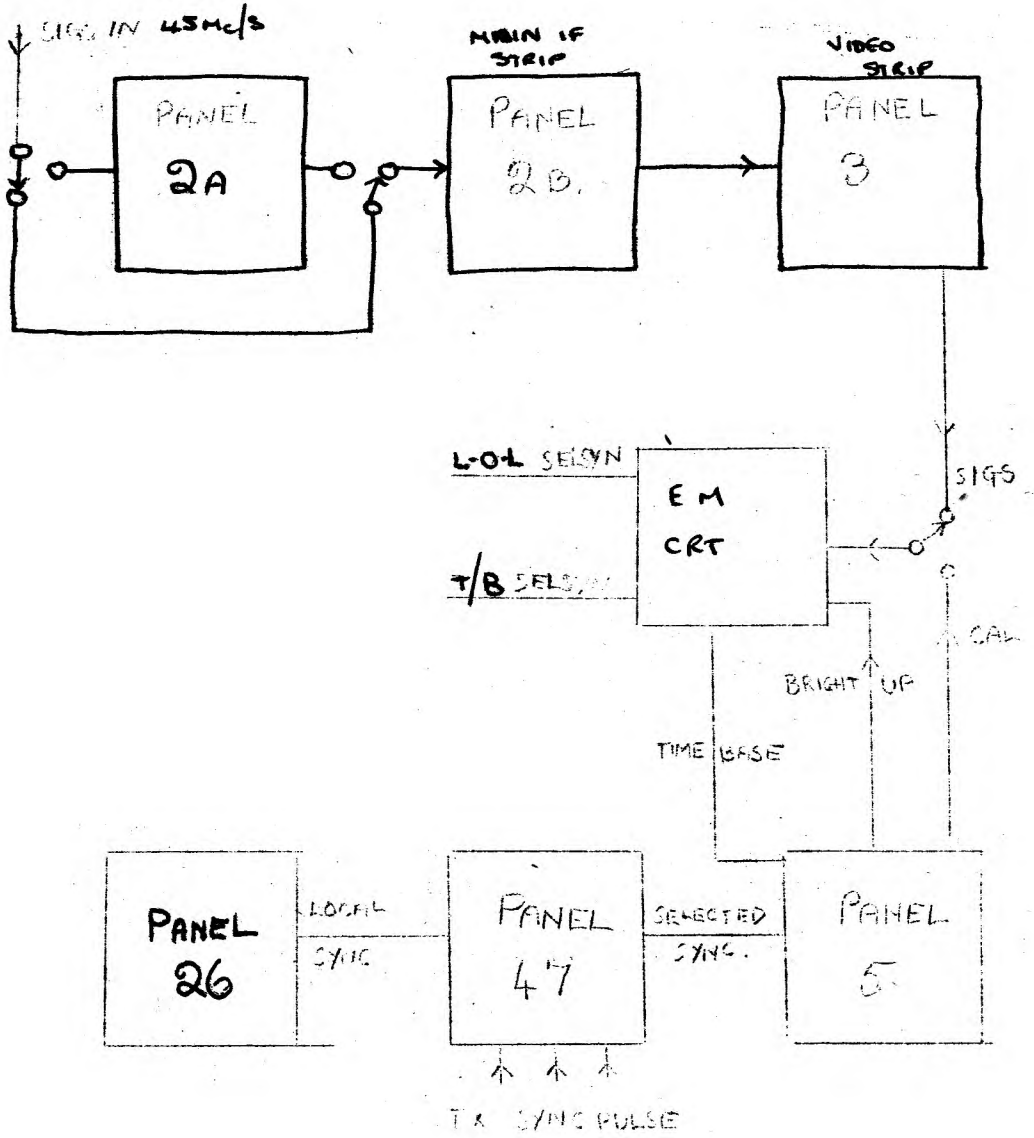


CONSOLE 16

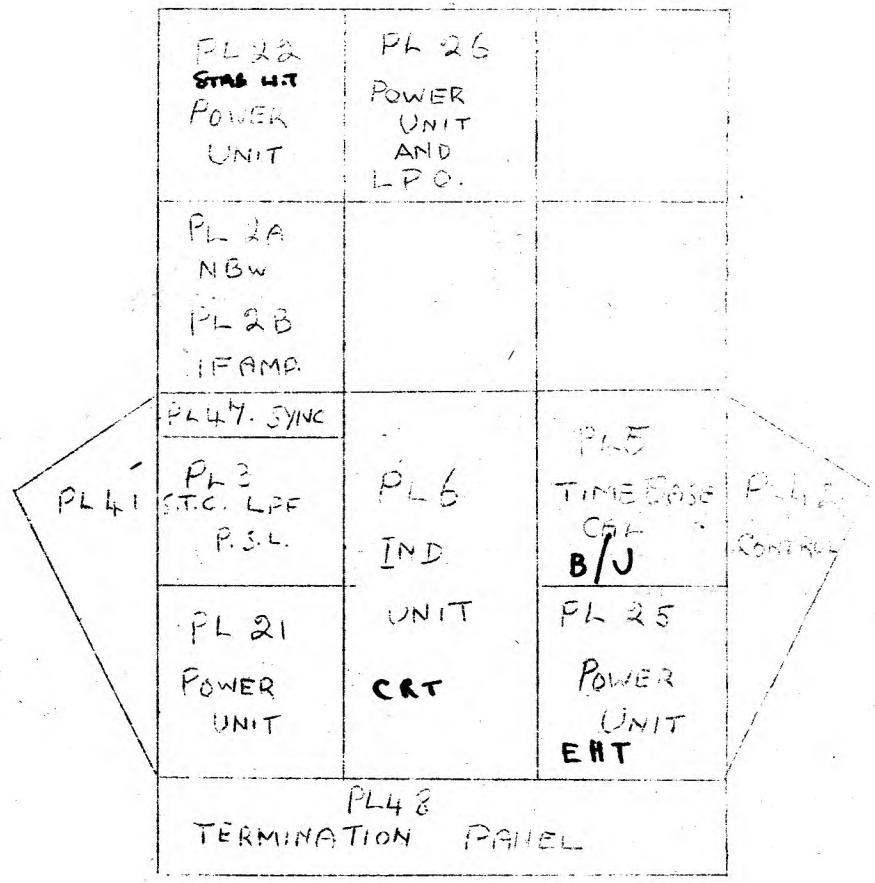


CONSOLE 15

CONSOLE TYPE 16.

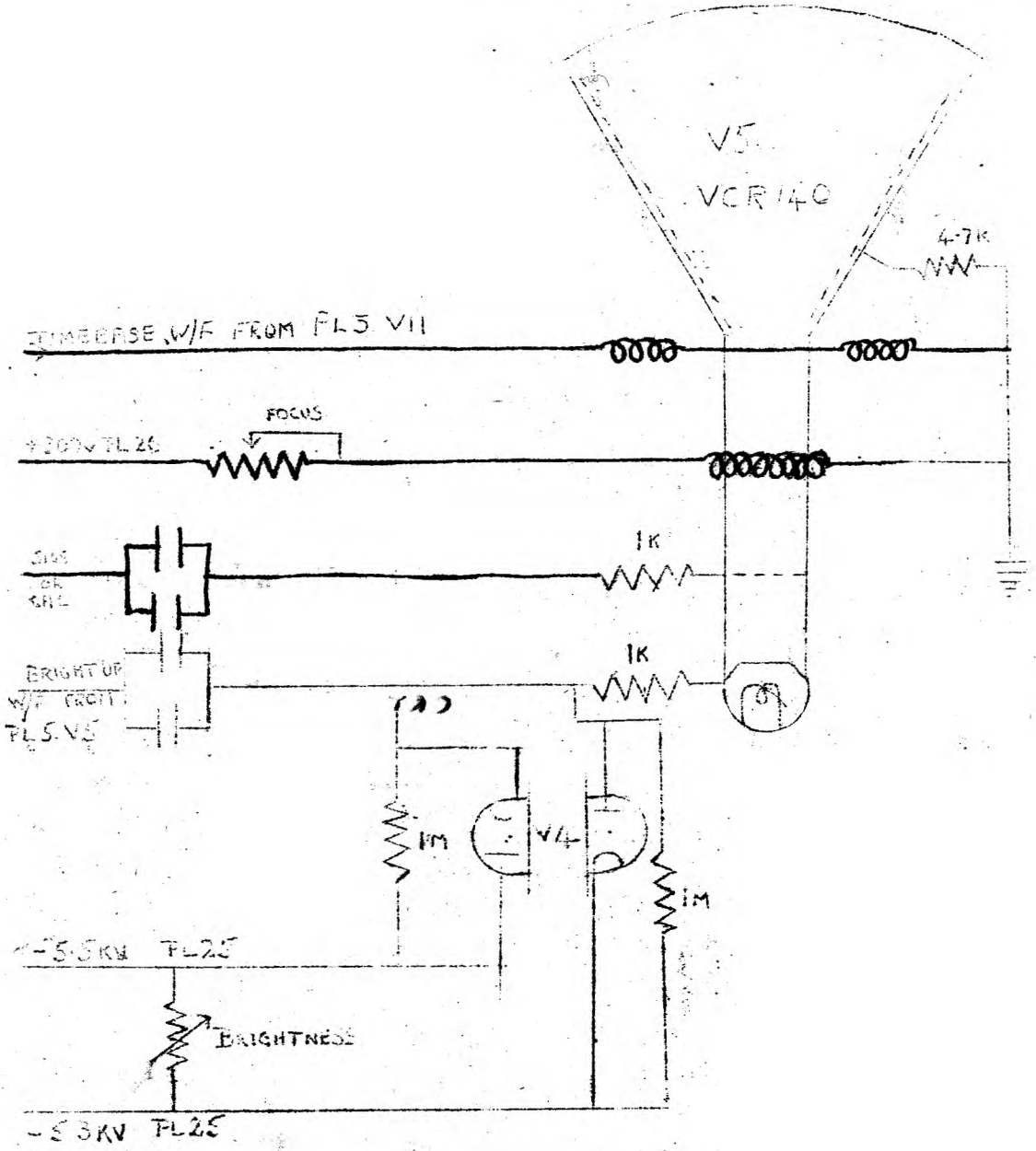


BLOCK DIAGRAM.

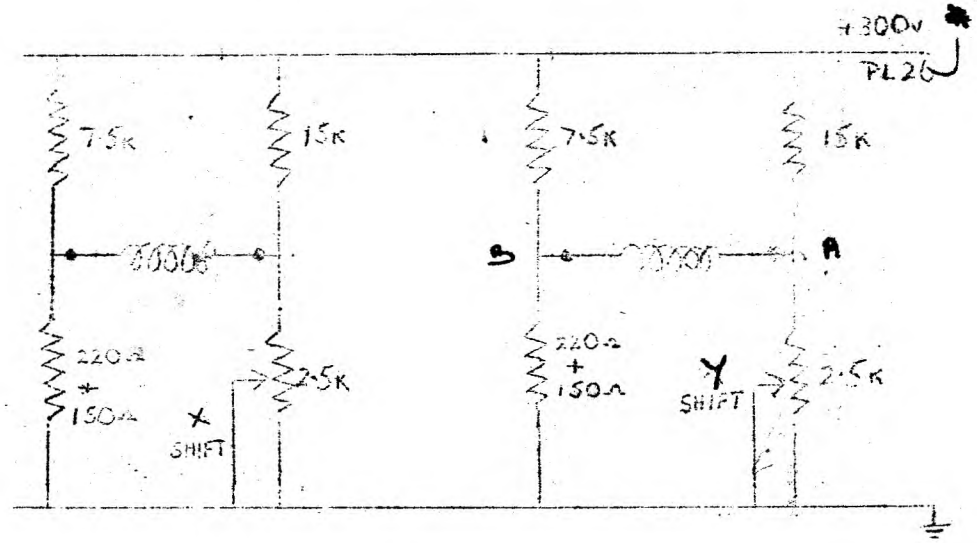


DU5

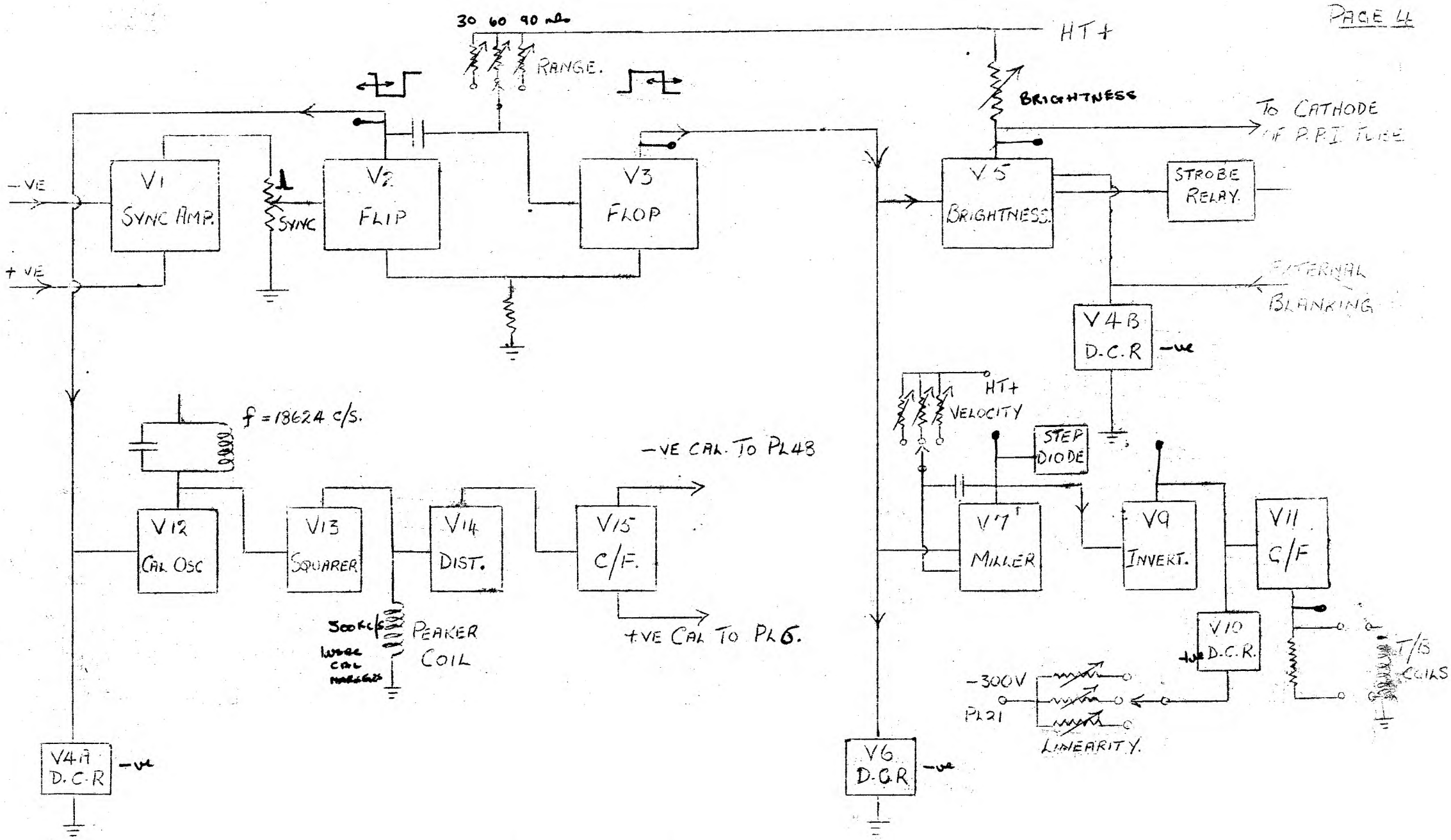
THE C.R.T. CIRCUIT SHOWING VOLTAGES, INPUTS, FOCUS AND SHIFT



THE SHIFT NETWORK

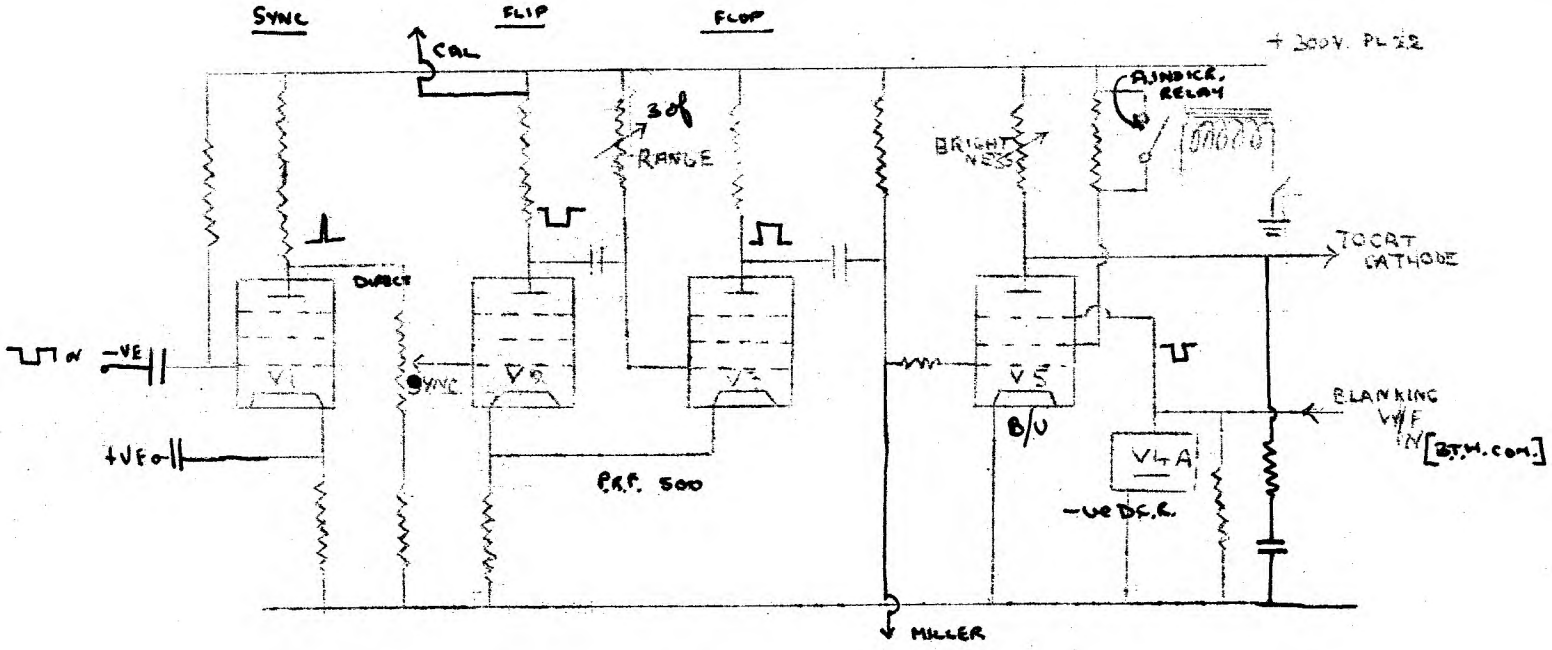


Shift is obtained by varying the P.D. across the shift coils, and hence the current through them. It gives approx. 4 - 5 cms off centre in one direction and 1 cm in the other.
If it is impossible to centre the spot, current through the coils may be reversed by reversing coil connections. This is done by altering the links at the back of the tuning mechanism.

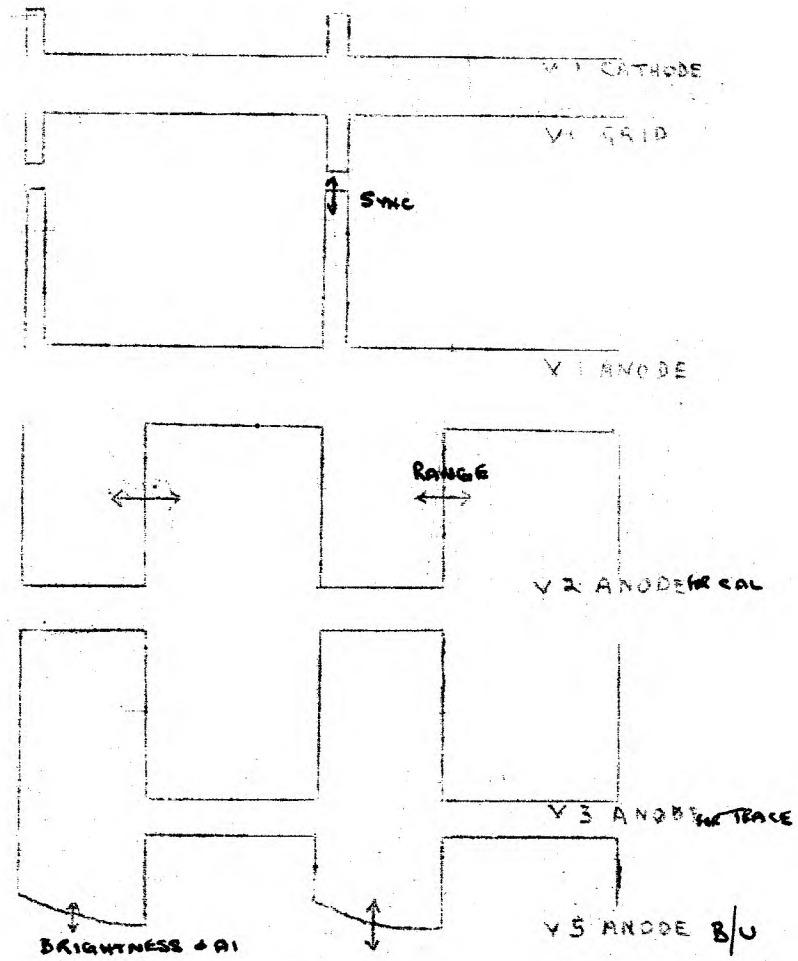


BLOCK SCHEMATIC — PL6.

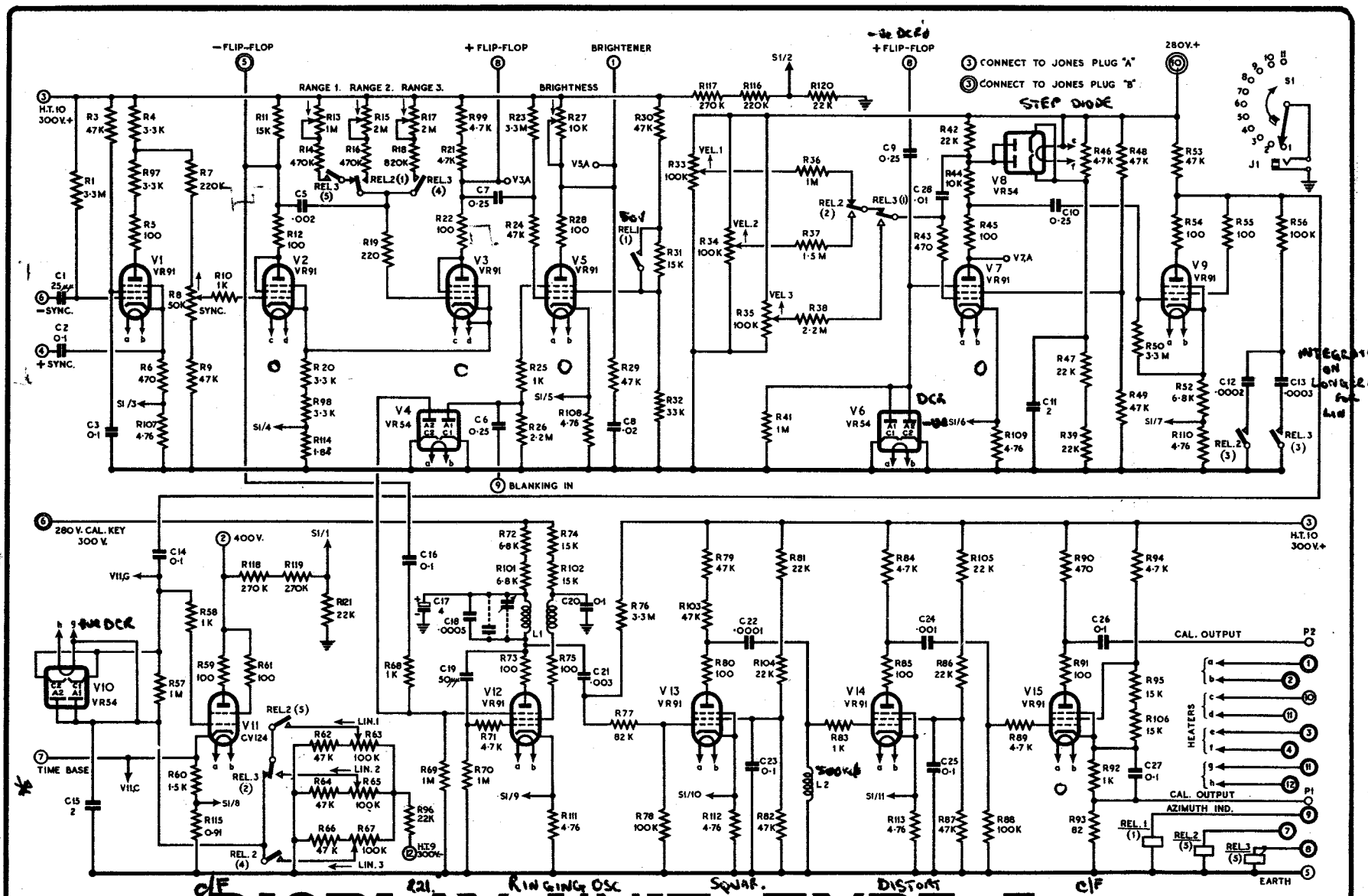
PL5 SYNC AND BRIGHTNESS SECTIONS



Sync input by Pye plug to P148 or from L.P.O. in P1 26.
Sync selector switch on P147 selects one of four :-
(1) L.P.O.
(2) Type 11 -ve sync.
(3) Type 13 +ve sync.
(4) Type 14 +ve sync.
The amplitude of sync inputs vary so the sync control is necessary to standardise flip-flop triggering.
V1 The Sync Valve. enables the time-base to lock on either +ve or -ve incoming triggering pulse. The sync control is adjusted so that V1 output is just sufficient to cut V2 on.
V2&3 Flip-Flop width of square wave adjustable by "Range" control which varies the leakaway time of the charge on the copling condenser.
V4 -ve D.C.R. for blanking pulse from turning gear to V5 suppressor grid.



V5 Brightness Input from V3.
Output from the anode of V5(-ve square wave) is fed to the cathode of the C.R.T. for bright-up during forward trace and black-out during flyback time.
The distotion of square wave due to C.R. from V5 anode to earth ensures trace is same brilliance along its length.



DISPLAY UNIT TYPE 5

Time Base Unit Type 38

R.T.P.

C.B.H. 16971

FOR FURTHER INFORMATION SEE A.P. 2897 A

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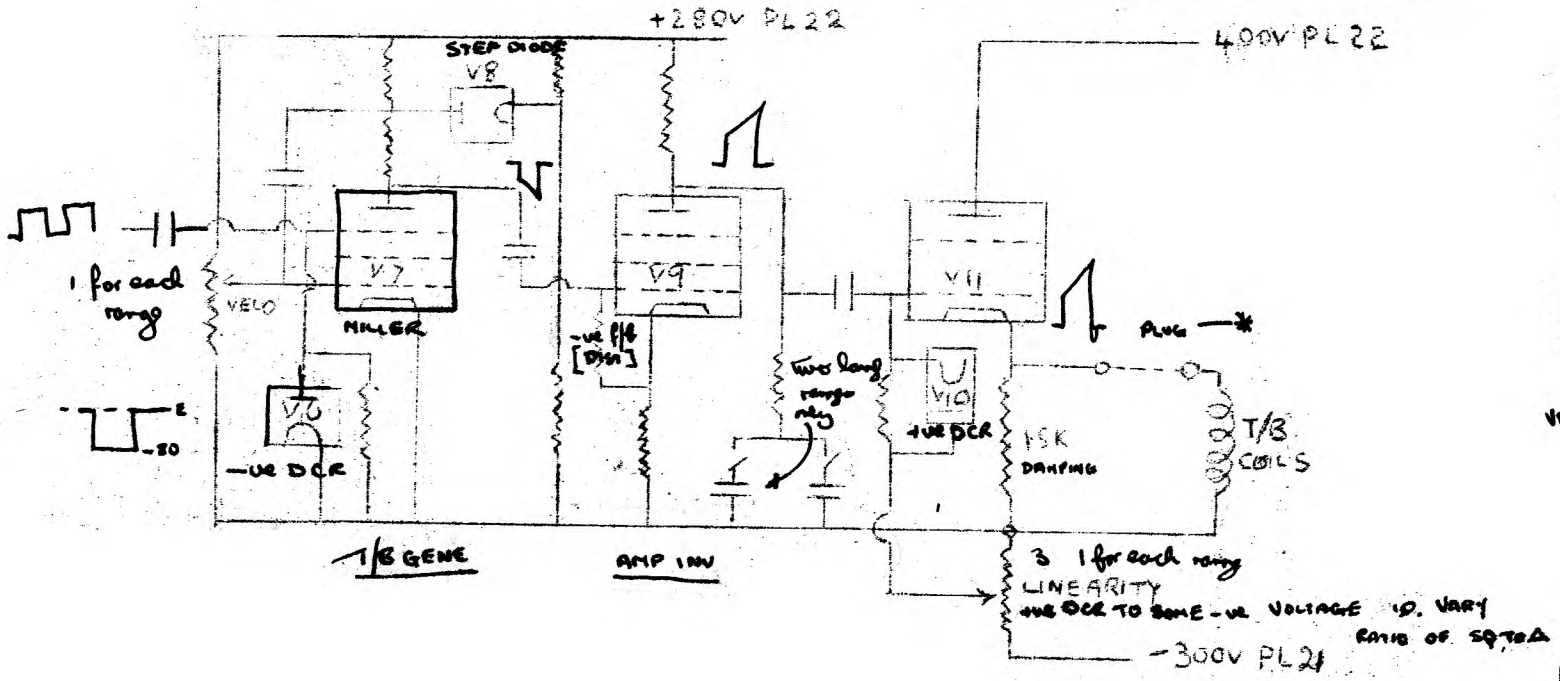
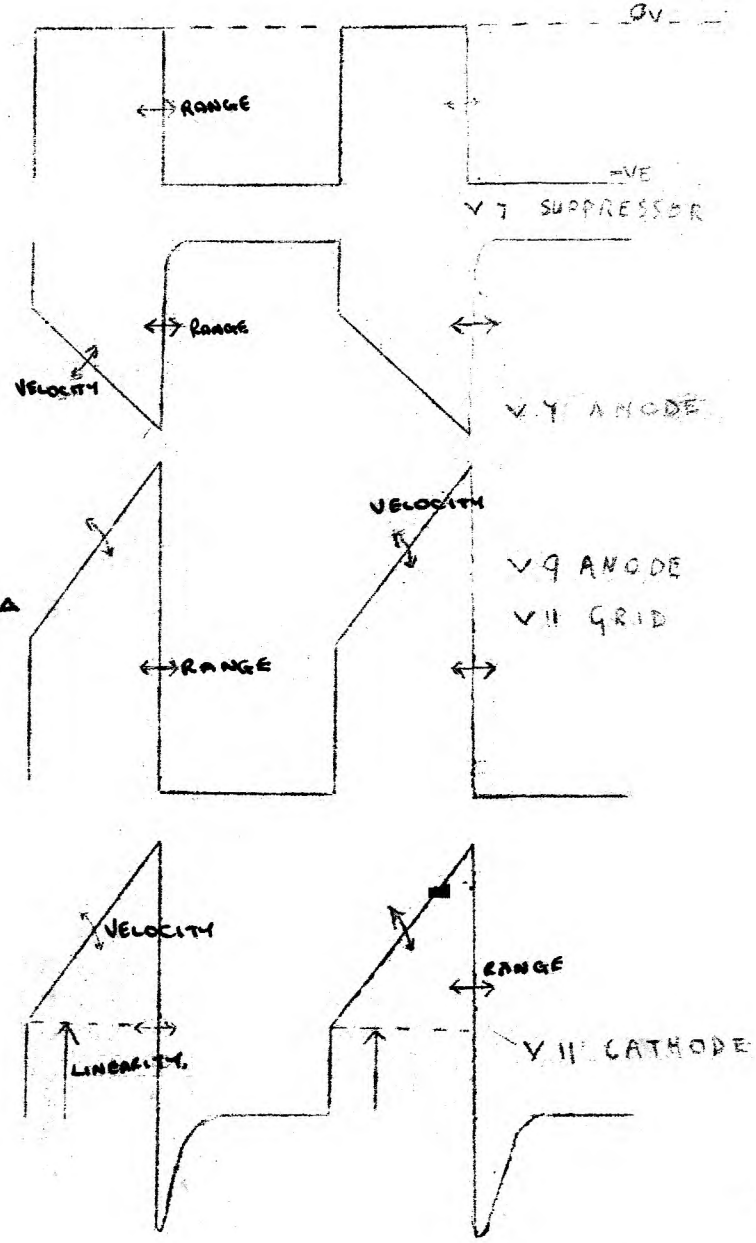
DU 5

PL 5 TIME BASE SECTION





V6 -ve DCR (CV1054 - Anodes strapped). DC restores to earth, the square wave output from flop (V3) which is applied to suppressor grid of V7 (miller valve).

V7 Miller. The time-base valve. Velocity control varies the leak away time of the Miller condenser, thus varying the slope of the output W/F.

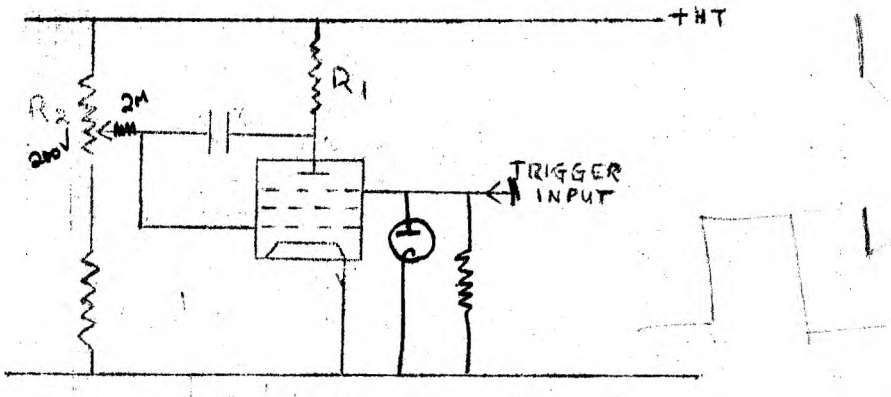
V8 STEP DIODE. Increases the step in the Miller W/F, producing a pedestal W/F.

V9 Inverter. Amplifies and inverts the output from V7. To reduce distortion a large percentage of negative feed-back is employed. On ranges 2 & 3, integrating circuits are switched in across the output of V9, which have the effect of altering the shape of the output W/F to improve the linearity on these ranges.

V10 +ve DCR. Positively DC restores the pedestal W/F from V9 anode, to -300V.

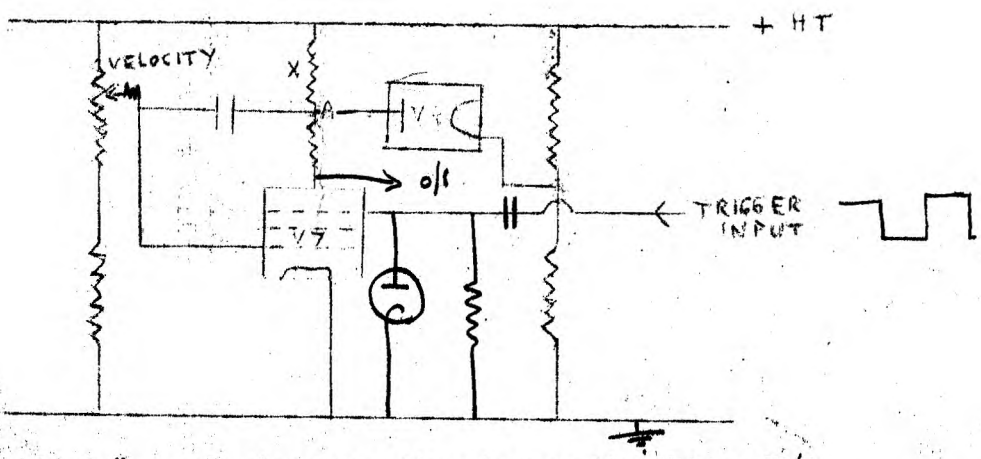
V11 Time-base output Cathode Follower. Used to match into time-base coils. The time-base coils form the cathode load of the valve.

THE BASIC MILLER.



Before the action commences Ia is cut-off at the suppressor.Screen current is flowing. Control grid held at zero potential by grid current.Condenser C is charged to 300V. Suppressor grid bias is removed and suppressor potential rises to cathode potential. Ia flows,Va falls carrying grid down with it.
When Vg approaches cut-off this rapid fall is checked.Ig has ceased and C now discharges through R2,the valve and R1.As C discharges bringing Vg up,the Ia is increasing so that Va is falling at the same time.This makes the discharge of C almost linear and therefore Va falls linearly.When the suppressor bias is re-applied,C assumes its original charge . (Charged by Ig).

STEP DIODE



Purpose of "Step Diode" - To increase the step on the Miller W/F.
Action. In the static condition,Ia of V7 is cut-off at the suppressor.V8 cathode is held at 250V positive,by a bleeder network across HT so that V8 anode is positive to its cathode.Current flows through resistor X.
When V7 is cut on Va falls,voltage at A falls tending to cut off V8,but as diode I thro' X is decreasing V7 anode current can increase by the same amount,without any appreciable change of potential at A.Since grid of V7 is connected to A,no change of potential has taken place at V7G,although V7A will have fallen considerably,producing a large step. Eventually V8 will cease to conduct and potential at A will fall by a further amount equal to grid base of V7,increasing step still further befor the Miller run-down occurs.

D.U.5

ACTION OF LINEARITY

DIAGRAM A

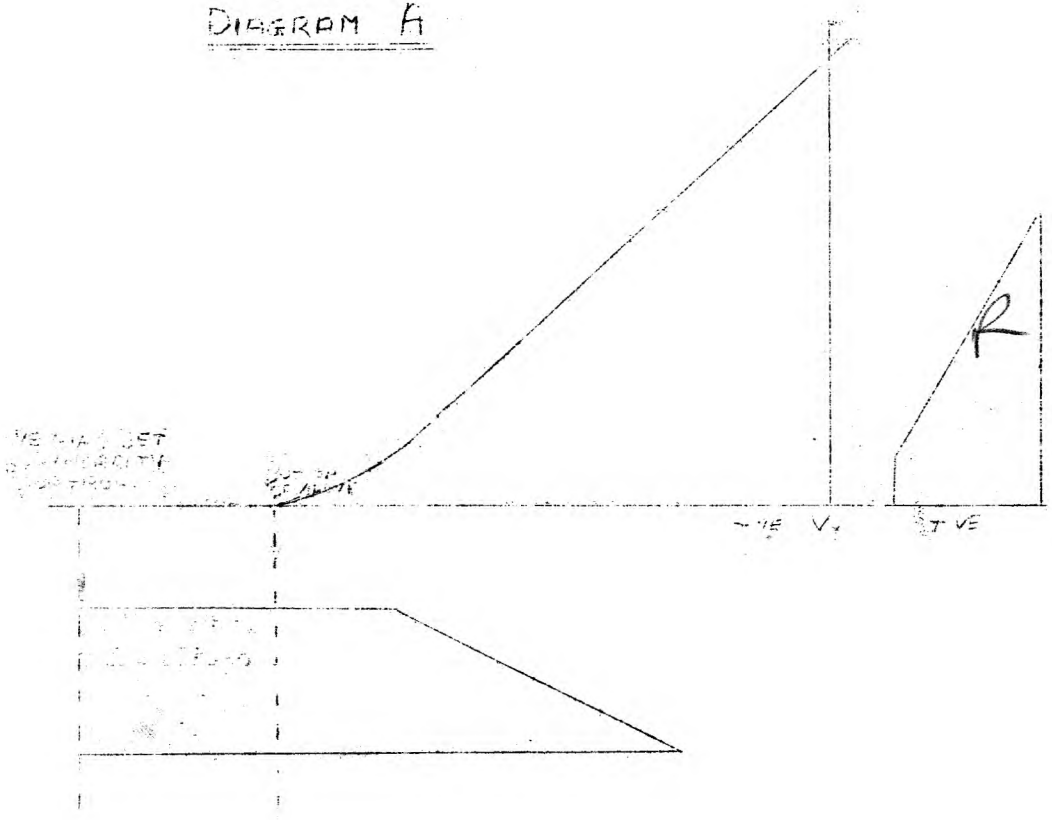
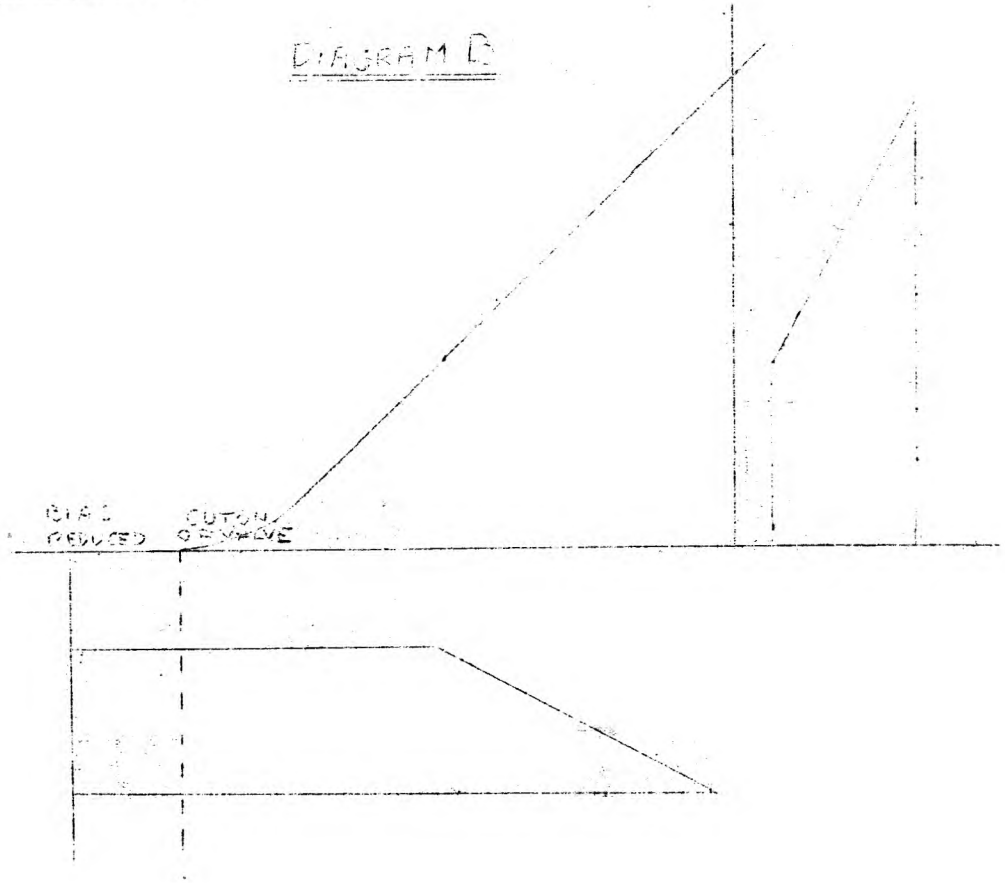


DIAGRAM B



In diagram A position is that V11 is biassed well beyond cut-off, the value of the standing bias applied being dependent upon the setting of the Linearity Control. The potential across the control (-300V) is obtained from Pl21.
The output from V9 is positively D.C. restored from the bias level by V10 and is large enough to overcome the bias. But only a portion of the square wave component of the input W/F is reproduced at the cathode of V11.

With bias reduced, it can be seen from Diagram B that the ratio of square wave to saw-tooth reproduced at V11 cathode has increased.
Therefore it can be seen, that by altering the Linearity Control (i.e. varying the bias to V11) the ratio of square wave to saw-tooth is varied in the pedestal wave-form produced at the cathode of V11.

CALIBRATION CIRCUIT PL 5

OSCILLATOR V 12

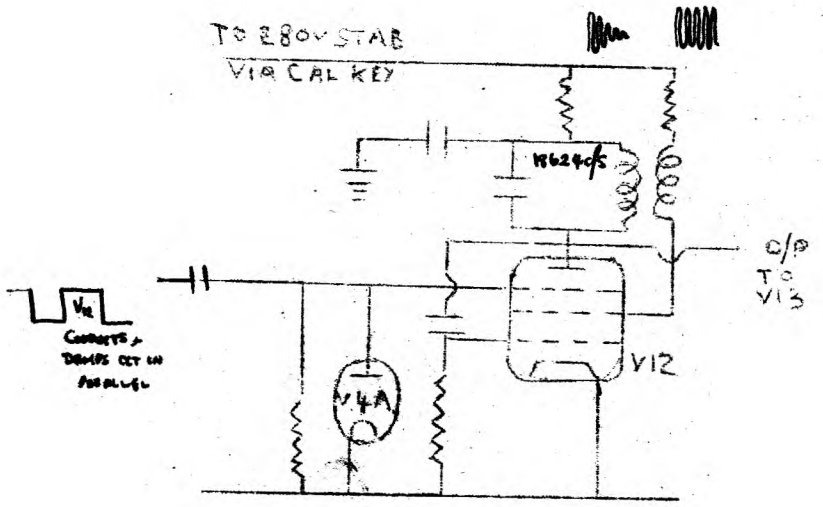


FIG 1.

ACTION The -ve square wave from the flip (V2) is applied to the suppressor of V12. It is D.C. restored negatively, so that the Ia of V12 is cut-off for the duration of the trace and cut-on during the period of flyback. During the fly-back period he circuit is not oscillating since feedback is in the wrong phase.

When the -ve square wave cuts off Ia the circuit is effectively as shown in Figs. 2 & 3. Is suddenly increases, Ia collapses. Tuned cct. in the anode commences to oscillate at 18624 c/s. The screen now acts as the anode, the coil in the screen cct. providing feedback in the correct phase to maintain oscillations.

When Ia is cut on, the rising current causes the phase of feed-back to be reversed, which quickly damps out the oscillations.

FIG 2.

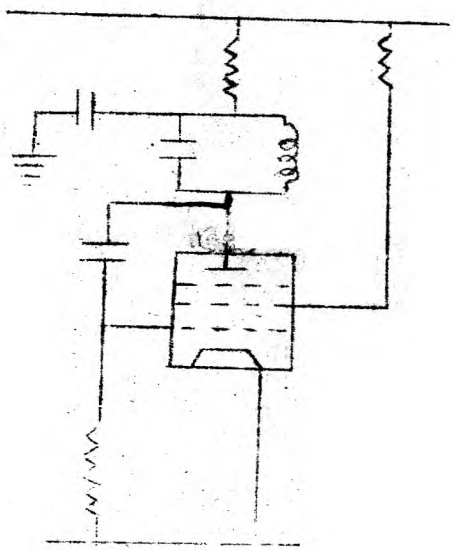
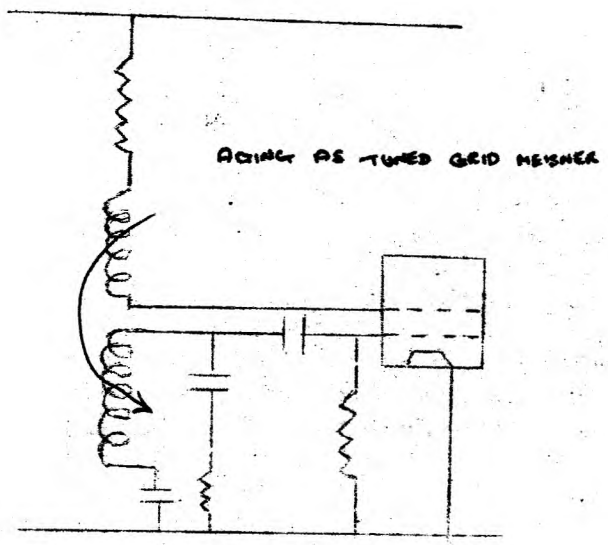
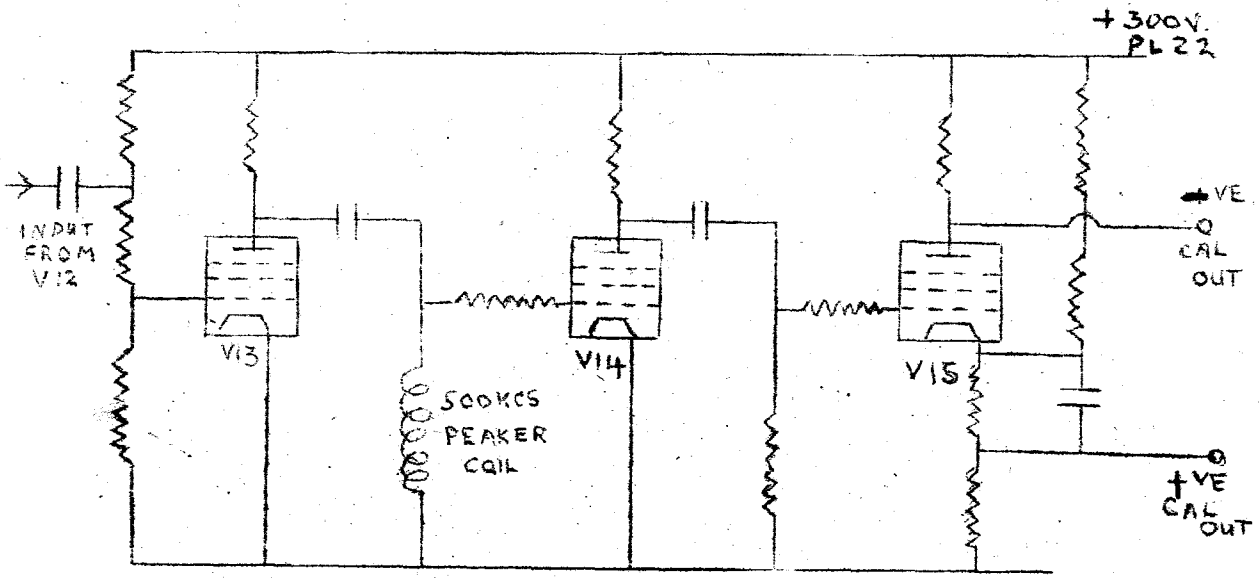
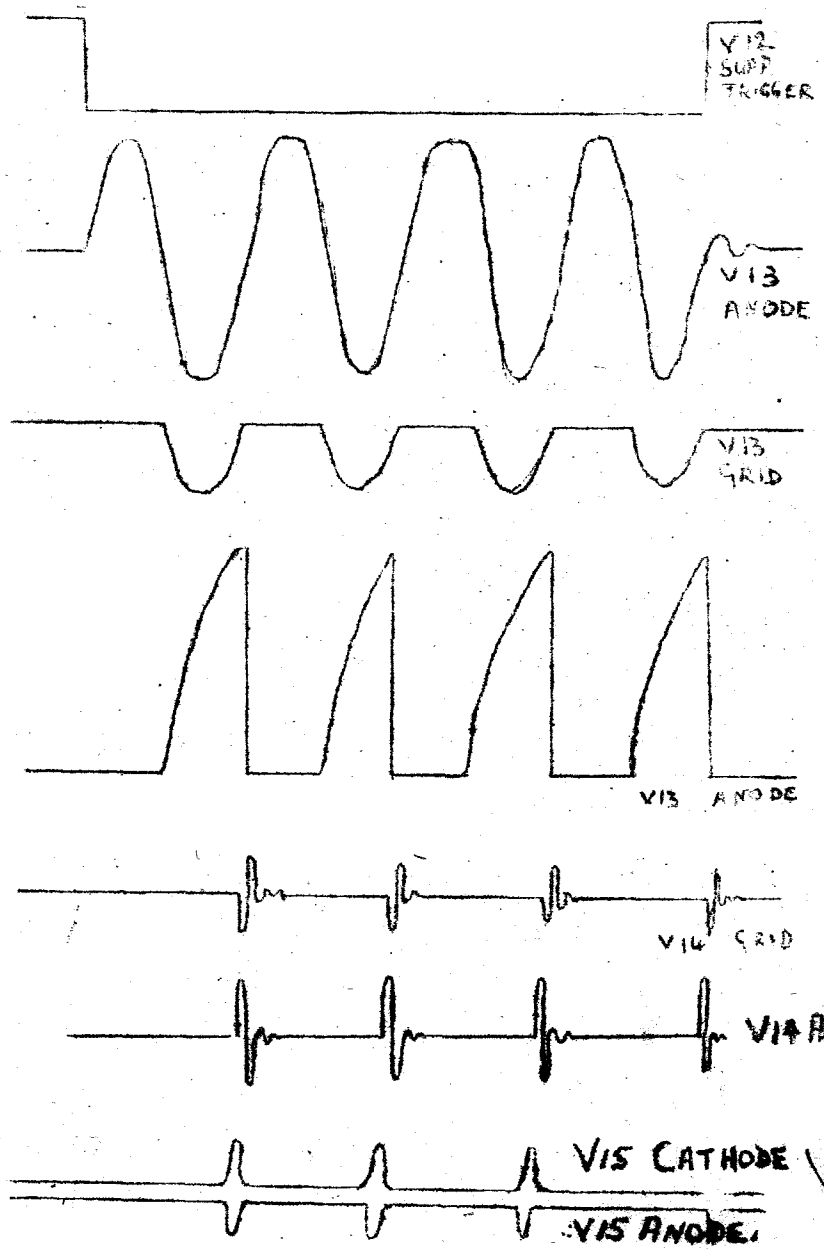


FIG 3



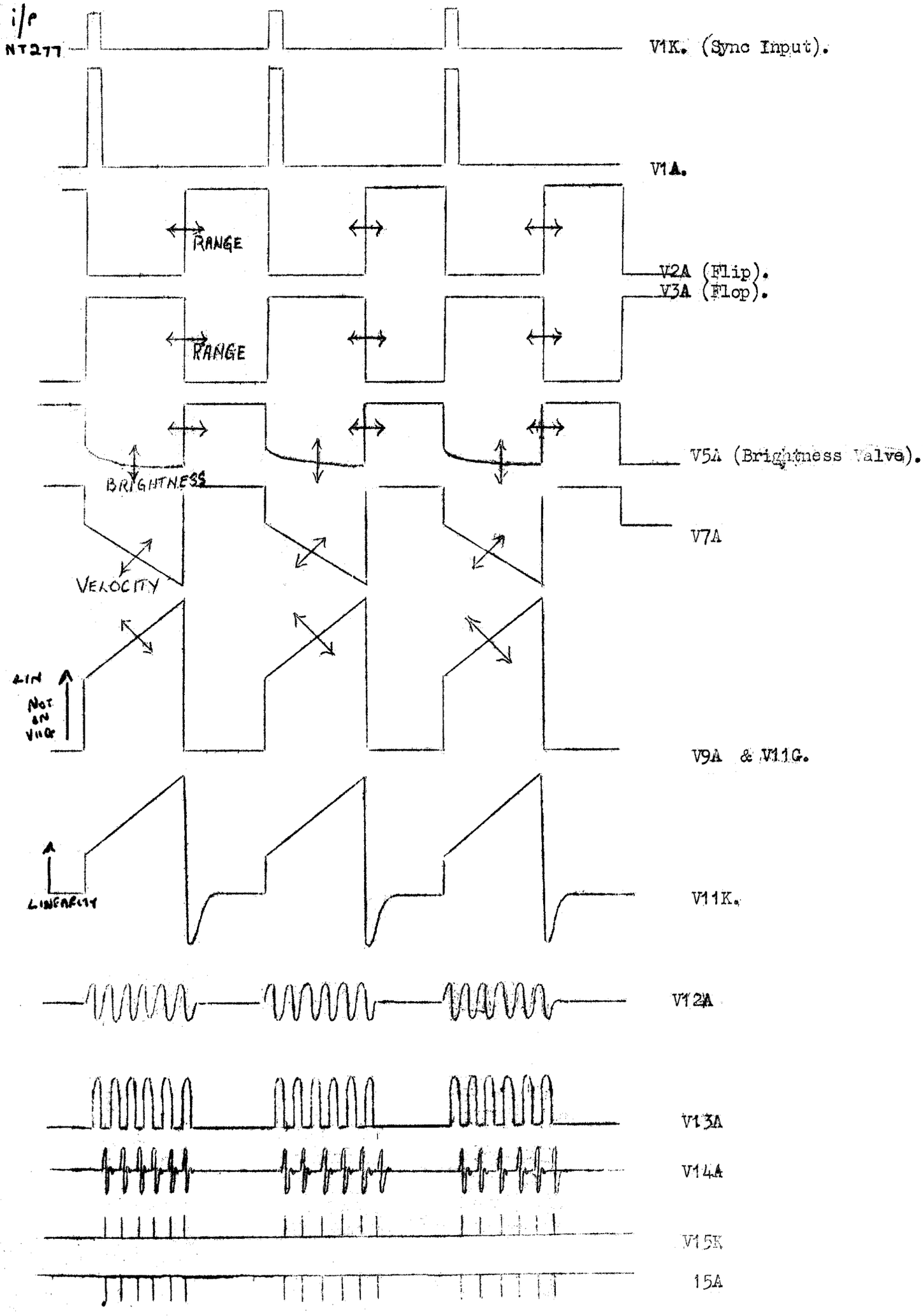
CALIBRATION CIRCUIT CONT. PL5



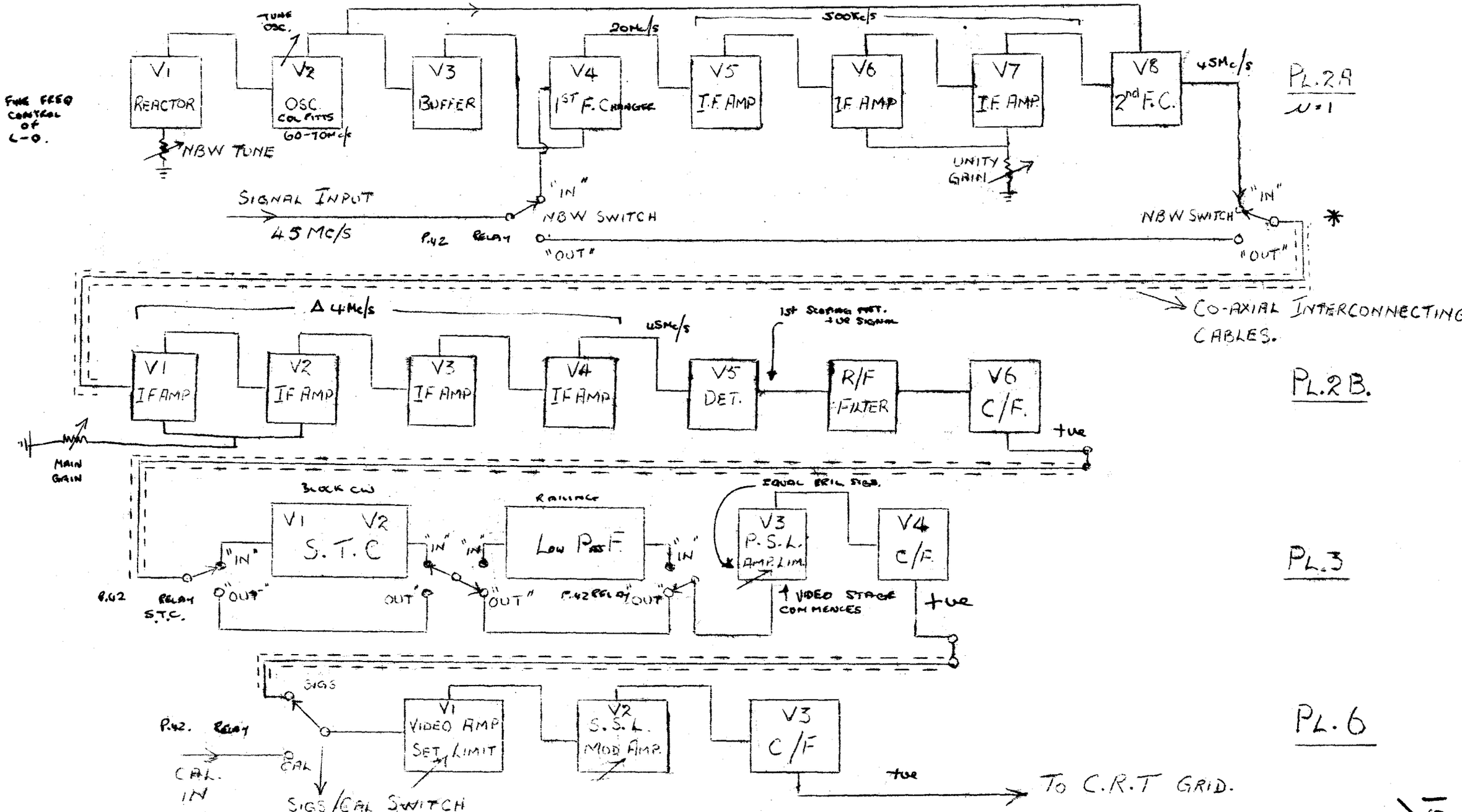


Input :- 18624 c/s sine wave from V12, fed to grid of V13.
V13 Squarer. Grid held at cathode potential by Ig. The +ve half cycles of the sine wave input is lost by Ig and only the -ve half cycles effect Ia. Due to the CR forming the anode cct, the waveform produced at the anode, has an exponential leading edge and a sharp lagging edge. Applied across a "peaker" coil, the exponential edge has no effect on the coil, but the sharp fall on the trailing edge, causes the coil to "ring" at 500 Kc/s. These oscillations are fed to the grid of
V14 Distorter. which is heavily damped by Ig, and at the anode of V14 produces a single oscillation at 500 kc/s which is applied to the grid of
V15 Cathode Follower. This valve is biassed beyond cut-off (+ve potential applied to cathode). The amplitude of input from V14 is such, that only the tips of the +ve pulses cause V15 to cut-on. Thus at The cathode of V15 positive "pips" are reproduced (which are fed to P16), whilst at the anode negative "pips" are produced (Which are fed to P148 from whence they can be used to calibrate any display which is incapable of producing its own calibration markers).

PANEL 3. WAVEFORMS.



BLOCK SCHEMATIC — SIGNAL CHAIN IN D.U.5.



PANEL 26 - POWER UNIT.

Input. 250V 50c/s. Fuses F1 &F2.

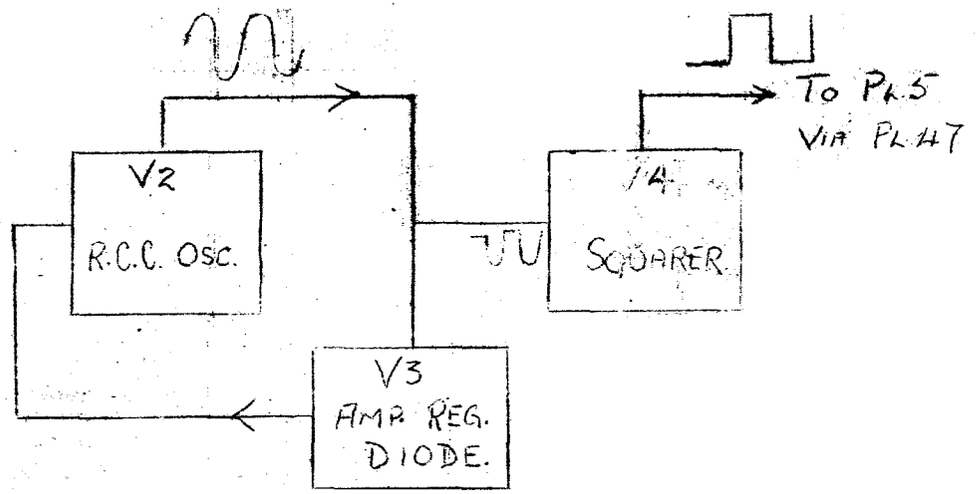
Output. Output from secondary winding 350 0 350V.
Applied to full wave rectifier V1.
Output from V1 300V 225mA. LC smoothing by
C1.L1,C2,L2 & C3.
In Console 15 output from V1 supplies :-
V2 & V4 in Pl.3
V7 in Pl.8
L.P.O. via Pl.46

Valves supplied in Console 16 are :-
V2 & V4 in Pl.3
V3 in Pl6
L.P.O. via Pl.47.

Output also used in Console 16 for application to Focus coil and "shift" cct.

A further secondary winding on the transformer gives an output of 70V which is applied across a full wave bridge cct.,employing metal rectifiers.
An out put of 50V D.C is obtained,used to operate all relays.
A tapping on this winding provides 25V 50c/s as an energising supply for all indicating lamps,on Pl 42(C.16) and Pl.44(C.15).

THE LOCAL PULSE OSCILLATOR

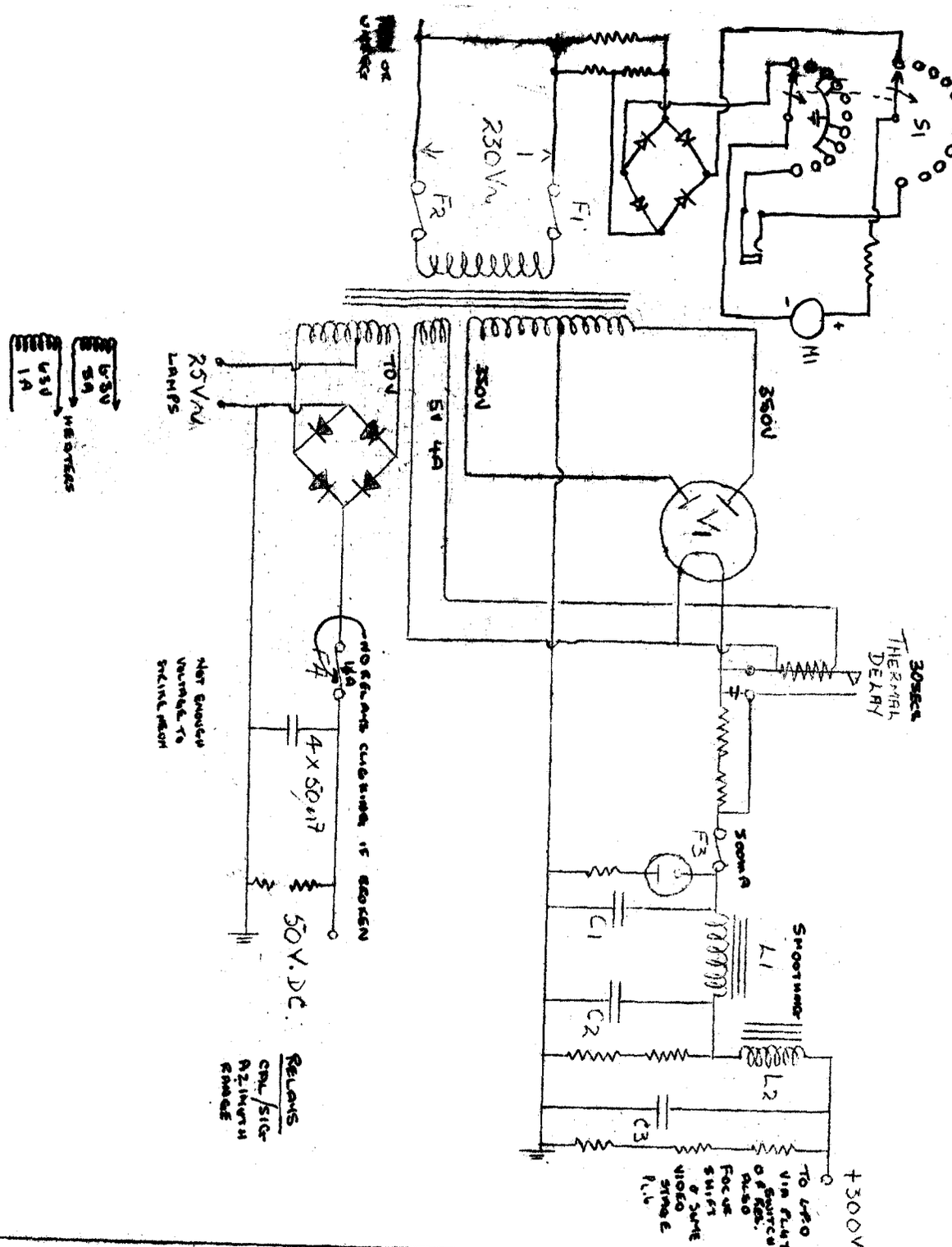


Purpose. To produce a maintenance sync pulse.

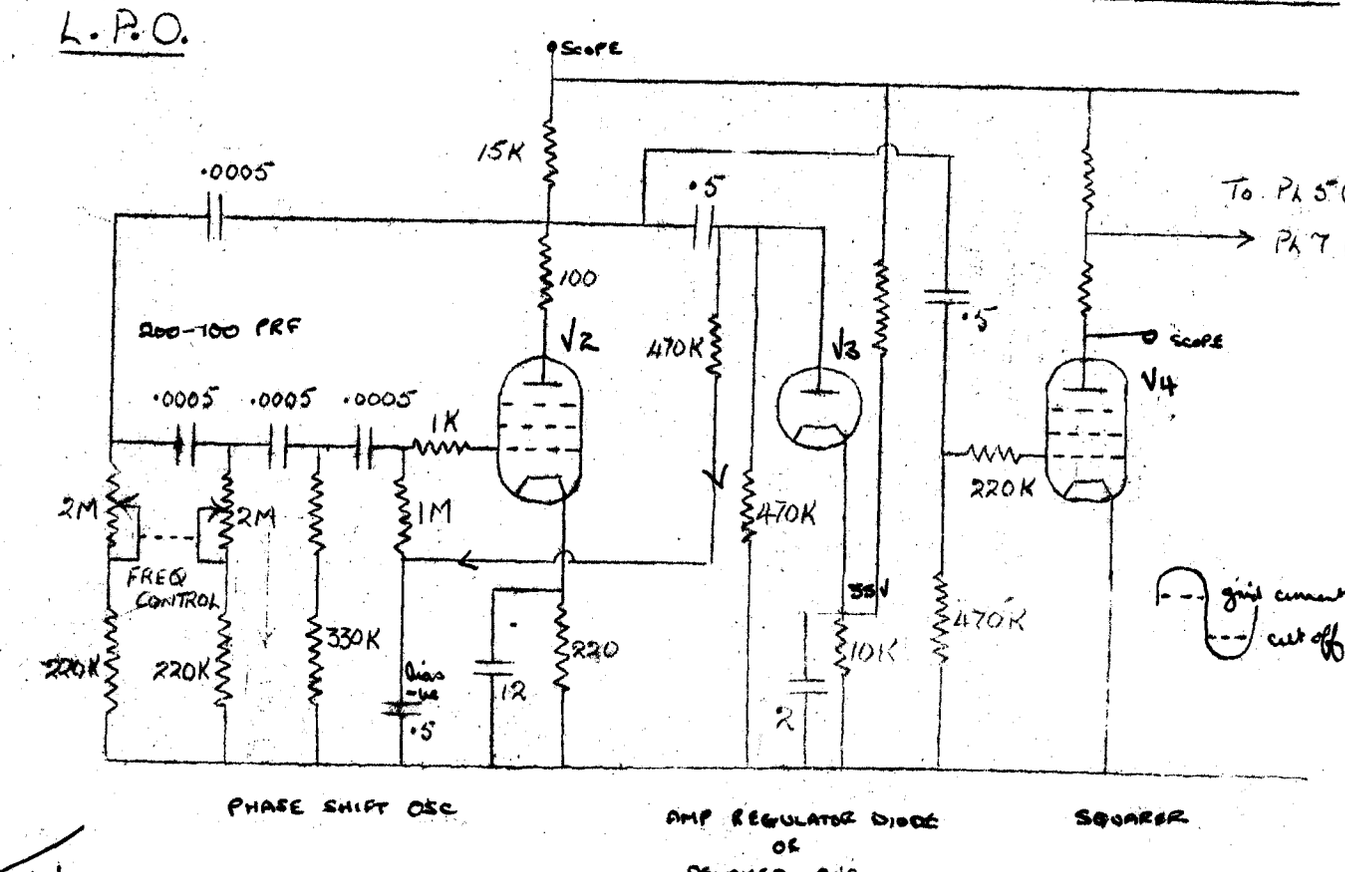
Action. V2 is a four cell R.C.C. oscillator.
Frequency of the oscillator is controlled by making the resistors in the first two cells variable,(Frequency variable between 200 and 700 c/s)
Amplitude of output is kept constant by :-
V3. Amp. Reg. Diode. The action of this valve may be likened to an A.V.C. diode with a delay of 55V.
The cathode of the diode is held at +55V.When the amplitude of oscillations exceeds 55V the diode will conduct,producing a bias applied to the grid of the oscillator,thus reducing the gain of the valve.
The amplitude of oscillation is thus limited and held at approximately 55V.
V4. Squarer. The sine wave output from V2 is fed to grid of V4. This is a normal squarer,producing at its anode a large amplitude squre wave,which is fed to Pl.5 via Pl.47(In C.16),and to Pl.7 via Pl.46.

NOTE. The H.T.supply to L.P.O. is switched by the sync selector switch on Pl.46 & Pl.47,and switch must be in L.P.O position. In any other position the H.T. supply is switched off.

POWER UNIT



L.P.O.



PANEL 22 - POWER UNIT.

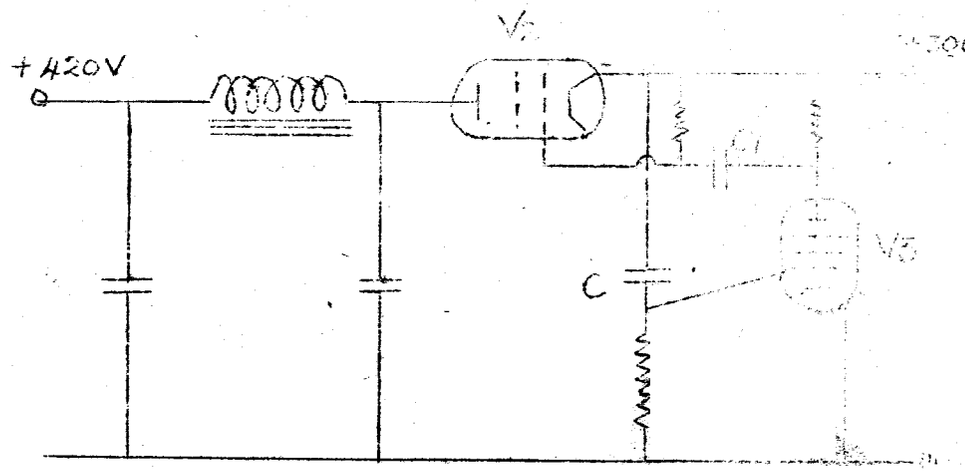
Input 230V 50 c/s. Fuses F1 & F2.

Outputs. Output form secondary winding (450 0 450V) applied to full wave rectifier V1. Rectified output 0,420V 200mA.
HT smoothing comprising C1, L1, C2.
Circuit incorporates a thermal delay. HT fuse - F3.

Output 1. 420V - Fed to V11 in Pl.5 (Time-base C/F).
Output 2. 420V To anti-jitter cct. Pl.22.
Output 3. 420V To stabilovolt. Fused by F4.
Stabilised outputs from stabilovolt :-
70V, 140V, 210V, 280V.
70V - Not used.
140V - Screen supply to V1, V2, V3, in Pl.2B.
210V - " " " V4 in Pl.2B.
280V - H.T. supply to V7, V9 & V12 in Pl.5.
" " " V1 & V2 in Pl.2A.

The current through the stabilovolt is initially adjusted to 20mA using the "Adj.Stab." control in Pl.22.

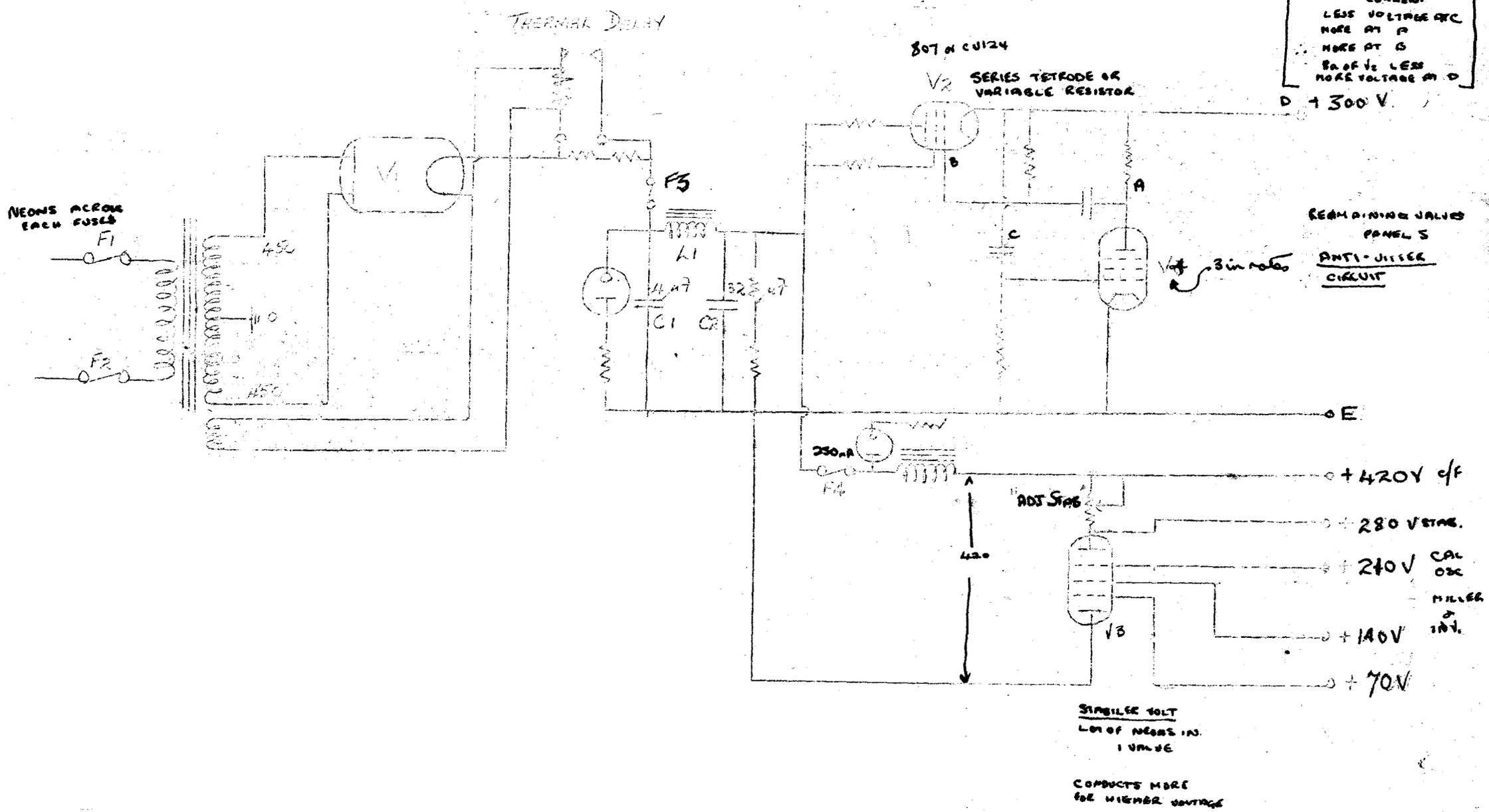
THE ANTI-JITTER CIRCUIT.



Purpose. To ensure that the voltage output from the power unit remains constant under rapidly changing load conditions.

Action. If the load suddenly increases, the volts drop across V2 increases with a resultant fall in output. This fall-in voltage is transferred as a fall to V3 grid (via C). If V3 grid falls, V3 anode rises. This rise in voltage appears at grid of V2 (via C1), increasing the conductance of V2 (i.e. the cathode/anode impedance is lowered).
Thus for an increase in load current there a corresponding fall in volts drop across V2 and the output remains steady.

POWER UNIT – PANEL 22



PANEL 21 POWER UNIT

INPUT. 230V 50 c/s. Fuses F1 & F2.

OUTPUTS. From transformer secondary winding, 325 - 0 - 325V, applied to full wave rectifier V1. Output from V1 300V 200mA. Output fused by F3.

Output 1. +ve 300V applied to :- V3 in Pl.3. V1 & V2 in Pl.6. Console 16)
V3 in Pl.3 V1 & V6 in Pl.8. Console 15) Video ccts.

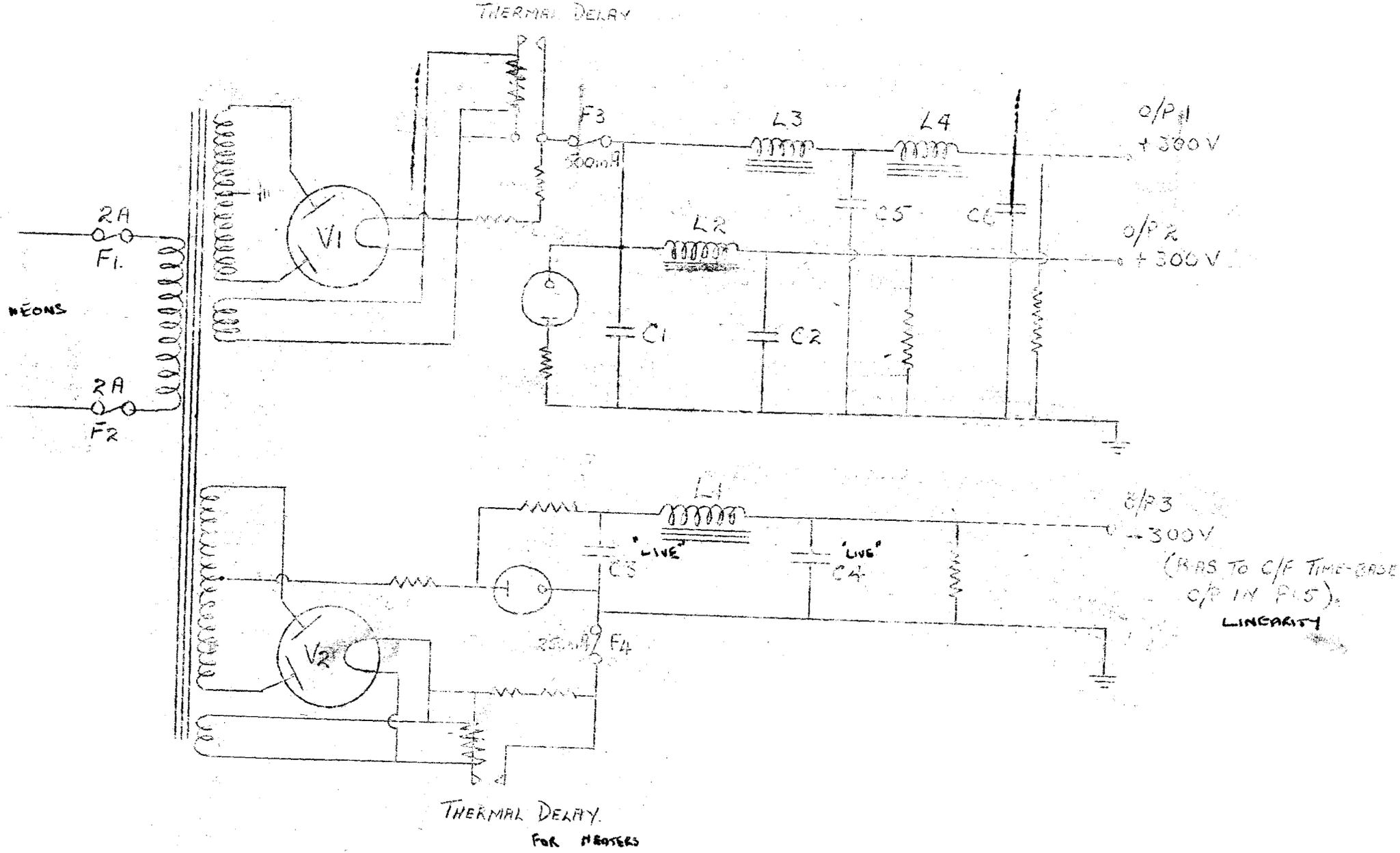
Is smoothing comprising C1, L3, C5, L4 & C6.

Output 2. Provides +300V as H.T. supply for signal chain i.e. all valves in Pl.2A & 2B with exception of V1 & V2 in Pl.2A.

Output 3. A separate full wave rectifier V2, provides an output of -ve 300V applied as bias to the time-base C/F (V11) in Pl.5. NOTE. THIS SUPPLY IS NOT USED IN CONSOLE 15.

A thermal delay in each rectifier cct. prevents the rectifiers from being loaded until their cathodes have reached a working temperature.

PANEL 21 POWER UNIT



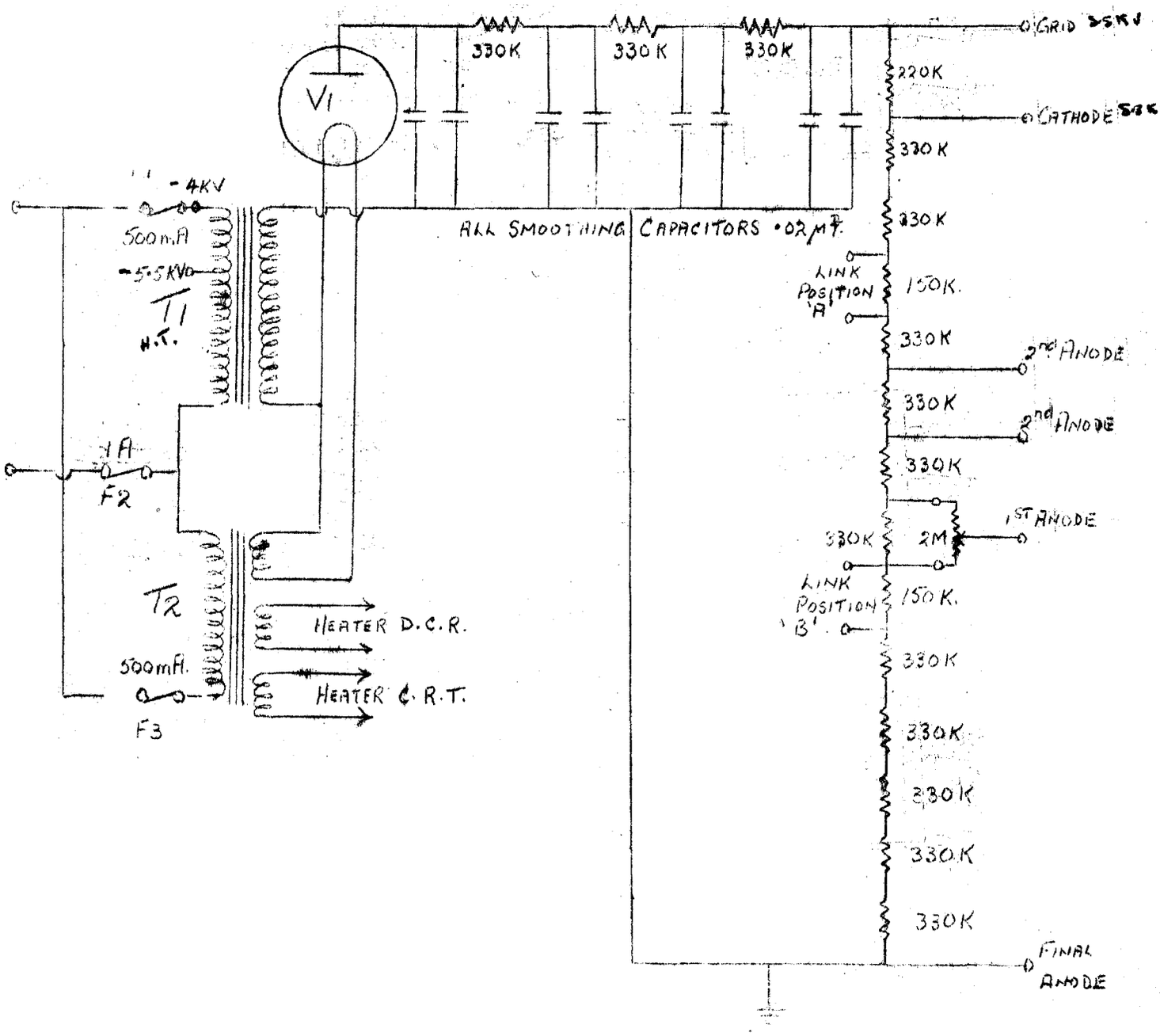
POWER UNIT PANEL 25.

Contains two oil immersed transformers, with paralleled primaries.

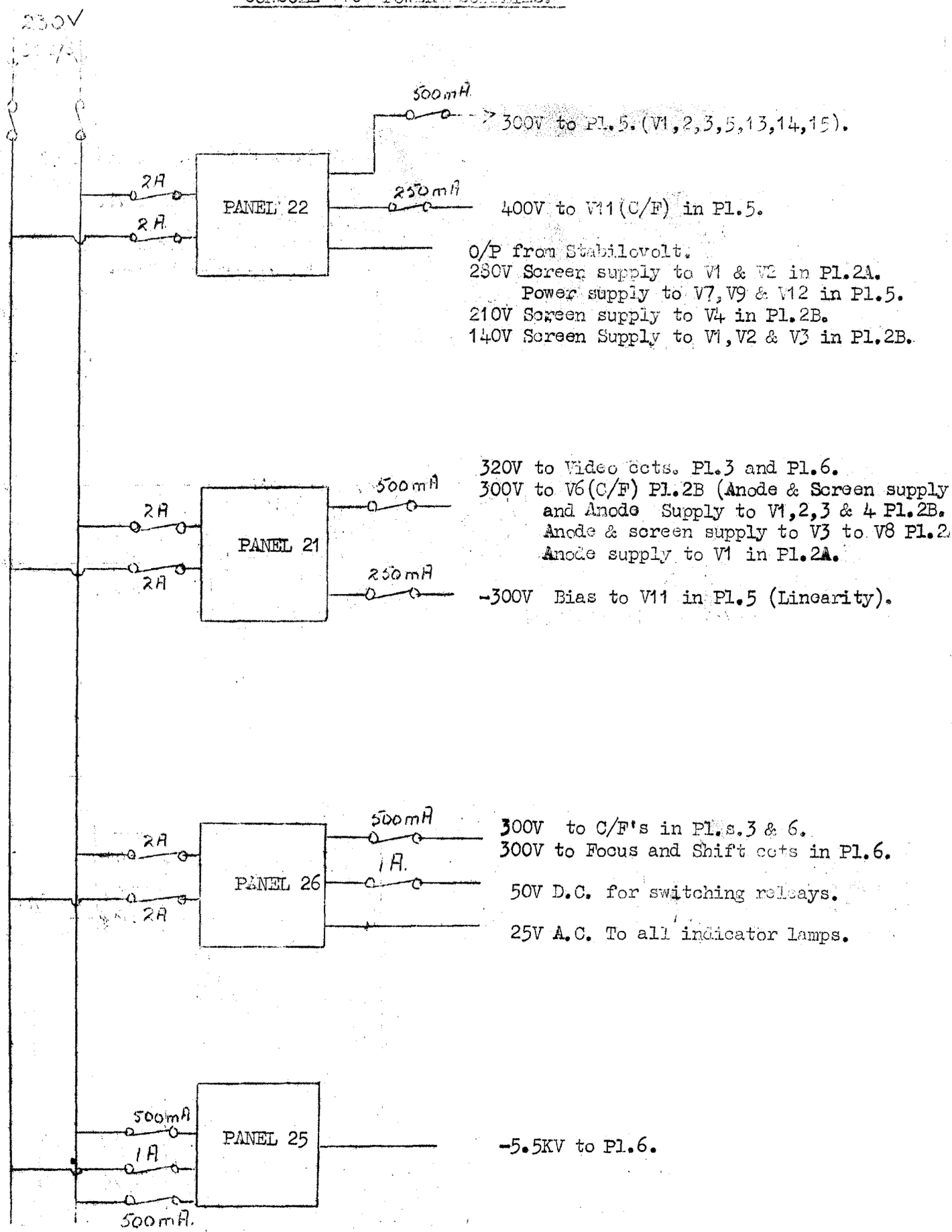
Input. 230V 50 c/s, fused by F1 & F2. AND F3

Output. From T1 (E.H.T) either 5.5 KV or 4KV (dependent on selection of primary tapping.
Output from transformer applied to half wave rectifier V1.
Output from rectifier smoothed by R.C. cct.
A bleeder network across the output enables the correct voltages to be tapped off for application to the C.R.T. electrodes.
In Console 15, the "link" on the side of P1.25 acts as a coarse focus control, the "1st Anode" control acting as a fine focus control.

T2 provides the heater voltage for the C.R.T., E.H.T. rectifier and the D.C.R. in the grid/cathode cct. of the C.R.T.



CONSOLE 16 POWER SUPPLIES.



SETTING UP INSTRUCTIONS CONSOLE 16

Adjustment of Focus. Remove input fuses to Pl 22 & Pl 26.
Turn up brightness control on Pl 6, and mark the position of the defocussed spot on the C.R.T. face.
Replace fuses to Pl 26.
Adjust the position of the focus coils with the screws provided, until the spot focusses and defocusses about the same point. NOTE The mark made on the C.R.T. face is a useful guide in adjusting the focus coil.
Centre the spot with the X & Y shift controls. If unable to do this, reverse the plugs at the rear of the C.R.T. base clamp.
Adjustment of Time-base. Turn Sync switch on Pl47 to L.P.O.
Set P.R.F. control to 500 c/s.
Replace fuses in Pl 22.
Adjust current through stabilovolt to 20 m.A. with "ADJ.STAB" control.
Turn Limiter controls on Pl 6 to maximum.
Switch on "Cal", and adjust "Sync" control on Pl 5 until time-base triggers on all three ranges.
Range Calibration. Switch to Range 1 and adjust "Range 1" control to obtain correct number of "Cal Pips".
Linearise trace using "Velo 1" and "Lin 1" controls.
Switch to Range 2 and Range 3 in turn and adjust in a similar manner.

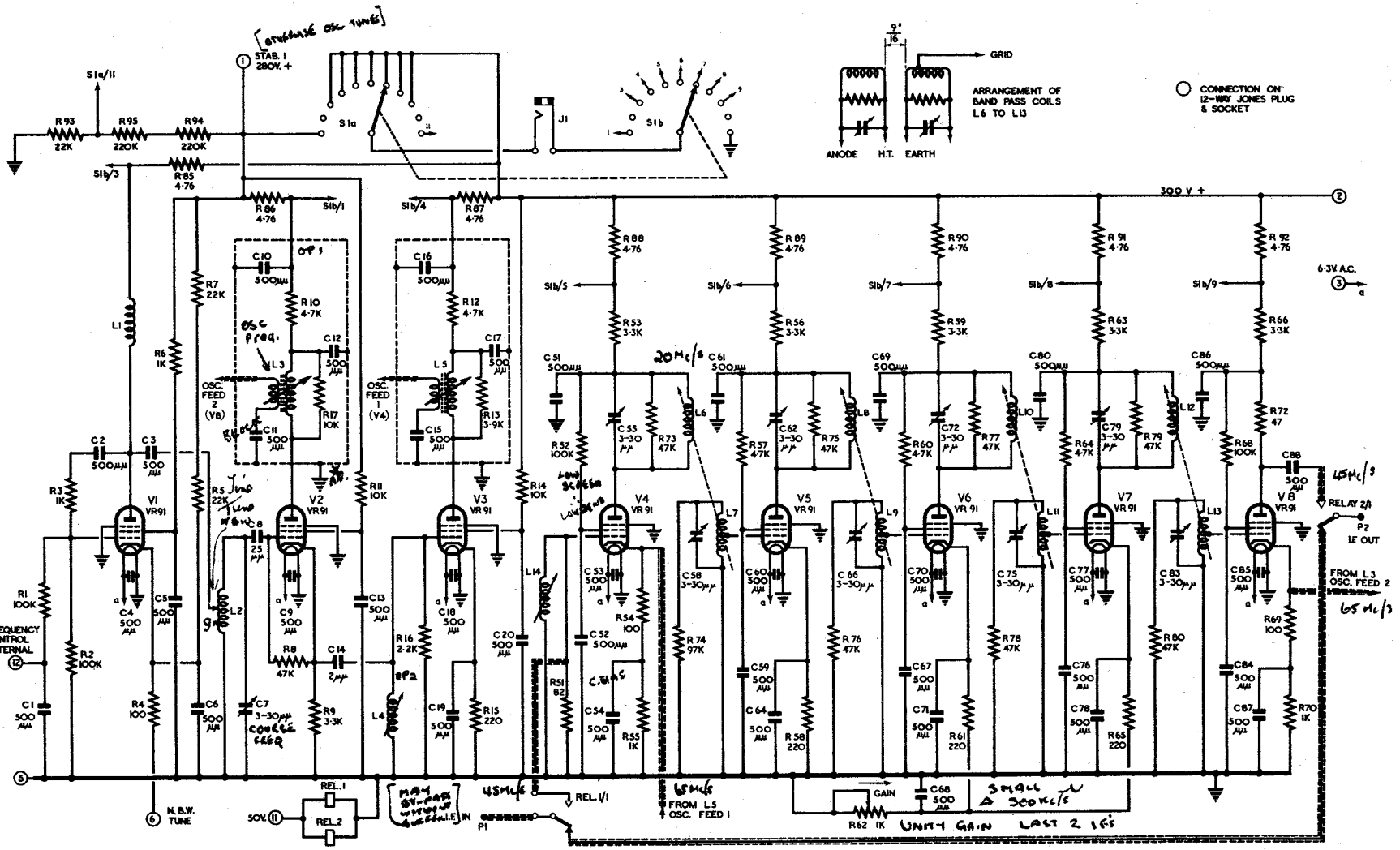
Number of "Cal" Pips.

Range 1	6 to 12 pips	(30 - 60 miles)
Range 2	12 to 18 "	(60 - 90 ")
Range 3	18 to 24 "	(90 - 120 ")

Switch off calibrator.

Signal Chain.
Pl 3 Set I.F. GAIN control to minimum and adjust "Amp Limit" control until current through V3 is 12 mA. Reset Gain control to Maximum.
Pl 6 Scope cans of grid blocking condensers. Adjust "Set Limit" control until signals displayed on the oscilloscope are limited just above the peaks of noise.
Adjust "Mod Amp" control to give a convenient "paint" on the P.P.I. tube, (i.e. signals amplitude about 30V peak to peak).
Pl 2A Turn down I.F. Gain control until sig/noise ratio is 5:1.
Set "N.B.W. Tune" control on Pl 42 to mid position and adjust Coarse Oscillator tuning condenser on Pl 2A for maximum signals.
Set "Unity Gain" control for overall gain of one.

Turn down "Brightness" control PL5 to minimum
Turn up " " " PL6 so trace + flyback just disappear
Turn up "Brightness" control PL5 for suitable brightness of calpips



DISPLAY UNIT TYPE 5

I.F. Unit Type 49

FOR FURTHER INFORMATION SEE A.P. 2897 A

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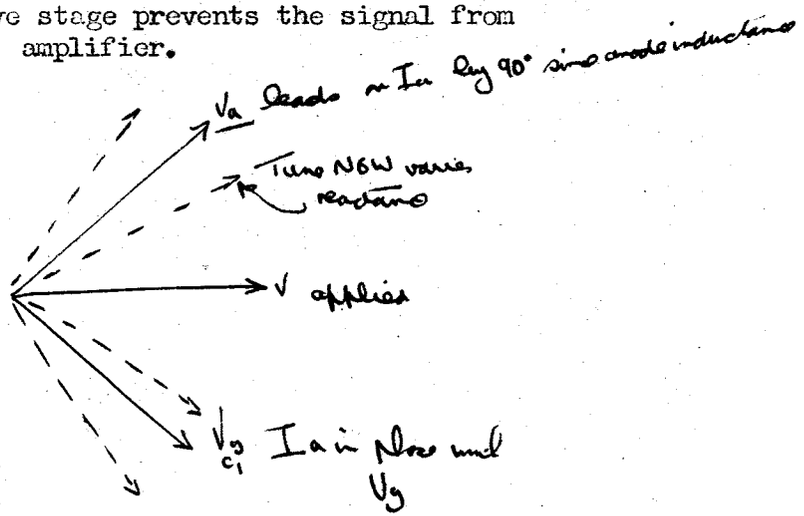
SIGNAL CHAIN: PL2A

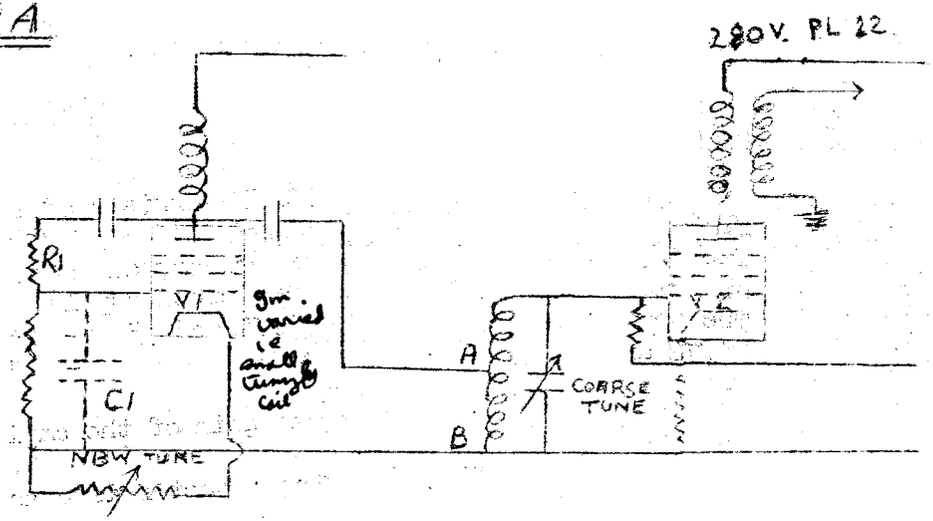
Whatever equipment this console is used with, the input must be 45 Mc/s.

P12A

This is known as the Narrow Band Width panel, and is used to eliminate interference on channels adjacent to the Tx frequency. It may be switched in or out of circuit.
Bandwidth of Panel 500Kc/s.
Gain of the Panel. Should be adjusted to give unity gain, by adjustment of the gain control which varies the bias to V6 & V7. Unity gain only is required so that no change is made to the intensity of the display with P12A "IN" or "OUT".
In order to maintain pulse shape, the bandwidth of the main I.F. amplifier is 4 Mc/s. This wide bandwidth makes for easy jamming on adjacent channels. By reducing the bandwidth jamming can be eliminated.
P12A is a specially designed I.F. amplifier with a bandwidth of 500 Kc/s and I.F. of 20 mc/s.
The 20Mc/s I.F. is produced by mixing the 45 Mc/s input with the output from a Local Oscillator on 65 Mc/s. The resultant 20 Mc/s output is passed through 3 stages of I.F. amplification before it is again mixed with a 65 Mc/s oscillation, to reproduce a 45Mc/s signal.

V3 Buffer. This valve stage prevents the signal from by-passing the N.B.W. amplifier.





V1 Reactor Valve.

Purpose. To provide operator with remote control over the frequency of Local Oscillator, to enable him to position N.B.W. in case of Tx or local oscillator drifting off frequency.

Action. The alternating voltage applied across V1 is the voltage developed across A-B in the grid cct of V2 (tunable between 60 - 70 Mc/s). Thus Va is in phase with V across A-B. A feedback path is provided by R1 and C1. The voltage developed across C1, (which is Vg input to V1) will lag on Va due to reactance of C1. As the Ia through the valve must be in phase with Vg, and Vg is lagging on Va, Ia is therefore lagging on Va, i.e. the Valve is acting as an inductance.
Its inductive effect may be varied by N.B.W. Tune control.
As the valve is shunted across part of the tuned cct in V2 grid it is effectively acting as a variable inductance in that cct.

PANEL 2B (I.F. Unit Type 48)

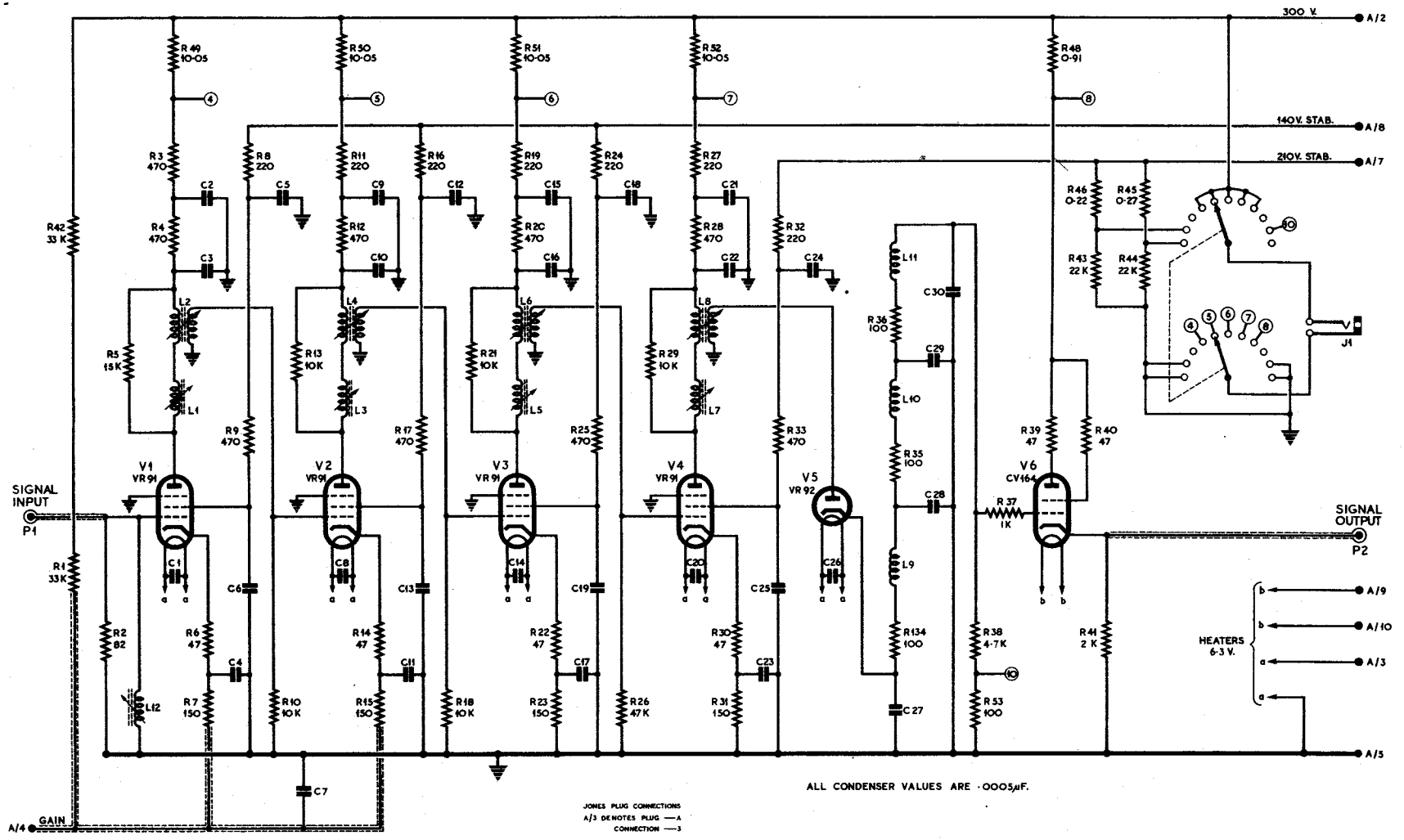
Pl 2B consists of four stages of I.F. amplification, followed by a diode detector and cathode follower. The I.F. is 45Mc/s with a bandwidth of 4 Mc/s. Bandwidth obtained by staggering the resonant frequencies of primary and secondary tuned circuits.
The screen supply to each of the amplifiers is a stabilised voltage obtained from Pl22.
V1, V2 and V3 - Screen voltage 140V
V4 - " " 210V [LARGER GRID BASE]

The gain of the amplifier is controlled manually by varying the cathode bias of V1 and V2.

The detector is a normal diode, followed by a three stage I.F. filter and a cathode follower.

When the "CALIBRATOR" Switch is in the "ON" position, the amplifier is muted to ensure that only the calibration markers are displayed on the tube. Muting is achieved by breaking the screen supply to V1, V2 & V3.

GAIN 6,000



JONES PLUG CONNECTIONS
A/3 DENOTES PLUG —A
CONNECTION —3

ALL CONDENSER VALUES ARE ·0005μF.

DISPLAY UNIT TYPE 5
I.F. Unit Type 48

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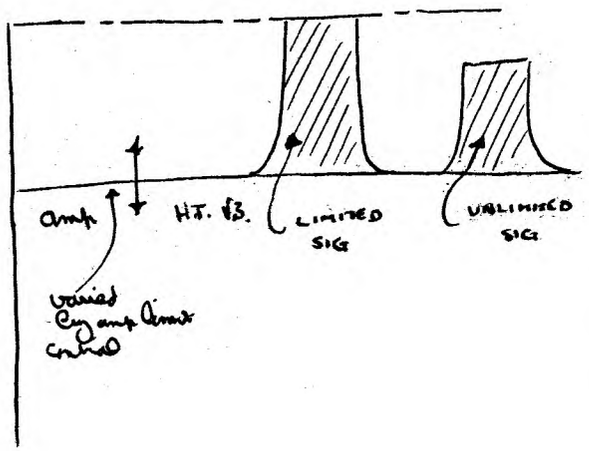
PANEL 3 ~ ANTI-JAMMING & LIMITING PANEL.



PANEL 3 (ANTI-JAMMING & LIMITING PANEL).

Pl 3 consists of four sections :- 1. The Short Time Constant (S.T.C.)
2. The Low Pass Filter (L.P.F.)
3. The Primary Signal Limiter.
4. Cathode Follower Output.

1. The Short Time Constant (S.T.C.) This cct.may be switched into circuit if C.W. jamming is being experienced. After detection the C.W.blocks emerge as a series of square waves,which if of a sufficiently large amplitude will cut-off the Primary Signals Limiter,resulting in the loss of all signals.
By introducing the S.T.C after the detector,the interfering "blocks" are differentiated.The resultant negative going portion of the "peaky" waveform is removed by the action of the diode V1,leaving the positive going "blip" which shows up on the display as a bright spot,which can easily be discriminated from echoes,as it is not "locked" to the time-base,and drifts across the trace.
To signals the S.T.C. is a Long C.R.,therefore the signals pass through undistorted.

2. The Low Pass Filter. (L.P.F.) This cct. is designed to eliminate the effect of "railing" jamming,and consists of a filter cct.which will filter all frequencies above 500 Kc/s.

3. The Primary Signal Limiter. V3.
Action. Under static conditions the valve is biassed almost to cut-off.This is achieved by connecting the cathode of the P.S.L. to the cathode of V6 in Pl2,which is 25V +ve with respect to earth.The grid of V3 (P.S.L.)is made positive,the amount that it is made positive being adjustable by the "A/T LIMIT"control. When setting up the P.S.L. the control should be adjusted so that V3 passes 12mA anode current.Under these conditions the grid is biassed to approximately -2V with respect to cathode(i.e. +ve 23V W.R.T.earth).
Positive going signals applied to the cathode of V3 will lift the cathode potential,and if of sufficient amplitude will cut the valve off.Any very large signals which carry the cathode well beyond cut off will therefore cause no increase in output.

4.Cathode Follower. The positive signal output from V3 is applied to V4 grid,V4 being a cathode follower. A cathode follower is used in this stage to match into the co-axial line which feeds the signals to the next stage,Pl6.

PANEL 6 INDICATING PANEL

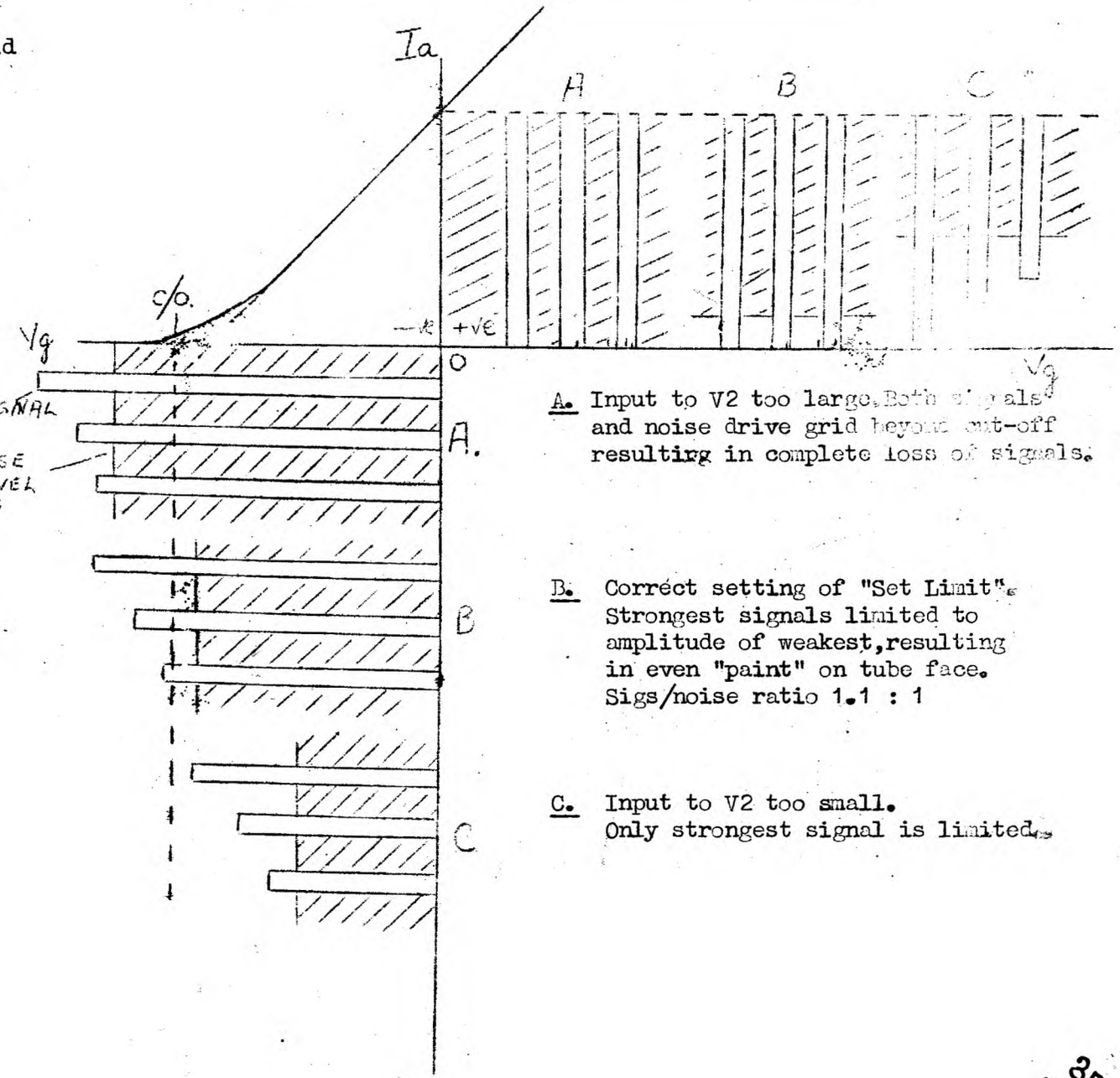
Produces a P.P.I. display on a 12" E.M. tube.
Video signals or calibration markers fed to control grid to give brilliance modulation, signals being fed in from P13, "cal" markers from I15. Selected by relay operated by "CAL" switch.

V1 Video amplifier. Signals or "cal" fed to grid of V1. Amplitude of output controlled by variable anode load, (Set Limit Control). Effect of varying the input to the following stage can be seen in diagram opposite.

V2 Secondary Signal Limiter. Input to valve controlled by Set Limit control, so that amplitude of signals applied to grid of V2 is constant.
"Mod Amp" control is a variable anode load. Varying this varies the gain of the stage, thus deciding the amplitde of signal applied to the cathode follower which forms the output stage of the video chain. "Mod Amp" should be adjusted to give a convenient "paint" on the C.R.T.

V4. D.C. Restorer (Double diode). One diode used to D.C. restore positively all signals before application to grid of the C.R.T.
The other diode D.C. restores negatively the brightness waveform applied to C.R.T. cathode.

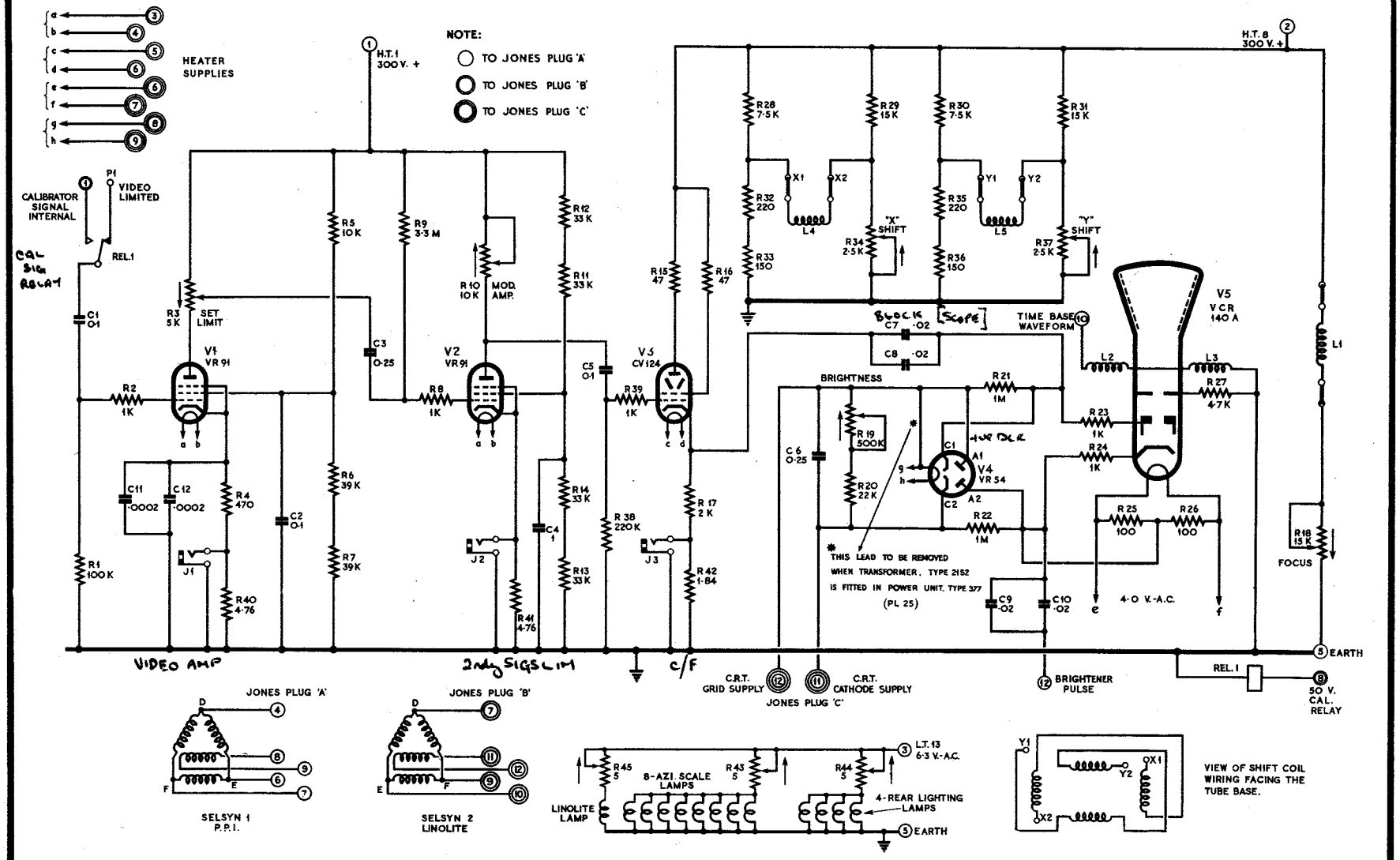
ACTION OF SET LIMIT CONTROL



A. Input to V2 too large. Both signals and noise drive grid beyond cut-off resulting in complete loss of signals.

B. Correct setting of "Set Limit". Strongest signals limited to amplitude of weakest, resulting in even "paint" on tube face. Sigs/noise ratio 1.1 : 1

C. Input to V2 too small. Only strongest signal is limited.



DISPLAY UNIT TYPE 5

Indicating Unit Type 115

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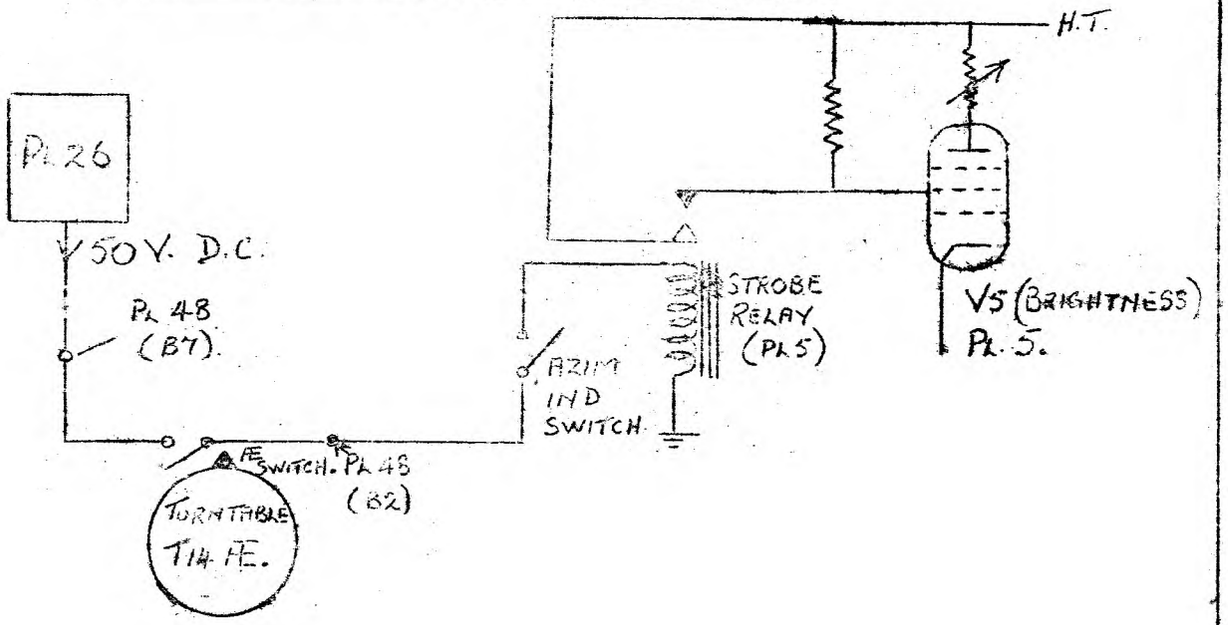
C.B.H. 16971 - Wt. 10545 - Dd. 3060/s-3000 - 5/49

AZIMUTH STROBE

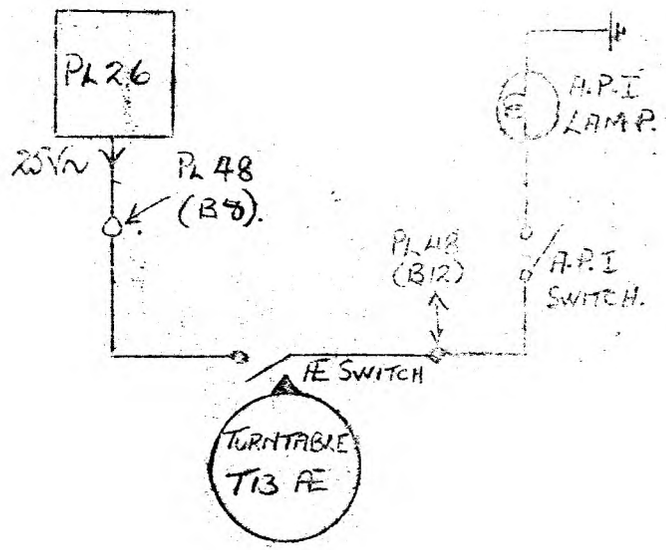
PURPOSE. TO CHECK ALIGMENT OF TYPE 14 AERIAL WITH P.P.I TIME-BASE.



Action. With Aerial and Azim. Ind. switches open, the strobe relay is de-energised. Azim. Ind. switch is a manually operated switch on Pl 42, the aerial switch is amechanical switch monted on the aerial turntable, which closes at some pre-determined position, (usually when the aerial is pointing due N) When both switches are closed, the strobe relay is energised, short circuiting the screen resistor to the brightness valve V5. This results in a fall of Va, thus producing a larger bright-up pulse with consequent trace brightening as the aerial passes through due North.
This should coincide with the time-base passing through North.
If aerial and time-base are not synchronised, disconnect the selsyn drive to the time-base coils, rotate the time-base coils by hand until trace is in correct position, then re-connect the selsyn motor.

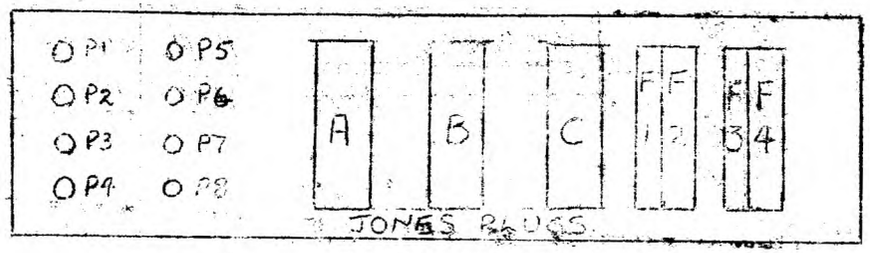
AERIAL POSITION INDICATOR.

PURPOSE. TO CHECK ALIGNMENT OF TYPE 13 AE WITH "LINE O LITE"



The "line o lite" indicates the direction in which the Type 13 Aerial is pointing.
With Aerial and A.P.I. switch open the A.P.I. lamp is de-energised.
The Aerial switch is arranged to close when the Type 13 aerial is pointing in a pre-determined direction. (Usually N). If the A.P.I. switch on Pl 42 is closed, when the aerial swings through N, the cct. to the A.P.I. lamp will be completed. At the instant the lamp flashes, the "line o lite" should also be pointing N.
If it is pointing in any other direction, disconnect drive to "line o lite" selsyn, turn "line o lite" by hand until it points due N, re-connect selsyn.

CONNECTION PANEL. PL 48



P. Pye plug connections.

P1 Signal input (45 Mc/s).
P2 Blank.
P3. +ve sync input Type 13.
P4 +ve sync input Type 14.
P5 -ve sync input Type 11.
P6) Blank
P7)
P8 -ve Cal output.

Jones Plugs.

A Regulated and unregulated mains supply input.

B T.P.I. selsyn connections.

C "Line o lite" selsyn connections.

CONTROL PANEL Pl 42.

Has all control switches, "N.B.W." tune control, and main gain control mounted on it.

SYNC SELECTOR PANEL Pl47.

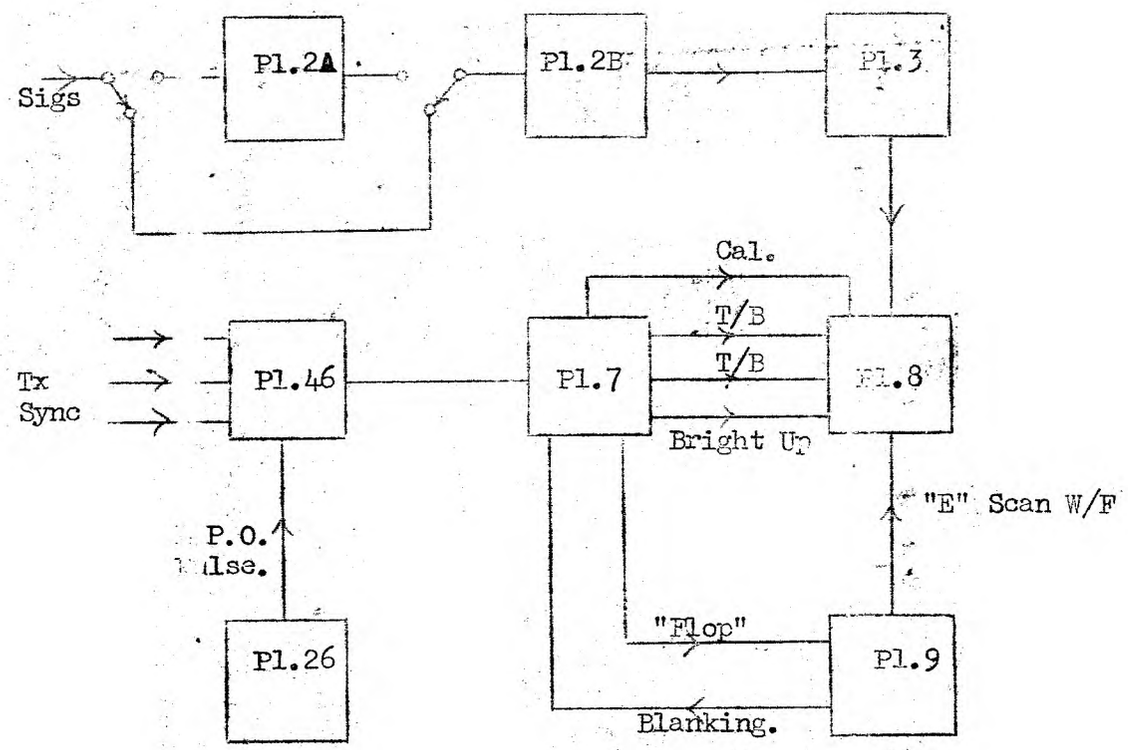
Contains sync selector switch, which selects appropriate sync pulse for Tx with which the equipment is working.

1. L.P.O. -For fault locatio or setting-up purposes.
2. Type 11.
3. Type 13.
4. Type 14.

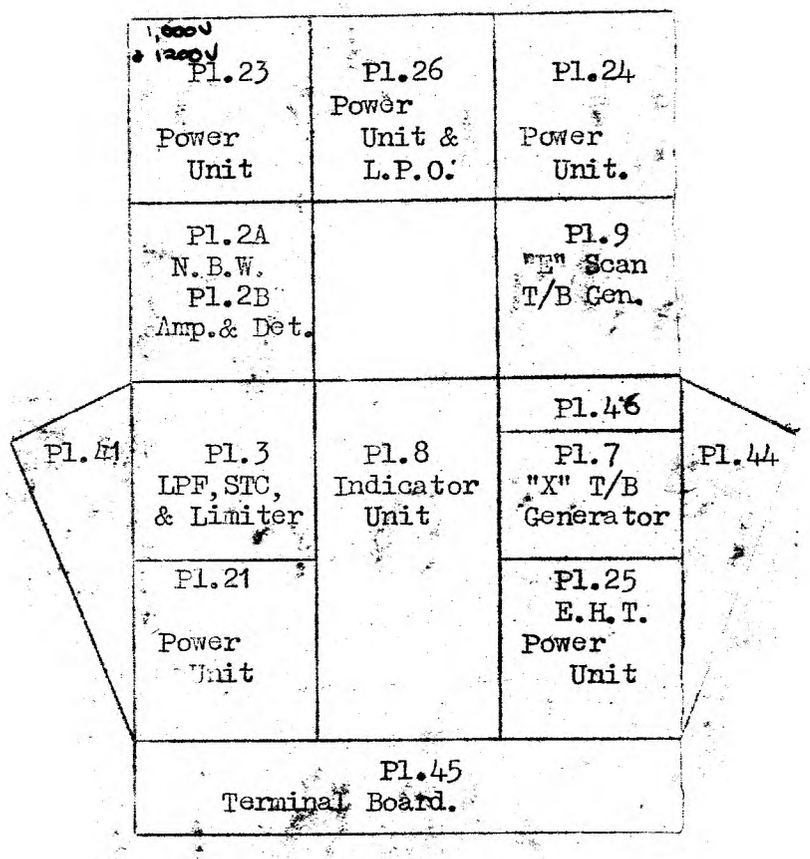
When on L.P.O. the H.T. supply is switched on to V2 & V4 in Pl 26.
In the remaining positions, the H.T. to these valves is broken, preventing the L.P.O from functioning.

Console Type 15

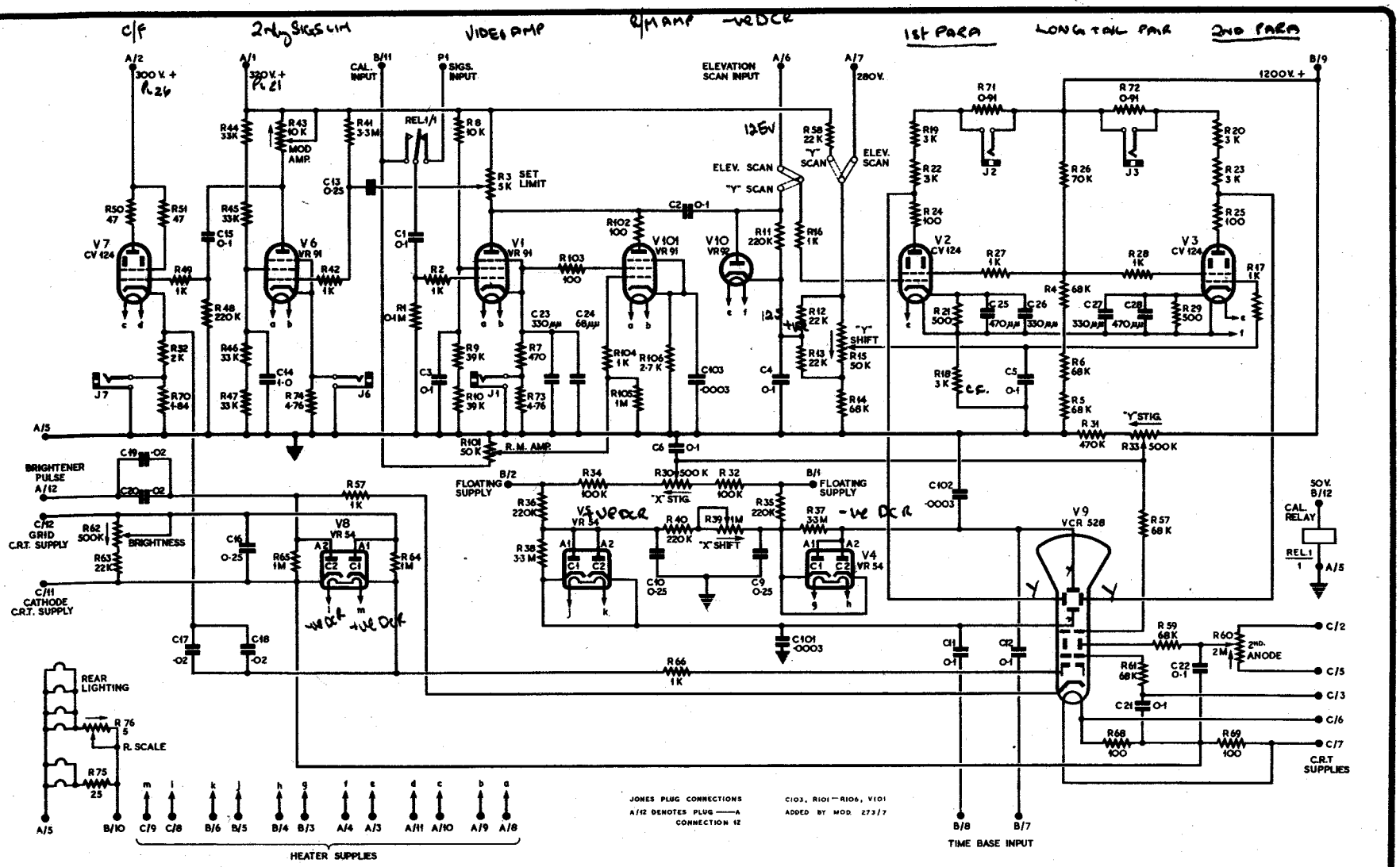
DISPLAY UNIT TYPE 5 - CONSOLE 15.



BLOCK DIAGRAM



PHYSICAL LAY-OUT.



DISPLAY UNIT TYPE 5

Indicating Unit Type 114

FOR FURTHER INFORMATION SEE A.P. 2897 B (2)

R.T.P.

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PANEL 8

'Y' scan Position of links as shown ; intensity and deflection modulation of signals. Signals being fed to long tail pair PPA's and then to 'Y' plates

V_{10} acting as a -ve D.C.R.

'E' scan. Intensity modulation of signals only. E scan waveform from panel 9 fed to PPA's and traced to Y plates. Shift voltage change from 250 - 280. This is done since the mean potential of the E scan wave form is 220 volts which would result in large shift voltage causing trace to go below proper working point.

'Y' shift adjust by varying grid potential of V_3 resulting in variation of V_3 DC anode voltage and also V_2 anode voltage enabling convenient means of shift control.

V_{101} Enables sigs and cal to be displayed together when an 'Y' scan

[long marker AMP] long marker amplitude adjusts amplitude of cal.

"X shift" Varies the potential difference between the x-plates, but does not vary the mean potential of the X plates

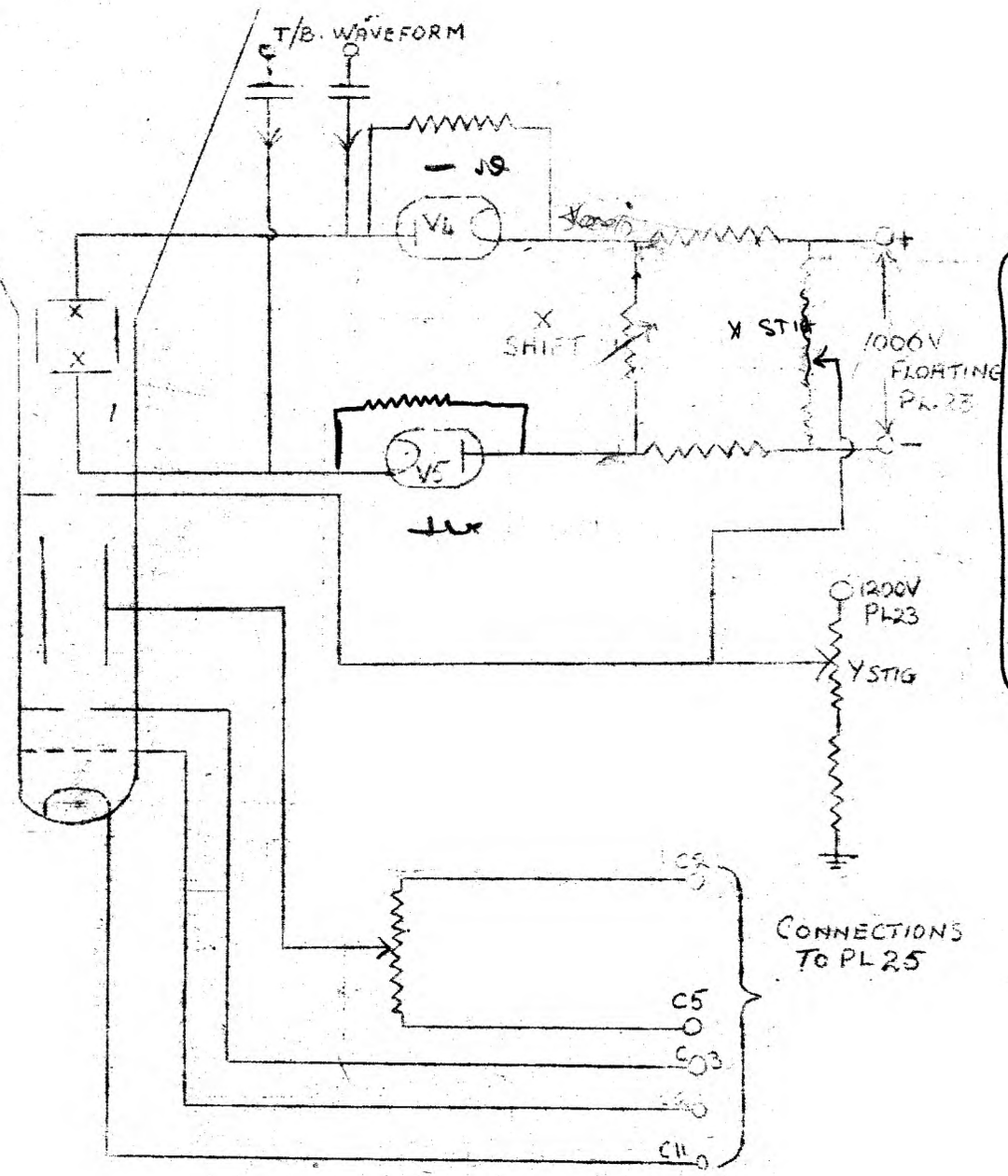
"X stig" Alters the mean potential of the x-plates with respect to the final anode, but does not alter the P.D. between the X plates.

"Y stig" Varies the potential on the final anode with respect to the fixed mean potential of the Y plates.

Variation of "Y stig" control does not upset "X stig" since 1,200 V floating supply used and mean potential of the X plates vary with the final anode.

4

PANEL 8, C.R.T. POWER SUPPLIES. SHIFT & "STIG" CIRCUITS.



Connections. C2,5,3,11 & 12 are taken to the bleeder network across the E.H.T. supply (Pl.25).

Brightness Control. Varies the potential of the grid with respect to cathode.

~~"X" Shift Control. Varies the mean potential of the X plates.~~

~~"X" Stig Control. Varies the potential of the X plates with respect to the final anode.~~

~~"Y" Stig Control. Mean potential of Y plates is 750V and the Y stig control enables the potential of the final anode to be adjusted so that it is at a similar potential.~~

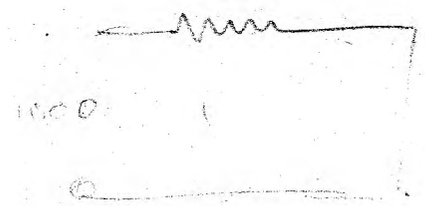
Focus Control. Varies the potential applied to the 2nd (focussing) anode.

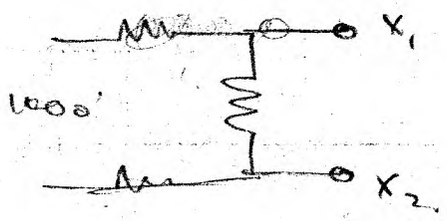
V4 & V5 -ve and +ve D.C. restorers, restoring the time base waveforms to the potential of the X plates.

→ see written notes

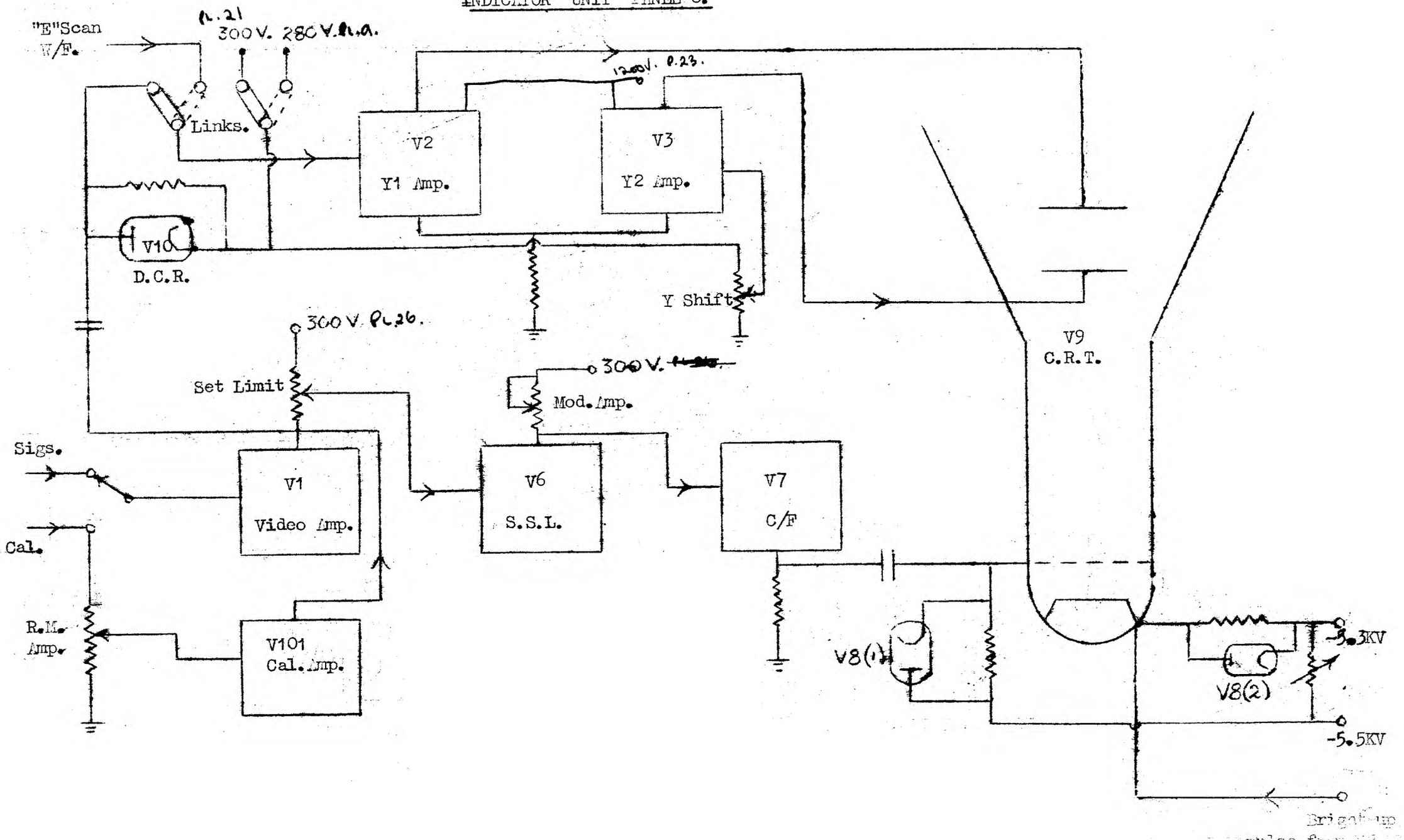
1200
200
1200
2200 mean 1700

600
-400 100V.

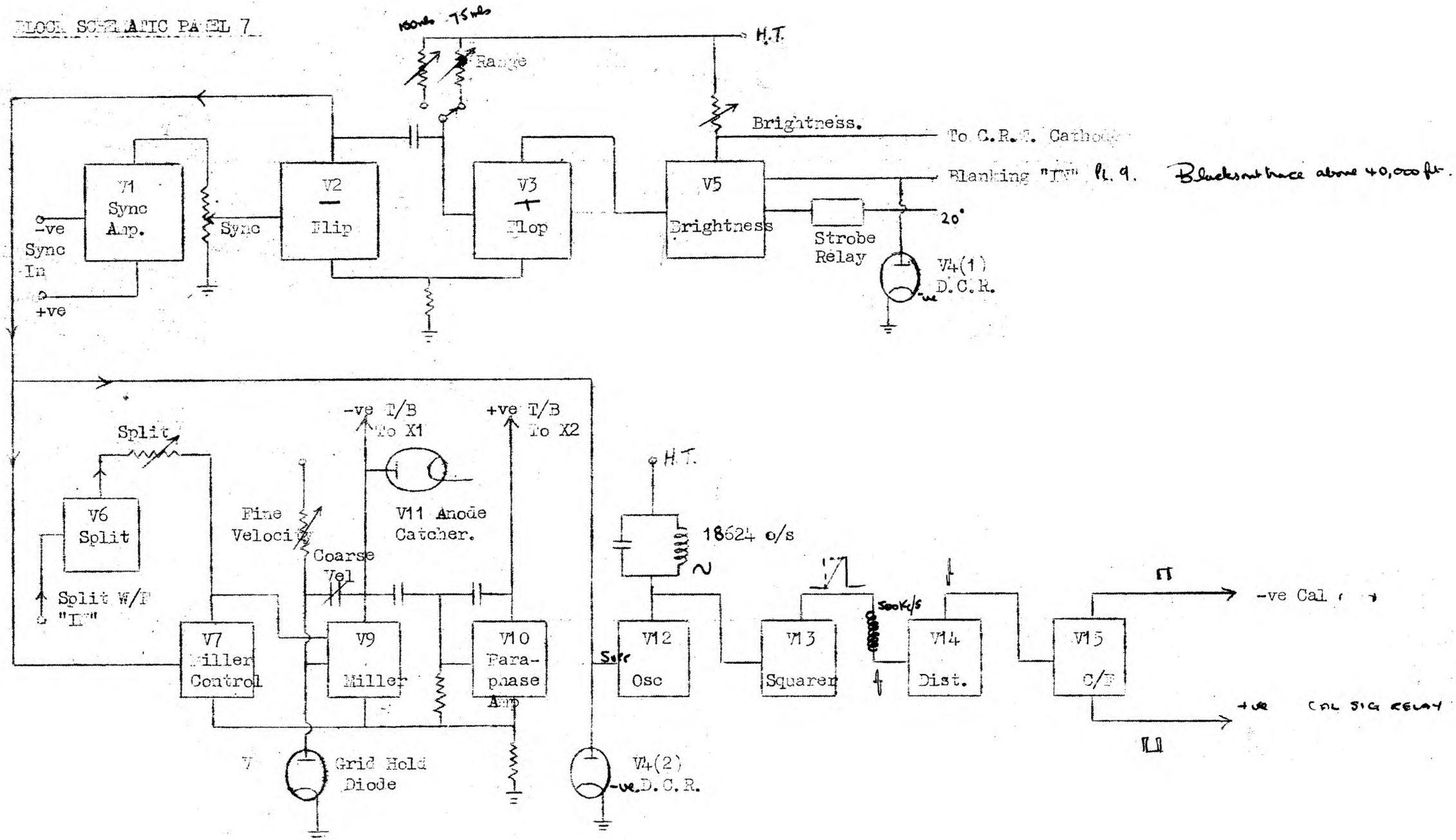




INDICATOR UNIT PANEL 8.



BLOCK SCHEMATIC PANEL 7.



PANEL 7 TIME-BASE PANEL.

PURPOSE. 1. To produce the time-base.
2. To produce calibration markers.
3. To eliminate flyback. (Brightness).

The circuit of Pl. 7 can be divided into three sections.

(a) Triggering & brightness. (V1 to V5)
(b) Time-base generator. (V6 - V11)
(c) Calibration. (V12 - V15)

(a) The triggering and brightness section is the same as in Pl. 5 except for the coupling between V1 & V2, and the number of ranges.

(c) The calibration cct. is identical to that in Pl. 5, except that H.T. to the "Cal" oscillator is not broken when the SIGS/CAL switch is in the SIGS position.

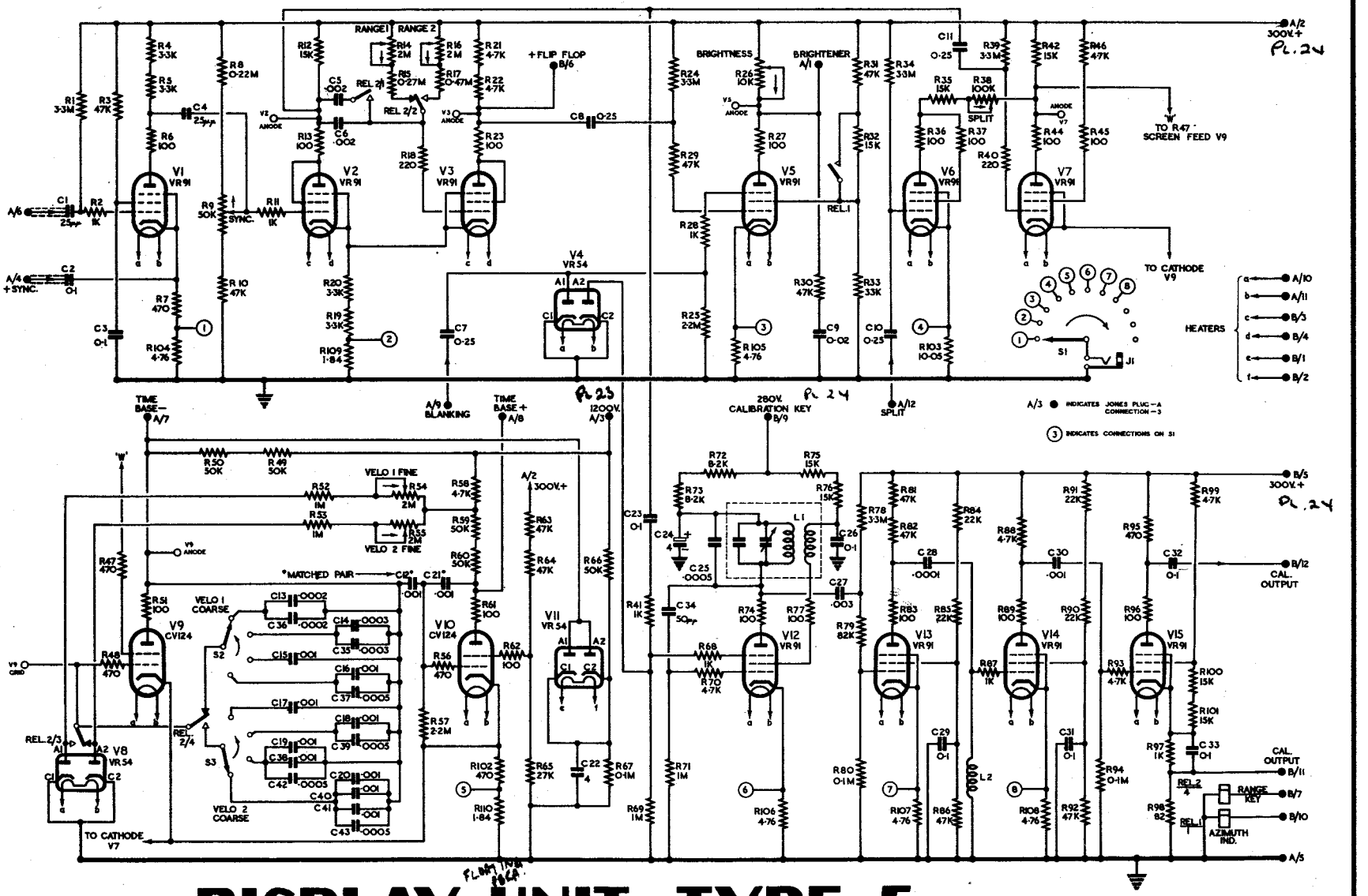
TRIGGERING AND BRIGHTNESS SECTION V1 to V5.

Action The circuit is the same as in Pl. 5, with the following exceptions.

1. The R.C. coupling between V1 & V2. This cct. differentiates the output from V1, so that the triggering pulse applied to V2 is a small, narrow +ve going pulse.
2. There are only two ranges on the flip-flop.
3. The Strobe relay is operated by the "AZIM IND." switch and the Aerial switch. The aerial switch is on the aerial tilting mechanism, and is adjusted to close at a pre-determined position, to give a "strobe" bright-up at a definite angle of tilt (Usually 5 degrees).

CALIBRATION CIRCUIT.

The calibration cct. (V12 - V15) is modified so that calibration markers are displayed all the time irrespective of the position of the SIGS/CAL switch. This is the only way in which the cct. differs from the "cal" cct. in Pl. 5.



DISPLAY UNIT TYPE 5

Time Base Unit Type 37

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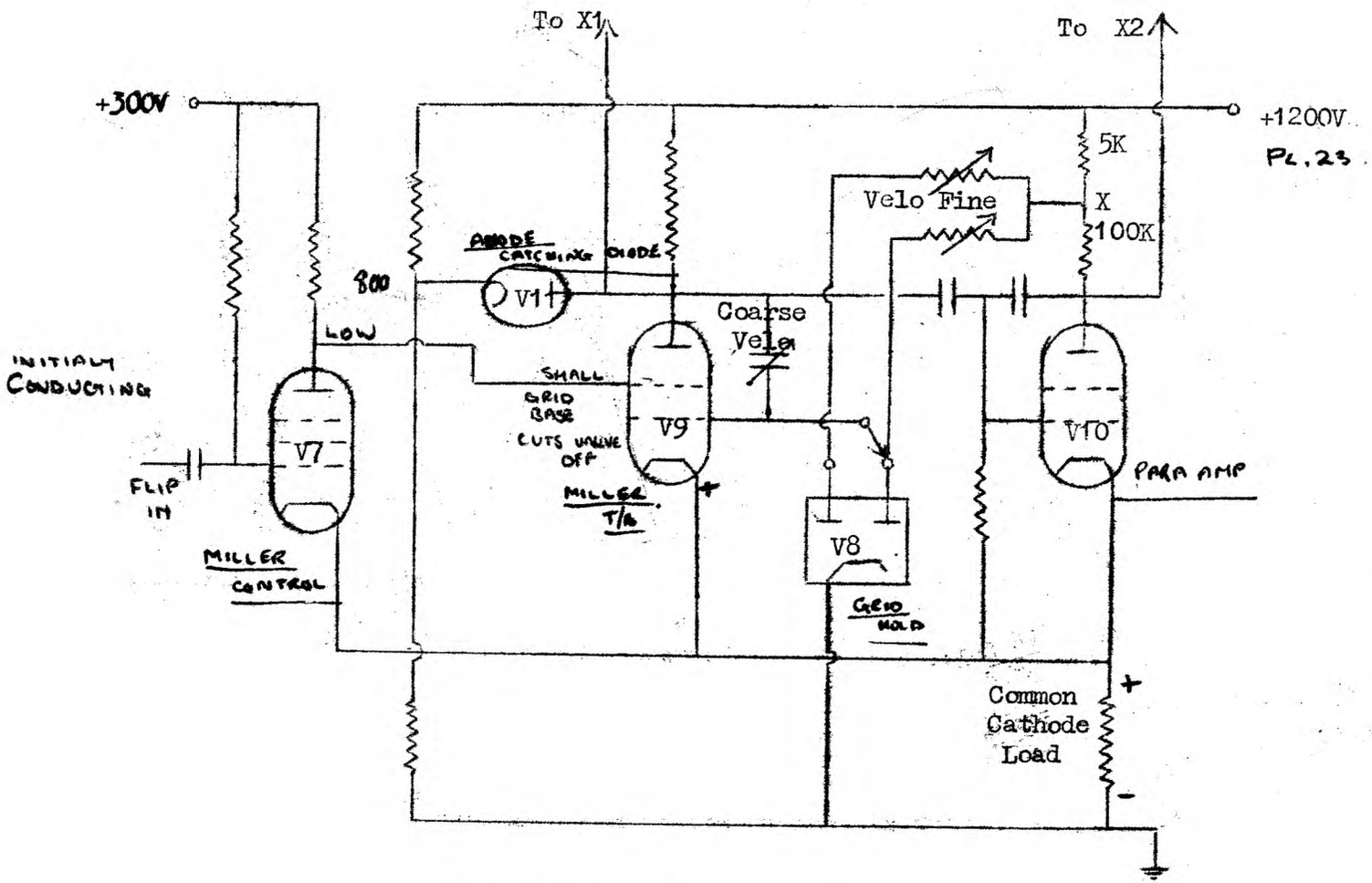
PANEL 7 - TIME-BASE PANEL.

Time-base Generator Section - V7 to V10.



SIMPLIFIED TIME-BASE CIRCUIT.

CIRCUIT ACTION.

V7 to V10 Static Conditions. V7 and V10 are conducting. V9K is therefore +ve with respect to earth (due to current through common cathode resistor). V9G is held at earth potential by the "grid hold" diode, V8. As there is a direct connecti between V7A & V9S, the screen potential of V9 is well below H.T. (V7 is conducting. Combination of these factors results in V9 being cut off.

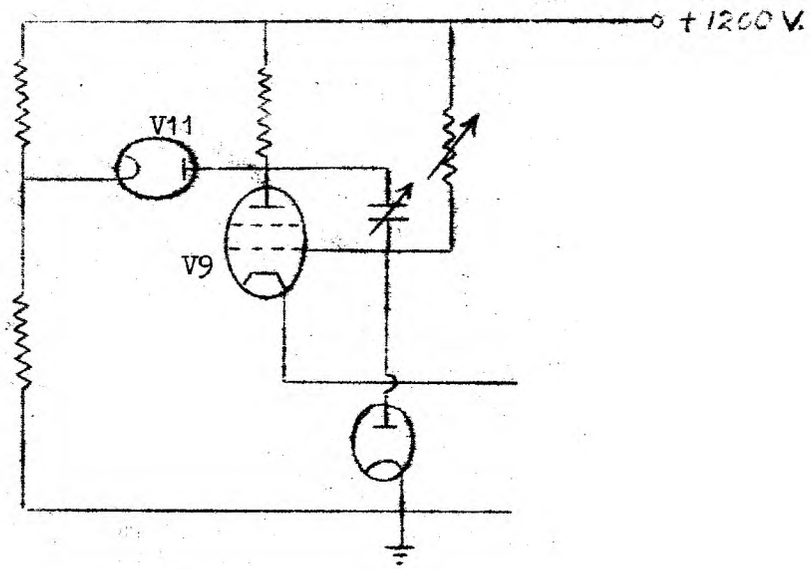
Triggering Action Negative going square wave from "flip" (V2), applied to grid of V7, cutting valve off. Potential at V7A rises, lifting V9S Due to decrease in current through the common cathode resistor, V9K falls. The increase in screen potenti and fall in cathode potential results in V9 conduc ing. Miller action takes place.

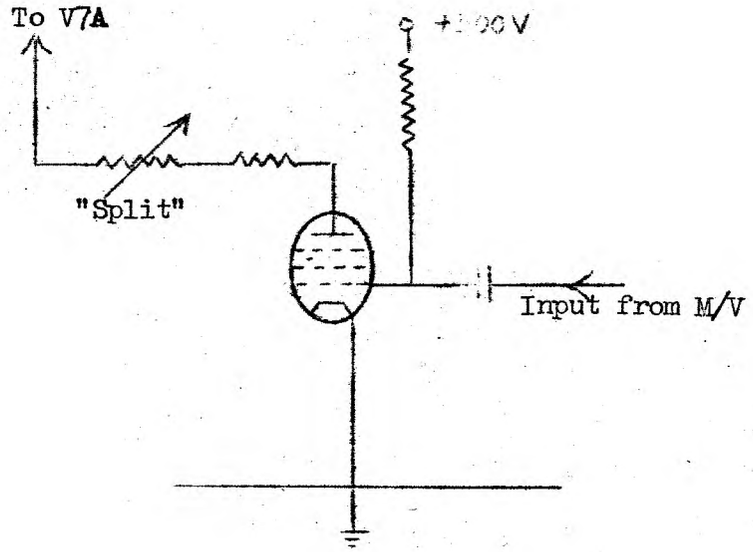
V10 is connected as a "floating" paraphase amplifier to V9. Output from V9 is therefore of equal amplitude but opposite in phase to V9.

Linearity. To ensure extreme linearity, the FINE VELOCITY controls, (Miller grid leaks), are returned to a tapping on the anode load of V10. Thus as the Miller condenser charges, lifting the potential of V9G, the potential at point X is also rising at the same rate. The potential across the VELO control is therefore constant, resulting in a constant charging rate to the Miller condenser.

PANEL 7 TIME-BASE

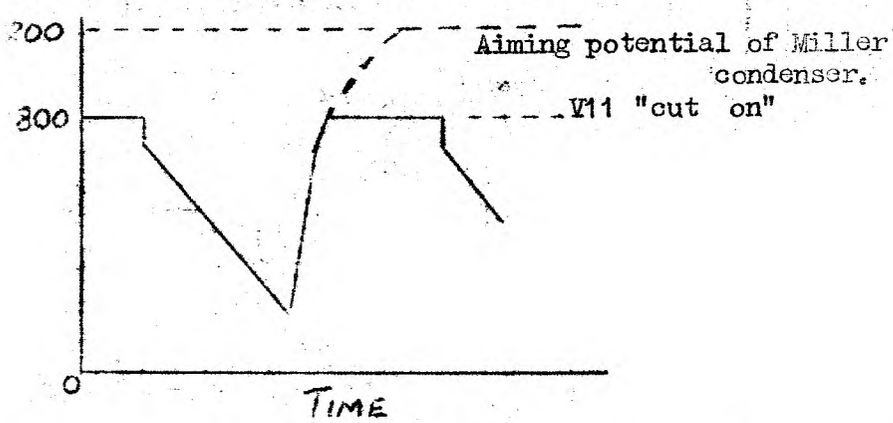
Action of V11 , The Anode Catcher.





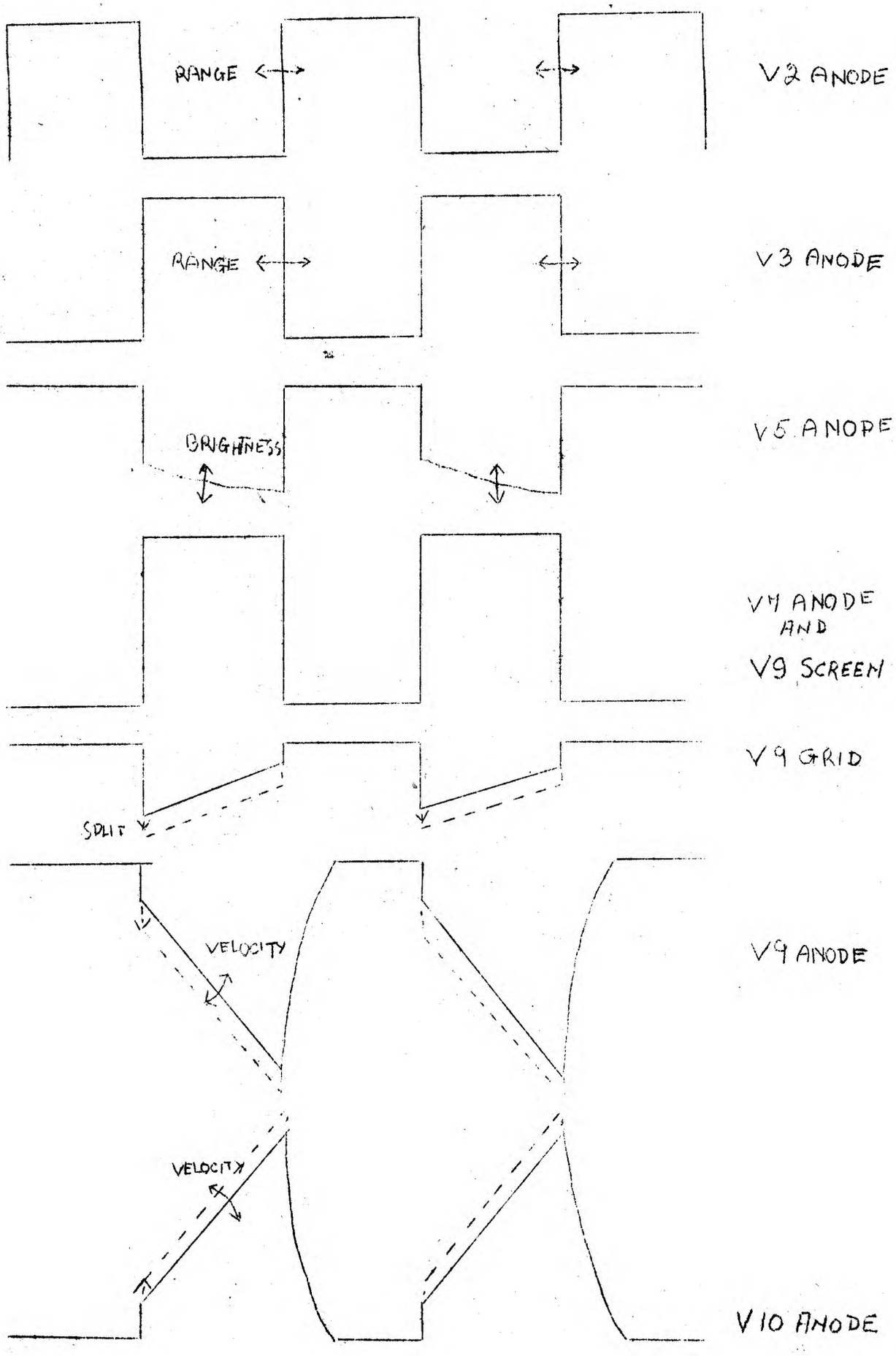
PURPOS To reduce the time of the "flyback".

ACTION. Cathode of V11 connected to a bleefer network across the supply and is 800V =ve with respect to earth. Anode of the diode connected to the anode of the Miller valve V9.
Under static conditions V11 is conducting, holding the anode of V9 at 800V approx. .
When V9 is triggered its anode potential falls and V11 is cut off. At the end of the triggering pulse V9 is once more cut off and the Miller condenser commences to charge,



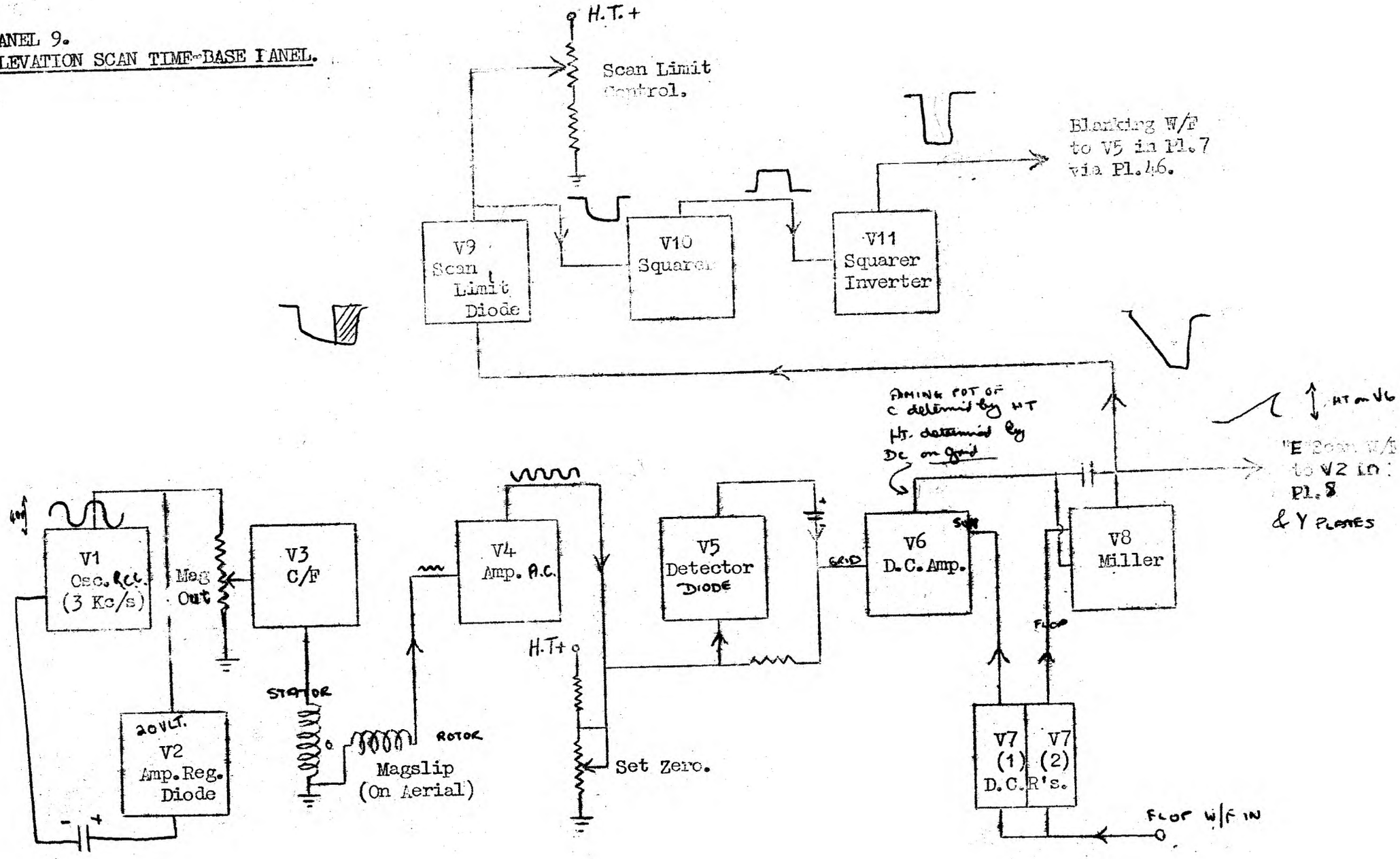
its aiming potential being 1200V. As soon as it reaches 800V the anode catcher V11 conducts , holding the potential of V9A at 800V

V6 Split Valve. PURPOSE To provide a method of shifting alternate traces to the right, thus affording facilities to compare signal amplitudes for height finding.
ACTION. A square wave at half P.R.F. obtained from a multi vib unit is applied to V6G. The -ve half cycle will cause potential at V6A to rise. V6A is connected to V7A via a variable resistor(Split Control). Therefore as V6A rises, V7A & V9S rises simultaneously. Increasing the screen potential of V9 effectively increases the grid base of the valve, which in turn will increase the step in the time-base waveform.
Thus alternate traces are displaced to the right, the amount of displacement being dependent upon the amount that the "step" is increased by.
This is controlled by the "Split" control.

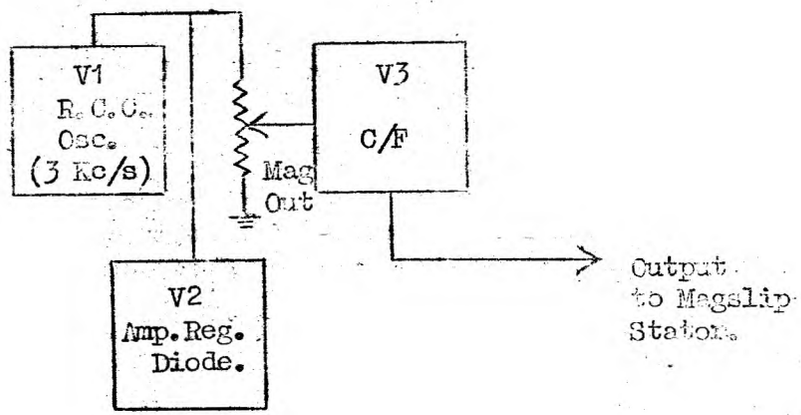


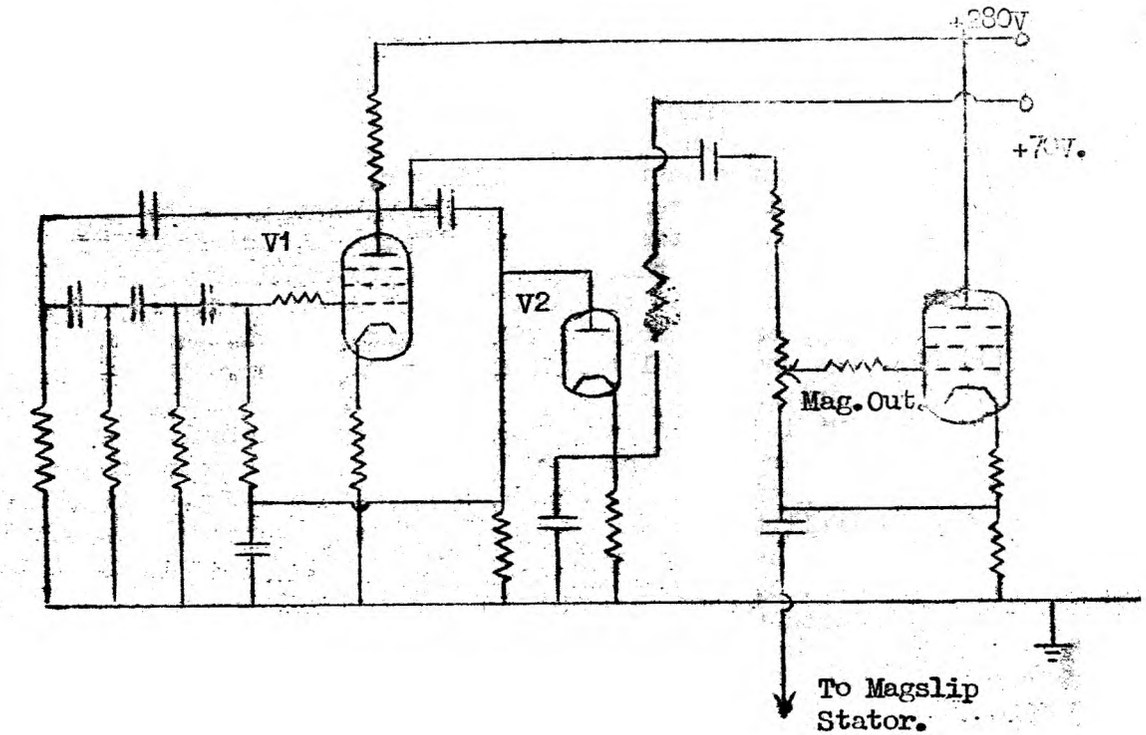
PL'Y TIMEBASE WAVEFORMS

PANEL 9.
ELEVATION SCAN TIME-BASE PANEL.



ELEVATION SCAN PANEL 9.





PURPOSE. To produce a miller time-base waveform, whose velocity varies as the angle of tilt of the Type 13 Aerial varies.

CIRCUITRY. V1, V2 & V3.

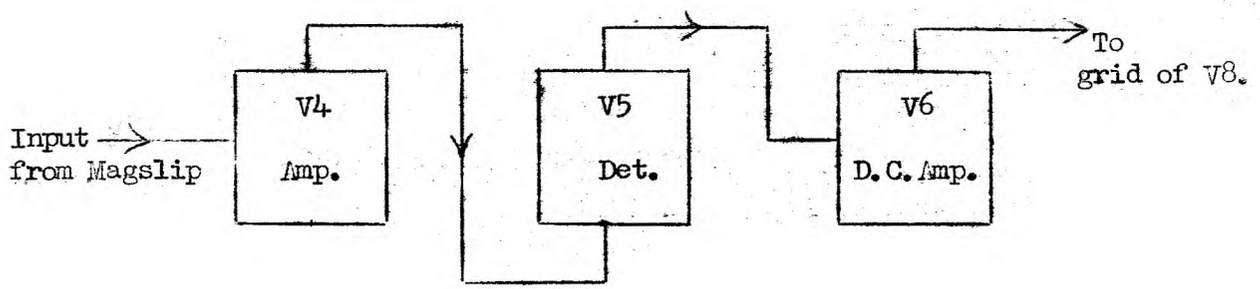
V1. R.C.C. Oscillator. This valve produces a sine wave output at a fixed frequency of 3 Kc/s. The amplitude of oscillation is kept constant by the action of :-

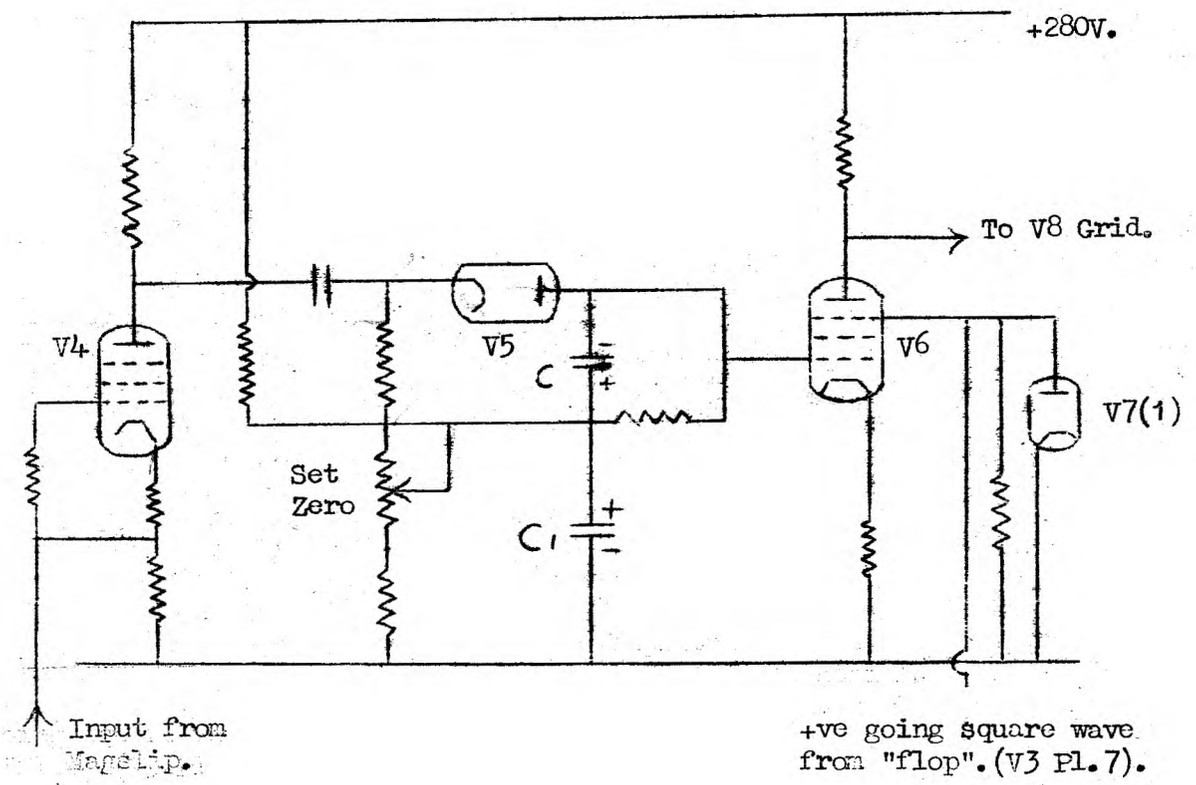
V2. Amplitude Regulating Diode. This valve controls the amplitude of oscillation in the same way as its counterpart in Pl.26.

The output from V1 is applied to V3 via the MAG OUT control. V3 is a cathode follower, which matches into the co-axial cable feeding the sine wave to the stator of a magslip, mounted on the Type 13 Aerial.

The MAG OUT control decides the amplitude of the oscillations fed into the magslip.

ELEVATION SCAN PANEL 9 - V4, V5, V6 & V7(1).





The voltage induced in the magslip rotor varies in amplitude, as the angle through which the aerial is tilting varies. It is arranged that maximum coupling between stator and rotor occurs when the aerial is at its greatest angle of tilt.

The rotor output is applied to and amplified by V4. Output from V4 is applied across the diode V5, which rectifies it. The rectified output charges the condenser C, themean D.C. voltage appearing across the condenser being directly proportional to the amplitude of the sine wave output from V4. (Which in turn depends upon the angle at which the aerial is tilted).

NOTE. To avoid working over the non-linear portion of the diode characteristic, the magslip rotor is offset, to turn from +5 to +31 degrees, as the aerial tilts between -1 and +25 degrees.

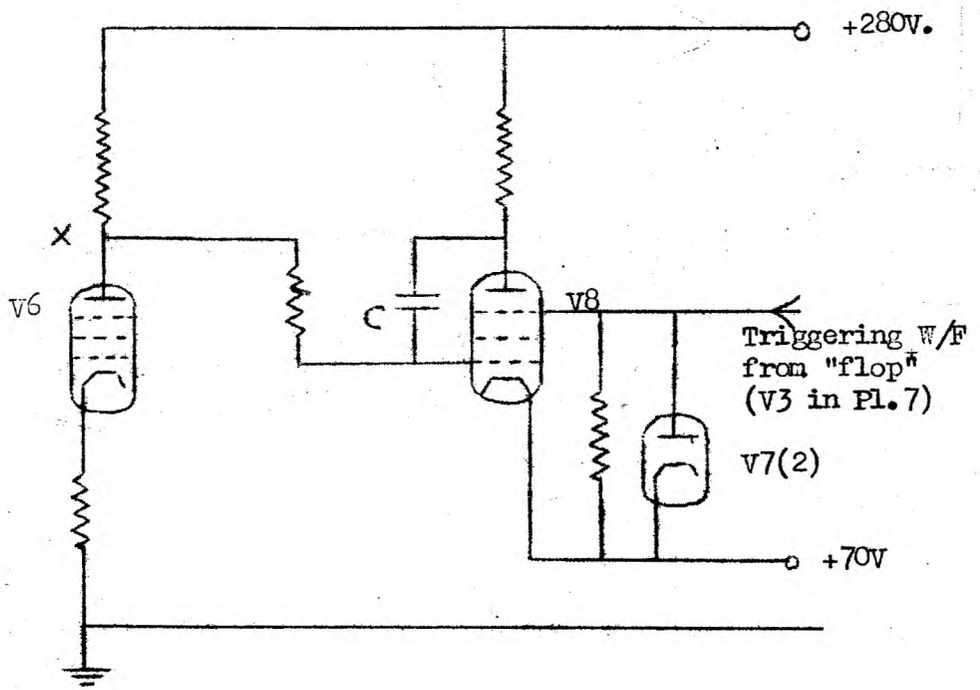
The D.C. voltage developed across C, is applied as bias to the grid of the D.C. amplifier (Miller Control valve) V6. With the aerial at -1 degrees there should be no output from the magslip rotor, but due to the offset there is, with a resultant voltage appearing across C.

To cancel the effect of this, a +ve potential is applied to V6G via the "SET ZERO" control. This should be adjusted so that when the aerial is at -1 degrees, the voltage appearing across C1, is exactly equal to that across C.

As the aerial tilts, the voltage across C increases, driving the grid of V6 negative. Consequently V6A rises.

V6 is cut on and off by applying negatively restored square wave from V3(flop), to its suppressor. When cut off V6A will be at H.T., and when cut on its potential will fall to a value decided by the bias on V6G (i.e. voltage across C). Thus the W/F at V6A will be a series of square waves, whose amplitude varies sinusoidally, in sympathy with the position of the aerial.

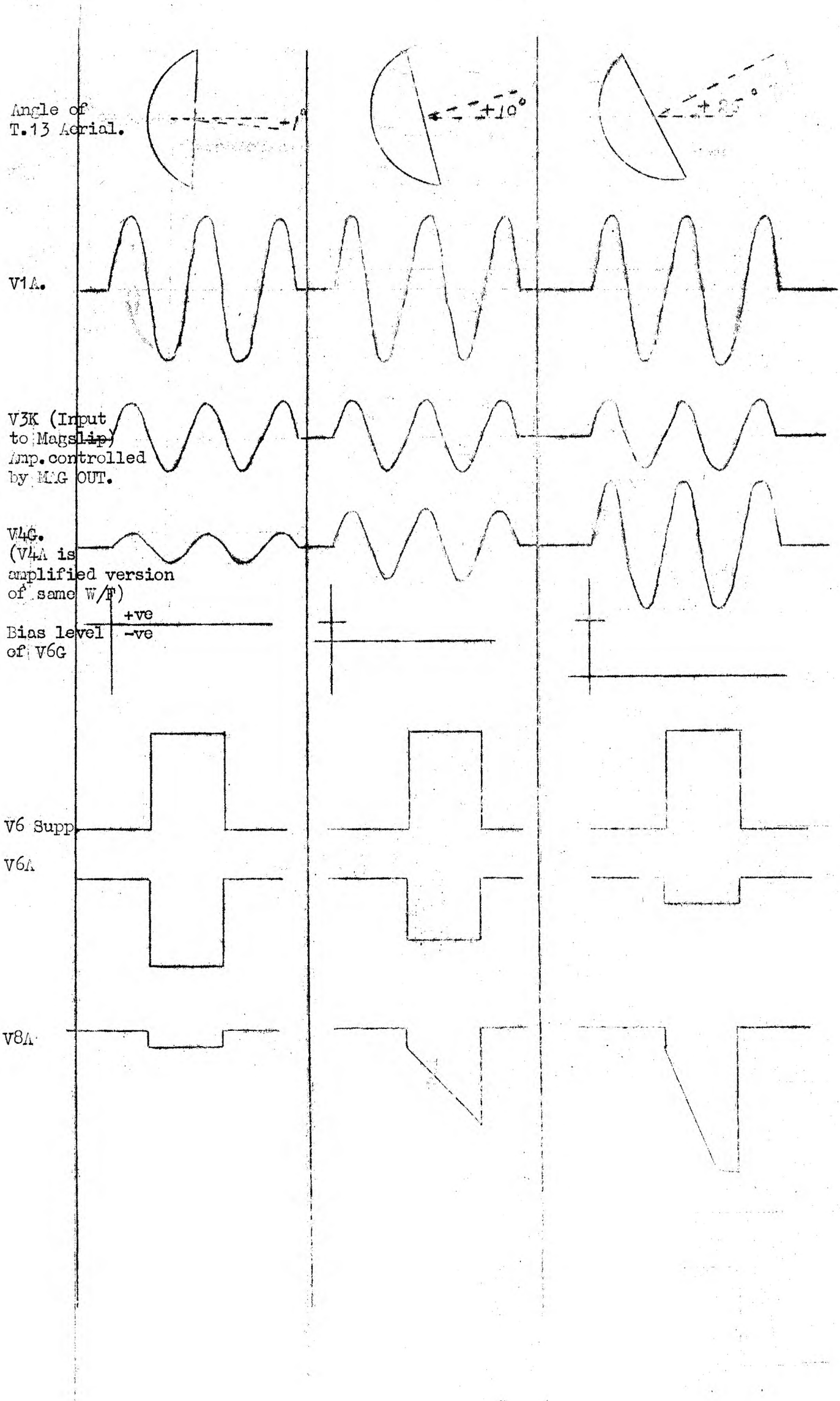
ELEVATION SCAN PANEL 9. MILLER VALVE V8.



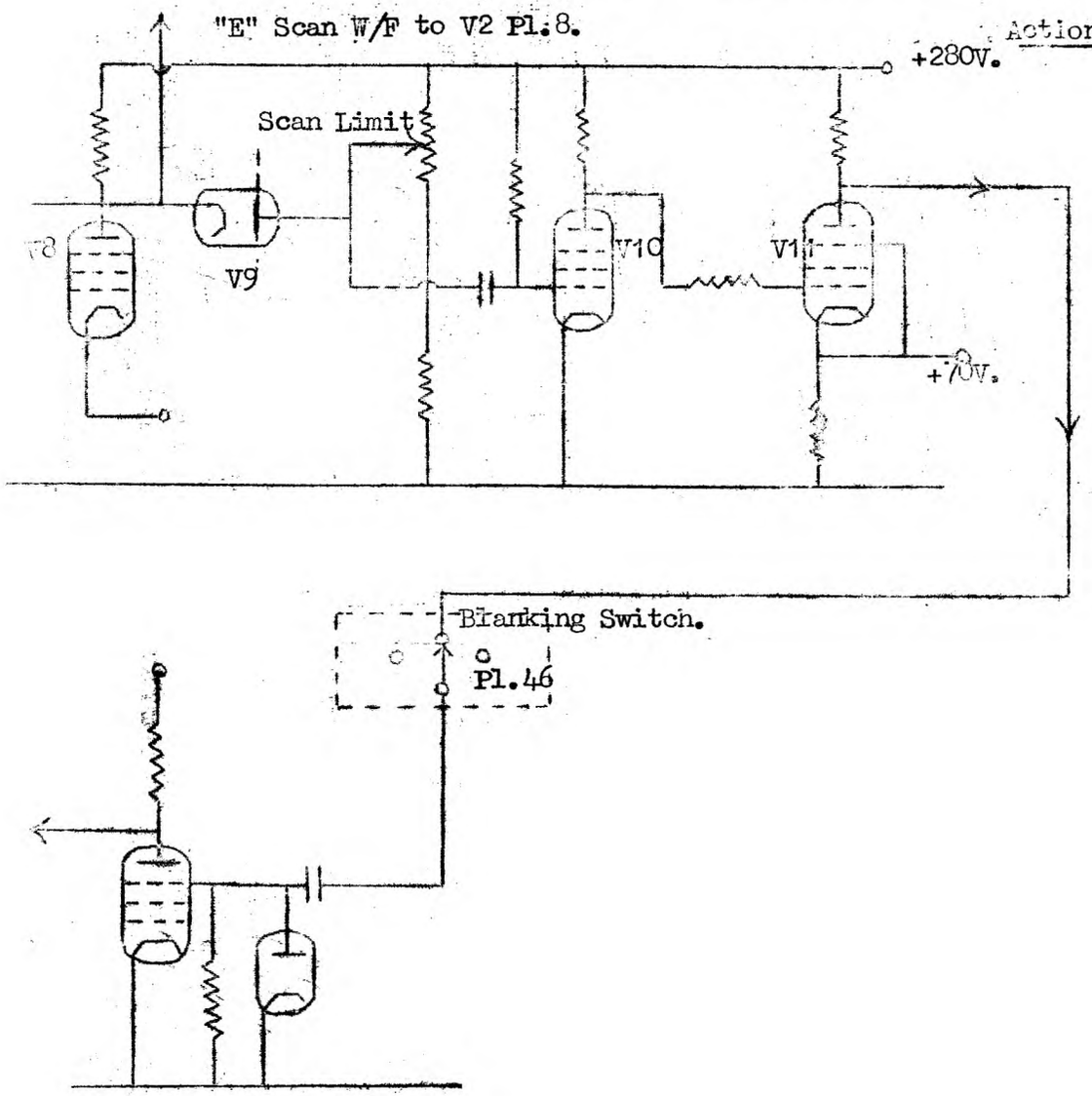
CIRCUIT ACTION. V6 and V8 are triggered simultaneously by waveform from "flop"(V3 in Pl.7). Triggering waveform is negatively restored by V7.
Ontriggering V8 conducts and its anode potential falls taking V8G down with it. The miller condenser commences to charge, its aiming potential being the potential of V6A.
V6 was triggered at the same instant as V8, and its anode potential fell to a value decided by the bias on its grid, the bias at V6G has been shown to vary as the angle to which the T.13 Aerial tilts.
Thus the aiming potential of the miller condenser (VELOCITY), is varied in sympathy with the angle at which the T.13 Aerial is tilted.

Consequently the output from V8 is a miller waveform, varying in velocity.
This is amplified in Pl.8 and applied to the C.R.T Y plates

PANEL 9 V1 - V8 WAVEFORMS



ELEVATION SCAN PANEL 9



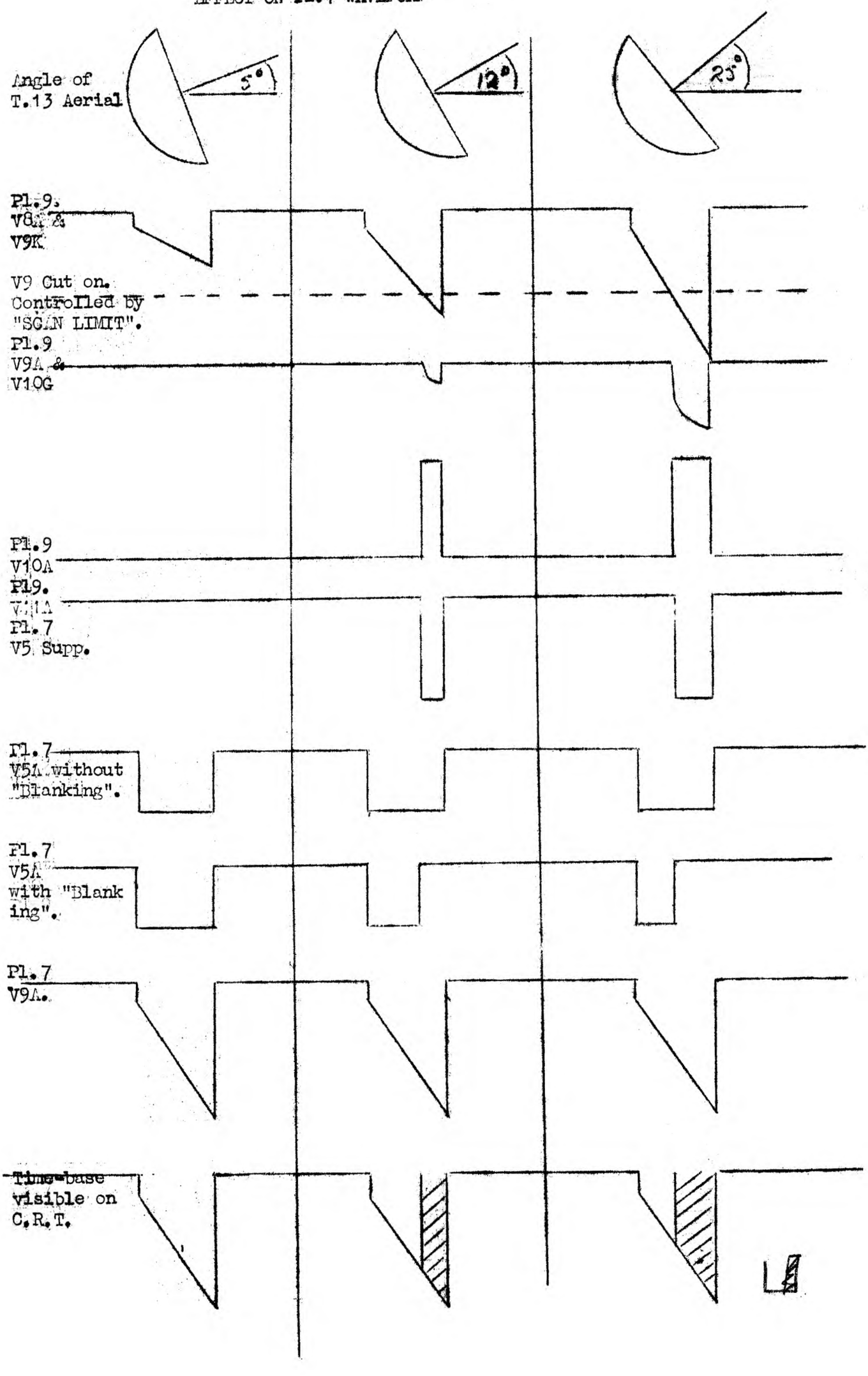
Action of SCAN LIMIT Diode.

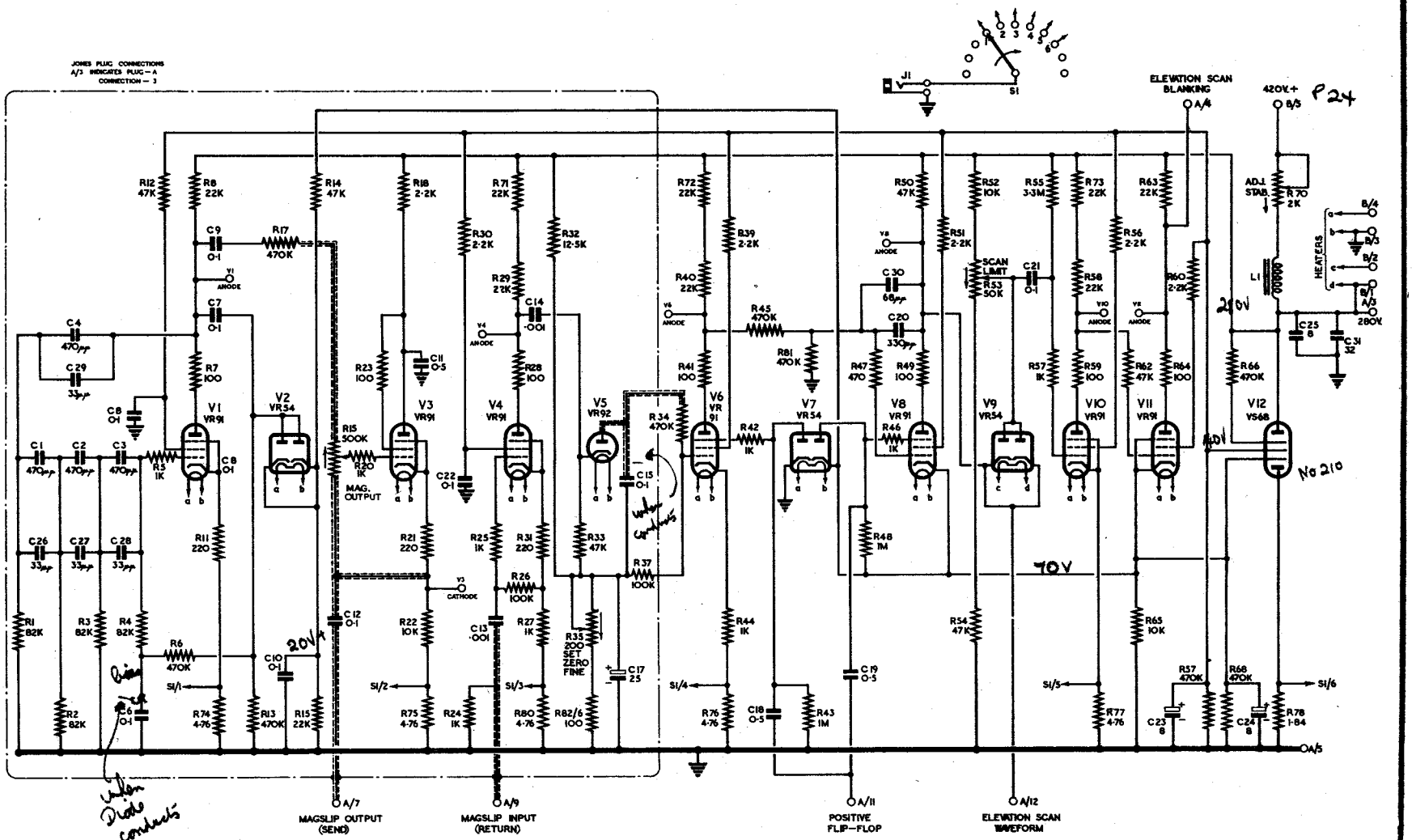
PURPOSE To blank out unrequired portion of "height"display

Action V9 - Scan Limit Diode.

Output from V8 is fed to the cathode of a diode V9.
The anode of V9 is held at a potential lower than H.T., potential being decided by the setting of a pot'meter, the Scan Limit control.
During quiescent period of the time-base, V9 is non-conducting, (cathode is +ve with respect to anode).
When V8 is cut on and commences to "miller", its anode falls, carrying the cathode of V9 down with it. At the instant that the cathode of V9 falls below the anode potential, V9 conducts, and will continue to conduct until V8 is once more cut off.
The waveform produced at V9 anode is a rough form of square wave,
Output from V9 anode is applied to grid of a "shaper" valve V10, which produces a +ve going square pulse at its anode.
This receives further shaping and inversion through the succeeding stage V11.
The -ve going square wave produced at V11 anode, is applied to the suppressor of V5 (Brightness valve) in Pl.7., via the BLANKING SWITCH on Pl.46.
This cuts V5 off, thereby eliminating the "bright up" pulse which it was producing at its anode.

Pl.9 BLANKING WAVEFORMS showing
EFFECT ON Pl.7 WAVEFORM





DISPLAY UNIT TYPE 5

Scanning Unit Type 14

FOR FURTHER INFORMATION SEE A.P 2897 B (2)

FOR FURTHER INFORMATION SEE A.P 2897 A

RESTRICTED

PREPARED BY THE MINISTRY OF SUPPLY FOR PROMULGATION BY AIR MINISTRY

AIR DIAGRAM 4370/MIN

ISSUE 1 12 SHEETS - SHEET 5. MAR. 1949

A.L. No.

DATE

INITIALS

R.T.P

C.B.H. 16971

SETTING UP PROCEDURE - CONSOLE 15.

"Y" SCAN (RANGE).

1. Check position of the "links".
2. Switch on Console and allow to "warm up".
3. Place "sync" switch on Pl.46 to L.P.O. position, and the "blanking" switch to OFF.
4. Monitor stabilovolts in Pl.24 & Pl.9, and adjust for a current of 20 mA.
5. Switch on CAL, and adjust SYNC control on Pl.7 for a stable trace on both ranges. Adjust FOCUS & STIG controls.
6. Adjust BRIGHTNESS controls on Pl.7 & Pl.8 to eliminate "flyback".
7. Switch to Range 1, and adjust Range 1 control for 15 Cal. pips.
8. Adjust X Shift control so that the first Cal. pip coincides with the first marker on the range mask.
9. Adjust VELO 1 controls (Coarse & Fine), so that Cal. pips coincide with respective markers on Range mask.
10. Switch to Range 2, and adjust Range 2 control for 30 Cal. pips.
11. Adjust VELO 2 controls so that Cal. pips coincide with respective markers.

N.B. X Shift should not be adjusted for Range 2.

12. Re-check Stabilovolts.

"E" SCAN (HEIGHT).

1. Check position of the "links".
2. Turn MAG OUT control to minimum and SCAN LIMIT to Maximum. Adjust SET ZERO control to obtain a horizontal trace.
3. With "links" in the "E" scan position, set up Pl.7 as for "Y" scan on ONE RANGE ONLY.
4. Switch on Aerial tilting motor.
5. Adjust MAG OUT & SET ZERO controls until trace tilts through the correct angle. Use MAG OUT control to adjust the trace for the maximum angle, and the SET ZERO control for horizontal trace.
6. Place BLANKING switch (Pl.46) to "E" scan position, and adjust SCAN LIMIT control so that trace is "blacked out" above 40,000 ft.

SIGNAL CHAIN.

This is set up in a similar manner to chain in Console 16.

An alternative method of adjusting AMP LIMIT control (Pl.3), is to adjust the control for a "Ground Ray" of 6 cms., when setting up on "Y" Scan.

Panel 45 Termination Board

Pye Plugs

P_1	I/F in
P_3	+ve sync. T.13.
P_4	+ve sync T.14.
P_5	−ve sync T.11.
P_6	magslip in
P_7	" Out
P_8	Calibrator out

Jones Plug "A"

A_1, A_2 } Regulated mains

A_7, A_8 } Unregulated mains

A_9, A_{10} 50V Azimuth Indication.

Panel 46

Sync. Switch as for panel 47 Additional compensating resistor on panel 46 drops 200V from panel 26 thus compensating for the fact that this power unit does not now provide focus and shift [as in console 16]

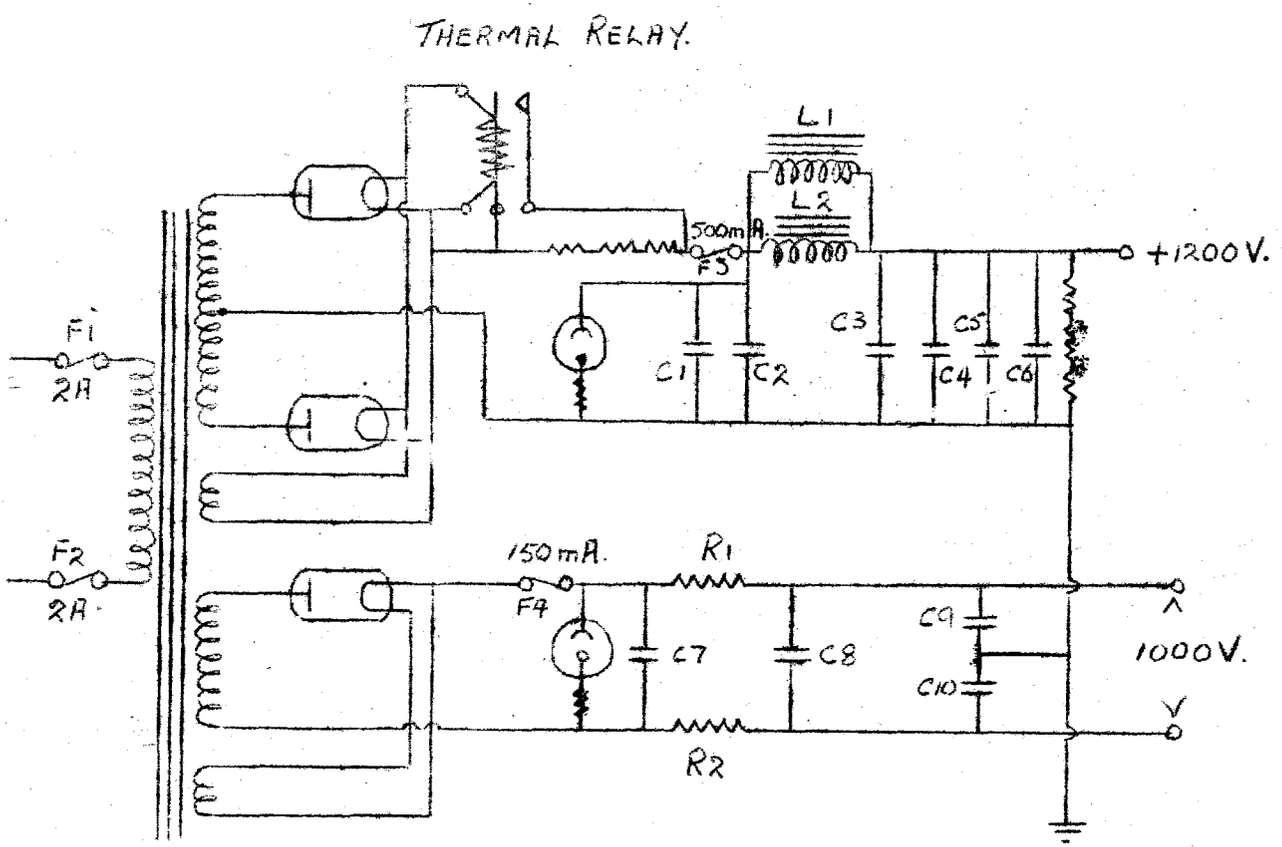
Blanking Switch

Function selects one of two blanking sources.

1) Selects external blanking.
2) The elevation scan waveform from panel 9 i.e. the blanking waveform which blanks out the unwanted portion of the trace on the C.R.T.
3) Off position — switches off incoming blanking.

* Unless on E scan blanking should be "off" and vice versa

POWER UNIT PANEL 23.

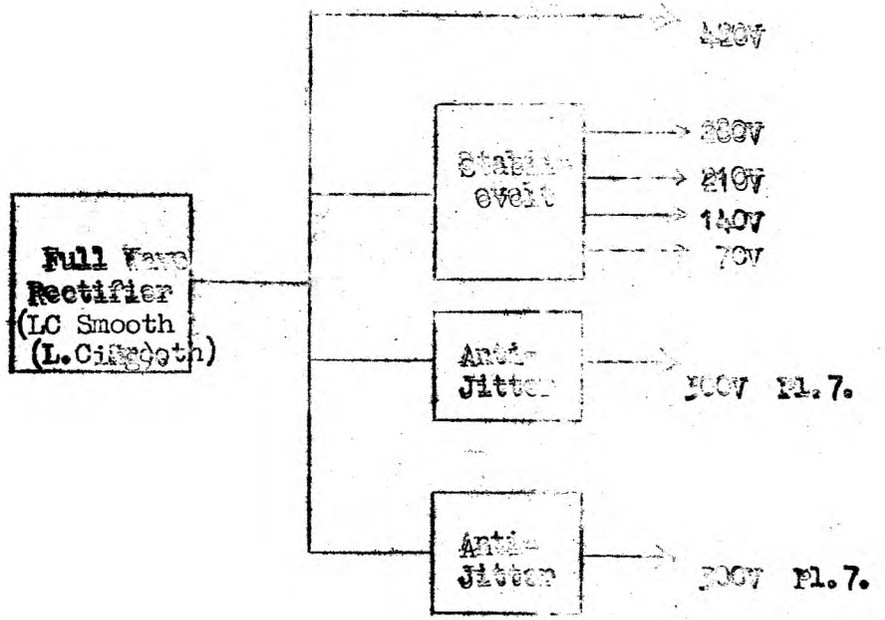


INPUT. 230V 50 c/s. Fused by F1 & F2.
Transformer has two secondary windings.

OUTPUT. From Secondary 1 is 1200 0 1200V.
This is applied to two half wave rectifiers (CV54), connected as afull wave rectifier.
Output from the rectifier is LC smoothed by L1, L2, C1 to C6.
The 1200V D.C. output is fed to :-
Pl.7 V9 & V10.
Pl.8 V2 & V3

The output from Secondary 2, 1000V, is applied across a half wave rectifier.
Output from the rectifier is R.C. smoothed.
The output is 1000V floating and is fed to Pl.8 to "X Shift" and "Stig" networks.

POWER UNIT PANEL 24.



Pl.24 consists of a conventional full wave rectifier, its output (420V-D.C.) being fed out through four circuits.

Outputs. 1. 420V fed to Pl.9.

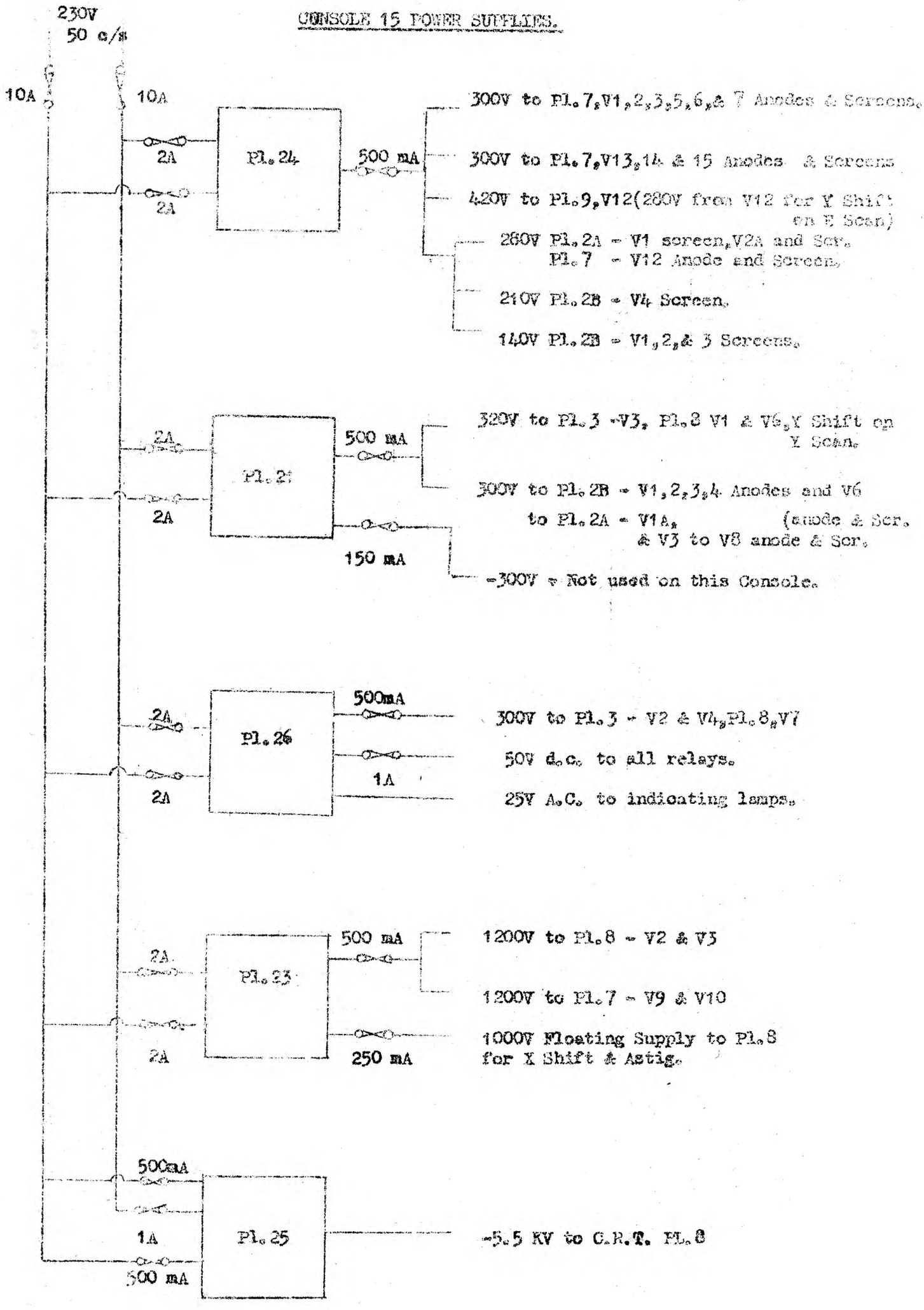
2. Fed across a Stabilovolt.
   Outputs taken from stabilovolt as follows :-
   280V to V12 in Pl.7
   " to V1 & V2 in Pl.2A.
   210V Screen supply to V4 in Pl.7B.
   140V " " " V1,V2 & V3 in Pl.2B.

3. Applied via an anti-jitter cct. to Pl.7 and supplies 300V to V1,2,3,4,5,6,7. & screen supply of V10

4. Applied via an anti-jitter cct. to V13, 14 & 15 in Pl.7.

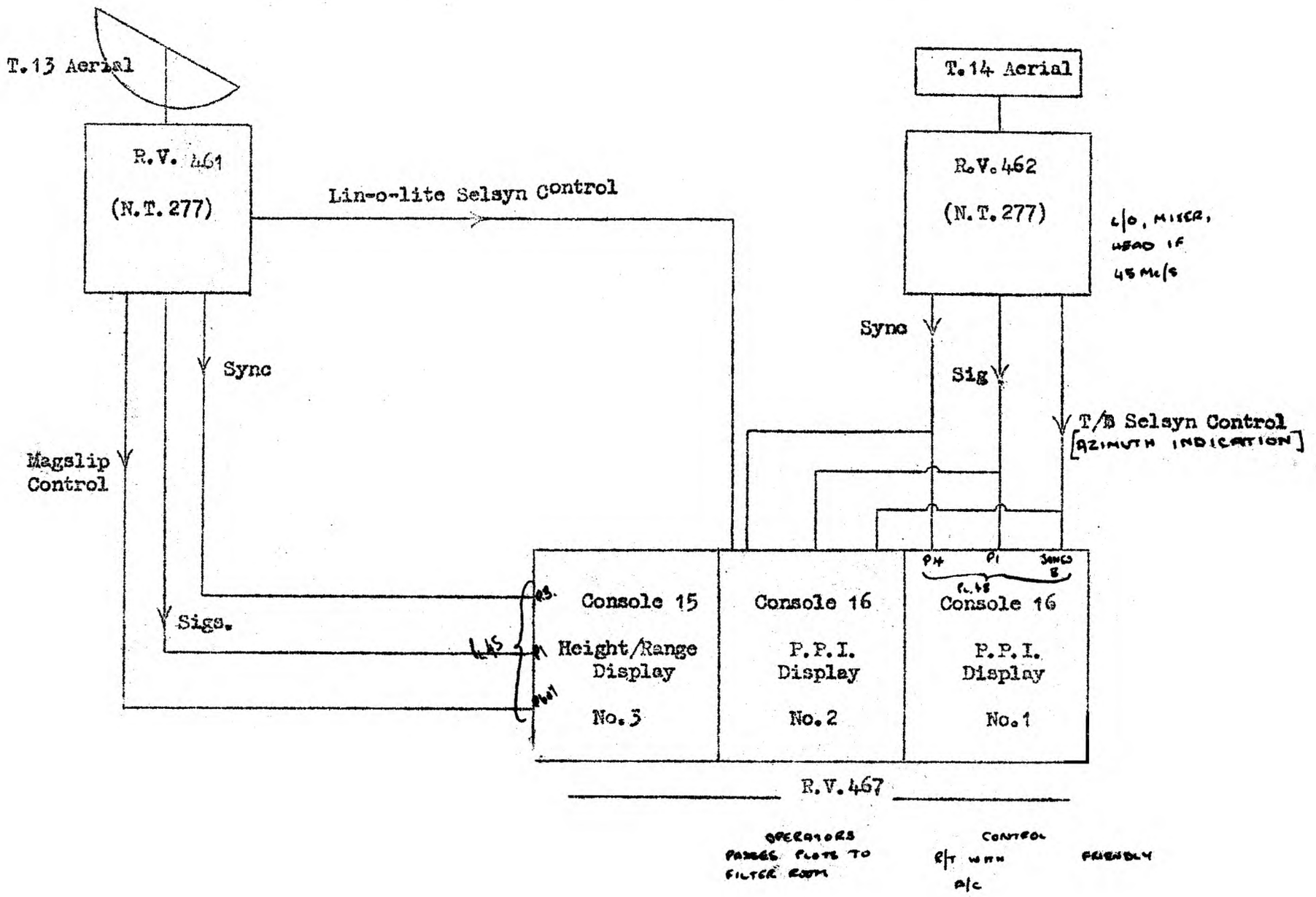
NOTE. The anti-jitter ccts. are identical to the one employed in Pl.22 in C.16.

CONSOLE 15 POWER SUPPLIES.



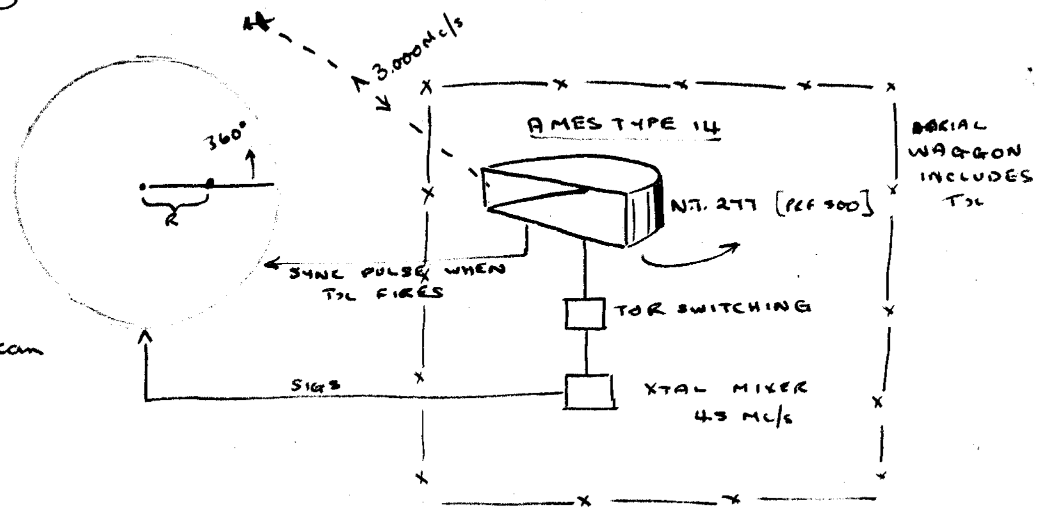
ALSO DIESEL VEHICLES

APPLICATION OF D.U.5. in TYPE 21 CONVOY.

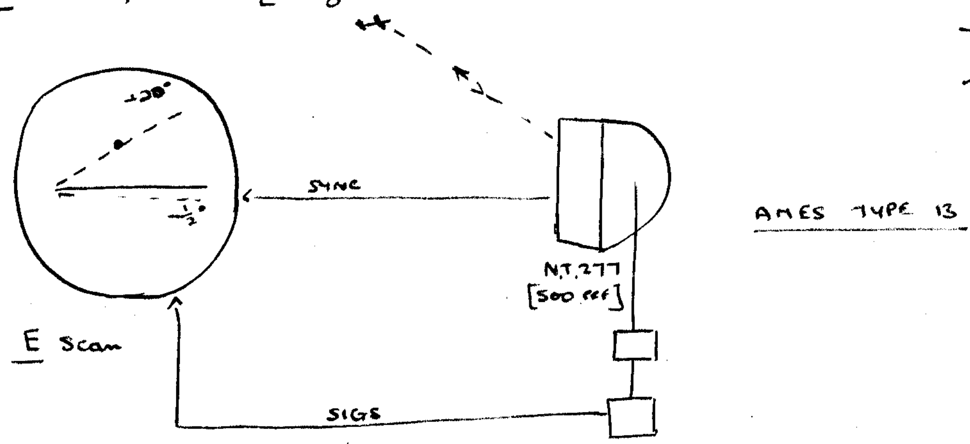


D.U.S.

Display Cons T.16. [Range & bearing]



Display Cons T. 15. [Height]



53
~~106~~ × 100
~~1500~~
75

75
7
525

75) 5300
525
050

B/U at due N.

At a pre determined position of T 14 aerial resolver in screen of B/U volume is slotted. Thus at due north trace brightens allowing selsyns to be lined up.

Line of light on T 16 gives T 15 operator chance to point aerial in direction of aircraft. 20° indication light also.

Cal pips may be displayed on both traces

Console T.16. SEE BLOCK DIAGRAM

Sigs fed in on coaxial cable at f of 45 Mc/s. Normally sigs have nothing to do with 2A, an interference panel. Instead they are fed to panel 2B the main IF strip [5 in number bandwidth 4 Mc/s staggered tuning and damping]. Then to a diode detector to video stage. ~~[illegible]~~ Panel 3. From there to grid of C.R.T. Switch for sigs or cal. NBW panel (2A) works on a narrow bandwidth ½ Mc/s in the event of interference, it may be switched in and out by switch on front. To get narrow bandwidth the IF is reduced to 20 Mc/s.

Panel 3 is the most important one it generates T/B, B/U and cal, B/U to cathode T/B applied to coils ⌐, cal on grid of CRT. Panel 3 must be synchronised from PANEL 47 with switch 9 as P.47. various sync pulses 5 the four position switch selects each sync. If not used a local sync may be used from Panel 26 [RCC osc. and squarer]. Trains used in lab. Sync pulses goes into panel 3 and triggers F/F which trigger the remainder. Range control etc. on F/F. T/B coils rotate around tube by means of power light ~~sy~~ selsyn. The L-O-C selsyn shft around the lamp and mirror indicates position of azimuth of aerial

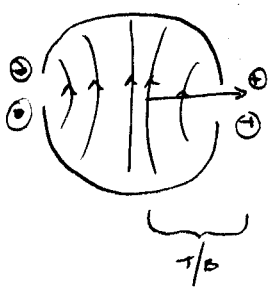
Panel 6 CRT. FOCUS SHIFT ETC.

3 valves in CRT unit are last stage of video stage amp and limiter. Cal will therefore also be amplified.

Electromagnetic tube VCR 140. E.H.T 5.5 KV from panel 25 fed to grid. Cathode slightly below (variable by brill control) Sig or Cal applied on to grid via Two large blocking condensers, loops set at side of CRT. B/U waveform applied to cathode ⊥. Sigs going to grid are positively restored to − 5.5 KV B/U waveform −ve restored to −5.3 KV Both restorers are one valve double diode VR54 Heater for diode and CRT from Panel 25 (prevents excessive insulation)

FOCUS Vary the current through the coils which varies the field in the supply from panel 26 where local sync pulse is developed

T/B A pedestal w/f applied to coils field set up. W/f from P.L.5.



Left hand rule.

c/f ~~47k~~ resistor prevents coils from ringing. Equedag or final anode at earth potential

SHIFT Obtained by two shift coils also around neck of tube

5 coil one direction and 1 coil in the other direction, reversable by changing plugs,

If X shift is moved to earth A is positive with r to B therefore spot moves towards A ~~Similarly~~ if Y shift is moved to 2.5kV. ~~Supply~~ B + ve to A [rotation]

Supply from panel 26. 300V It is really a bleeder across 300V, one end of coil varying wrt other.

Panel 5 see block Diagram.

See that sync. switch is on appropriate position assuming pin plugs are connected. T11 −ve pulse.
NT277 +ve pulse

If −ve input to V1 sync amp, a positive pulse is required to trigger f/f, it goes on grid. If goes true goes to cathode. Sync varies amplitude of triggering pulse adjusted until it just cuts flip on. Width of −ve flip pulse varied by CR in anode i.e range control S.M.R. coarse and fine control in each. +ve f/f feedback grid of V5 giving at anode a positive w/f. This is fed thro condenser and resistor to give a type of pedestal for ease elimination Brightness control in anode of V5 varies brightness and amplitude of B/U pulse.
Strobe relay operates when aerial goes through pre determined position and increases gain of B/U valve as described. External blanking from commutator on D.T.H.
+ve f/f also triggers off the miller as its suppressor held low. Suddenly suppressor lifted from −80 −ve Anode falls and since it is connected to grid. It can only fall 5V grid loses of value in anode Due to condenser grid rises whilst anode falls. Then back wise.
Step diode ∧ delays time at which grid fall thus a high pedestal can be obtained

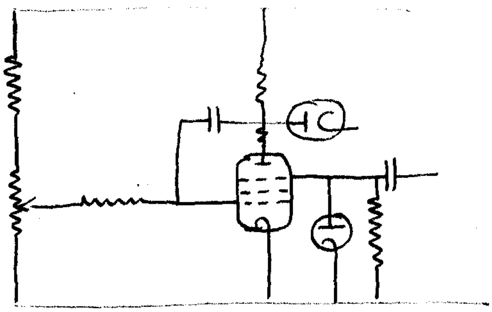
It is then fed to inverter and finally c/f with coils as load.

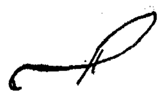
Linearity Ped w/f is +ve DCR to a voltage determined by LIN i.e. it varies bias point in c/f. Supplied from panel 21 −300V

Velocity varies width of T/B it is in grid of miller

CAL
−ve waveform triggers CAL OSC. etc see diag.

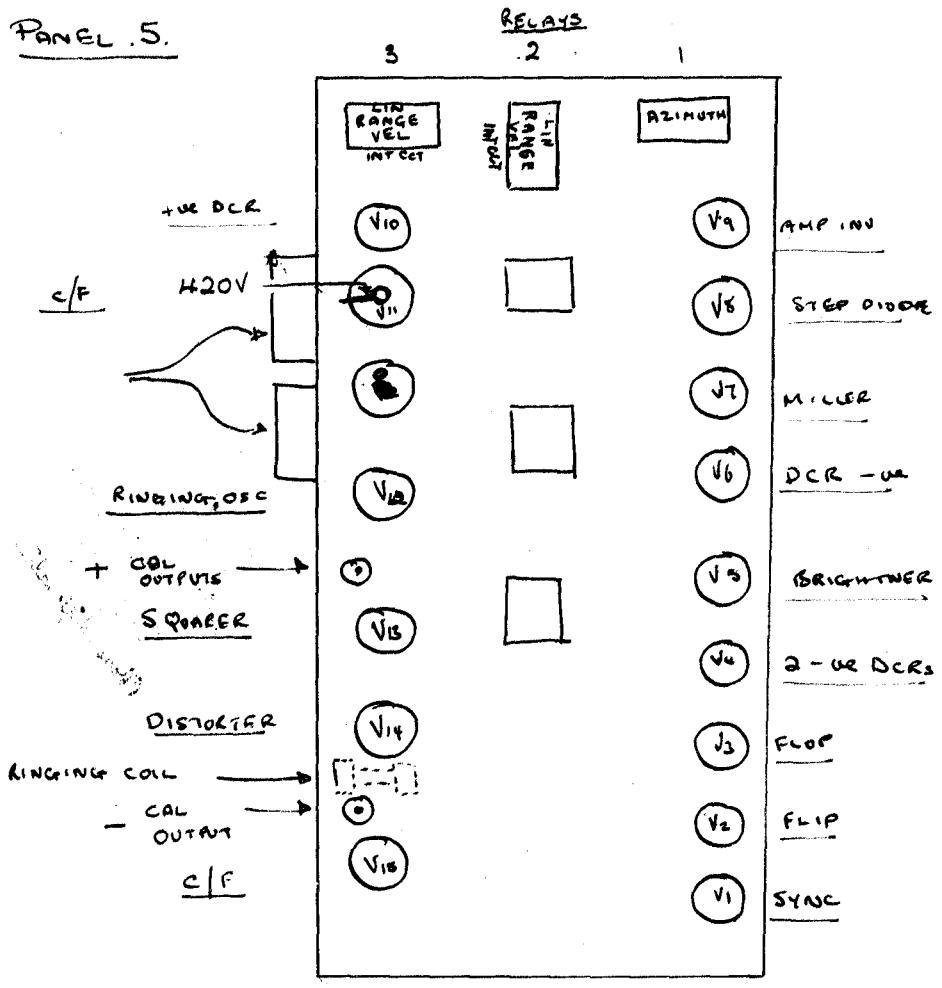
Brightline 2nd
Flip Flop
miller
Linearity osc etc
Grid current
Diode
DCR's
Phase diff selec
2A





LAYOUT DUS

PANEL 5.



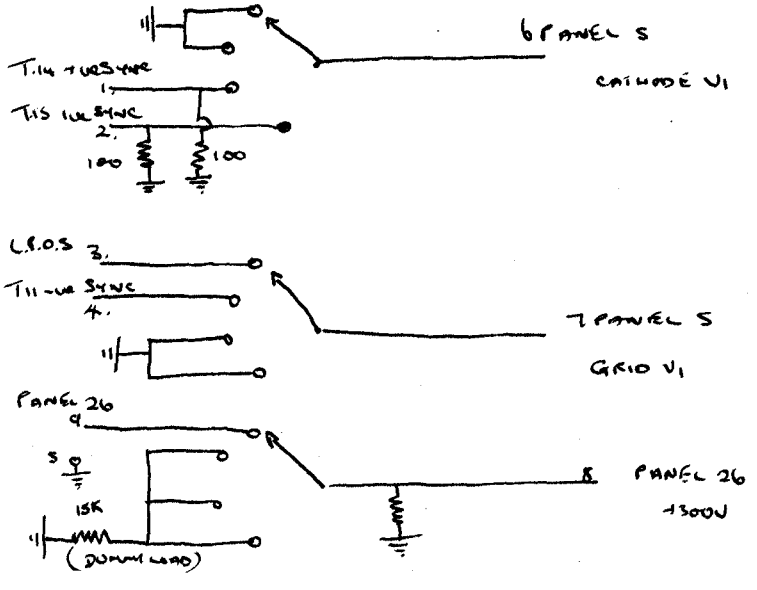
JONES PLUGS

'A' PLUG

'B' PLUG

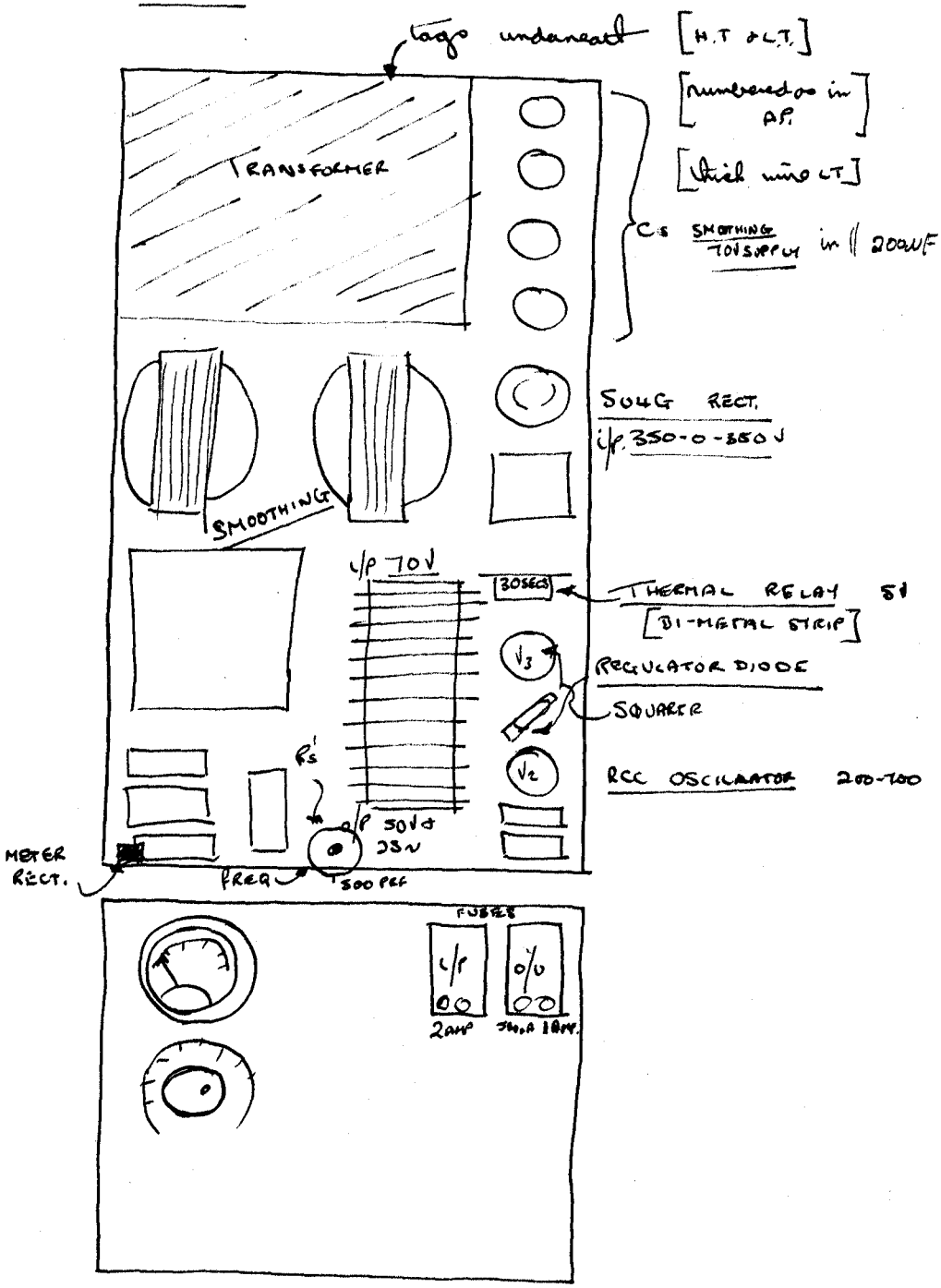
Also connection numbered

PANEL 27



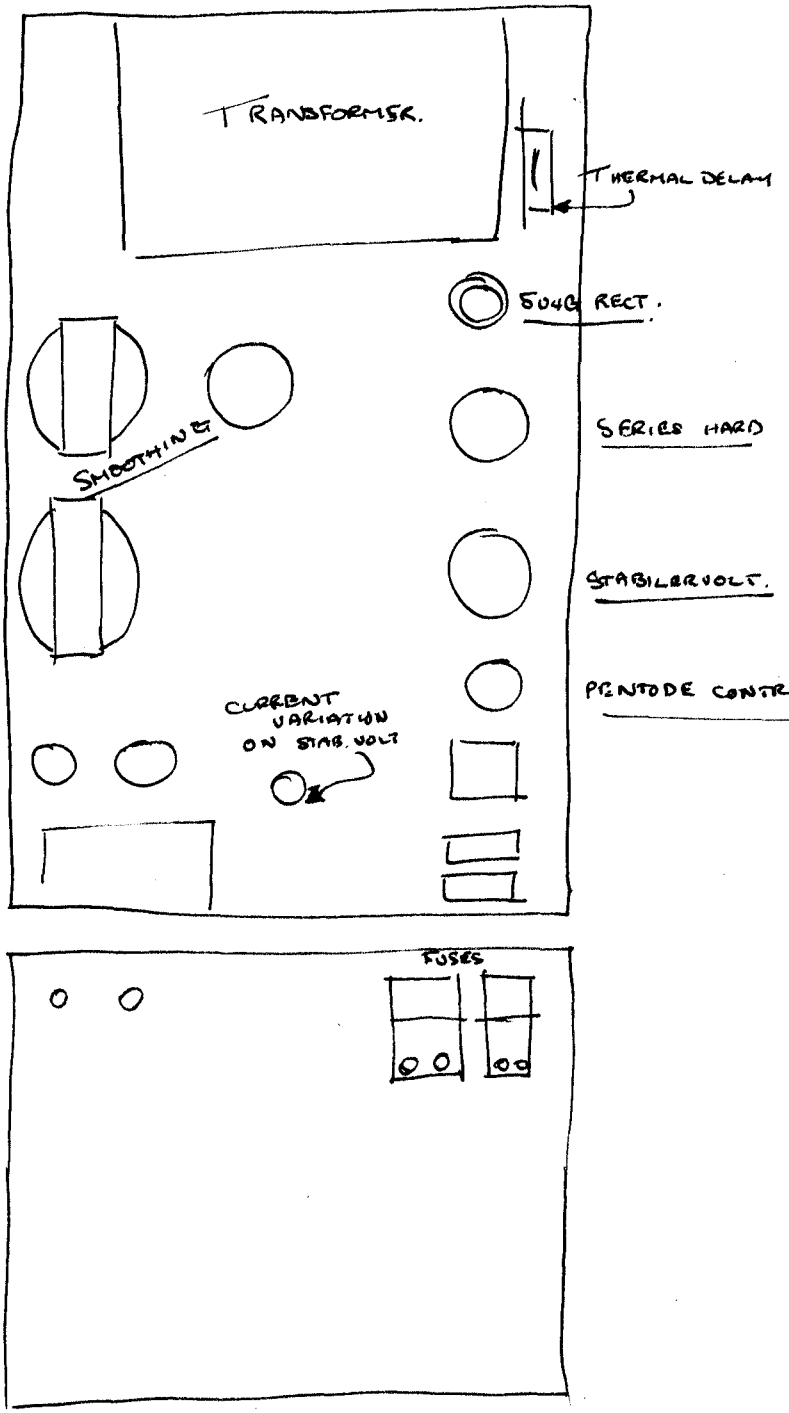
PU 26

LAYOUT

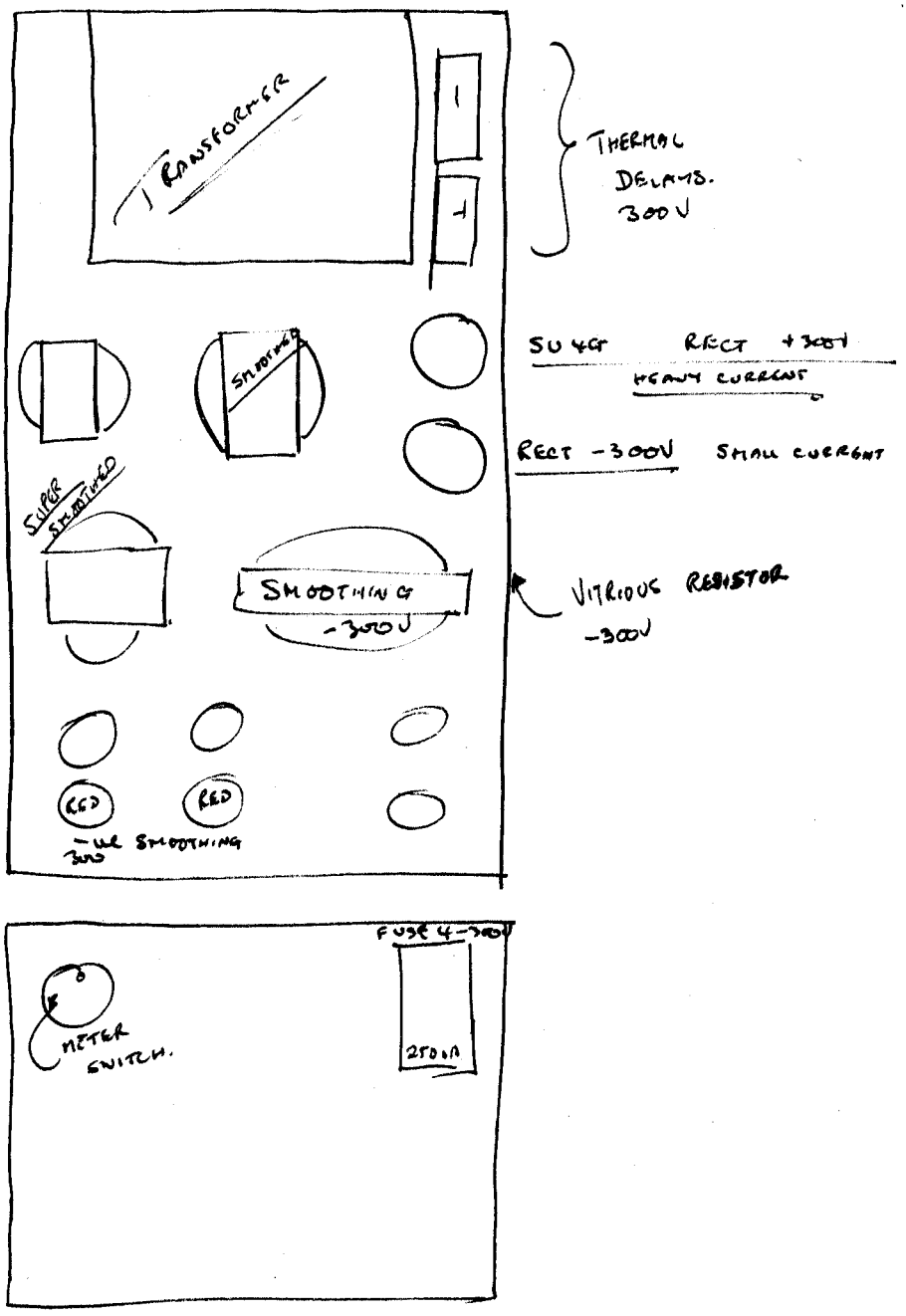

tags underneath
[H.T & L.T.]
[numbered as in A.P.]
[thick wire L.T.]
TRANSFORMER
C5 SMOOTHING TO SUPPLY in ‖ 200μF
SMOOTHING
5U4G RECT.
i/p 350-0-350 V
i/p 70 V
30 SECS
THERMAL RELAY 5s
[BI-METAL STRIP]
REGULATOR DIODE
SQUARER
RCC OSCILLATOR 200-700
R5
o/p 50 V @ 20 V
METER RECT.
FREQ
500 PCF
FUSES
i/p
o/p
2 AMP
250 mA 1 AMP

Pu 22

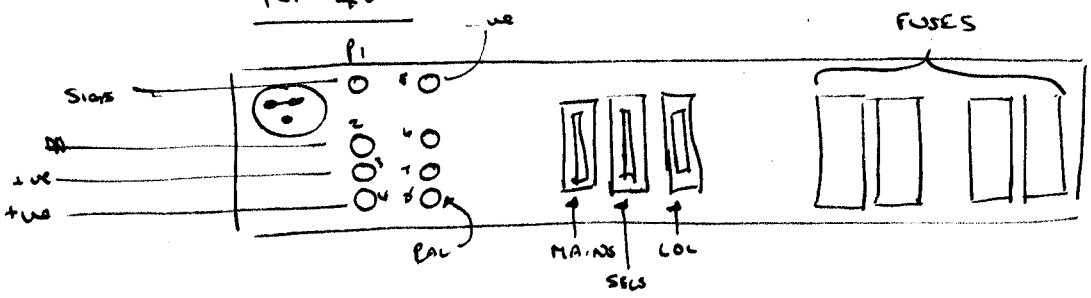
LAYOUT


TRANSFORMER.
THERMAL DELAY
one for each rect except PL. 83.
5U4G RECT.
SERIES HARD
SMOOTHING
STABILIVOLT.
PENTODE CONTROL
CURRENT VARIATION ON STAB. VOLT
FUSES

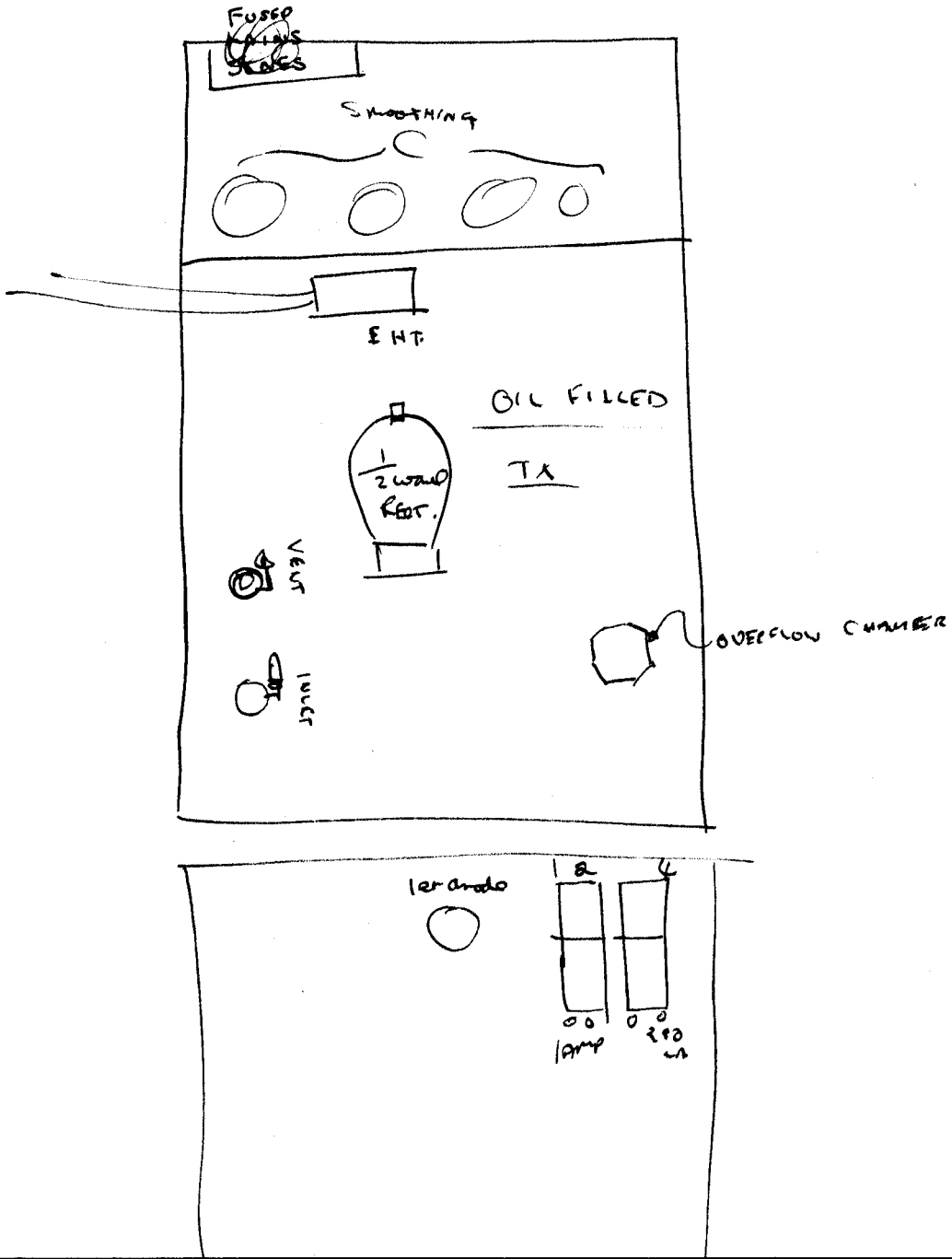
PU 21 LAYOUT


TRANSFORMER
THERMAL DELAYS. 300V
SMOOTHING
SUPER SMOOTHED
SMOOTHING -300V
RED
RED
-ve SMOOTHING
SU 4GT RECT +300V
HEAVY CURRENT
RECT -300V SMALL CURRENT
VITREOUS RESISTOR -300V
METER SWITCH.
FUSE 4-300V
250mA

Pl. 48



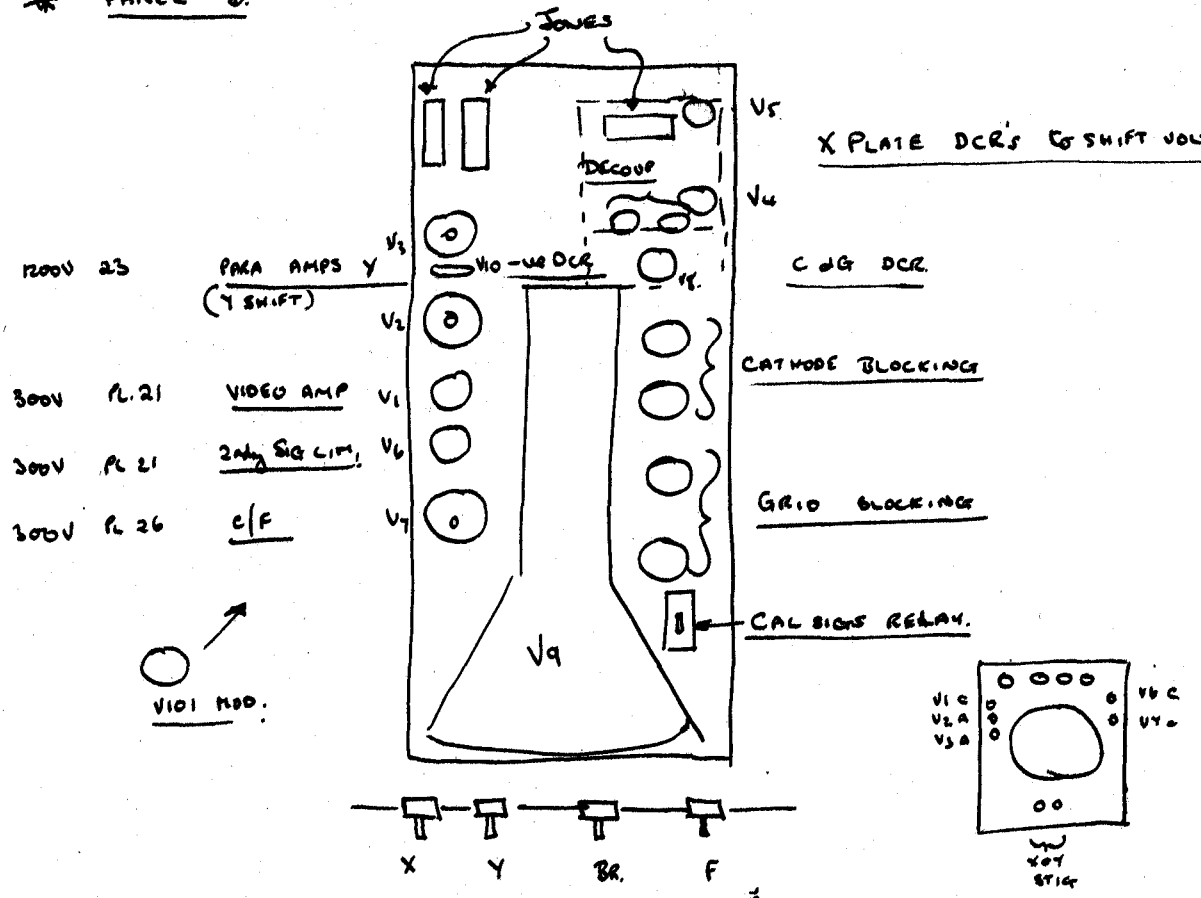
PANEL 25 LAYOUT



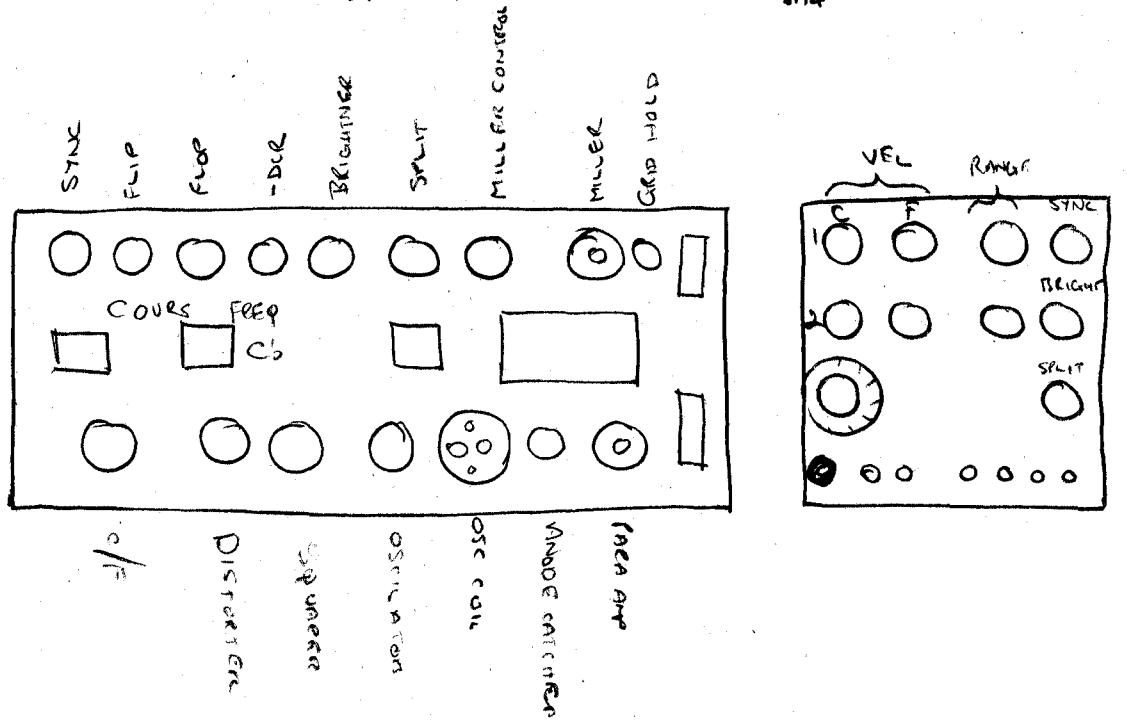
CONSOLE 15.

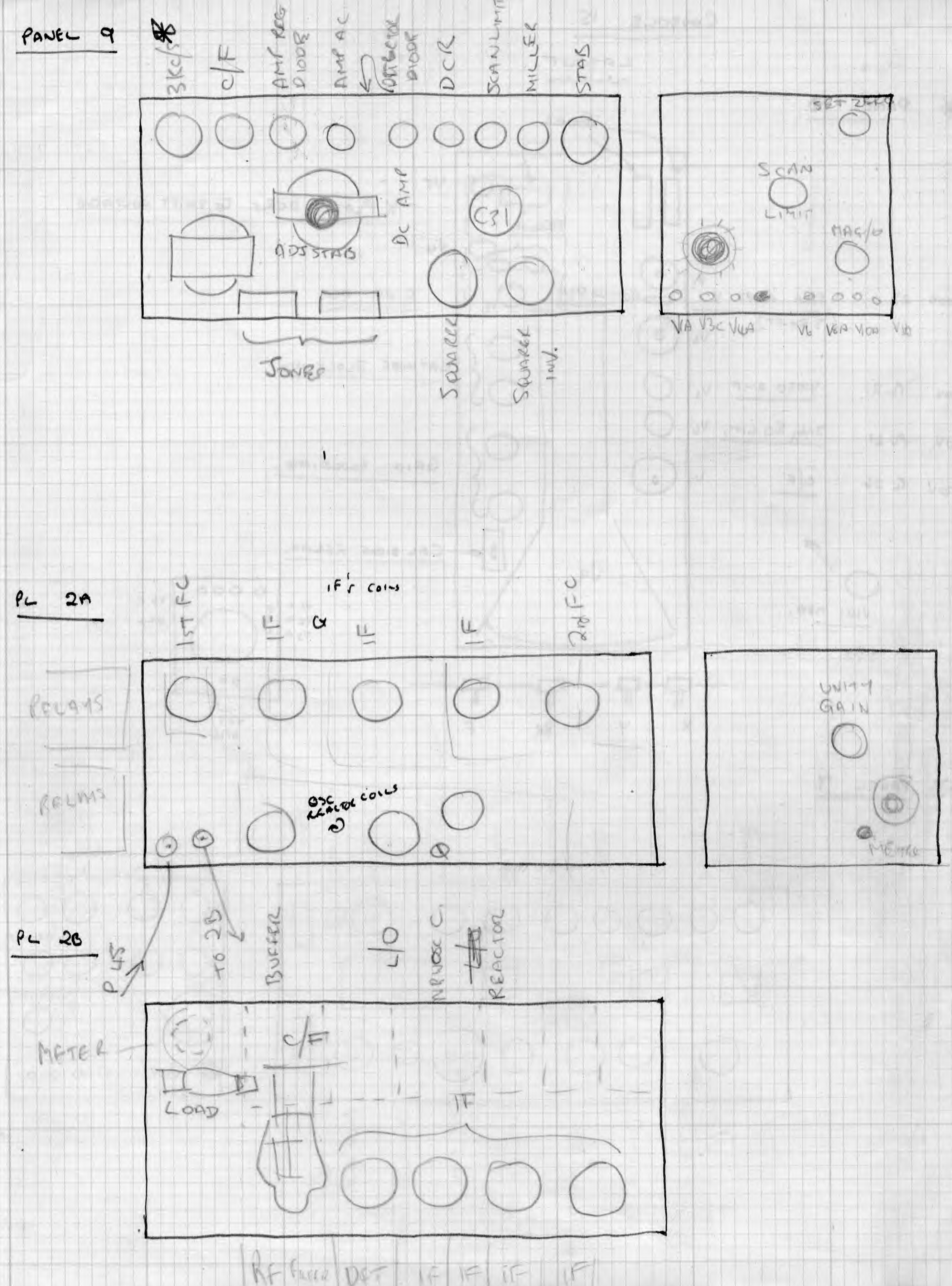
LAYOUT.

* PANEL 9.

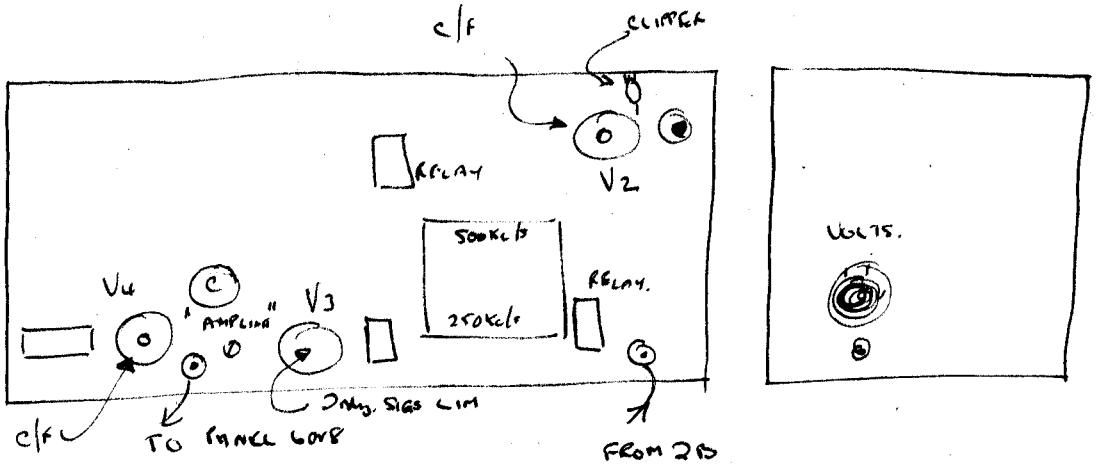


* PANEL 7.

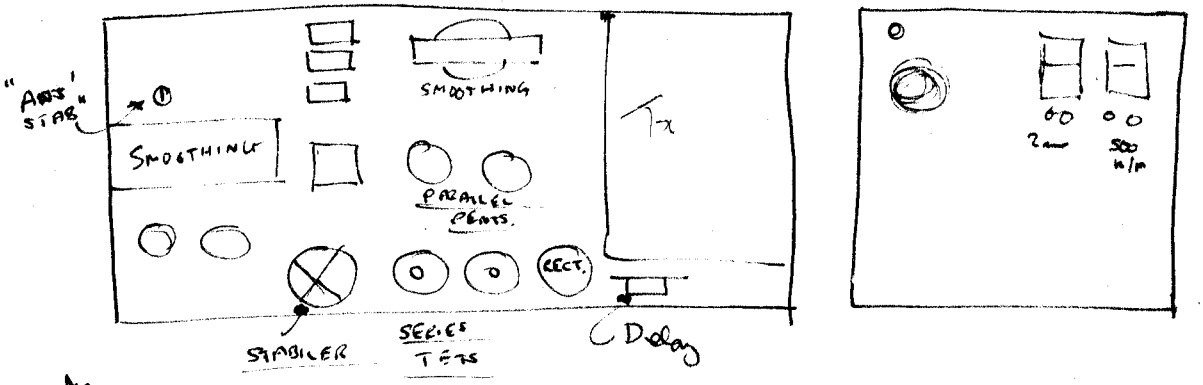



PANEL 9
3KC/S
C/F
AMP REG DIODE
AMP AC
DETECTOR DIODE
DCR
SCAN LIMIT
MILLER
STAB
DC AMP
C31
ADJ STAB
JONES
SQUARER
SQUARER INV.
SET ZERO
SCAN LIMIT
MAG/6
VA V3C V4A
V6 VEA VOA VB
PL 2A
IF'S COILS
1ST FC
IF
IF
IF
2nd FC
RELAYS
RELAYS
OSC REACTOR COILS
UNITY GAIN
METER
PL 2B
P 45
TO 2B
BUFFER
L/O
NRVOSC C.
REACTOR
METER
C/F
LOAD
IF
RF Freq DET IF IF IF IF

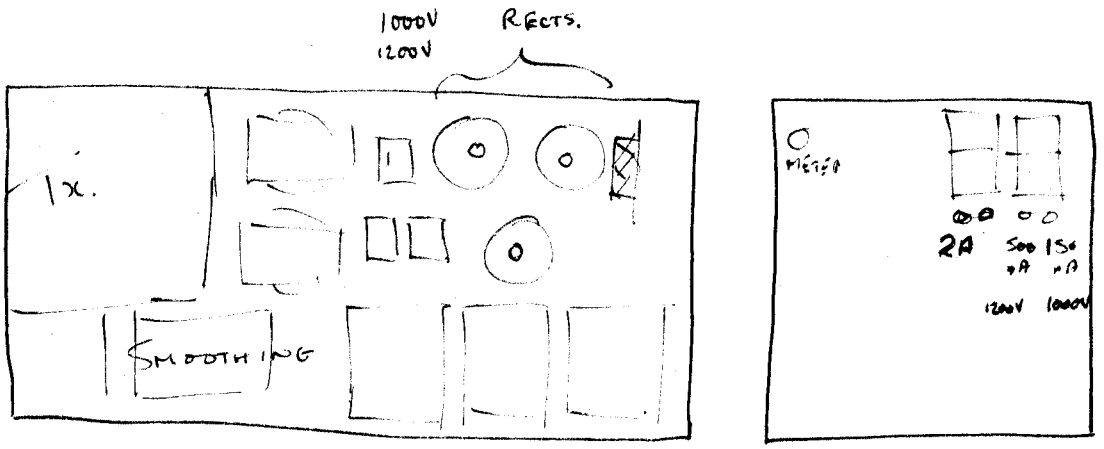
Pl 3



Pl 2A



Pl 2B



PL 46
PL 45
PL 25
PL 21
PL 26
PL 41
PL 44

} See other note

Faults caused by u/s valves.

PNL 26

V1 Rect, o/p 300V, L C smoothing, 5U4G.

Position 3. .62 of full scale deflection. goes to L-P-O then 46 to sync switch

Takes H.T. off L-P-O and switches in compensating resistor

When u/s signals will be affected [cal possible] Vg P.8. No cal on E scan no sync on L-P-O.

V2 & V4 u/s since no 300V on them [C/F.O.]

V2 Oscillator, 200-700 ~~cps~~, 4 big CR branches, fixed two variable, H.T. 300V panel 26 normally set 500 VR91

Position 8 meter scope point V2A When u/s - No L-P-O.

V3 Amplitude regulating diode to 55 volts

V4 Squarer VR91. grid stopper & cut off. scope V4 anode. Position 9 meter

goes via short CR to grid of sync valve. When u/s no L-P-O.

No reading of main in if rect u/s

If no 300V out side of fuses will remain across — thermal delay of rect itself

PNL 28

V1 V2 2 ½ wave rects give 1200V connected up as full wave — big current LC

~~Dodge~~ (power unit) Distorted spot No T shift no T/B. when u/s

V3 No 1,000 volts — no X shift RC smoothing. Half wave.

PNL 24

V1 Full wave rect. 420 volts

Top chassis { V2 | V5 } Sc.T P. Rect — 300 volts Panel 7 [V1 V2 V3 V5 V6 V7 as V10] } from comm.

{ V3 | V6 } " " — 300 volt [Cal cct. except cal rec] }

V4 Stab

V2 u/s — Spot since F/F not working. However, on experimenting not even a spot. There is only a means of clocking parallel pentodes
If V5 removed, still reading but lower.

V3 u/s — Trace but no cal — no meter reading
Any fuse will effect any o/p from panel 24

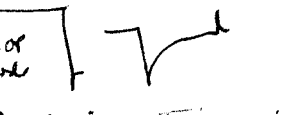
Stabilivolt removed V4 Output to cal 260V therefore cal but no [illegible] sigs since there is no 210 or 140V to screens.

Panel 25 ½ wave rect 3 fuses on i/p 2 500's on 1 amp with 4 neons Any fuses u/s no o/p. o/p 5.5KV Controls links change over ratio of voltages. Focus and Brilliance If no bell Jones plug not fitting onproperly also focus. No meter point. CS u/s reading on the tube

Panel 21 2 full wave rects. +300V & −300V [not used on 18]
V1 5U4G 300V CC smoothing
two o/p A6 & A7 Concerned with signal chain
Two input fuses and 500mA +300V fuse
250mA −300V fuse

Panel 7
V1 :— Sync valve gives +ve sync output to trigger ff
i/p C-P-O diffd. square wave grid
T.11 −ve "
T13 +ve } on cathode
T14 +ve }
H.T. 300 volts Pnl. 24.
Scope on grid if valve removed — no grid current ∴ diffd. waveform.
also no anode waveform.
V2 :— Flip H.T. 300V Pl 24 (let ANTI JITTER)
Scope put on anode also value may be retired.

V3 — Flop +ve output
H.T. 300 Volts from Panel 24



grid flop

goes to Bright up valve and to Panel via triggering off two valves ~~Miller~~ D.C. amp and miller. Fault on ~~time~~ wrecks flop waveform

V4 — DCR of V/S no cal but not always

Blanking +
Cal i.e. ensures supply does not go above earth and that valve cuts off (Cal osc)

L.T. Panel 24

V5 — Brightness valve triggered by pulse from flop on grid; blanking pulse goes to supply. (from V11 panel 9 via Jones plug) Brightness varies anode load of valve. Scope and meter. Supply straight line if Va not conducting. If V/S flyback can be seen.

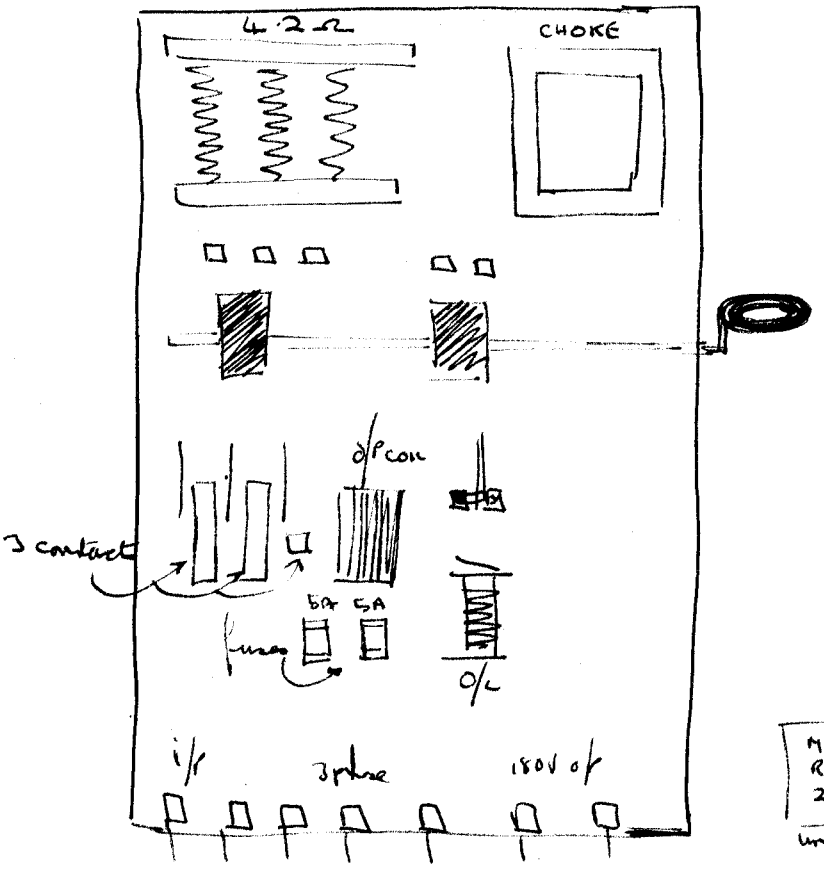
V6 — Split anode connected to ~~split~~ screen. of Miller. Square wave of ½ PRF which cuts

TR 3561

LAYOUT

STARTER

wattage dissipated



MAINS
RECT
2 SMPS for 110
interwound.

TRIGGER UNIT

(two left) DOOR SWITCHES & FUSES