sinclair

micro vision MTV1

Service Manual and Schematic Diagram

Compiled in July 2009 by Peter Wisniewski
using info provided by Steve Niechcial and Jon Evans

TECHNICAL DESCRIPTION

System

The Microvision uses conventional television superheterodyne conversion to convert RF signals into video. Intercarrier sound is taken off after video detection. All circuitry was designed by Sinclair Radionics Ltd staff in England.

UHF Tuner

This comprises of input amplifier, tuned bandpass circuit, mixer and local oscillator. All transistors are silicon bipolar. Tuning is by variable capacitance diodes. Delayed Automatic Gain Control (AGC) is applied to the input stage. Automatic Frequency Control (AFC) is applied to the tuning voltage. Frequency range:- Bands IV and V.

VHF Tuner

This comprises of input tuned circuit, RF amplifier, tuned bandpass circuit, mixer and local oscillator. All transistors are silicon bipolar. Tuning is by varicap diodes. Band switching is by Pin diodes. The mixer stage acts as an Intermediate Frequency (IF) amplifier when the set is receiving Bands IV and V (UHF).

AGC and AFC are applied as in the UHF tuner.

Video IF Amplifier

IF amplification, after the tuners, is carried out in two stages, on a Sinclair designed bipolar linear Integrated Circuit (IC). IF frequency response is determined by tuned circuits. Unwanted responses are rejected by traps. AGC is applied to both IF stages.

The varicap diode voltage regulator and tuner AGC delay circuit are included on the video IF amplifier IC.

Video Detector

This is a low level synchroncus (switching) detector, providing both positive and negative video outputs at low impedance. The circuitry is contained in a Sinclair disigned bipolar linear integrated circuit which also provides AFC, gated AGC (for high noise immunity) and composite synchronisation pulse outputs.

Sound IF and Audio Amplifier rc

The sound IF limiting amplifier is preceeded by three pin diode switched ceramic filters (to select the correct intercarrier sound IF frequency 4.5, 5.5 or 6.0 MHz) The limited IF signal is fed to a quadrature detector producing an AF output for amplification to drive the loudspeaker.

IF amplifier and detector and audio amplifer are contained on two bipolar linear ICs.

Line and Frame Oscillator and Drive

Composite sync. from the video detector is separated into line and frame sync. The line oscillator is a phase locked loop with excellent hold in and pull in. The frame oscillator is injection locked. Both oscillators have excellent stability and are part of the third Sinclair designed bipolar linear integrated circuits.

This device also includes the control circuit for the regulated EHT.

Oscillator waveforms are fed to discrete transistor CRT deflection plate drive circuits.

The frame output is adjusted for the US 60 Hz standard.

EHT Convertor - 2KV

This is produced by a high efficiency switching convertor and is regulated.

Power

The Microvision is powered by 4 internal rechargeable Nickel Cadmium cells giving approximately 4 hours viewing time. The set can be recharged using the adaptors supplied, in about 14 hours. The charge and discharge currents of the batteries are optimised to give maximum possible cell life - unlike some rechargeable powered products which fail within 1 or 2 years.

The set can also be powered by the mains adaptor/charger, an external 6V source, or an external 12V source. e.g. automobile cigar lighter socket.

Mechanical Construction

The electronic circuits are built on four major glass fibre printed circuit boards. These are interconnected by gold plated plug/socket units and form a modular chassis type construction.

The whole is incorporated in a tough steel case with plastic front and rear trim panels.

Quality and Reliability Assurance

All the component parts used in the Sinclair Microvision have been designed or specified with reliability and quality in mind, random samples of production TVs are subjected regularly to a series of vigorous environmental conditions in our environmental life test laboratory to ensure that our high quality and reliability is maintained.

It is Sinclair's committed policy to ensure continued improvement

DISMANTLING INSTRUCTIONS

To remove the chassis the following procedure must take place.

1. Remove the UHF aerial by unscrewing the two clips securring it to the inner aerial arms.

2. Remove the VHF aerial by pulling gently upwards vertically. Be very careful of the VHF aerial plastic trim which can easily be damaged.

3. Remove the two screws from the back cover (over the controls) and remove this cover. Remove the two screws to the external VHF aerial input and the 6v - 12v sliding cover.

4. Remove the two screws from the rear casing (above controls) and the two screws underneath the case at the front. There are two more screws to remove, under the FCC label.

5. The outer case will now slide back, leaving the chassis exposed.

To Dismantle the Chassis

1. Remove the two screws from the top and two from the bottom of the metalwork holding the front panel in place. In some models there is a screw securring the audio board to this metalwork which also has to be removed. This panel and metalwork can now be slid forward.

2. The screws can now be removed from the rear of the tuner panel.

3. The Audio panel can now be removed by carefully pulling out sideways, removing the pins in the sockets.

4. The Vision panel is removed in the same way

5. The Tuner panel can now be lifted up, and after removing the Earphone Jack Socket and prising the VHF aerial holder and contact from the Tube moulding, can be removed completely

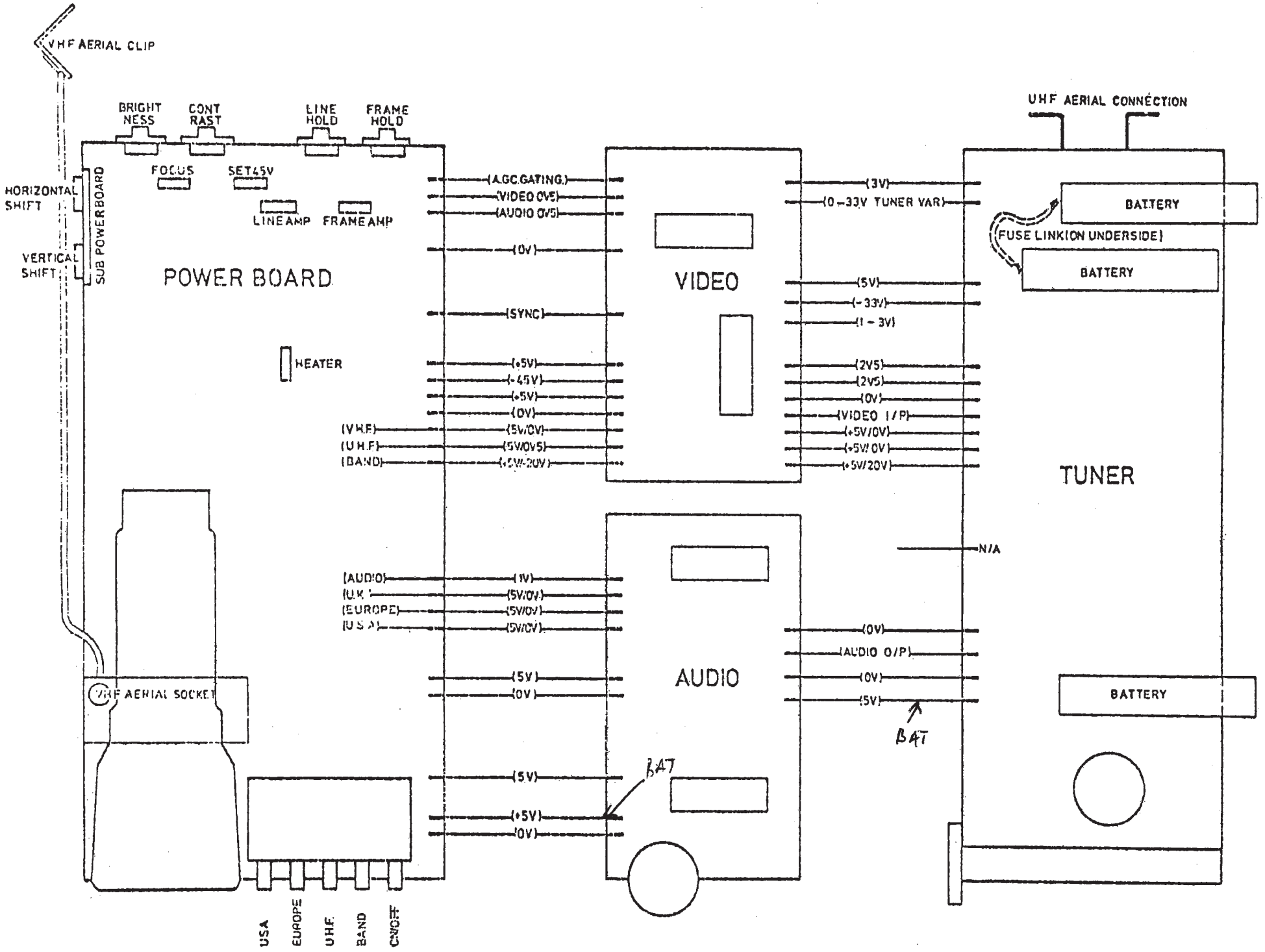
ASSEMBLY

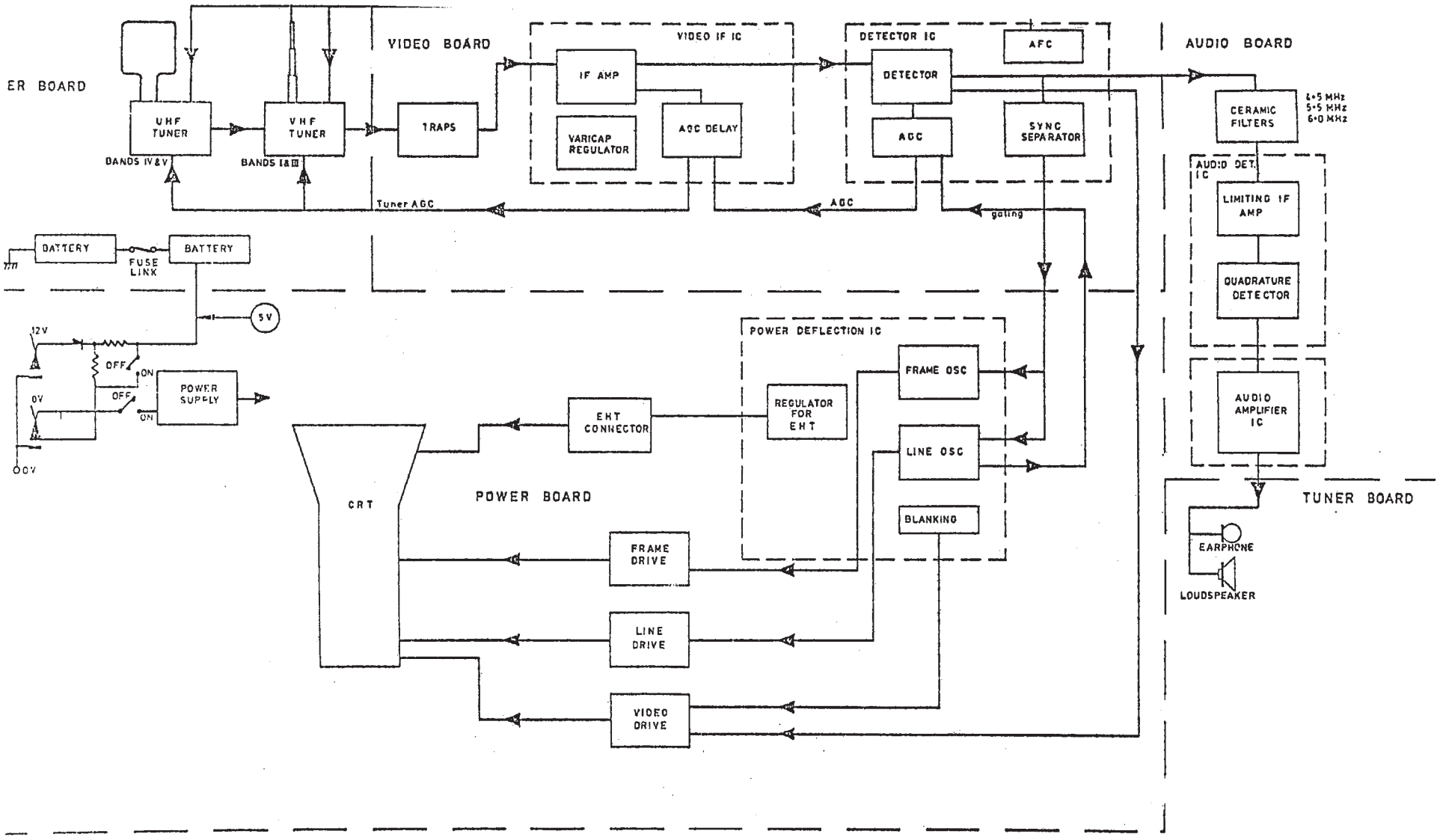
To assemble the receiver the reverse actions to the Dismantling procedure is required. Care must be taken in replacing the Audio and Video panels. The pins must locate exactly with the sockets or a short will take place, open-circuiting the battery safety fuse line on the print side of the Tuner board.

The two insulators must be replaced over the audio panel and under the power board in the appropriate place.

When refitting the front panel assembly, care must be taken to locate the front of the tuner panel into the two slots in the front panel.

When fitting the case assembly, the speaker grill is placed to cover the loudspeaker.


VHF AERIAL CLIP
BRIGHT NESS
CONT RAST
LINE HOLD
FRAME HOLD
FOCUS
SET 45V
LINE AMP
FRAME AMP
HORIZONTAL SHIFT
VERTICAL SHIFT
SUB POWER BOARD
POWER BOARD
HEATER
VHF AERIAL SOCKET
USA
EUROPE
UHF
BAND
CNDR
(A.G.C.GATING.)
(VIDEO 0V5)
(AUDIO 0V5)
(0V)
(SYNC)
(+5V)
(-45V)
(+5V)
(0V)
(VHF)
(UHF)
(BAND)
(5V/0V)
(5V/0V5)
(5V/20V)
VIDEO
(3V)
(0-33V TUNER VAR)
(5V)
(-33V)
(1-3V)
(2V5)
(2V5)
(0V)
(VIDEO I/P)
(+5V/0V)
(+5V/0V)
(+5V/20V)
(AUDIO)
(U.K.)
(EUROPE)
(U.S.A.)
(1V)
(5V/0V)
(5V/0V)
(5V/0V)
(5V)
(0V)
(5V)
(+5V)
(0V)
AUDIO
N/A
(0V)
(AUDIO O/P)
(0V)
(5V)
BAT
BAT
UHF AERIAL CONNECTION
BATTERY
(FUSE LINK ON UNDERSIDE)
BATTERY
TUNER
BATTERY


ER BOARD
VIDEO BOARD
UHF TUNER
VHF TUNER
BANDS IV&V
BANDS I&III
TRAPS
VIDEO IF IC
IF AMP
VARICAP REGULATOR
AGC DELAY
DETECTOR IC
AFC
DETECTOR
AGC
SYNC SEPARATOR
AUDIO BOARD
CERAMIC FILTERS
4·5 MHz
5·5 MHz
6·0 MHz
AUDIO DET. IC
LIMITING IF AMP
QUADRATURE DETECTOR
AUDIO AMPLIFIER IC
Tuner AGC
AGC
gating
BATTERY
FUSE LINK
BATTERY
5V
12V
0V
OFF
ON
POWER SUPPLY
POWER DEFLECTION IC
REGULATOR FOR EHT
FRAME OSC
LINE OSC
BLANKING
EHT CONNECTOR
CRT
POWER BOARD
FRAME DRIVE
LINE DRIVE
VIDEO DRIVE
TUNER BOARD
EARPHONE
LOUDSPEAKER

SETTING UP PROCEDURES

1. SET UP - 45 VOLTS

Connect meter between Pin 7 of Berg skt and Earth.
Adjust POT for - 45 volts.

2. SET HEATER

Connect an RMS meter between Link marked X and earth.
Adjust pot for 0.55 volts RMS.

3. OTHER ADJUSTMENTS, WIDTH, HEIGHT, ETC

Fairly obvious but advisable to check - 45 volts after carrying out any such adjustments.

CIRCUIT DESCRIPTION

The 16 pin IC can be split into 4 sections, these being:-

1) Stabilised Rail.
2) Line oscillator and phase comparator with dual output drivers.
3) Frame oscillator and dual output drivers.
4) EHT regulator.

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1) Stabilised Rail

A 0.5 MA current source is generated and is fed into a 5 diode chain to produce a stabilised 3.6 volt point. Two emitter followers are connected from this point to produce two 2.9 volt rails, which are used throughout the circuitry as a stabilised rail and reference voltage. The 2.9 volt rail has a - Vbe temperature coefficient.,

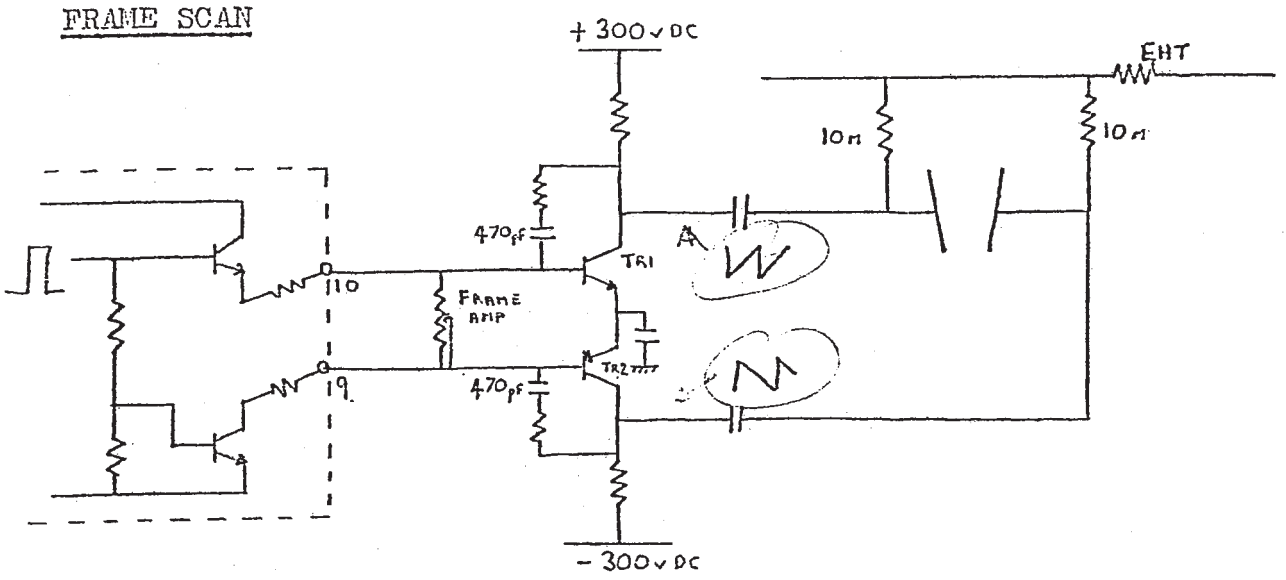
2) The line oscillator produces a sawtooth voltage across an externally connected capacitor. This is done by switching a reference voltage in conjunction with a current source. Both scan and flyback times are varied when changing the line oscillator frequency. The oscillator flyback time is 9 uS.

The phase comparitor uses a longtail pair and compares the phase of the sawtooth voltage from the oscillator with that of the line sync pulse, during the flyback time.

Outputs from the line oscillator are used to produce an AGC gating pulse (which is also used by the filament driver circuit) a pulse to reset the EHT convertor, a line blanking output, and two pulses which are used by the line deflection circuitry.

3) The frame oscillator charges an externally connected capacitor for a short period of time of 0.6MS, via a resistor to a stabilised rail. This charging current is then switched off and the capacitor is allowed to discharge via a variable resistance (frame hold pot), connected across the capacitor. The switching occurs when the voltage across the capacitor is the same as the reference voltage inside the IC. This reference voltage is switched between two levels. The oscillator is triggered by a frame sync pulse.

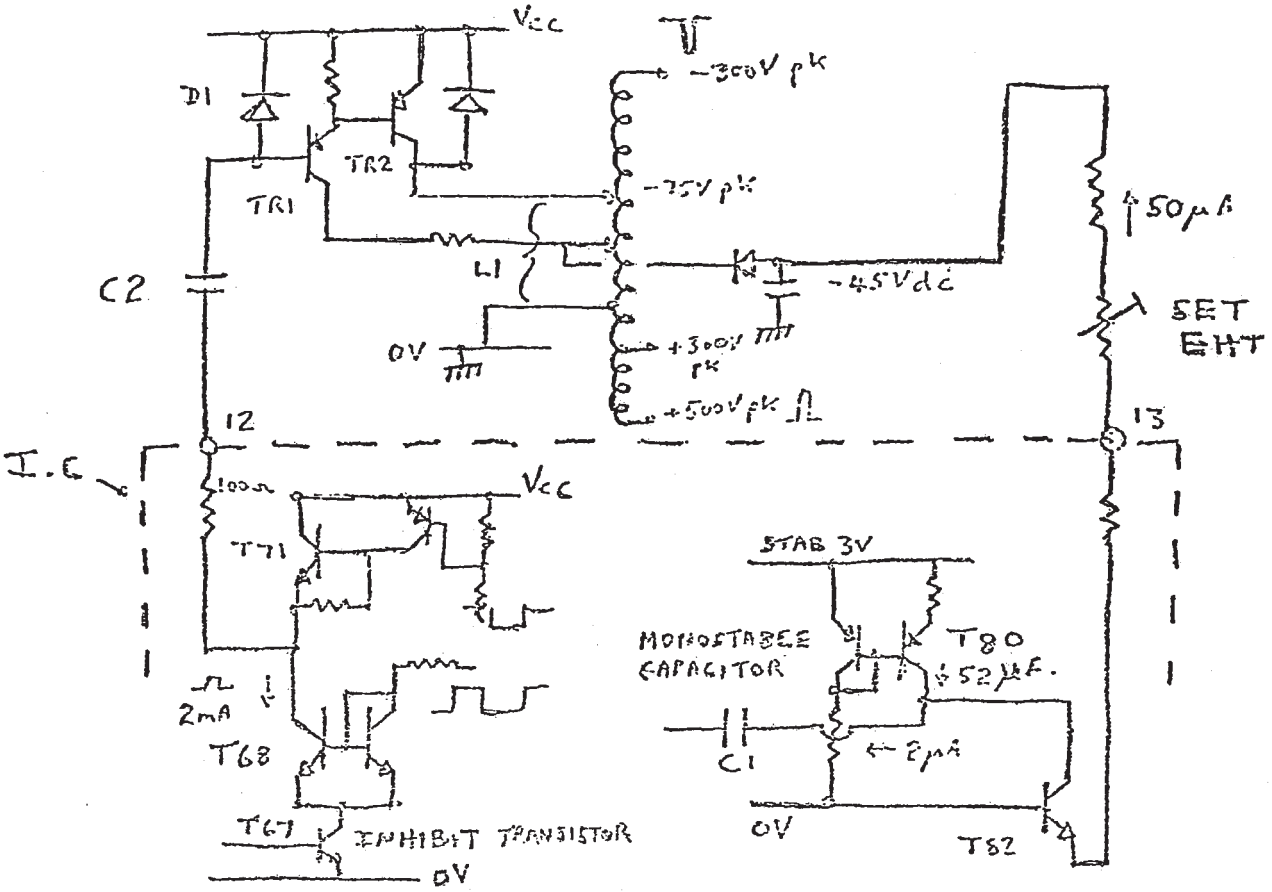
Outputs from the oscillator used to produce a frame blanking pulse, and two pulses which are used by the frame deflection circuitry.



During frame flyback transistors T52 and T50 are turned on. This causes the transistors TR1 and TR2 to turn on and eventually saturate.

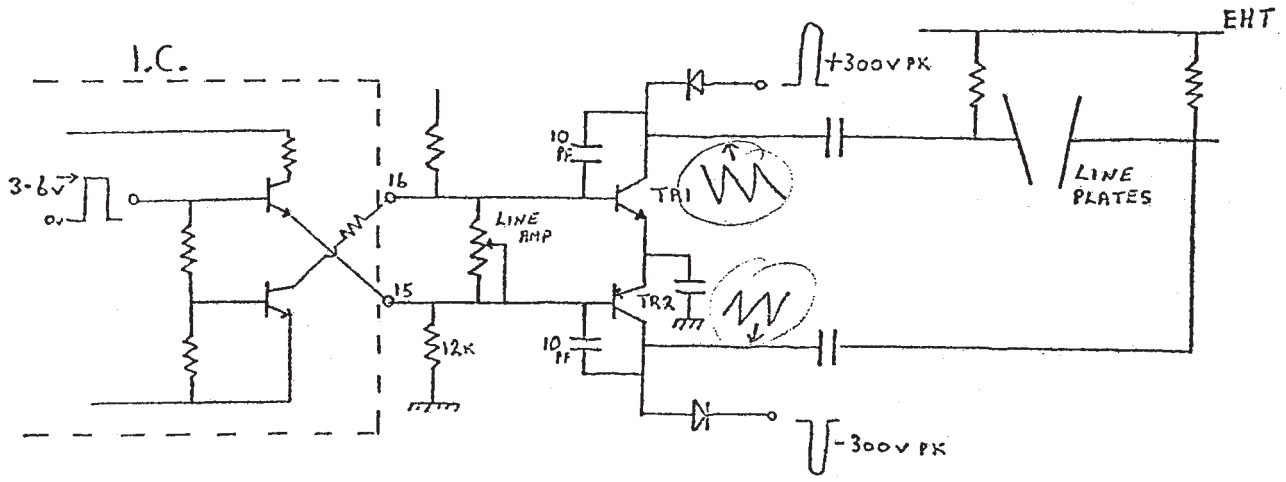
During frame scan, the transistors T52 and T50 turn off and the collectors of TR1 and TR2 rise linearly towards their respective 300 V HT's. Their scan amplitudes are dictated by the rate at which the 470pf capacitors are charged. This current is due to the 1.2 volts across TR1 and TR2 VBE's and the value of the amplitude pot.

EHT REGULATOR



Energy is stored in LI during part of the line scan period and is then released into the various parts of circuitry during line flyback time.

To put energy into the coil LI during part of the scan period the current source T68 (2Ma) is turned on (T71 is off) and this current turns TR1 and TR2 on into saturation via the capacitor C2. After the required amount of energy has been stored by L1 the transistor T71 turns on (due to a trigger pulse from the line oscillator at the beginning of flyback). This removes the charge on C2 via D1 and turns TR1 and TR2 off. The time period for which T68 is in its off state is determined by the charging rate of C1 which is in turn, determined by the -45V rail setting of EHT pot and reference current source T80.

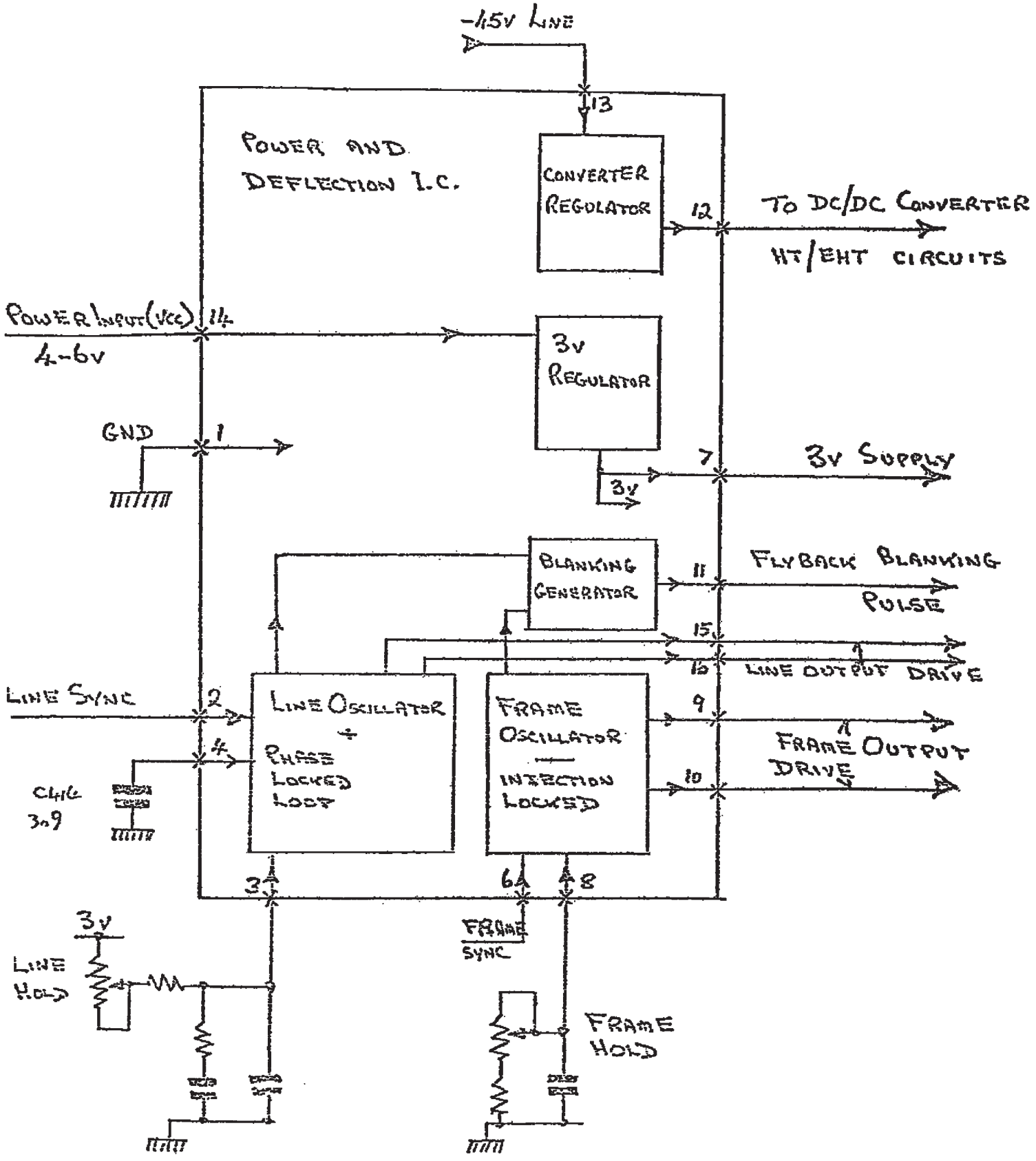


4) The EHT regulator comprises a constant current reference, a mono stable triggered by the line oscillator, and a push-pull type output driver for the convertor transistor. The convertor driver's output is inhibited during switch on transient until the supply voltage Vcc has built up to greater than 3.1 volts. This allows the line oscillator to start before the convertor transistor switches on.

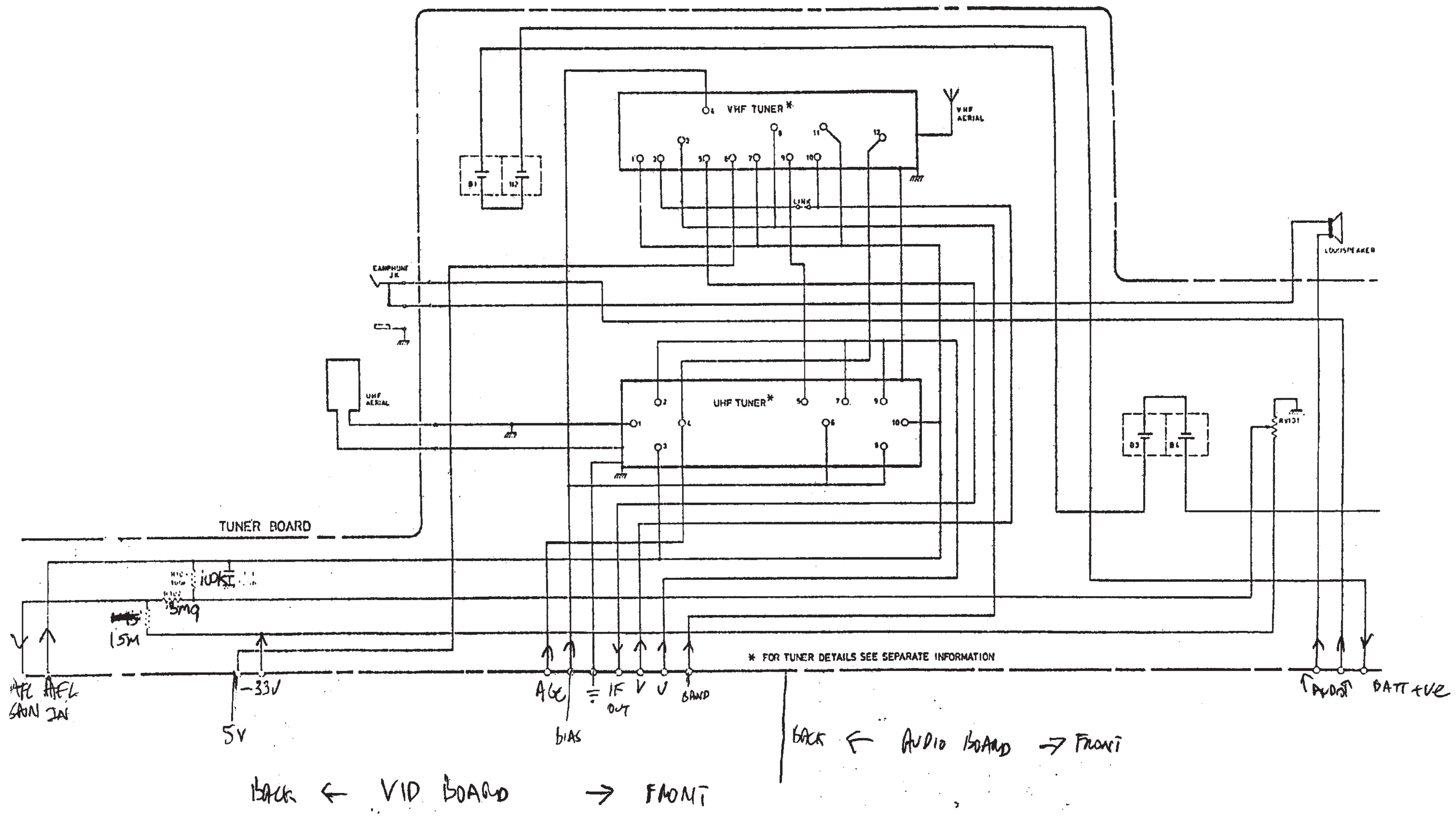
During flyback, T35 and T36 turn on which makes TR1 and TR2 turn off. At this time a flyback voltage on the EHT transformer produces a + 300 volt pulse. These pulses charge the 10pf capacitors to their peak voltages. At the end of flyback time the transistors T35 and T36 turn off and the transistors TR1 and TR2 produce a voltage ramp at their collectors (and hence deflection plates) due to the miller capacitance of 10pf and the resultant constant current through the 12K resistor and line amplitude pot. The maximum amplitude of scan voltage is when the transistors TR1 and TR2 saturate.

This type of circuit has low output impedance due to the miller capacitance, low power consumption, and a single line amplitude control.

A careful choice of temperature coefficient on the 10pf capacitor makes the line scan amplitude almost independent of temperature.

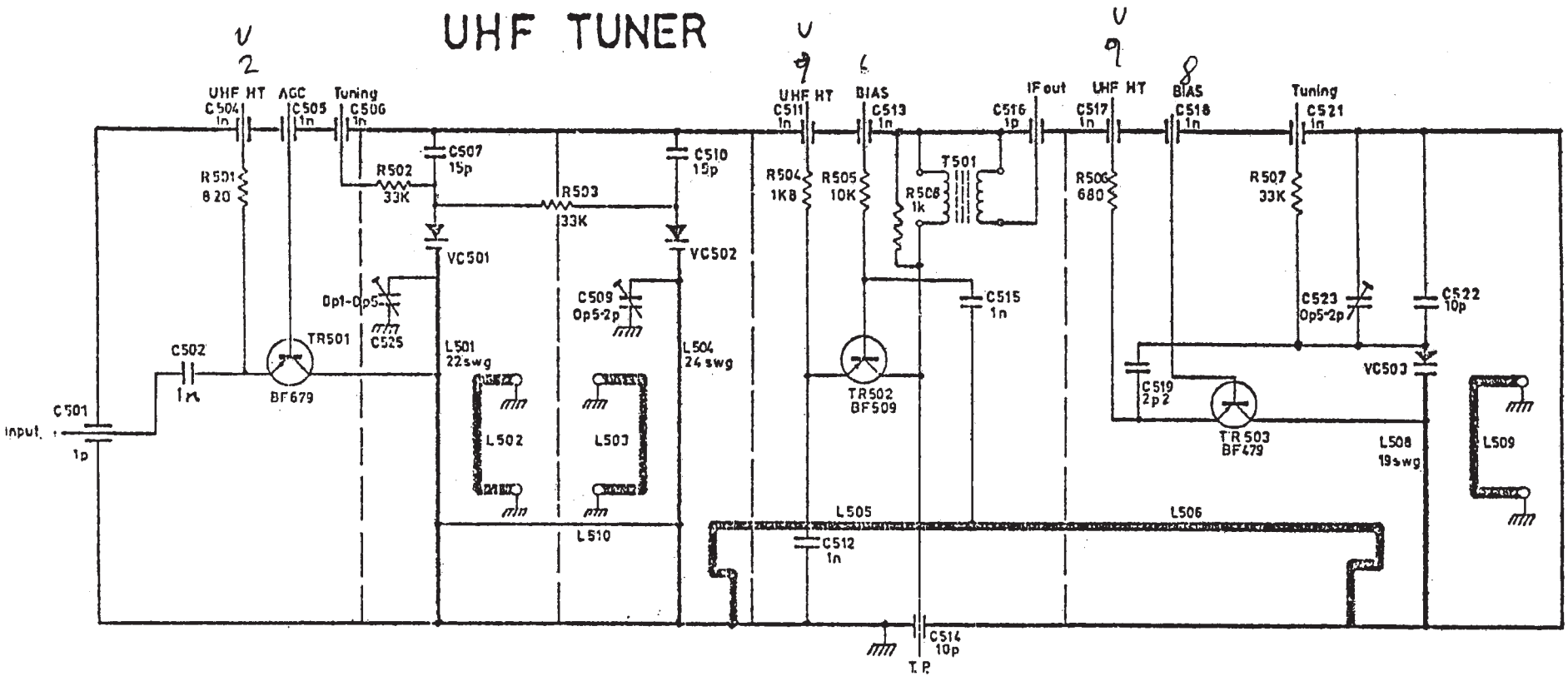


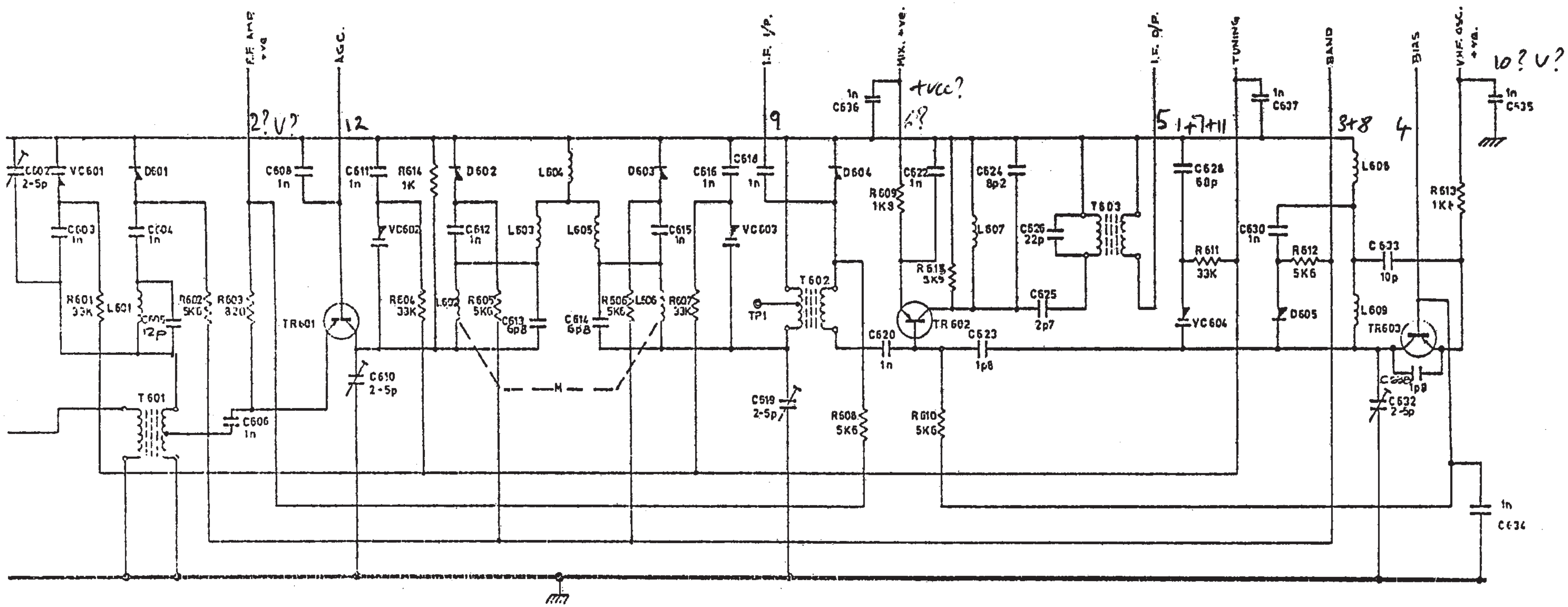
BLOCK SCHEMATIC
POWER & DEFLECTION
INTEGRATED CIRCUIT



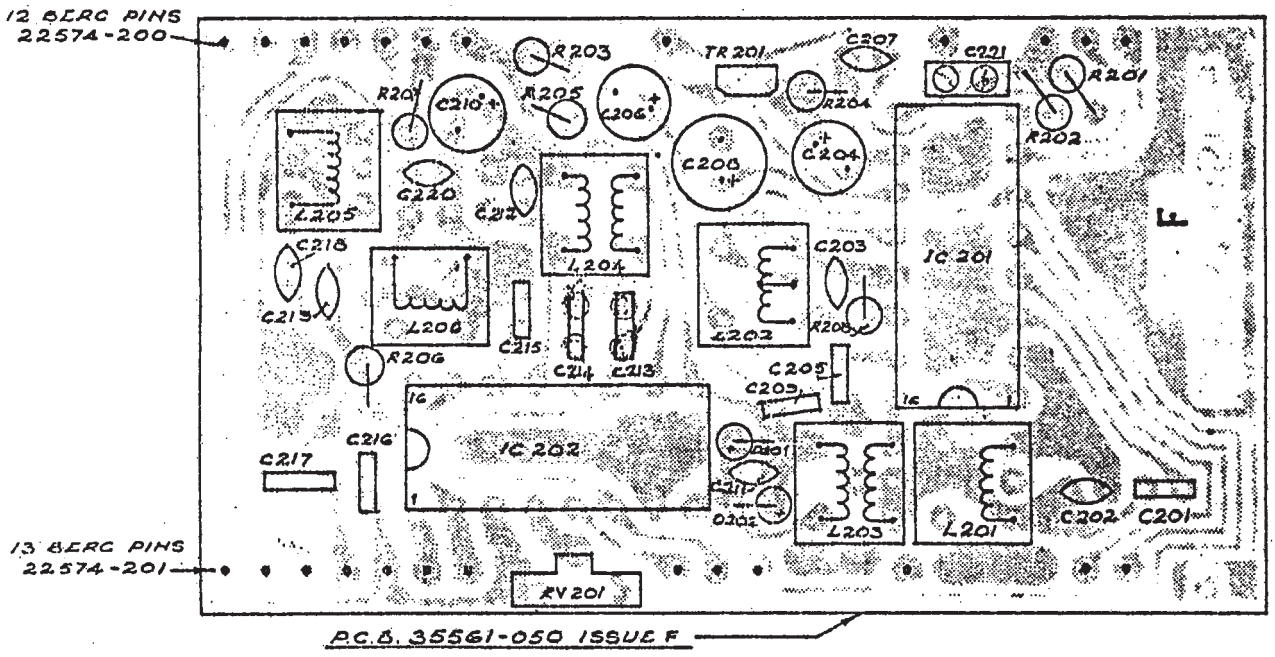
VHF TUNER*
VHF AERIAL
LINK
LOUDSPEAKER
EARPHONE JK
UHF AERIAL
UHF TUNER*
RV101
TUNER BOARD
10K
5Mq
15M
AFC GAIN
AFC IN
5V
-33V
AGC
BIAS
IF OUT
V
U
BAND
* FOR TUNER DETAILS SEE SEPARATE INFORMATION
BATT +VE
BACK ← AUDIO BOARD → FRONT
BACK ← VID BOARD → FRONT

UHF TUNER

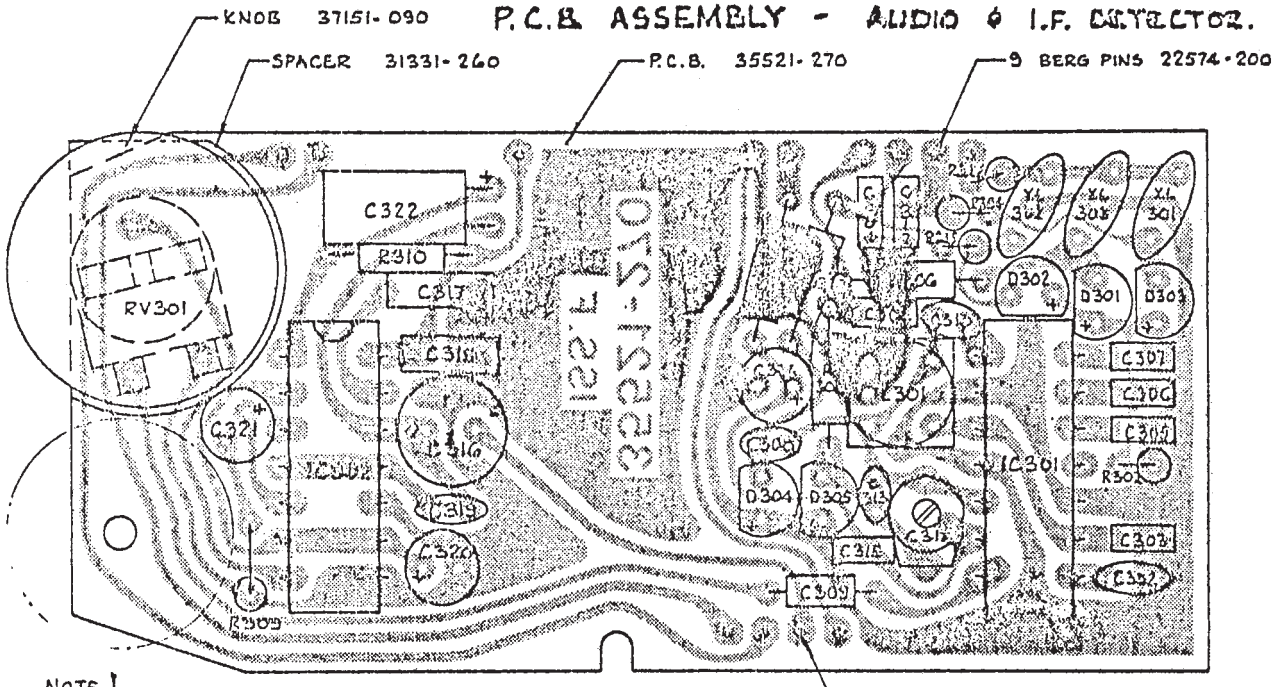

V 2
UHF HT
C504 1n
AGC
C505 1n
Tuning
C506 1n
R501 820
R502 33K
C507 15p
R503 33K
C510 15p
VC501
VC502
0p1-0p5
C525
C509 0p5-2p
TR501
BF679
C502 1n
C501 1p
Input
L501 22swg
L502
L503
L504 24swg
L510
V 9
UHF HT
C511 1n
BIAS
C513 1n
C516 1p
IF out
R504 1K8
R505 10K
R508 1k
T501
C515 1n
TR502 BF509
C512 1n
L505
L506
C514 10p
T.P
V 9
UHF HT
C517 1n
BIAS
C518 1n
R506 680
C519 2p2
TR503 BF479
Tuning
C521 1n
R507 33K
C523 0p5-2p
C522 10p
VC503
L508 19swg
L509


R.F. AMP +ve
A.G.C.
I.F. I/P.
MIX. +ve.
I.F. O/P.
TUNING
BAND
BIAS
V.H.F. OSC. +ve.
2? V?
12
9
+vcc?
5 1+7+11
3+8
4
10? V?
C602 2-5p
VC601
D601
C603 1n
C604 1n
R601 33K
L601
C605 12P
R602 5K6
R603 820
T601
C606 1n
TR601
C608 1n
C610 2-5p
C611 1n
R614 1K
VC602
R604 33K
D602
C612 1n
L602
R605 5K6
C613 6p8
L603
L604
L605
C614 6p8
R506 5K6
L506
D603
C615 1n
R607 33K
C616 1n
C618 1n
VC603
TP1
T602
C519 2-5p
D604
R608 5K6
C620 1n
C636 1n
R609 1K8
C622 1n
R613 3K9
TR602
R610 5K6
C623 1p8
C624 8p2
L607
C626 22p
C625 2p7
T603
C628 68p
R611 33K
VC604
C637 1n
C630 1n
R612 5K6
D605
L608
L609
C633 10p
TR603
C632 2-5p
1p8
R613 1K
C635 1n
C634 1n

VIDEO I.F. & D.E.T. BOARD ASSY.



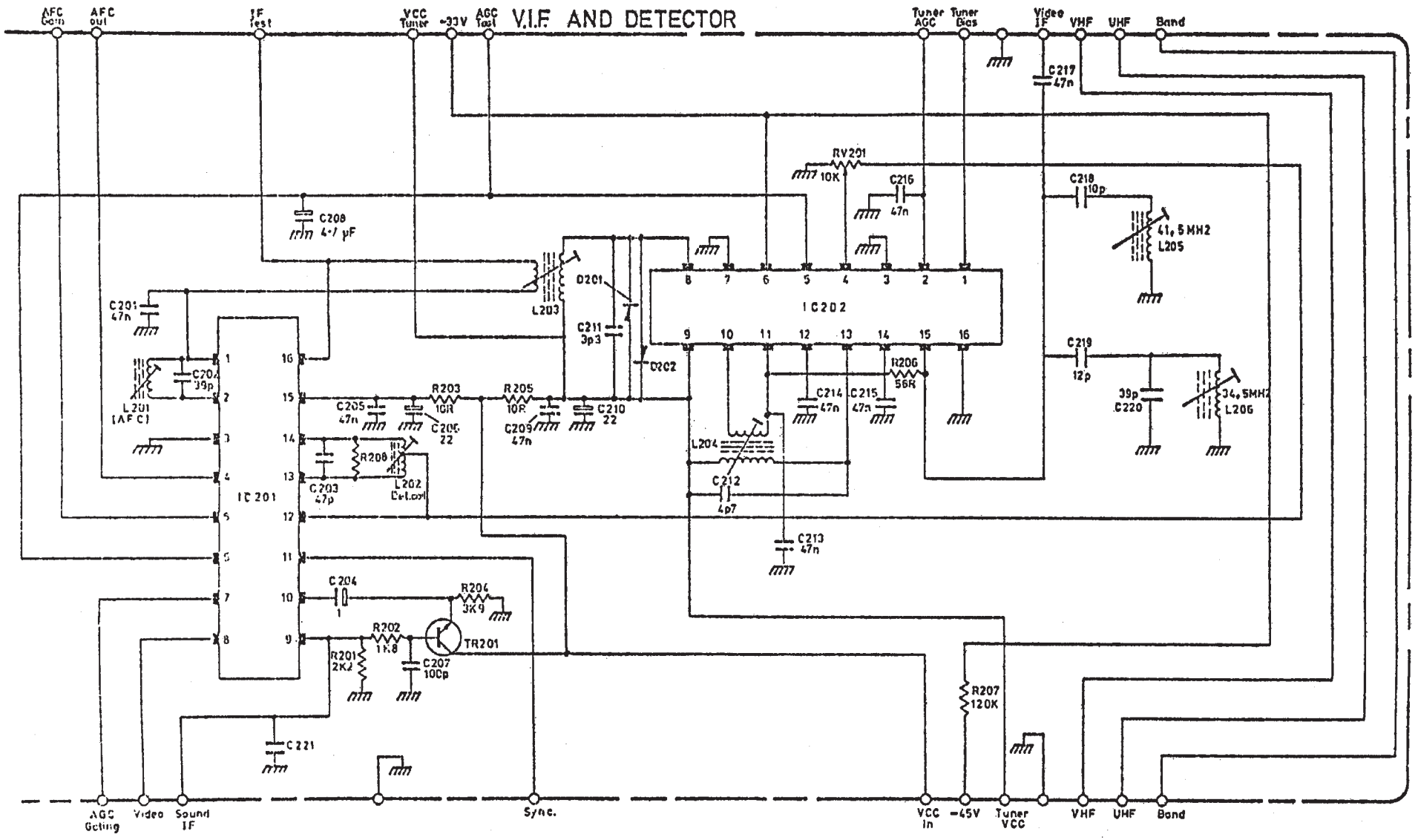
P.C.B. ASSEMBLY - AUDIO & I.F. DETECTOR.

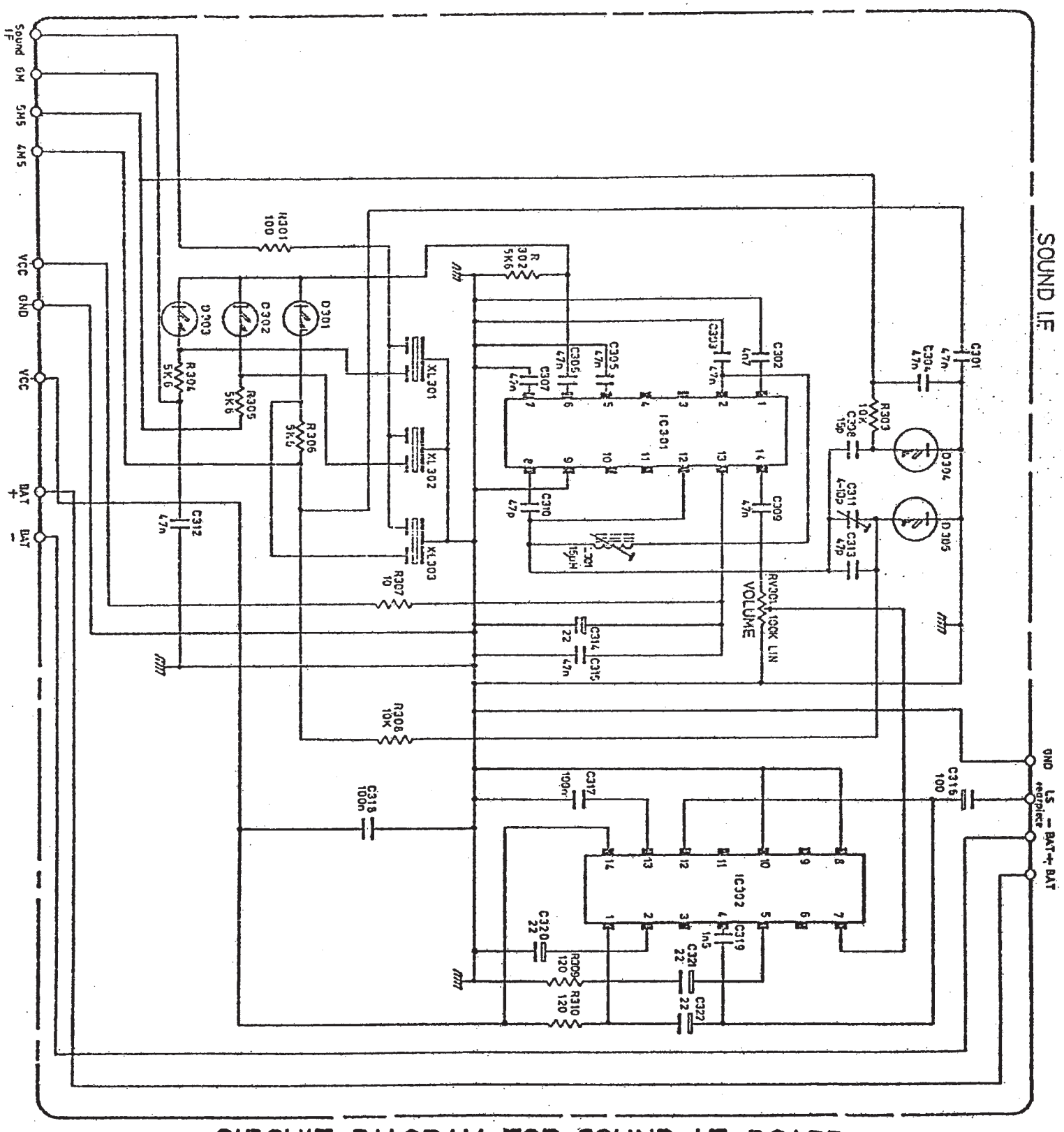


NOTE !

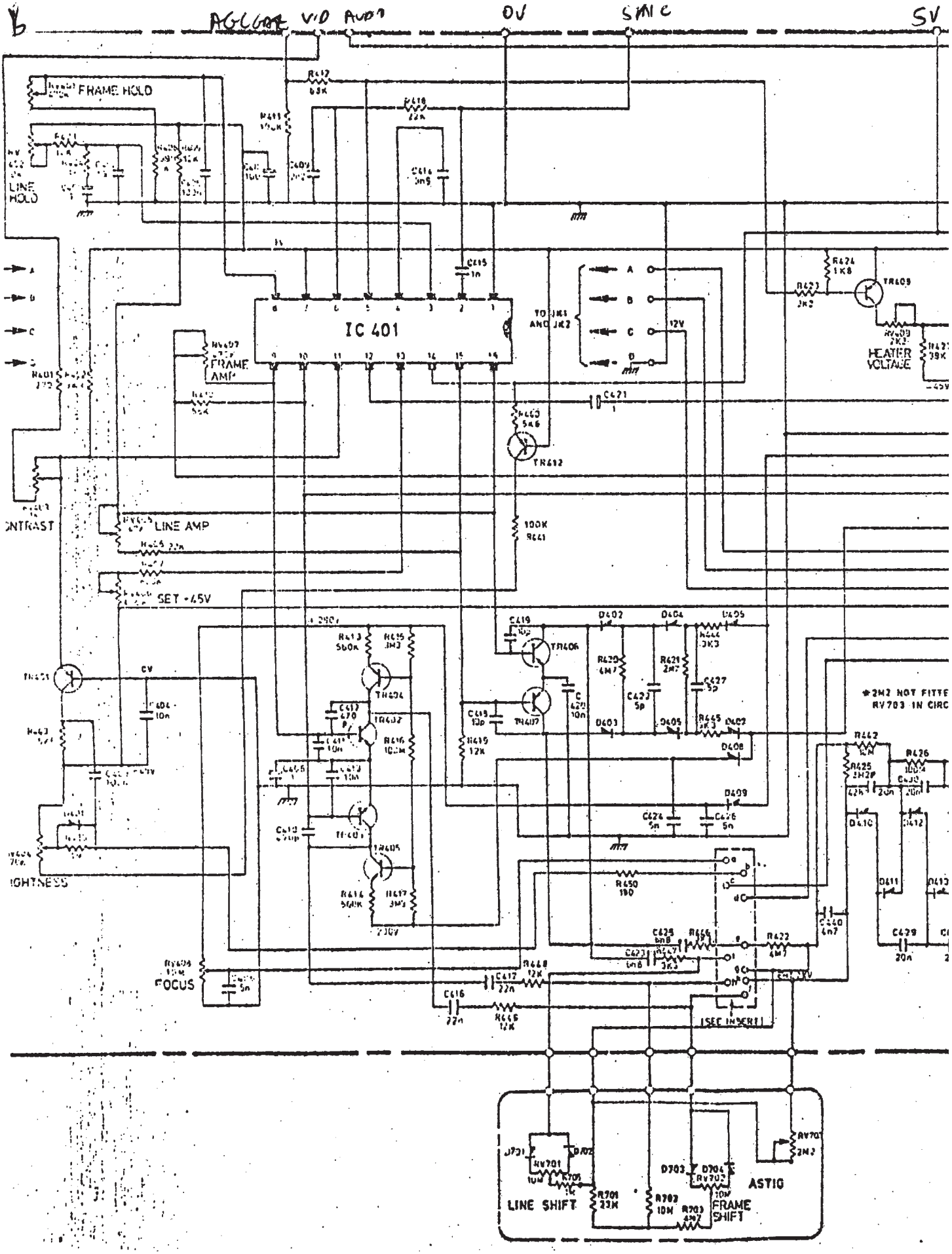
P.C.B. IS TO ISSUE F

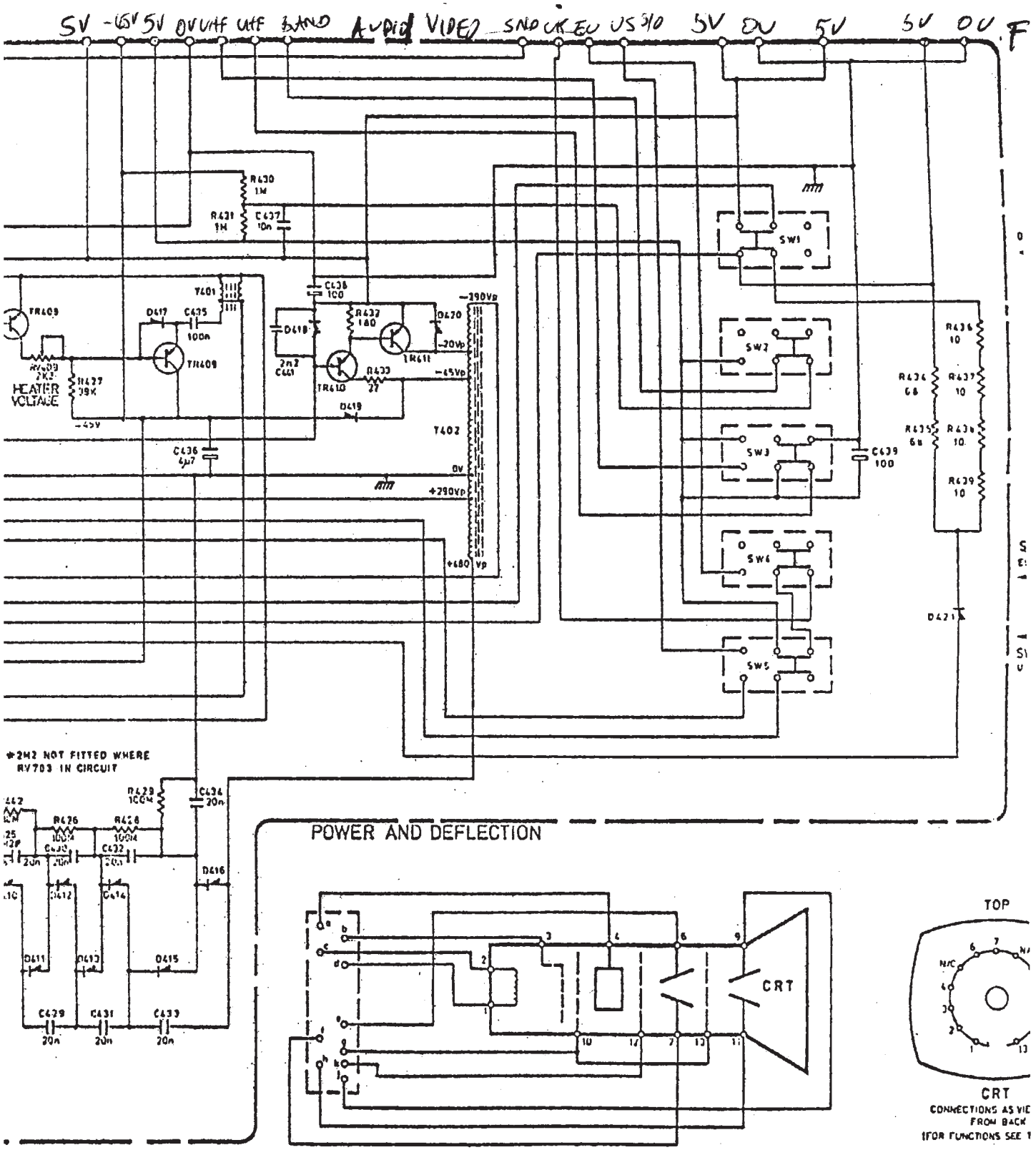
ARTWORK IS TO ISSUE F


V.I.F AND DETECTOR
AFC Com
AFC out
IF Test
VCC Tuner
-33V
AGC Test
Tuner AGC
Tuner Bias
Video IF
VHF
UHF
Band
C217 47n
RV201 10K
C216 47n
C218 10p
41,5 MHz L205
C208 4·7 µF
L203
D201
C211 3p3
D202
IC202
C201 47n
L201 (AFC)
C204 39p
IC201
R203 1GR
R205 10R
C205 47n
C206 22
C209 47n
C210 22
R208
C203 47p
L202 Det.coil
R206 56R
C214 47n
C215 47n
C219 12p
39p C220
34,5MHz L206
L204
C212 4p7
C213 47n
C204 1
R204 3K9
R202 1K8
TR201
R201 2K2
C207 100p
C221
R207 120K
AGC Getting
Video
Sound IF
Sync.
VCC In
-45V
Tuner VCC
VHF
UHF
Band



CIRCUIT DIAGRAM FOR SOUND IF BOARD


FRAME HOLD
LINE HOLD
IC 401
FRAME AMP
LINE AMP
SET -45V
CONTRAST
BRIGHTNESS
FOCUS
HEATER VOLTAGE
LINE SHIFT
FRAME SHIFT
ASTIG
SEE INSERT



PIN N°	CRT FUNCTION
1	HEATER CATHODE
2	HEATER
3	GRID
4	FOCUS
6	LINE PLATE
7	LINE PLATE
9	FRAME PLATE
10	A1
11	FRAME PLATE
12	A2
13	EHT

TOTAL RECEIVER

No Go.	Try on an adaptor to prove condition of batteries. If the batteries are completely flat, it will take a few minutes charging to produce results.	If results OK, che input socket for good connection, charge batteries. Batteries fuse.lir o/c. Batteries faulty or o/c connection at ends or connection via audio board.
	If still no results after dismantling from the other boards it is possible to run it up separately via the power adaptor socket.	If power board doe not run up, go to power board caults sheet.
No Sound	Sound Board fault.	Check connections to Borg sockets gc to sound faults sheet.
No pic or Sound	Check for Raster. If no Raster suspect power board. If Raster present check vision 1F board and Tuner board.	Check Borg connections. Go to vision 1F fault sheet. Check Tuner board.
No Frame No Cine	Check Power Board	
No Vision	Check Power Board Check Vision 1F Board.	

TUNER BOARDS

The Tuner Units VHF and UHF are not easily repairable. In order to cure any faults in this part of the receiver it is suggested that the complete board be replaced.

Other faults that can occur on this board are:

1) Fuse from batteries - open circuit.

2) Batteries faulty - open circuit.

3) Loudspeaker - open circuit.

VISION IF BOARD

For all faults a visual check for Dry Joints, Solder blobs causing shorts or components touching each other should be made before attempting repairs.

Vision Smearing	ST1, many of coils o/c will cause smearing.
No or poor vision	L203, ST1, C201, C219, C218, C215, L205, C214, ST2
High Gain	ST1
AGC faulty	C216, R203, R205, RV2(
No Sync.	C216, ST1
Tuner Bias Incorrect	ST2
No - 33v	ST2
High current	ST2, C213, ST1, C201, C209, C214

AUDIO BOARD

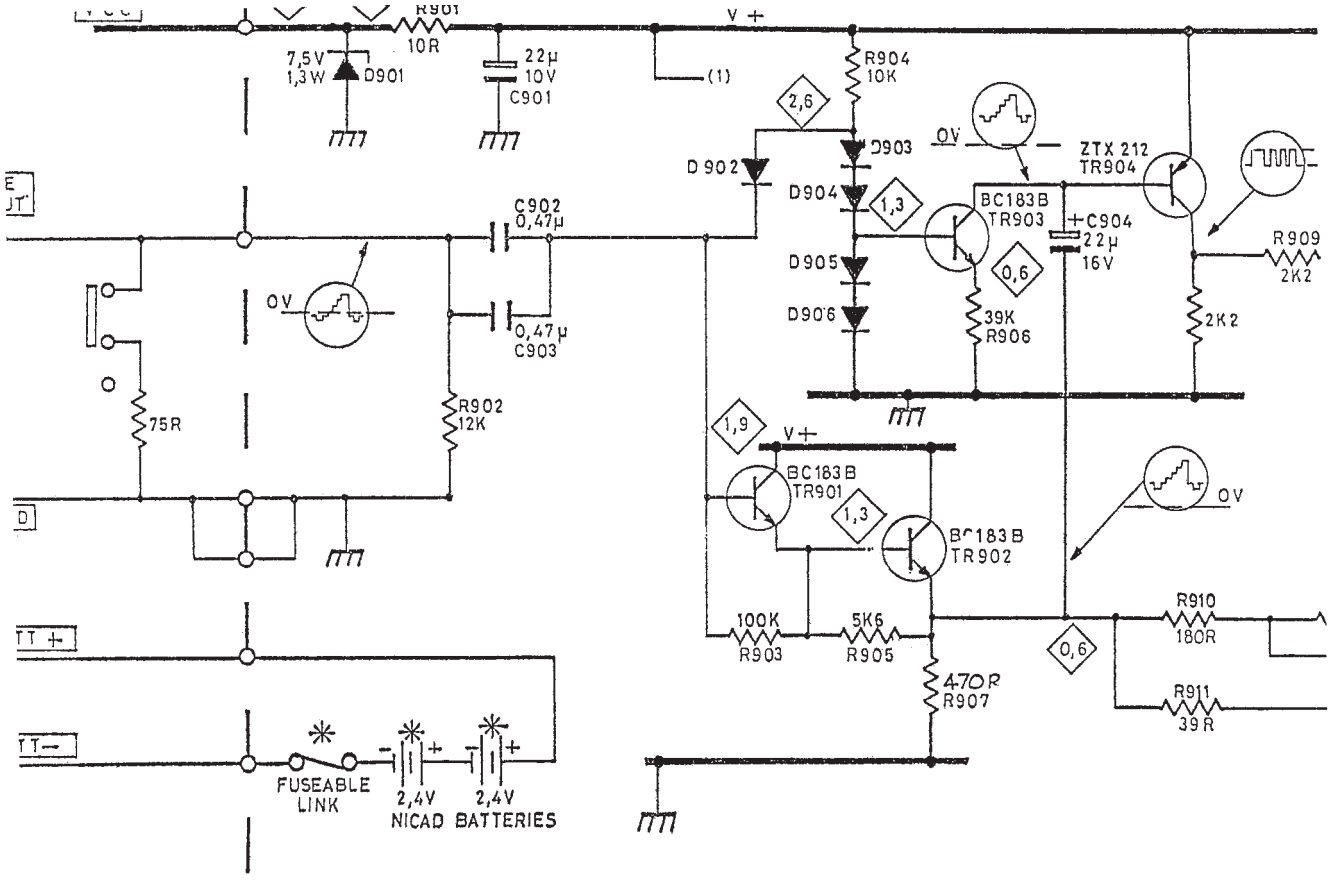
For all faults a visual check for Dry joints, Solder blobs cuasing shorts or components touching each other should be made before attempting repairs.

Symptons	Cure
No Detector	C305, TAA661, C307, C393, C314, C306
No Audio	TBA820, R310
Distortion	Crystal Filter Misalignment

POWER BOARD FAULTS

For all faults a visual check for Dry Joints, Solder blobs causing shorts or components touching each other should be made before attempting repairs.

SYMPTONS	COMMENTS	CURE
No Raster		ST3, TR410 s/c, D413 S/c D421, TR 401, C29, TR409 TR406, TR407, D.19
Low or no EHT		C430 C432 D411
No Video		TR491, ST3
No Sync.		R403, C415
Frame No.		D408, TR405, D409 TR402, C405, TR403 C417
Frame faulty inc Shift		D704 RV401 R702
Focus faults		D410, C431



VIDEO INTERFACE BOARD FOR MONITOR 1A AND 1AS