# Racal

## Panoramic adapter

## RA-366

## Operations & maintenance manual

# CONTENTS



## ILLUSTRATIONS

# TECHNICAL SPECIFICATION

| | |
|---|---|
| Mode of Operation: | (a) Panoramic display of signals in a spectrum up to 1 MHz wide.<br>(b) Spectrum analysis facilities in a band centred on the receiver tuned frequency equal to the receiver bandwidth. |
| Input Frequencies: | R.F. Mode: 2-3 MHz.<br>I.F. Mode: 1.6 MHz ± f kHz (where f is half the receiver bandwidth). |
| Sweep Frequency Range: | R.F. Mode: Adjustable from 100 kHz to 1 MHz with ability to sweep any particular portion of the discrete 1 MHz band.<br>I.F. Mode: Adjustable from 7.5 kHz to a maximum equal to the receiver bandwidth with the ability to sweep any particular portion of the band. |
| Resolution: | R.F.1: Capable of resolving two equal amplitude signals spaced by 1.0 kHz (Narrow band).<br>R.F.2: Capable of resolving two equal amplitude signals spaced by 10 kHz (Wide band).<br>I.F.: Capable of resolving two equal amplitude signals spaced by 1.0 kHz. |
| Deflection Amplifiers: | Linear with manual gain control facilities. |
| Sweep Rate: | 4 Hz approximately. |
| Frequency Markers: | R.F. Mode: (a) 100 kHz intervals across spectrum. *<br>(b) Marker indicating receiver frequency.<br>I.F. Mode: Centre frequency marker. * |

* With Receiver set to CALIBRATE mode.

| | |
|---|---|
| Sensitivity: | Such as to enable the resolution of a 2 μV signal at the receiver input over the range 3 kHz to 30 MHz with the receiver in the tuned input mode. |
| Controls: | POWER ON/OFF, R.F. Sweep, R.F. Centre, I.F. Sweep, Tuning Marker ON/OFF, I.F. Centre, Brilliance, Focus, Gain, R.F. - I.F. Mode Selector, Horizontal Position, Vertical Position. |
| Power Supplies: | Derived from associated receiver (RA.366A) or from an integral power unit (RA.366B).<br>(a) -16 volts regulated 140 mA (nominal).<br>(b) -24 volts unregulated 200 mA (nominal). |
| Dimensions: | $3\frac{1}{2}$ in. (8.64 cm) high x 19 in. (48.3 cm) wide. (Unit width $8\frac{1}{4}$ in. (20.95 cm) x $16\frac{3}{4}$ in. (42.54 cm) deep). |
| Weight: | 12 lb (5.4 kg) approximately. |
| Enviromental Conditions: | Operating: 0°C to +55°C.<br>Storage: -40°C to +70°C. |

# CHAPTER 1

## INTRODUCTION

The Panoramic Adaptor Type RA.366 provides a visual display of signals in any selected frequency band between 980 kHz and 30 MHz. It is designed for use with the Communications Receivers in the RA.1217 series. Signals in the 3 kHz to 980 kHz band may be observed by the addition of the L.F. Adaptor Type RA.337.

The maximum spectrum width that can be viewed is one megahertz and this is selected by the MHz tuning control on the receiver.

When the Panoramic Adaptor is operated in the i.f. mode, spectrum analysis facilities are provided for signals in the i.f. passband of the receiver and are selected by using the kHz tuning control.

In either mode of operation the displayed spectrum can be expanded to permit finite inspection of the selected signal.

Signals appear on the screen of the c.r.t. as inverted "V" deflections; the signal to which the receiver is tuned being seen as a deflection near the centre of the screen. Other signals within the selected spectrum appear to the left or right of centre according to their frequencies, and as the receiver is tuned these deflections will move across the c.r.t. When a deflection approaches the centre of the screen its corresponding signal will be heard through the receiver.

A tuning marker signal is derived from the receiver when the adaptor is used in the r.f. mode and marker pips appear on the screen at 100 kHz intervals when the receiver is set to CAL.

There are two types of adaptor RA.366 and these differ only in the power supply unit which is available for the panoramic adaptor. The units are identified as follows:

RA.366A (Drg. DA.40880/A): less power supply unit - for use with RA.1217 having 10 mW audio output.

RA.366B (Drg. DA.40880/B): with power supply unit - for use with RA.217, RA.1218/RA.1220 and RA.1217 with 1 watt audio output.

The power unit used in the RA.366B is the PU.1153 which is described in the appendix. The connections between this power unit and the RA.366 are shown in Fig. 10

# CHAPTER 2

# INSTALLATION

1. After unpacking the Panoramic Adaptor, inspect the unit carefully for any visible signs of damage. Ensure that the chassis and c.r.t. are completely clear of fluff and shavings.

## Power Supply

2. (a) Ensure that the receiver power input switch is set correctly to a.c. or d.c. according to the type of power supply in use.

(b) Ensure that the Panoramic Adaptor BATTERY/LINE switch on the rear panel is correctly set for the power supply in use.

## Connections to Receiver

3. The following connections should be made between the receiver and the RA.366.

### Coaxial Connections

| RA.366 | Receiver |
|---|---|
| 2-3 MHz input (J201) | 2-3 MHz out |
| 1.6 MHz narrow (J102) | 1.6 MHz out |
| 2nd V.F.O. (J202) | 2nd V.F.O. out |

### Power Connections

RA.366A. The power supplies are taken from the associated receiver and the following connections are required:

| RA.366 | Receiver |
|---|---|
| -16V regulated | -16V regulated |
| Earth (Ground) | Earth |
| -16V unregulated | -20V unregulated |

RA.366B. The power supplies are taken from an integral power unit and the connections should be made as shown in Fig. 10.

### CAUTION

OBSERVE POLARITY WHEN MAKING POWER SUPPLY CONNECTIONS.
IF THE -16V REGULATED AND -20V UNREGULATED CONNECTIONS ARE REVERSED THE D.C./D.C. INVERTER IN THE RA.366 WILL BE PERMANENTLY DAMAGED.

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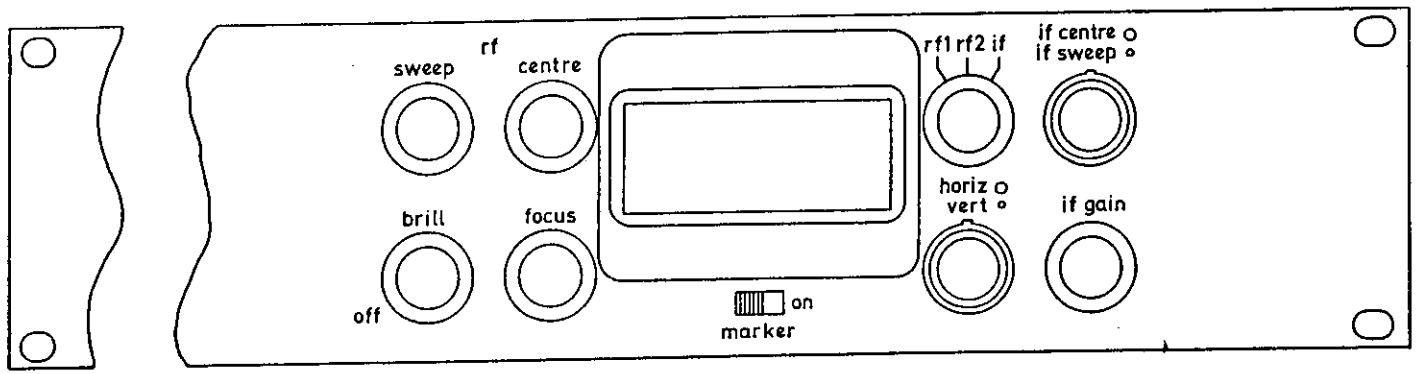
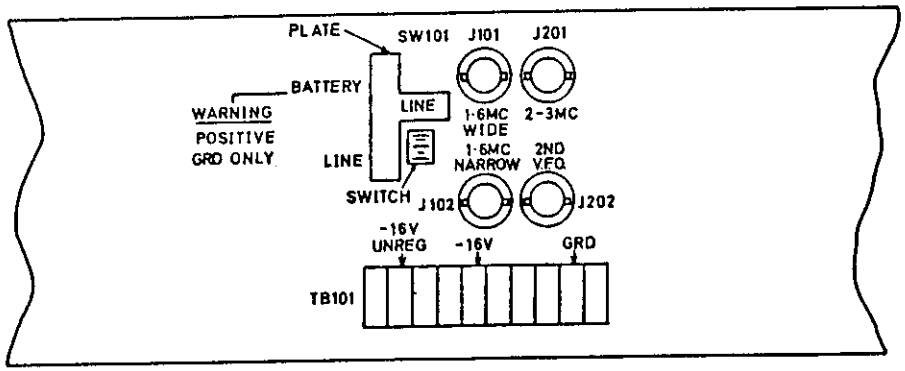



FRONT PANEL




REAR PANEL

FIG. 2·1

# FRONT & REAR PANELS: RA.366

# CHAPTER 3

# SETTING TO WORK

## Preliminary Settings

NOTE: The following control settings should be made with the power OFF at the receiver and the panoramic adaptor, and with all inter-connections correctly made.

1. (1) Rotate the r.f. sweep control fully clockwise.

(2) Rotate the i.f. sweep control fully clockwise.

(3) Set the horizontal and vertical position controls to mid-range.

(4) Set the r.f. centre and i.f. centre controls to mid-range.

(5) Switch the selector to "rf2".

(6) Set the marker switch to 'on'.

(7) Rotate the i.f. gain control fully clockwise.

(8) Turn the brilliance and focus controls fully anticlockwise.

Switch ON the receiver and the panoramic adaptor.

2. With the power switched on:

(1) Adjust the brilliance and focus controls for a suitable trace (approx. mid-range).

(2) Adjust the vertical control for a trace along the etched line near the bottom of the c.r.t.

(3) Adjust the horizontal control until the trace is centred and extends to both edges of the c.r.t.

When the foregoing settings have been made, a negative square wave (marker) should appear on the c.r.t.

NOTE: If the unit is switched OFF and then immediately switched ON, the trace may not reappear. If this occurs, switch the unit off and wait approximately 15 seconds for the power circuits to discharge before switching on. In extreme cases, however, it may be necessary to operate the ON-OFF switch in rapid sequence from ON-to-OFF-to-ON in order to obtain the missing trace.

R.F. Mode Calibration

3. (1) Make the preliminary settings listed above and adjust the r.f. centre control to centre the tuning marker on the c.r.t.

(2) Switch the receiver to CAL and set the kHz control to 500 kHz. Eleven marker pips (100 kHz) markers should appear on the trace of the RA.366.

(3) Rotate the kHz control on the receiver from 0 kHz to 1000 kHz and ensure that the tuning marker is at the extreme left at 0 kHz, and at the extreme right at 1000 kHz.

(4) Connect a 1 microvolt, 2.5 MHz signal to the receiver r.f. input and note that a positive 'pip' approximately $\frac{1}{4}$" (6 mm) high appears above the marker pulse.

(5) With the signal centred, rotate the 'rf sweep' control counter-clockwise and observe that the sweep width narrows from 1 MHz to 100 kHz i.e. the signal pip opens up but remains sensibly centred on the c.r.t.

(6) Switch the selector to 'rfl' and note that a narrower spectrum signal also appears slightly smaller in amplitude. This is caused by the crystal filter which is switched into circuit in this mode of operation.

I.F. Mode Calibration

4. (1) Switch the selector to "i.f." and note that the marker pulse disappears.

(2) Turn the "i.f. sweep" control fully clockwise and adjust the "i.f. centre" control to obtain a response in the centre of the trace. Set the receiver i.f. bandwidth to maximum.

(3) Turn the receiver kHz dial and observe that the two moving pips converge on the fixed one in the centre of the trace.

(4) Continue turning the kHz control until the largest pip is at the right hand side of the trace. Note this figure in kHz. Turn the kHz control until the same pip is at the left hand side of the trace and note the figure in kHz. Subtract the second reading from the first; the difference is the maximum sweep in the i.f. position of the selector switch.

(5) Turn the "i.f. sweep" control fully counter-clockwise. The pip should increase in width at the centre. (Slight adjustment of the "i.f. centre" control may be necessary.)

(6) Rotate the kHz control on the receiver until the pip is at the right hand edge of the trace. Note the figure in kHz. Turn the kHz control until the response is at the left hand edge of the trace. Subtract this figure from the first reading. The difference should be less than 100 kHz and indicates the minimum sweep width in the i.f. position of the selector.

# CHAPTER 4

# OPERATING INSTRUCTIONS

References to the controls are in accordance with the titles shown on the front panel (see Fig. 2.1).

| Function | |
|---|---|
| r.f. sweep | This control adjusts the sweep width of the r.f. spectrum. The sweep width can be varied from 1 MHz (fully clockwise) down to 100 kHz. |
| r.f. centre | When the selector switch is in the r.f.1 or r.f.2 position this control enables the displayed r.f. spectrum to be shifted horizontally on the c.r.t. |
| brill (brilliance) | This control is combined with the power ON/OFF switch. Clockwise rotation increases the intensity of the trace. |
| rf1, rf2, i.f. | Selector switch: |

rf1 R.F. narrow band position. Provides for the resolution of two r.f. signals separated by 1 kHz or more. When operating in this mode the r.f. sweep width should be reduced to 100 kHz (fully clockwise).

rf2 R.F. wideband position. Provides for the resolution of two r.f. signals separated by 10 kHz or more. It is used to observe the r.f. spectrum from 1 MHz to 100 kHz by varying the r.f. sweep width to obtain the required spectrum width.

i.f. Enables various i.f. spectrum widths to be observed depending upon the i.f. bandwidth setting of the receiver. Provides for the resolution of two signals separated by 1 kHz or more. In this position the receiver tuning marker is disconnected.

| | |
|---|---|
| i.f. centre)<br>i.f. sweep) | A dual concentric control:<br>i.f. centre: Larger (outer) knob. Used to adjust the horizontal position of signals when operating in the i.f. mode.<br>i.f. sweep: Smaller (inner) knob. Adjusts the i.f. sweep width from approximately 13 kHz (fully clockwise) down to 7.5 kHz when switched to the i.f. mode. |
| horizontal<br>vertical | Dual concentric control:<br>horizontal: Outer knob: Shifts the displayed trace left or right on the c.r.t.<br>vertical: Inner (smaller) knob: Shifts the displayed trace up or down on the c.r.t. |
| i.f. gain | Adjust the amplifier gain. Maximum gain is fully clockwise. |
| marker ON/OFF | In the marker "ON" position the receiver tuning marker is available when switched to the rf1 or rf2 modes of the RA.366. |

Display of Individual Signals

1. The i.f. position of the selector switch enables a discrete portion of the r.f. spectrum to be examined. When this facility is required the following procedure should be adopted without moving the r.f. centre control from its correct setting.

2. With the selector switch in the r.f.2 position, and the "marker" switch ON, tune the receiver exactly to the desired signal in the r.f. spectrum. (Use the receive tuning marker that is displayed on the c.r.t.).

3. Set the RA.366 selector to the i.f. position. The desired signal pip will appear in the centre of the c.r.t. without the tuning marker. (A slight adjustment of the receiver kHz control may be necessary to obtain maximum amplitude of the displayed signal).

4. An analysis of the signal is then possible by adjusting the i.f. sweep control.

5. The i.f. spectrum display is limited by the i.f. bandwidth of the associated receiver.

# CHAPTER 5

## BRIEF TECHNICAL DESCRIPTION

1. The block diagram shown in Fig. 5.1 should be used in conjunction with the information in this chapter.

### R.F. Amplifier and 1st R.F. Mixer

2. The output from the receiver (2-3 MHz input) is applied to the 2-3 MHz amplifier in the panoramic adaptor RA.366. The amplifier output is fed through a 2-3 MHz bandpass filter and is combined in the 1st r.f. mixer with 23-24 MHz from the sweep oscillator.

3. The resultant frequency difference of 21 MHz is then applied to the 2nd r.f. mixer.

### 2nd R.F. Mixer and 19.4 MHz Crystal Oscillator

4. The 21 MHz signal is combined with 19.4 MHz from the crystal oscillator in the 2nd r.f. mixer. The 1.6 MHz i.f. output from the 2nd r.f. mixer is passed through a low-pass filter to the i.f. module via the r.f. position of the r.f./i.f. selector switch.

### I.F. Module, 1.6 MHz Amplifier, and 1st I.F. Mixer

5. The 1.6 MHz signal from the receiver is selected by the selector switch (r.f. position) on the front panel of the RA.366. In this mode, the 1.6 MHz signal is amplified and taken via a bandpass filter to the 1st i.f. mixer of the adaptor.

6. In the "r.f." position of the selector, the mixer combines 1.145 MH from the i.f. crystal oscillator with the 1.6 MHz signal to produce 455 kHz.

7. In the "i.f." position, the r.f. section is switched out of circuit and the 1st i.f. mixer then combines the 1.6 MHz signal from the receiver with the sweep oscillator output (1.145 MHz ± 40 kHz) to produce 455 kHz. The 455 kHz signal is amplified and fed through the crystal filter.

8. The amplified 455 kHz signal is taken via the diode detector to a vertical amplifier and the Y deflection plates on the c.r.t.

Sawtooth Generators

9. The horizontal sawtooth generator receives a synchronising pulse from the i.f. sawtooth generator and produces a time base deflection voltage which is amplified by the horizontal deflection amplifier. The pulse is then fed to the horizontal deflection plates on the c.r.t.

10. The horizontal sawtooth generator also supplies a synchronizing pulse to the r.f. sawtooth generator to ensure that all three sawtooth generators are in synchronization.

Sweep Oscillator (23-24 MHz)

11. The r.f. sawtooth generator provides a sawtooth voltage to the r.f. sweep oscillator at a sweep rate of 4 hertz. This sweep rate is set by an internal adjustment in the r.f. sawtooth generator. The oscillator sweeps from 23-24 MHz and is fed to the 1st r.f. mixer and the 1st marker mixer.

Receiver Marker

12. An output of 3.6-4.6 MHz is taken from the 2nd V.F.O. of the receiver and is fed, via a low pass filter, to the 1st marker mixer of the RA.366. A negative blanking pulse is also fed to the 1st marker mixer from a multivibrator which is triggered by the horizontal sawtooth generator. The mixer combines the 3.6-4.6 MHz with the 23-24 MHz output from the sweep oscillator to produce 19.4 MHz.

2nd Marker Mixer and Marker Generator

13. The 19.4 MHz output from the 1st marker mixer is combined with 19.4 MHz from the r.f. crystal oscillator to produce a zero beat ±1 kHz output. This signal is amplified and fed to a multivibrator which produces a wide positive going square wave. The wide pulse width is necessary to prevent double pulsing of the marker generator by the audio signal on either side of zero beat.

14. The multivibrator square wave output is integrated to obtain a positive spike which is used to trigger a third multivibrator. This multivibrator produces a positive square wave marker which is taken to the i.f. and detector module.

15. The marker pulse and the detected signal are taken simultaneously to the Y-deflection plates of the c.r.t.

16. As the receiver is tuned (kHz), the receiver's 2nd V.F.O. frequency (3.6-4.6 MHz) varies the position of the marker pulse relative to the 23-24 MHz horizontal time base.

Power Unit (Internal d.c./d.c.)

17. A d.c./d.c. inverter produces the e.h.t. voltages to operate the c.r.t.

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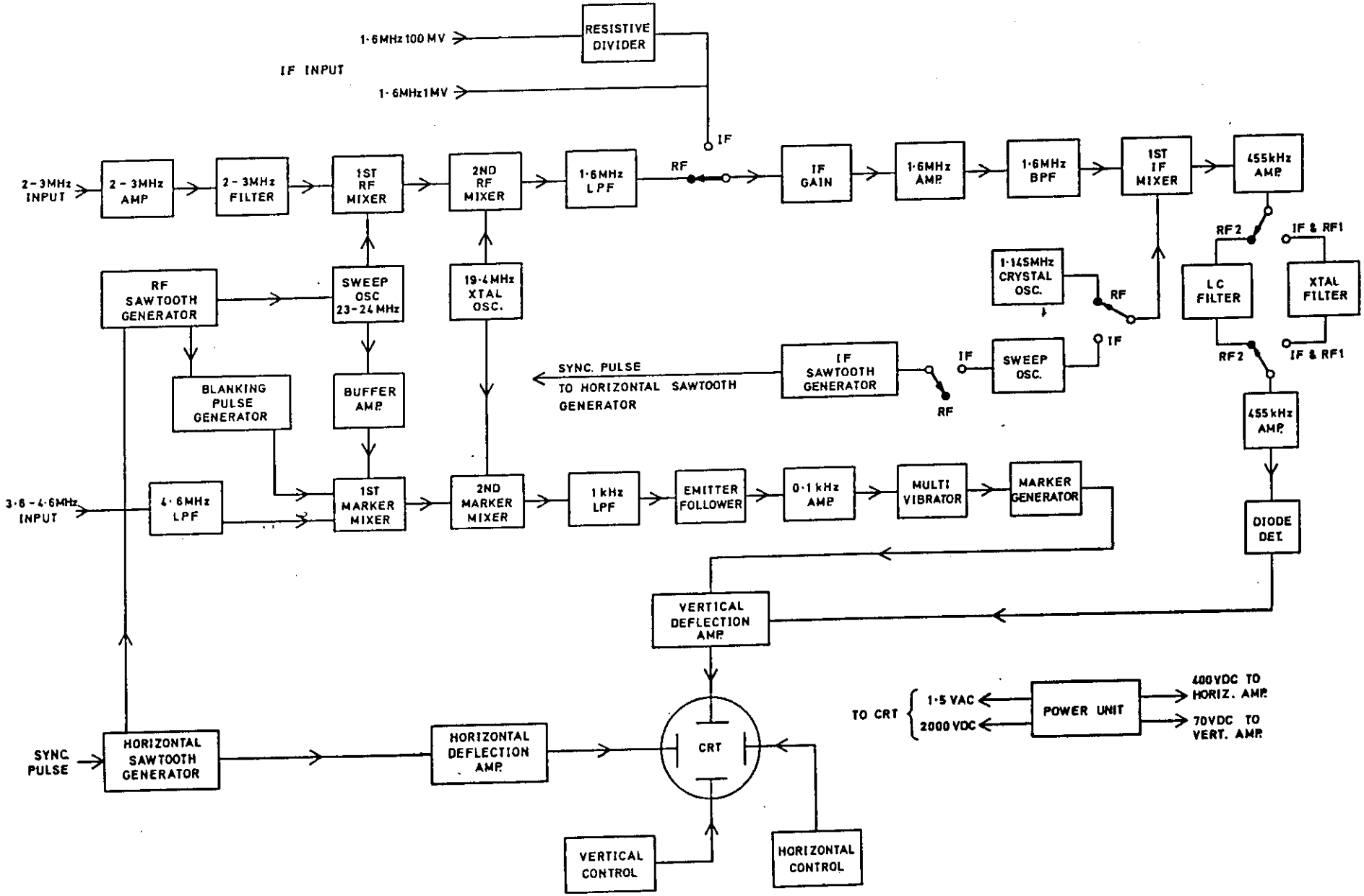



FIG. 5·1

BLOCK DIAGRAM: PANORAMIC ADAPTOR. RA.366

# CHAPTER 6

## DETAILED CIRCUIT DESCRIPTION

1. In order to assist in understanding the circuitry of the panoramic adaptor it is useful to regard it as consisting of three sub-units viz: the r.f. signal channel; the i.f. signal channel, and the calibration marker circuits. (The internal d.c./d.c. inverter is additional).

Interconnections and Input Circuits (Figs. 1a and 1b)

2. The signal connections from the receiver to the panoramic adaptor are made via coaxial cables. Although the cable lengths are not critical, any excessive extensions will attenuate the spectrum signal input and can de-tune the 4.6 MHz low-pass filter.

R.F. Amplifier and 1st R.F. Mixer (Fig. 3)

3. The r.f. input spectrum (2-3 MHz) is taken to the base of Q1 via R38, L1, and C7. The amplified signal is filtered by the bandpass components A1 to A7 and is applied to the base of the mixer Q4.

4. A 23-24 MHz signal is derived from the sweep oscillator (Q3) and is mixed in Q4 to produce 21 MHz.

5. A second 23-24 MHz output is taken from the sweep oscillator circuit to the buffer amplifier Q8 in the Marker circuit (Fig. 4).

2nd R.F. Mixer (Fig. 3)

6. The first and second r.f. mixers are coupled by a filter which is tuned to 21 MHz by the preset capacitors C24/5. Q5 also accepts a signal from the 19.4 MHz oscillator and the 1.6 MHz output is fed via a 1.6 MHz low-pass filter (L3, C36) to the i.f. module.

7. The 19.4 MHz crystal controlled oscillator also supplies a second output which is taken to the emitter of the second marker mixer Q4 (Fig. 4).

I.F. and Detector Module (Fig. 6)

8. Two i.f. inputs are available; one from the swept r.f. stages, and the other directly from the receiver. Selection is effected by the mode selector switch (r.f./i.f.) which functions via relay K1; the selected input being routed to Q1 via the front panel i.f. gain control.

9. The amplified i.f. signal is filtered by the bandpass filter formed by tuned coils L1, L2, assemblies A1/2 and capacitors C6, C8.

1st I.F. Mixer and Filters (Fig. 6)

10. Capacitor C9 couples the 1.6 MHz signal from the bandpass filter to the base of mixer Q2. 1.145 MHz is fed to the emitter from the crystal oscillator when the selector switch is in the r.f. position, or from the sweep oscillator when in the i.f. position. The resultant i.f. difference of 455 kHz is then fed to the tuned primary winding of T1.

11. Capacitor C13 couples the 455 kHz from the transformer secondary winding to the base of i.f. amplifier Q3. R22 is used to set the gain of the 455 kHz amplifier.

12. The 455 kHz signal is passed from Q3 through relay K2 to either the LC filter or the crystal filter FL1 depending on the position of the selector switch.

13. When the selector switch is in the r.f.1 or i.f. position the crystal filter is in the circuit. Since the crystal filter bandwidth is only 500 Hz, the r.f.1 position is useful only when the r.f. sweep width is reduced to 100 kHz.

14. With the selector switch in the r.f.2 position, the LC filter is in circuit. Since the bandwidth of the LC filter is approximately 10 kHz this filter may be used for any setting of the r.f. sweep width control.

15. After filtering, the 455 kHz signal is amplified by Q4 and fed through tuned transformers T2 and T3 to the diode detection stage and voltage doubler consisting of CR1, CR2, C27 and C28.

Diode Detector and Vertical Amplifier (Fig. 6)

16. All signals appearing at the input of the detector circuit (C27 are both positive and negative. It is not necessary to display the entire signal since one-half mirrors the other, so the signals are detected or rectified and coupled producing a positive going spectrum which is then fed to the vertical amplifier.

17. Potentiometer R35 is used to adjust the gain of the detected signal while potentiometer R39 is preset to adjust the emitter bias, preventing saturation or cut-off of Q5.

18. The detector circuit provides a linear output to the vertical deflection amplifier which feeds the vertical deflection plates on the display tube. Positive square wave pulses from the marker module are also fed to the vertical deflection circuit via terminal E14 through resistor R37 and out via terminal E13.

I.F. SWEEP (Fig. 7)

I.F. Sawtooth Generator and 1.145 MHz Oscillator

19. Unijunction transistor Q1 and emitter follower Q2 form a relaxation oscillator producing a non-linear sawtooth voltage. The output of the oscillator is fed via R9 through the i.f. sweep width control and relay K1 (when in the i.f. position of the selector switch) to the varicap CR1 where it is used to vary the voltage and, therefore, the capacitance thus varying the frequency of the 1.145 MHz oscillator.

20. In the r.f. position the sawtooth voltage is eliminated and the oscillator is then crystal controlled.

21. This sawtooth voltage is also tapped from the emitter of Q2, integrated and fed to the horizontal sawtooth generator for use as a synchronizing pulse.

22. The 1.145 MHz oscillator signal is fed via terminal E12 to the 1st i.f. mixer.

23. Potentiometer R5 is preset to adjust the sweep rate (approximately 250m sec) of the sawtooth generator.

24. R6 is used to adjust the linearity of the sawtooth voltage and thus compensate for the non-linearity in varicap CR1.

25. The d.c. balance potentiometer R10 is adjusted so that a change in the amplitude of the sawtooth voltage will not cause a shift in the mean d.c. reference level.

26. Potentiometer R11 is used to pull the frequency of the crystal controlled oscillator.

HORIZONTAL AND R.F. TIME BASE (Fig. 8)

(Horizontal Sawtooth Generator)

27. The synchronizing pulse from the i.f. sawtooth generator is fed via C1, emitter follower Q1 and C3 to the second base of the unijunction transistor Q2 where it is used to trigger the horizontal sawtooth generator.

28. Potentiometer R7 is preset to adjust the sweep rate by adjustment of the RC time constant.

29. Potentiometer R8 adjusts the linearity of the sawtooth voltage, and potentiometer R13 provides for the d.c. balance adjustment.

30. Potentiometer R12 is used to set the horizontal gain (dispersion) of the trace.

31. From the wiper of potentiometer R12 the horizontal voltage is fed to the horizontal deflection amplifier Q4, and then via terminal E7 to pin 2 (horizontal plate) of the display tube.

32. Potentiometer R15 is used to preset the emitter bias on Q4.

33. The sawtooth voltage produced by Q3 is integrated by C7 and fed to the emitter-follower stage Q5; the trigger pulse output of Q5 being applied via C10 to the unijunction transistor Q6 where it is used to synchronize the r.f. sawtooth generator. It is also fed via terminal E8 to the marker circuit where it is used to trigger the blanking pulse generator.

34. Potentiometer R23 is used to adjust the sweep rate of the r.f. sawtooth generator and potentiometer R24 is used to adjust the linearity of the sawtooth voltage.

Marker Circuits (Fig. 4)

35. The 3.6-4.6 MHz 2nd V.F.O. output from the associated receiver is fed via a 4.6 MHz low-pass filter (A1, A2) to the base of the 1st marker mixer Q5.

36. A 10 volt negative blanking pulse is also fed to the base of Q5 which cuts off the transistor during the flyback period of the sweep oscillator. The blanking pulse is generated by multivibrator Q1 and Q2 which is triggered by a pulse from the horizontal sawtooth generator.

37. The sweep oscillator output (23-24 MHz) is injected at the emitter of Q5 from buffer amplifier Q8 and is combined with the 4.6 MHz signal at the base.

38. The 1st marker mixer output is 19.4 MHz ± a discrete band of frequencies. This frequency band is determined by the double tuned circuit T1 and T2, and is fed via the capacitive divider C16 and C17 to the base of the 2nd marker mixer Q4. 19.4 MHz from the crystal oscillator on the swept r.f. board is injected to the emitter of Q4. The output of Q4 is a zero beat ± a discrete band of frequencies which is passed through a 1 kHz low-pass filter (R23 and C11) and then via C13 to emitter follower Q6 and amplifier Q7.

39. The output of Q7 triggers the 2nd multivibrator (Q9 and Q10) which has a pulse width of approximately 200 milliseconds and is integrated by C28.

40. The integrated positive pulse is fed via CR3 and triggers the 3rd multivibrator Q11 and Q12. The output of the 3rd multivibrator is the marker pulse seen on the c.r.t. This narrow negative pulse is approximatel 5 milliseconds wide. Because of its narrow pulse width, if the zero ±1 kHz signal is fed directly to the 3rd multivibrator, both the zero -1 kHz and zero +1 kHz signal would trigger the multivibrator thereby producing an extraneous marker pulse. The 2nd multivibrator prevents double pulsing because its wide pulse width is triggered only by the zero -1 kHz signal and produces only one trigger pulse for each sweep cycle.

Power Supplies (Fig. 9)

41. The power required to operate the panoramic adaptor can be derived from the associated receiver. When the receiver is operating on a.c. line voltage there are two negative d.c. voltages fed via interconnecting cables to the RA.366:

(a) -16V d.c. regulated.

(b) -21 to -40V d.c. unregulated (-16V unregulated terminal).

42. For battery operation, only -16V is required with the positive side grounded.

43. During mains operation, the unregulated d.c. voltage (-21 to -40V) from the receiver is fed to a series voltage regulator in the power unit. Potentiometer R2 is used to set the output voltage at -16.0 volts at Test Point 2.

44. When battery operated, the voltage regulator is by-passed and the -16 volts d.c. is fed directly to a d.c./d.c. inverter via terminal E1.

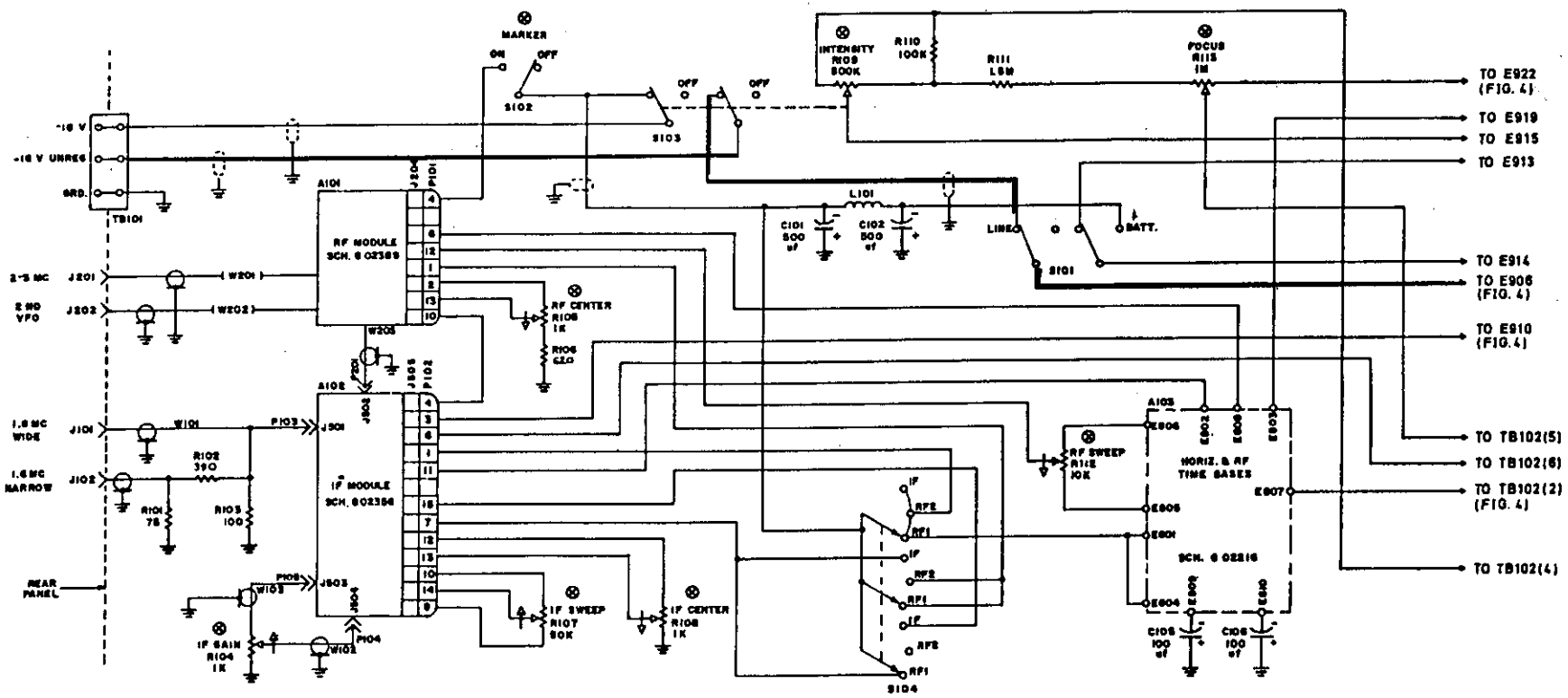
45. The inverter provides three outputs:

(1) A 1.5 volt r.m.s. output which is fed to the filaments of the c.r.t. (Pins 3 and 8).

(2) A -2000V d.c. which is fed through a resistive divider network to ground. Included in this divider are the intensity (Pin 3) and focus controls (Pin 5). It is also fed directly to the grid (Pin 4) of the c.r.t.

(3) 400 volts d.c. is fed to a 290 volt zener diode regulator chain consisting of VR2, VR3 and VR4. The 290 volt supply is then fed in parallel to the horizontal position control (Pin 1), the vertical position control (Pin 7) and also to the horizontal sweep amplifier. Both the horizontal and vertical control circuits are resistive divider chains. Included in the zener chain is a 70 volt d.c. tap which supplies the vertical amplifier.

46. When the power supplies are taken from an integral power unit, as in the RA.366B the same voltage levels are applied to the panoramic adaptor and the outputs from the inverter are as described in para. 45.

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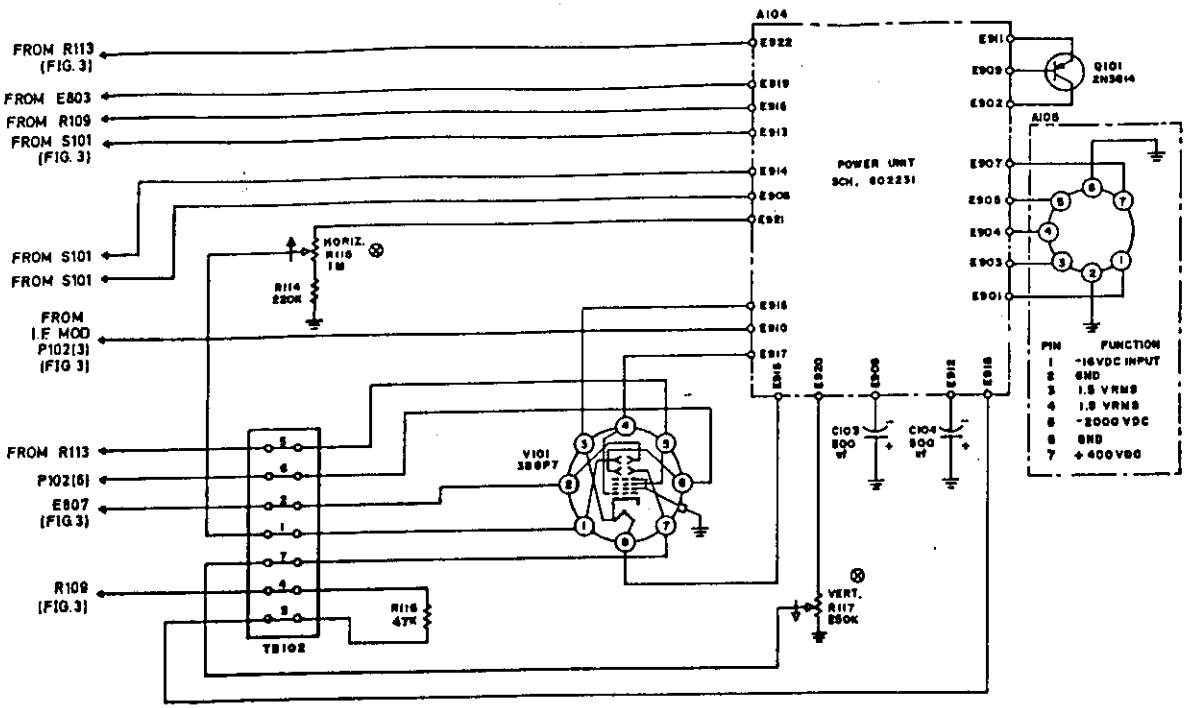
Main Chassis: Interconnections (Sheet 1) RA.366

Fig.1a

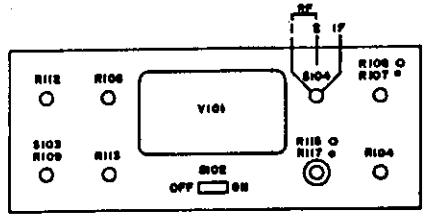



UNLESS OTHERWISE NOTED:

1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K= 1,000 M= 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION

INDICATES SCREWDRIVER ADJUSTMENT

INDICATES FRONT PANEL MOUNTING




FRONT PANEL

LOCATION OF COMPONENTS

RACAL
PANORAMIC ADAPTER
DWG 6-02599
SERIES 100

H309/1b

## Main Chassis: Interconnections (Sheet 2) RA.366

Fig.1b

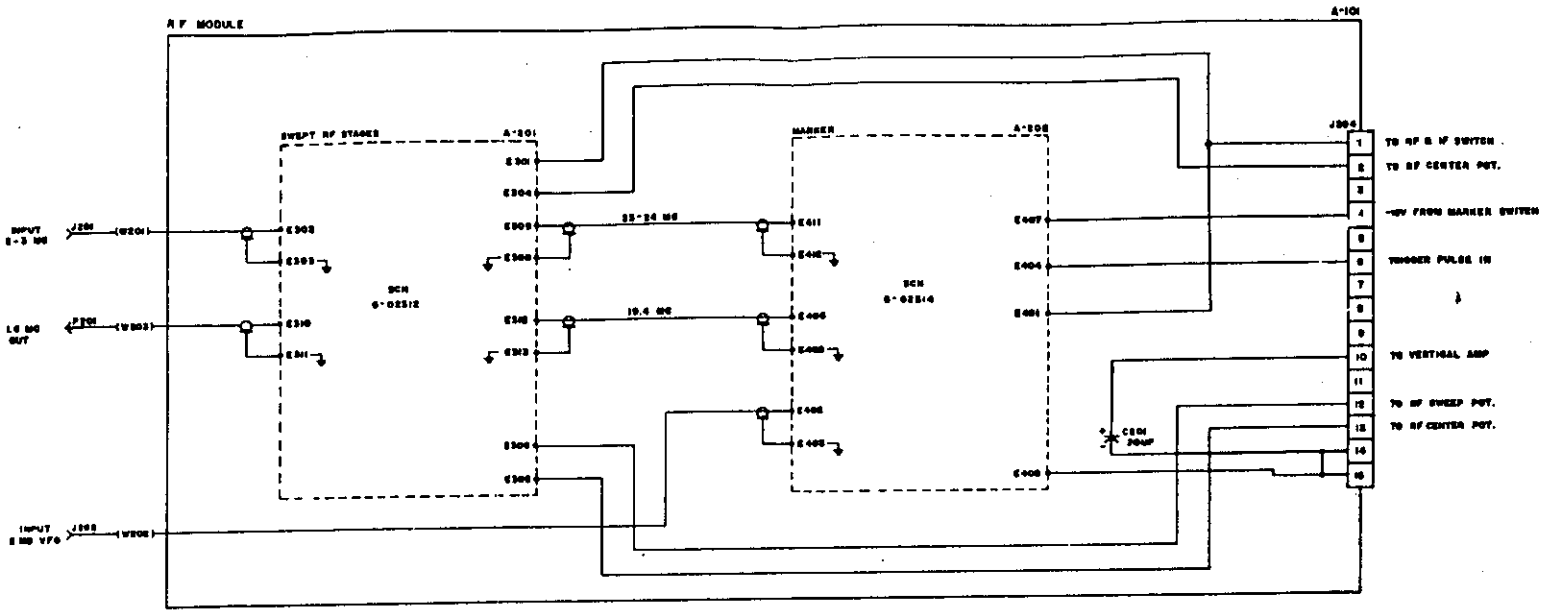
## MAIN CHASSIS

### 100 Series

| Cct. Ref. | Description | Value | Tol. % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Resistors** | | Ohms | | watts | |
| R101 | Fixed Composition | 75 | 5 | 1/4 | RC07GF150J |
| R102 | Fixed Composition | 390 | 5 | 1/4 | RC07GF391J |
| R103 | Fixed Composition | 100 | 5 | 1/4 | RC07GF101J |
| R104 | Potentiometer | 1k (i.f.gain) | | | RCI B-02337 |
| R105 | Potentiometer | 1k (r.f.centre) | | | RCI B-02336 |
| R106 | Fixed Composition | 620 | 5 | 1/4 | RC07GF621J |
| R107 | Potentiometer | 50k (i.f. sweep) | | (dual) | (RCI B-02334 |
| R108 | Potentiometer | 1k (i.f.centre) | | | (RCI B-02334 |
| R109 | Potentiometer | 500k (brilliance) | | | RCI B-02332 |
| R110 | Fixed Composition | 100k | 5 | 1/4 | RC07GF104J |
| R111 | Fixed Composition | 1.5M | 5 | 1/4 | RC07GF155J |
| R112 | Potentiometer | 10k (r.f. sweep) | | | RCI B-02335 |
| R113 | Potentiometer | 1M (focus) | | | RCI B-02333 |
| R114 | Fixed Composition | 220k | 5 | 1/4 | RC07GF224J |
| R115 | Potentiometer | 1M (horizontal position) | | | RCI B-02338 |
| R116 | Fixed Composition | 47k | 5 | 1/4 | RC07GF473J |
| R117 | Potentiometer (dual with R115) | 250k(vertical position) | | | RCI B-02338 |
| **Capacitors** | | µF | | volts | |
| C101 | Electrolytic | 500 | -10+75 | 50 | Sprague 39D507G05GL4 |
| C102 | Electrolytic | 500 | -10+75 | 50 | Sprague 39D507G05GL4 |
| C103 | Electrolytic | 500 | -10+75 | 50 | Sprague 39D507G05GL4 |
| C104 | Electrolytic | 500 | -10+75 | 50 | Sprague 39D507G05GL4 |
| C105 | Electrolytic | 100µF | 20 | 25 | Sprague TE-1211 |
| C106 | Electrolytic | 100µF | 20 | | Sprague TE-1211 |
| **Inductors** | | | | | |
| L101 | Filter Choke | 150µH | | 250mA | National R-40-150 |
| **Tube & Socket** | | | | | |
| V101 | Cathode Ray Tube | | | | Sylvania 3BGP7 |
| XV101 | Pre-wired Octal Socket | | | | Sylvania 8000-7038 |

## MAIN CHASSIS - 100 Series contd

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Transistor** | | | | | |
| Q101 | 2N3614 - Germanium, PNP | | | | Motorola RCI 30751 |
| **Transformer** | | | | | |
| A105 | Power Transformer (Inverter) | | | | RCI C-02000 |
| **Switches** | | | | | |
| S101 | dpdt Slide Switch Line (Receiver)/Battery | | | | Oak 278 |
| S102 | dpdt Slide Switch (Marker On/Off) | | | | Oak 278 |
| S103 | Power On/Off, Part of R109 | | | | B-02332 |
| S104 | Rotary, 3 position (RF/IF Selector) | | | | B-02542-1 |
| **Terminal Strips** | | | | | |
| TB101 | Rear Panel, 3 position | | | | RCI 70320 |
| TB102 | 10 position | | | | RCI 70300 |
| **Connectors** | | | | | |
| J101 | Coaxial, 1.6 MHz Wideband Input | | | | Micon 1003 |
| J102 | Coaxial, 1.6 MHz Narrowband Input | | | | Micon 1003 |
| P101 | Plug - 15 contacts | | | | Cannon DAM-15S |
| P102 | Plug - 15 contacts | | | | Cannon DAM-15S |
| P103 | Coaxial Plug | | | | Micon 1002/196 |
| P104 | Coaxial Plug | | | | Micon 1002/196 |
| P105 | Coaxial Plug | | | | Micon 1002/196 |




UNLESS OTHERWISE NOTED:

1. RESISTOR VALUES ARE IN OHMS OHMS OHMS
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION

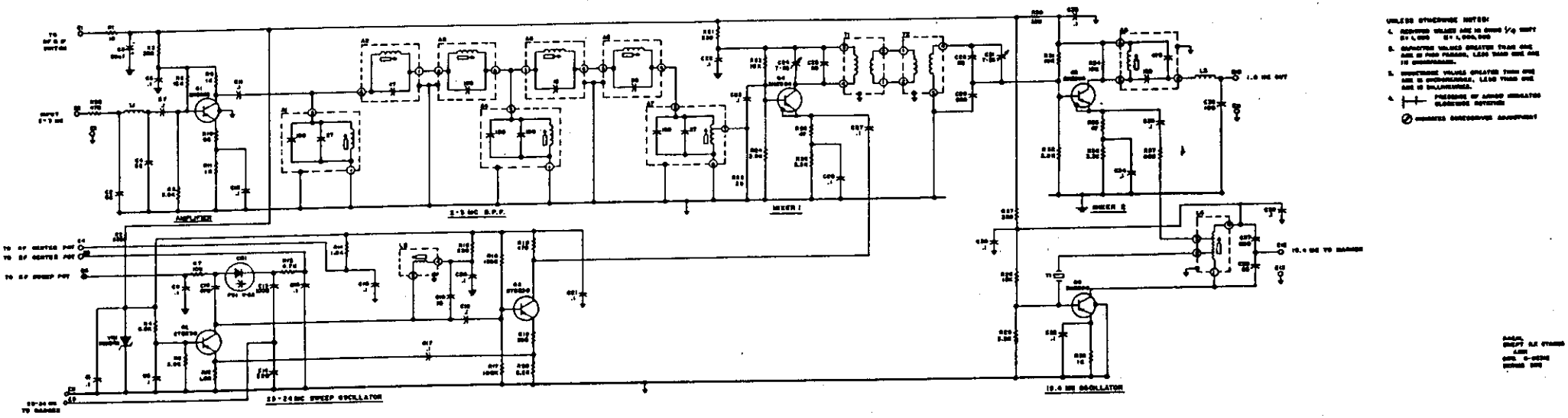
INDICATES SCREWDRIVER ADJUSTMENT

RACAL
R.F. MODULE A-101
DWG. 0-02500
SERIES 200

H 309/2

R.F Module Interconnections RA.366

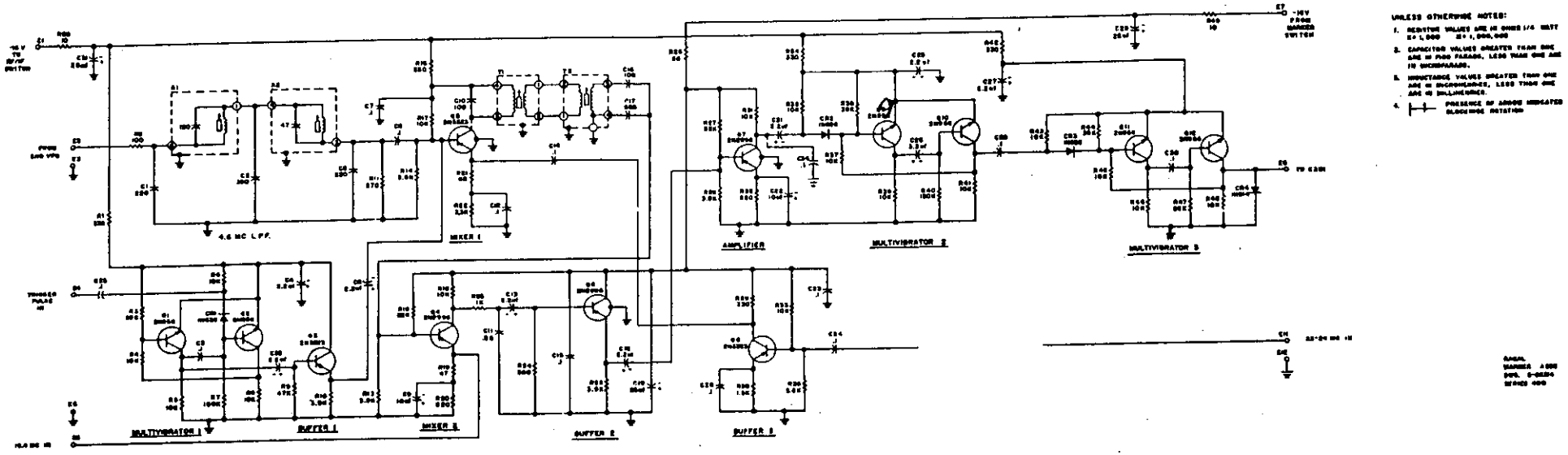
FIG 2.



H309/3

Circuit: Swept R.F Stages RA.366

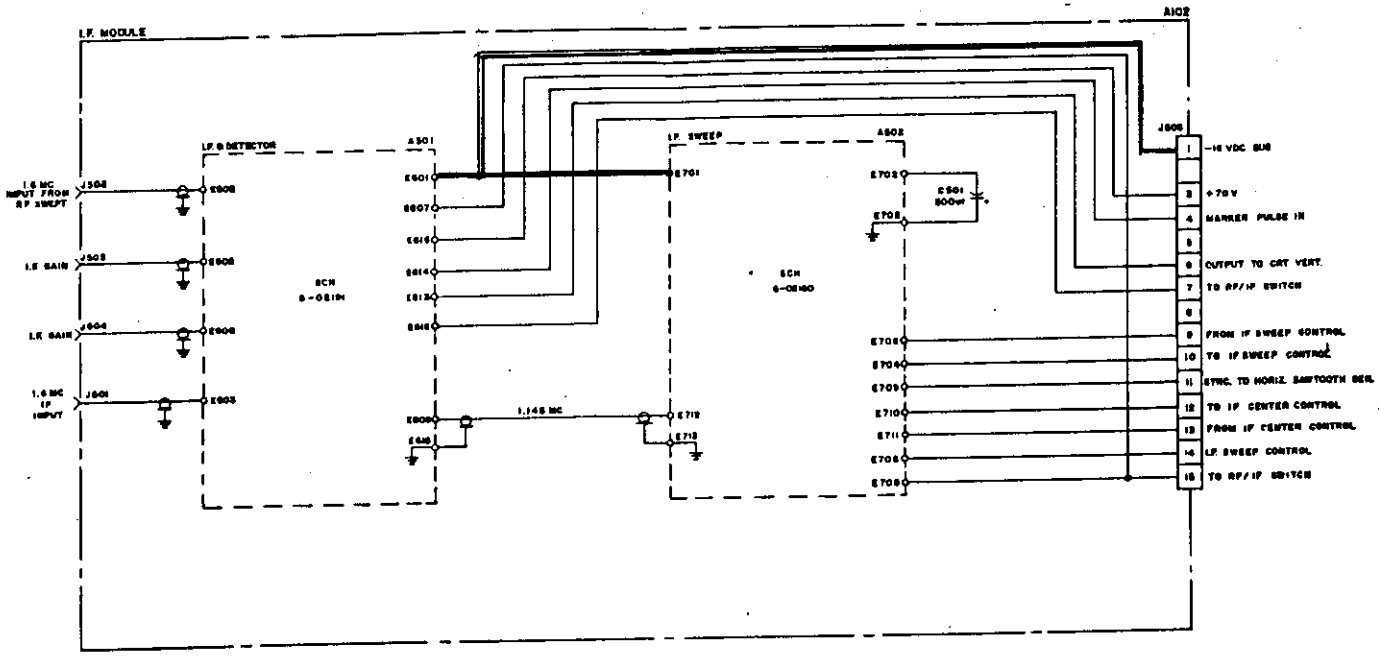
Fig. 3




H 309/4

Circuit: Marker RA.366

Fig. 4




UNLESS OTHERWISE NOTED:

1. RESISTOR VALUES ARE IN OHMS UNTIL K = 1,000 M = 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN MICROFARADS. LESS THAN ONE ARE IN MICROMICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION

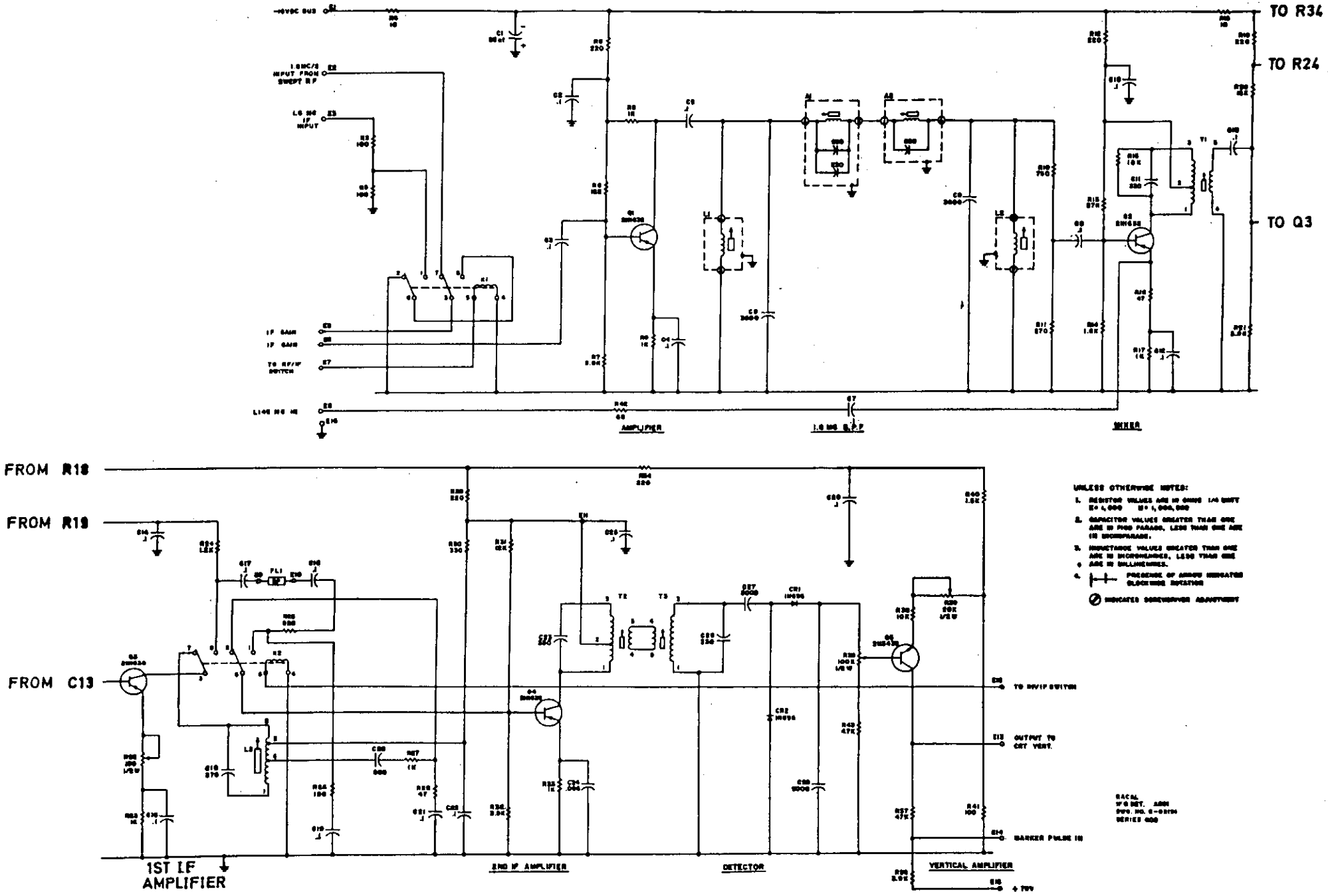
INDICATES SCREWDRIVER ADJUSTMENT

RACAL
I.F. MODULE A102
DWG 8-02286
SERIES 500

H309/5

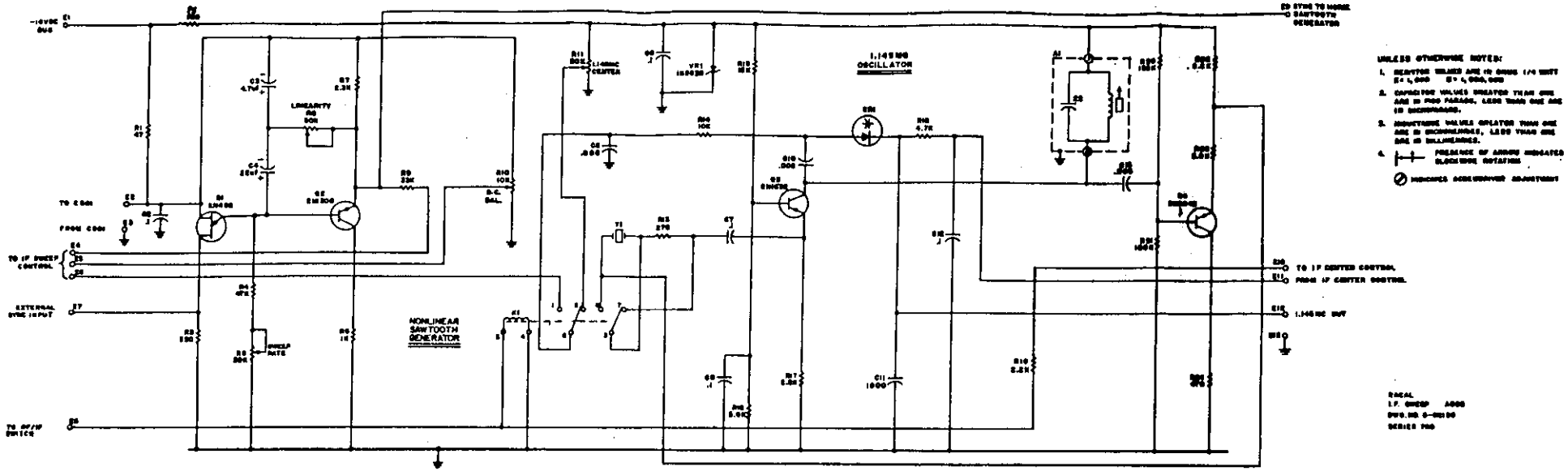
I.F Module Interconnections RA.366

Fig. 5



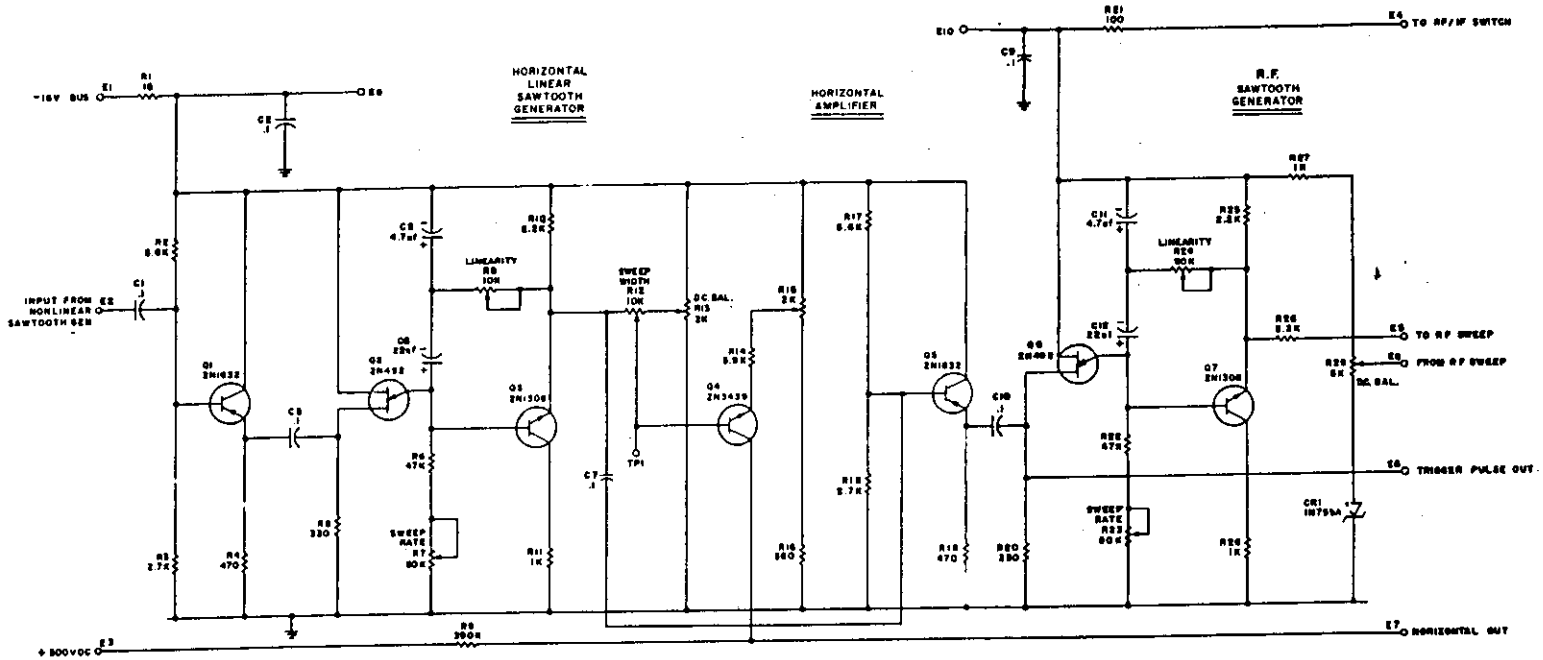

H309/6

Circuit. I.F. Module. RA 366. Series 600. Fig 6




H309/7

Circuit: I.F Sweep RA.366 Series 700 Fig.7




UNLESS OTHERWISE NOTED:

1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K = 1,000 M = 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN MICRO FARAD, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. ⊢⊢ PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION

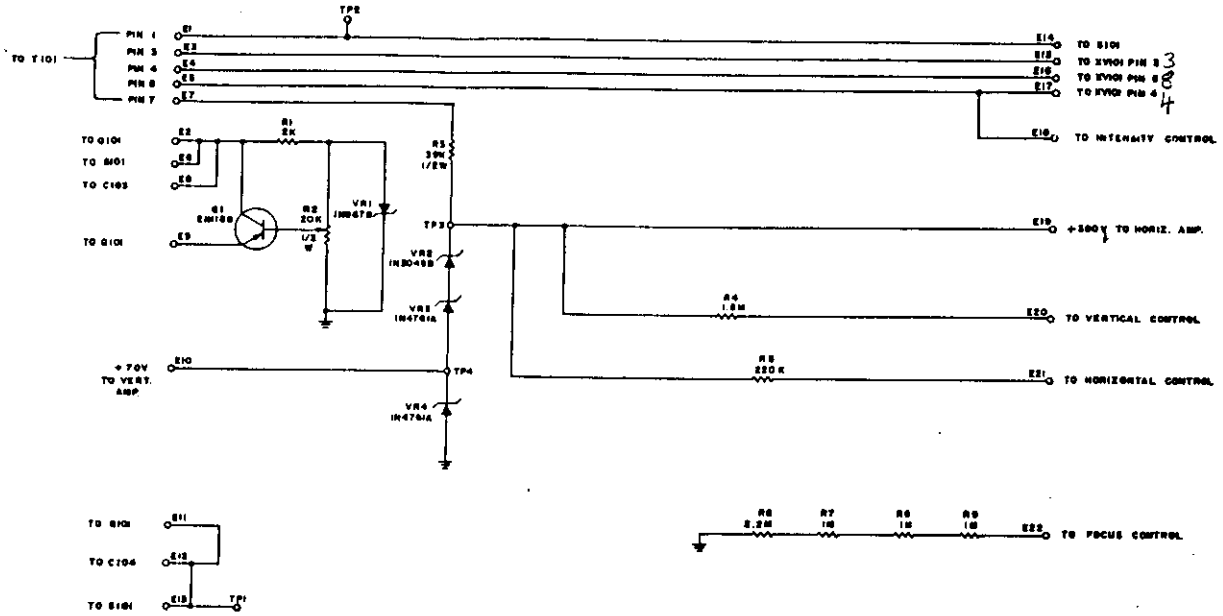
⊘ INDICATES SCREWDRIVER ADJUSTMENT

RACAL
HORZ. & R.F. TIME BASES AS
DWG NO 6-0256
SERIES 900

H 309/8

Circuit : Time Base R A. 366

Fig. 8




UNLESS OTHERWISE NOTED:

1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K = 1,000 M = 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION

INDICATES SCREWDRIVER ADJUSTMENT

RADAL
POWER UNIT AA
DWG. A-02331
SERIES 000

H309/9

Circuit : Power Unit RA.366

Fig.9

## R.F. MODULE

### 200 Series

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| J201 | 2 - 3 MHz Input (UG 1463) | | | | Micon 1005/196 |
| J202 | 2nd VFO Input (UG.1463) | | | | Micon 1005/196 |
| P201 | 1.6 MHz Output | | | | Micon 1002/196 |
| J204 | Module Connector, 15 Contacts | | | | Cannon DAMF-15-P |
| **Capacitor** | | | | | |
| C201 | Electrolytic | µF | -10+50 | 450 | Sprague 39D206F450GL4 |

## SWEPT R.F. STAGES

### 300 Series

| Resistors | | ohms | | volts | |
|---|---|---|---|---|---|
| R1 | Fixed Composition | 10 | 5 | 1/4 | RC07GF100J |
| R2 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R3 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R4 | Fixed Composition | 6.8k | 5 | 1/4 | RC07GF682J |
| R5 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R6 | Fixed Composition | 12k | 5 | 1/4 | RC07GF123J |
| R7 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R8 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R9 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R10 | Fixed Composition | 68 | 5 | 1/4 | RC07GF680J |
| R11 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R12 | Fixed Composition | 1.8k | 5 | 1/4 | RC07GF182J |
| R13 | Fixed Composition | 4.7k | 5 | 1/4 | RC07GF472J |
| R14 | Fixed Composition | 1.5k | 5 | 1/4 | RC07GF152J |
| R15 | Fixed Composition | 220 | 5 | 1/4 | RC07GF221J |
| R16 | Fixed Composition | 150k | 5 | 1/4 | RC07GF154J |
| R17 | Fixed Composition | 100k | 5 | 1/4 | RC07GF104J |
| R18 | Fixed Composition | 470 | 5 | 1/4 | RC07GF471J |
| R19 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R20 | Fixed Composition | 2.2k | 5 | 1/4 | RC07GF222J |
| R21 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R22 | Fixed Composition | 39 | 5 | 1/4 | RC07GF390J |
| R23 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R24 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R25 | Fixed Composition | 47 | 5 | 1/4 | RC07GF470J |

## SWEPT R.F. STAGES - 300 Series contd.

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Resistors** (contd) | | ohms | | watts | |
| R26 | Fixed Composition | 3.3k | 5 | 1/4 | RC07GF332J |
| R27 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R28 | Fixed Composition | 18k | 5 | 1/4 | RC07GF183J |
| R29 | Fixed Composition | 3.3k | 5 | 1/4 | RC07GF332J |
| R30 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R31 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R32 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R33 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R34 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R35 | Fixed Composition | 47 | 5 | 1/4 | RC07GF470J |
| R36 | Fixed Composition | 3.3k | 5 | 1/4 | RC07GF332J |
| R37 | Fixed Composition | 680 | 5 | 1/4 | RC07GF681J |
| R38 | Fixed Composition | 470 | 5 | 1/4 | RC07GF471J |
| **Capacitors** | | | | volts | |
| C1 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C2 | Mica | 82pF | 1 | 300 | CD6F82G300 |
| C3 | Electrolytic | 25µF | 25 | 25 | Sprague TE-1207 |
| C4 | Mica | 82pF | 1 | 300 | CD6F82G300 |
| C5 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C6 | Not used | | | | |
| C7 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C8 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C9 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C10 | Mica | 470pF | 5 | 100 | CD7F471G100 |
| C11 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C12 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C13 | Ceramic disc | .001µF | 10 | 500 | Centralab CE-102 |
| C14 | Mica | 220pF | 2 | 300 | CD7F221G300 |
| C15 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C16 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C17 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C18 | Mica | 10pF | 1 | 500 | CD6C100J500 |
| C19 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C20 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C21 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C22 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C23 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C24 | Variable | 7-35pF | | | RCI 28021 |
| C25 | Mica | 68pF | 1 | 500 | CD6C680G500 |

## SWEPT R.F. STAGES - 300 Series contd.

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Capacitors** (contd) | | | | volts | |
| C26 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C27 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C28 | Mica | 82pF | 1 | 300 | CD6F82G300 |
| C29 | Mica | 680pF | 2 | 100 | CD7F681G100 |
| C30 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C31 | Variable | 7-35pF | | | RCI 28021 |
| C32 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C33 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C34 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C35 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C36 | Mica | 100pF | 1 | 300 | CD6F101G300 |
| C37 | Mica | 680pF | 2 | 100 | CD7F681G100 |
| C38 | Mica | 68pF | 1 | 500 | CD6C680G500 |
| C39 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| **Inductors** | | | | | |
| L1 | RF Choke | 33µH | | | Nytronics Deciductor |
| L2 | RF Choke Assy. | | | | RCI D-02359 |
| L3 | RF Choke | 10µH | | | Nytronics Deciductor |
| L4 | RF Choke Assy. | | | | RCI D-02360 |
| **Filter Assemblies** | | | | | |
| A1 | 2 - 3 MHz Filter | | | | RCI D-02363 |
| A2 | 2 - 3 MHz Filter | | | | RCI D-02364 |
| A3 | 2 - 3 MHz Filter | | | | RCI D-02365 |
| A4 | 2 - 3 MHz Filter | | | | RCI D-02366 |
| A5 | 2 - 3 MHz Filter | | | | RCI D-02367 |
| A6 | 2 - 3 MHz Filter | | | | RCI D-02368 |
| A7 | 2 - 3 MHz Filter | | | | RCI D-02369 |
| A8 | 2nd Mixer Filter Assembly | | | | RCI D-02370 |
| **Diode** | | | | | |
| VR1 | 1N964B, Zener Diode | | | | RCI 33520 |

## SWEPT R.F. STAGES - 300 Series contd

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Transistors** | | | | | |
| Q1 | 2N3283, Germanium PNP | | | | RCI 30500 |
| Q2 | ST8230, Silicon PNP | | | | Transitron RCI 31501 |
| Q3 | ST8230, Silicon PNP | | | | Transitron RCI 31501 |
| Q4 | 2N2996, Germanium PNP | | | | T.I. RCI 30252 |
| Q5 | 2N2996, Germanium PNP | | | | T.I. RCI 30252 |
| Q6 | 2N2996, Germanium PNP | | | | T.I. RCI 30252 |
| **Miscellaneous** | | | | | |
| CR1 | Varicap V-33 | 33pF | | | Pacific Semiconductor |
| Y1 | Crystal 19.4 MHz | | | | CR67/U RCI 37001 |
| T1 | RF Transformer | | | | RCI D-02361 |
| T2 | RF Transformer | | | | RCI D-02361 |

## MARKER

### 400 Series

| Resistors | | ohms | | watts | |
|---|---|---|---|---|---|
| R1 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R2 | Fixed Composition | 100 | 5 | 1/4 | RC07GF101J |
| R3 | Fixed Composition | 39k | 5 | 1/4 | RC07GF393J |
| R4 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R5 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R6 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R7 | Fixed Composition | 180k | 5 | 1/4 | RC07GF184J |
| R8 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R9 | Fixed Composition | 47k | 5 | 1/4 | RC07GF473J |
| R10 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R11 | Fixed Composition | 270 | 5 | 1/4 | RC07GF271J |
| R12 | Not used | | | | |
| R13 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R14 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R15 | Fixed Composition | 82k | 5 | 1/4 | RC07GF823J |
| R16 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R17 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R18 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R19 | Fixed Composition | 47 | 5 | 1/4 | RC07GF470J |
| R20 | Fixed Composition | 820 | 5 | 1/4 | RC07GF821J |

## MARKER - 400 Series contd.

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| Resistors (contd) | | ohms | | watts | |
| R21 | Fixed Composition | 68 | 5 | 1/4 | RC07GF680J |
| R22 | Fixed Composition | 3.3k | 5 | 1/4 | RC07GF332J |
| R23 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R24 | Fixed Composition | 560 | 5 | 1/4 | |
| R25 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R26 | Fixed Composition | 68 | 5 | 1/4 | RC07GF680J |
| R27 | Fixed Composition | 82k | 5 | 1/4 | RC07GF823J |
| R28 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R29 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R30 | Fixed Composition | 1.5k | 5 | 1/4 | RC07GF152J |
| R31 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R32 | Fixed Composition | 820 | 5 | 1/4 | RC07GF821J |
| R33 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R34 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R35 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R36 | Fixed Composition | 5.6k | 5 | 1/4 | RC07GF562J |
| R37 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R38 | Fixed Composition | 39k | 5 | 1/4 | RC07GF393J |
| R39 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R40 | Fixed Composition | 120k | 5 | 1/4 | RC07GF124J |
| R41 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R42 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R43 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R44 | Fixed Composition | 39k | 5 | 1/4 | RC07GF393J |
| R45 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R46 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R47 | Fixed Composition | 56k | 5 | 1/4 | RC07GF563J |
| R48 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R49 | Fixed Composition | 10 | 5 | 1/4 | RC07GF100J |
| R50 | Fixed Composition | 10 | 5 | 1/4 | RC07GF100J |
| Capacitors | | | | volts | |
| C1 | Mica | 220pF | 2 | 300 | CD7F221G300 |
| C2 | Ceramic disc | .1μF | 20 | 25 | Sprague Monolythic 5C7 |
| C3 | Mica | 390pF | 2 | 100 | CD7F391G100 |
| C4 | Tantalum | 2.2μF | 10 | 20 | Kemet K2R2J20KS |
| C5 | Mica | 220pF | 2 | 300 | CD7F221G300 |

| Cct. Ref. | Description | Value | Tol % | Rat. volts | Mfr. Part No. |
|---|---|---|---|---|---|
| **Capacitors** (contd) | | | | | |
| C6 | Tantalum | 2.2µF | 10 | 20 | Kemet K2R2J20KS |
| C7 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C8 | Ceramic disc | .1µF | 20 | 25 | Sprague M nolythic 5C7 |
| C9 | Tantalum | 10µF | 10 | 20 | Sprague 150D106X9020B2 |
| C10 | Mica | 100pF | 1 | 300 | CD6F101G300 |
| C11 | | .22µF | | | |
| C12 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C13 | Tantalum | 2.2µF | 10 | 20 | Kemet K2R2J20KS |
| C14 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C15 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C16 | Mica | 100pF | 1 | 300 | CD6F101G300 |
| C17 | Mica | 680pF | 2 | 100 | CD7F681G100 |
| C18 | Tantalum | 2.2µF | 10 | 20 | Kemet K2R2J20KS |
| C19 | Electrolytic | 25µF | -20+100 | 25 | Sprague TE-1207 |
| C20 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C21 | Tantalum | 2.2µF | 10 | 20 | Kemet K2R2J20KS |
| C22 | Tantalum | 10µF | 10 | 20 | Sprague 150D106X9020B2 |
| C23 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C24 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C25 | Tantalum | 2.2µF | 10 | 20 | Kemet K2R2J20KS |
| C26 | Tantalum | 3.3µF | 10 | 35 | Kemet K3R3J35KS |
| C27 | Tantalum | 2.2µF | 10 | 20 | Kemet K2R2J20KS |
| C28 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C29 | Electrolytic | 25µF | -20+100 | 25 | Sprague TE-1207 |
| C30 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C31 | Electrolytic | 25µF | -20+100 | 25 | Sprague TE-1207 |
| C32 | Tantalum | 2.2µF | 10 | 20 | Kemet K2R2J20KS |
| C33 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C34 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| **Filter Assemblies** | | | | | |
| A1 | Filter Assembly | | | | RCI D-02376 |
| A2 | Filter Assembly | | | | RCI D-02377 |
| **Transformers** | | | | | |
| T1 | RF Transformer (19.4 MHz) | | | | RCI D-02378 |
| T2 | RF Transformer (19.4 MHz) | | | | RCI D-02378 |

## MARKER - 400 Series contd.

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Transistors** | | | | | |
| Q1 | 2N956, NPN -Silicon | | | | RCI 32253 |
| Q2 | 2N956, NPN -Silicon | | | | RCI 32253 |
| Q3 | 2N3323, PNP -Germanium | | | | RCI 30251 |
| Q4 | 2N2996, PNP -Germanium | | | | RCI 30252 |
| Q5 | 2N3323, PNP -Germanium | | | | RCI 30251 |
| Q6 | 2N2996, PNP -Germanium | | | | RCI 30252 |
| Q7 | 2N2996, PNP -Germanium | | | | RCI 30252 |
| Q8 | 2N3323, PNP -Germanium | | | | RCI 30251 |
| Q9 | 2N956, NPN -Silicon | | | | RCI 32253 |
| Q10 | 2N956, NPN -Silicon | | | | RCI 32253 |
| Q11 | 2N956, NPN -Silicon | | | | RCI 32253 |
| Q12 | 2N956, NPN -Silicon | | | | RCI 32253 |
| **Diodes** | | | | | |
| CR1 | 1N626 | | | | RCI 35507 |
| CR2 | 1N626 | | | | RCI 35507 |
| CR3 | 1N626 | | | | RCI 35507 |
| CR4 | 1N914 | | | | RCI 35510 |

## I.F. MODULE

### 500 Series

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Connectors** | | | | | |
| J501 | 1.6 MHz IF input | | | | Micon 1003 |
| J502 | 1.6 MHz IF input | | | | Micon 1003 |
| J503 | IF Gain | | | | Micon 1003 |
| J504 | IF Gain | | | | Micon 1003 |
| J505 | Module Connector, 15 Contacts | | | | Cannon DAMF-15-P |
| **Capacitor** | | | | | |
| C501 | Electrolytic | 500µF | -10+75 | 50 | Sprague 39D507G050GLA |

## I.F. AND DETECTOR

### 600 Series

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Resistors** | | ohms | | watts | |
| R1 | Not used | | | | |
| R2 | Fixed Composition | 100 | 5 | 1/4 | RC07GF101J |
| R3 | Fixed Composition | 100 | 5 | 1/4 | RC07GF101J |
| R4 | Fixed Composition | 10 | 5 | 1/4 | RC07GF100J |
| R5 | Fixed Composition | 220 | 5 | 1/4 | RC07GF221J |
| R6 | Fixed Composition | 12k | 5 | 1/4 | RC07GF123J |
| R7 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R8 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R9 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R10 | Fixed Composition | 750 | 5 | 1/4 | RC07GF751J |
| R11 | Fixed Composition | 270 | 5 | 1/4 | RC07GF271J |
| R12 | Fixed Composition | 220 | 5 | 1/4 | RC07GF221J |
| R13 | Fixed Composition | 27k | 5 | 1/4 | RC07GF273J |
| R14 | Fixed Composition | 1.8k | 5 | 1/4 | RC07GF182J |
| R15 | Fixed Composition | 18k | 5 | 1/4 | RC07GF183J |
| R16 | Fixed Composition | 47 | 5 | 1/4 | RC07GF470J |
| R17 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R18 | Fixed Composition | 10 | 5 | 1/4 | RC07GF100J |
| R19 | Fixed Composition | 220 | 5 | 1/4 | RC07GF221J |
| R20 | Fixed Composition | 12k | 5 | 1/4 | RC07GF123J |
| R21 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R22 | Potentiometer | 100 | 30 | 1/2 | Beckman 62P-R100 |
| R23 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R24 | Fixed Composition | 1.2k | 5 | 1/4 | RC07GF122J |
| R25 | Fixed Composition | 820 | 5 | 1/4 | RC07GF821J |
| R26 | Fixed Composition | 180 | 5 | 1/4 | RC07GF181J |
| R27 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R28 | Fixed Composition | 47 | 5 | 1/4 | RC07GF470J |
| R29 | Fixed Composition | 220 | 5 | 1/4 | RC07GF221J |
| R30 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R31 | Fixed Composition | 12k | 5 | 1/4 | RC07GF123J |
| R32 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R33 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R34 | Fixed Composition | 220 | 5 | 1/4 | RC07GF221J |
| R35 | Potentiometer | 100k | 30 | 1/2 | Beckman |

## I.F. AND DETECTOR - 600 Series contd.

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Resistors** (contd.) | | ohms | | watts | |
| R36 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R37 | Fixed Composition | 47k | 5 | 1/4 | RC07GF473J |
| R38 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R39 | Potentiometer | 20k | 30 | 1/2 | Beckman 62P-R20K |
| R40 | Fixed Composition | 1.5k | 5 | 1/4 | RC07GF152J |
| R41 | Fixed Composition | 100 | 5 | 1/4 | RC07GF101J |
| R42 | Fixed Composition | 68 | 5 | 1/4 | RC07GF680J |
| R43 | Fixed Composition | 4.7k | 5 | 1/4 | RC07GF472J |
| **Capacitors** | | | | volts | |
| C1 | Electrolytic | 25µF | -20+100 | 25 | Sprague TE-1207 |
| C2 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C3 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C4 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C5 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C6 | Mica | 3600pF | 5 | 500 | CM06F362JN3 |
| C7 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C8 | Mica | 3600pF | 5 | 500 | CM06F362JN3 |
| C9 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C10 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C11 | Mica | 330pF | 2 | 100 | CD7F331G100 |
| C12 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C13 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C14 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C15 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C16 | Mica | 270pF | 2 | 300 | CD7F271G300 |
| C17 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C18 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C19 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C20 | Mica | 680 | 2 | 100 | CD7F681G100 |
| C21 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C22 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C23 | Mica | 330pF | 2 | 100 | CD7F331G100 |
| C24 | Ceramic disc | .005µF | 20 | 500 | Centralab, DM502 |
| C25 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C26 | Mica | 330pF | 2 | 100 | CD7F331G100 |
| C27 | Ceramic disc | .005µF | +80-20 | 50 | Sprague TG-D50 |
| C28 | Ceramic disc | .005µF | +80-20 | 50 | Sprague TG-D50 |
| C29 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |

## I.F. AND DETECTOR - 600 Series contd.

| Cct. Ref. | Description | Value | Tol. % | Rat. | Mfr Part No. |
|---|---|---|---|---|---|
| **Inductors** | | | | | |
| L1 | Variable, Coil Assy. | | | | RCI D-02382 |
| L2 | Variable, Coil Assy. | | | | RCI D-02382 |
| L3 | Variable, Coil Assy. | | | | RCI D-02379 |
| **Filter Assemblies** | | | | | |
| A1 | Filter Assembly 1.6 MHz | | | | RCI D-02380 |
| A2 | Filter Assembly | | | | RCI D-02381 |
| **Transformers** | | | | | |
| T1 | 455 kHz i.f. | | | | RCI B-3019-1 |
| T2 | 455 kHz i.f. | | | | RCI B-3019-2 |
| T3 | 455 kHz i.f. | | | | RCI B-3019-2 |
| **Diodes** | | | | | |
| CR1 | 1N695, Germanium | | | | RCI 35515 |
| CR2 | Same as CR1 | | | | |
| **Transistors** | | | | | |
| Q1 | 2N1632, PNP Germanium | | | | RCI 30752 |
| Q2 | 2N1632, PNP Germanium | | | | RCI 30752 |
| Q3 | 2N1638, PNP Germanium | | | | RCI 30755 |
| Q4 | 2N1638, PNP Germanium | | | | RCI 30755 |
| Q5 | 2N3439, NPN Silicon | | | | RCI 32001 |
| **Relays** | | | | | |
| K1 | dpdt, non-latching, 26.5 volts | | | | GE3SBC1008A2 |
| K2 | dpdt, non-latching, 26.5 volts | | | | GE3SBC1008A2 |
| **Crystal Filter** | | | | | |
| FL1 | Bandpass Crystal Filter, 455 kHz | | | | RCI C-02073 |

## I.F. SWEEP

### 700 Series

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Resistors** | | ohms | | watts | |
| R1 | Fixed Composition | 47 | 5 | 1/4 | RC07GF470J |
| R2 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R3 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R4 | Fixed Composition | 47k | 5 | 1/4 | RC07GF473J |
| R5 | Potentiometer | 50k | 30 | 1/2 | Beckman 62P-R50K |
| R6 | Potentiometer | 50k | 30 | 1/2 | Beckman 62P-R50K |
| R7 | Fixed Composition | 2.2k | 5 | 1/4 | RC07GF222J |
| R8 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R9 | Fixed Composition | 33k | 5 | 1/4 | RC07GF333J |
| R10 | Potentiometer | 10k | 30 | 1/2 | Beckman 62P-R10K |
| R11 | Potentiometer | 20k | 30 | 1/2 | Beckman 62P-R20K |
| R12 | Not used | | | | |
| R13 | Fixed Composition | 270 | 5 | 1/4 | RC07GF271J |
| R14 | Fixed Composition | 10k | 5 | 1/4 | RC07GF103J |
| R15 | Fixed Composition | 12k | 5 | 1/4 | RC07GF123J |
| R16 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R17 | Fixed Composition | 2.2k | 5 | 1/4 | RC07GF222J |
| R18 | Fixed Composition | 4.7k | 5 | 1/4 | RC07GF472J |
| R19 | Fixed Composition | 2.2k | 5 | 1/4 | RC07GF222J |
| R20 | Fixed Composition | 150k | 5 | 1/4 | RC07GF154J |
| R21 | Fixed Composition | 100k | 5 | 1/4 | RC07GF104J |
| R22 | Fixed Composition | 2.2k | 5 | 1/4 | RC07GF222J |
| R23 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R24 | Fixed Composition | 470 | 5 | 1/4 | RC07GF471J |
| **Capacitors** | | | | volts | |
| C1 | Not used | | | | |
| C2 | Ceramic disc | .1μF | 20 | 25 | Sprague Monolythic 5C7 |
| C3 | Electrolytic | 4.7μF | 10 | 35 | Sprague 150D475X9035B2 |
| C4 | Electrolytic | 22μF | 10 | 15 | Sprague 150D226X9015B2 |
| C5 | Ceramic disc | .005μF | +80-20 | 50 | Sprague TG-D50 |
| C6 | Ceramic disc | .1μF | 20 | 25 | Sprague Monolythic 5C7 |
| C7 | Ceramic disc | .1μF | 20 | 25 | Sprague Monolythic 5C7 |
| C8 | Not used | | | | |
| C9 | Ceramic disc | .1μF | 20 | 25 | Sprague Monolythic 5C7 |
| C10 | Ceramic disc | .005μF | +80-20 | 50 | Sprague TG-D50 |

## I.F. SWEEP 700 Series contd.

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| Capacitors (contd.) | | | | volts | |
| C11 | Ceramic disc | 1800pF | 10 | 1000 | Centralab DD182 |
| C12 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C13 | Ceramic disc | .005µF | +80-20 | 50 | Sprague TG-D50 |
| Transistors | | | | | |
| Q1 | 2N492, Silicon PNP - TI | | | | RCI 31252 |
| Q2 | 2N1308, Germanium, NPN | | | | RCI 30753 |
| Q3 | 2N1632, Germanium, PNP | | | | RCI 30752 |
| Q4 | 2N3242, Silicon, NPN | | | | RCI 31251 |
| Miscellaneous. | | | | | |
| VR1 | Diode, 1N963B, Silicon | | | | RCI 35519 |
| CR1 | Varicap, 150pF | | | | Philco V-4091 |
| K1 | Relay, dpdt, non-latching, 26.5 volts | | | | G.E. 35BC1008A2 |
| A1 | Coil Assembly | | | | RCI D-02388 |
| Y1 | Crystal, 1145 kHz, CR19A/U | | | | RCI 37002 |

## HORIZONTAL AND RF TIME BASES

### 800 Series

Resistors

| | | ohms | | watts | |
|---|---|---|---|---|---|
| R1 | Fixed Composition | 18 | 5 | 1/4 | RC07GF180J |
| R2 | Fixed Composition | 5.6k | 5 | 1/4 | RC07GF562J |
| R3 | Fixed Composition | 2.7k | 5 | 1/4 | RC07GF272J |
| R4 | Fixed Composition | 470 | 5 | 1/4 | RC07GF471J |
| R5 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R6 | Fixed Composition | 47k | 5 | 1/4 | RC07GF473J |
| R7 | Potentiometer | 50k | 30 | 1/2 | Beckman 62P-R50K |
| R8 | Potentiometer | 10k | 30 | 1/2 | Beckman 62P-R10K |
| R9 | Fixed Composition | 390k | 5 | 1/4 | RC07GF394J |
| R10 | Fixed Composition | 2.2k | 5 | 1/4 | RC07GF222J |
| R11 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R12 | Potentiometer | 10k | 30 | 1/2 | Beckman 62P-R10K |
| R13 | Potentiometer | 2k | 30 | 1/2 | Beckman 62P-R2K |
| R14 | Fixed Composition | 3.9k | 5 | 1/4 | RC07GF392J |
| R15 | Potentiometer | 2k | 30 | 1/2 | Beckman 62P-R2K |

## HORIZONTAL AND RF TIME BASES 800 Series contd.

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Resistors (contd)** | | ohms | | watts | |
| R16 | Fixed Composition | 560 | 5 | 1/4 | RC07GF561J |
| R17 | Fixed Composition | 5.6k | 5 | 1/4 | RC07GF562J |
| R18 | Fixed Composition | 2.7k | 5 | 1/4 | RC07GF272J |
| R19 | Fixed Composition | 470 | 5 | 1/4 | RC07GF471J |
| R20 | Fixed Composition | 330 | 5 | 1/4 | RC07GF331J |
| R21 | Fixed Composition | 100 | 5 | 1/4 | RC07GF101J |
| R22 | Fixed Composition | 47k | 5 | 1/4 | RC07GF473J |
| R23 | Potentiometer | 50k | 30 | 1/2 | Beckman 62P-R50K |
| R24 | Potentiometer | 50k | 30 | 1/2 | Beckman 62P-R50K |
| R25 | Fixed Composition | 2.2k | 5 | 1/4 | RC07GF222J |
| R26 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R27 | Fixed Composition | 1k | 5 | 1/4 | RC07GF102J |
| R28 | Fixed Composition | 8.2k | 5 | 1/4 | RC07GF822J |
| R29 | Potentiometer | 5k | 30 | 1/2 | Beckman 62P-R5K |
| **Capacitors** | | | | volts | |
| C1 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C2 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C3 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C4 | not used | | | | |
| C5 | Electrolytic | 4.7µF | 10 | 35 | Sprague 150D475X9035B2 |
| C6 | Electrolytic | 22µF | 10 | 15 | Sprague 150D226X9015B2 |
| C7 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C8 | Not used | | | | |
| C9 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C10 | Ceramic disc | .1µF | 20 | 25 | Sprague Monolythic 5C7 |
| C11 | Electrolytic | 4.7µF | 10 | 35 | Sprague 150D475X9035B2 |
| C12 | Electrolytic | 22µF | 10 | 15 | Sprague 150D226X9015B2 |
| **Transistors** | | | | | |
| Q1 | 2N1632, PNP - Germanium | | | | RCI 30752 |
| Q2 | 2N492, PNP - Silicon, TI | | | | RCI 31252 |
| Q3 | 2N1308, NPN - Germanium | | | | RCI 30753 |
| Q4 | 2N3439, NPN - Silicon | | | | RCI 32001 |
| Q5 | 2N1632, PNP - Germanium | | | | RCI 30752 |
| Q6 | 2N492, PNP - Silicon, TI | | | | RCI 31252 |
| Q7 | 2N1308, NPN - Germanium | | | | RCI 30753 |
| **Diode** | | | | | |
| CR1 | 1N755A, 7.5 V ref, ±5%, 400 mW | | | | Motorola |

## POWER UNIT

## 900 Series

| Cct. Ref. | Description | Value | Tol % | Rat. | Mfr. Part No. |
|---|---|---|---|---|---|
| **Resistors** | | ohms | | watts | |
| R1 | Fixed Composition | 2k | 5 | 1/4 | RC07GF202J |
| R2 | Potentiometer | 20k | 30 | 1/2 | Beckman 62P-R20K |
| R3 | Fixed Composition | 39k | 5 | 1/2 | RC07GF393J |
| R4 | Fixed Composition | 1.5M | 5 | 1/4 | RC07GF155J |
| R5 | Fixed Composition | 220k | 5 | 1/4 | RC07GF224J |
| R6 | Fixed Composition | 2.2M | 5 | 1/4 | RC07GF225J |
| R7 | Fixed Composition | 1M | 5 | 1/4 | RC07GF105J |
| R8 | Fixed Composition | 1M | 5 | 1/4 | RC07GF105J |
| R9 | Fixed Composition | 1M | 5 | 1/4 | RC07GF105J |
| **Transistor** | | | | | |
| Q1 | 2N1189, Germanium, PNP | | | | RCI 30750 |
| **Diodes** | | | | | |
| VR1 | 1N967B, Zener diode | | | | RCI 33518 |
| VR2 | 1N3049B, Zener diode | | | | RCI 33516 |
| VR3 | IN4761A, Zener diode | | | | RCI 33517 |
| VR4 | IN4761A, Zener diode | | | | RCI 33517 |

# APPENDIX

## POWER SUPPLY UNIT PU.1153

1. The PU.1153 is the power unit used in the RA.366B. The unit consists of a main assembly and a printed circuit board containing the stabilizer circuit. The circuit is shown in Fig. A.1 at the end of this appendix.

### Inputs and Outputs

2. The PU.1153 can operate from the following supplies.

(a) 100-125 volts a.c. 45-400 Hz single phase.

(b) 200-250 volts a.c. 45-400 Hz single phase.

(c) 21-27 volts d.c. with positive earth.

Two outputs are provided by the unit:

(a) -16 volts (regulated) 400 mA.

(b) -20 volts (unregulated) 200 mA. Generally this level will be approximately -24 volts.

### Switches

3. A.C./D.C. Switch. A locking plate displays the type of power input, either 'A.C.' or 'D.C.'. If the indication is not correct, remove the locking plate (one screw), set the switch to the alternative position and replace the locking plate in the reversed position so that the correct indication is displayed.

4. Voltage Selector Switch. This switch is in use when the A.C./D.C. switch is set to A.C. It should display the correct a.c. supply voltage range, either 100-125 or 200-250. If the setting is not correct remove the locking plate, reset the switch and replace the locking plate in the reversed position so that the correct voltage range is indicated.

### Fuselinks

5. Two fuselinks are provided. The MAINS fuse is in circuit whenever the A.C./D.C. switch is set to A.C. The H.T. fuse is in circuit on both supplies. Replacement fuses must be of the anti-surge type. The MAINS fuse is rated at 500 mA when operating on 100-125 volts a.c.

## Power Connections

6. The external power supply is connected via a 3-core power cable to which a suitable 3-pin connector should be fitted. For an a.c. supply connect the red lead to line, black to neutral and green to earth (ground). For a d.c. supply connect the red lead to positive and the black lead to negative.

## Circuit Description

7. When operating on a.c. the input supply is applied to the primary winding of transformer 1T1 via the switch 1SA which connects the windings in parallel for 100-125 volts or in series for 200-250 volts. In d.c. operating the positive input is connected to the 0 volt output (earth) and the negative input to the regulator transistor and the unregulated -20 volt output.

8. The fuse 1FS1 protects the input to the transformer, the other fuse 1FS2 is common to both a.c. and d.c. inputs to the bridge rectifiers D1 and D2. The rectified output from D1 is fed to the stabilizer board and the output from D2 provides the unregulated -20 volt supply. The capacitors 1C1 and 1C2 serve as an r.f. filter and the resistor 1R1 is provided to discharge the capacitors when the power is switched off.

9. The output from the bridge rectifier D1 is fed to the filter capacitor 1C3. The transistor 1VT1 completes the connection to the -16 volt output line and stabilizes the output by acting as a series regulator under the control of the d.c. amplifiers VT1 and VT2. The output can be set to -16 volts by adjustment of the potentiometer 1RV1.

10. The emitter of VT2 is held at a constant voltage by the zener diode D3. The level at the base of VT2 is determined by the setting of 1RV1 and also by an change of voltage occuring in the chain R4, 1RV1 and R5 due to a change in the output load. For example, if an increase in output loading causes the voltage at 1RV1 to go less negative the collector current in VT2 decreases. This causes a change in the base current of the beta multiplier VT1 which in turn increases the output of 1VT1 so as to maintain a constant output voltage.

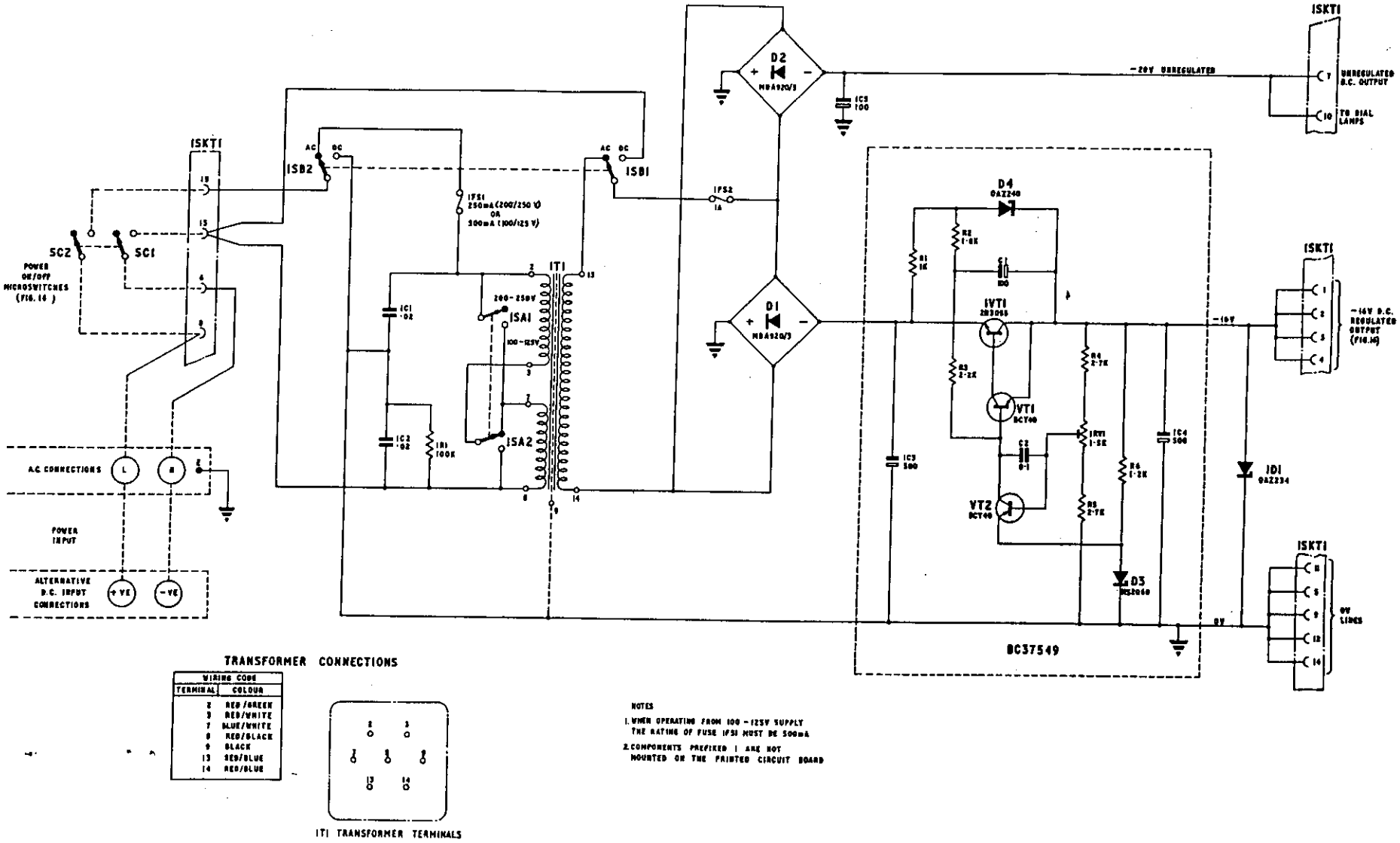
11. To allow the stabilizer to operate from a wide range of input voltages the network R1, R2 and R3 together with the zener diode D4 provide input regulation. The diode D4 holds the junction of R1 and R2 at a constant 4.7 volts, thus clamping the base of VT1 at a constant level despite changes in input voltage. The electrolytic capacitor C1 eliminates ripple.

## COMPONENTS LIST PU.1153

### Component Board Assembly BA.37549

| Cct. Ref. | Value | Description | Rat. | Tol. % | Racal Part No. | Manufacturer |
|---|---|---|---|---|---|---|
| | **Resistors** | | | | | |
| 1R1 | 100k | Metal Oxide | | 5 | 907866 | Electrosil TR5 |
| R1 | 1k | Metal Oxide | | 5 | 906031 | Electrosil TR5 |
| R2 | 1.8k | Metal Oxide | | 5 | 906026 | Electrosil TR5 |
| R3 | 2.2k | Metal Oxide | | 5 | 906020 | Electrosil TR5 |
| R4 | 2.7k | Metal Oxide | | 5 | 906347 | Electrosil TR5 |
| R5 | 2.7k | Metal Oxide | | 5 | 906347 | Electrosil TR5 |
| R6 | 1.2k | Metal Oxide | | 5 | 906346 | Electrosil TR5 |
| | **Potentiometers** | | | | | |
| 1RV1 | 1.5k | | | | 908689 | Colven 1106/9S |
| | **Capacitors** | | | | | |
| 1C1 | .02 | Paper | 350 | 20 | 902279 | Dubilier Minicap G1 |
| 1C2 | .02 | Paper | 350 | 20 | 902279 | Dubilier Minicap G1 |
| 1C3 | 500 | Electrolytic | 64 | -10 +50 | 906759 | Mullard C431 BR/H500 |
| 1C4 | 500 | Electrolytic | 64 | -10 +50 | 906759 | Mullard C431 BR/H500 |
| 1C5 | 100 | Electrolytic | 50 | | 900506 | Hunts MEFC43AT |
| C1 | 100 | Electrolytic | 6.4 | -10 +50 | 911691 | Mullard C426 AR/C100 |
| C2 | 0.1 | Polyester | 250 | 20 | 909428 | Mullard C280 AE/P100K |
| | **Transformer** | | | | | |
| 1T1 | | Mains power transformer | | | | USA D-01650 |
| | **Transistors** | | | | | |
| 1VT1 | | High Current n.p.n. | | | 906371 | RCA 2N 3055 |
| VT1 | | p.n.p. | | | 911565 | Mullard BCY40 |
| VT2 | | p.n.p. | | | 911565 | Mullard BCY40 |

| Cct. Ref. | Value | Description | Rat. | Tol. % | Racal Part No. | Manufacturer |
|---|---|---|---|---|---|---|
| | | **Diodes** | | | | |
| 1D1 | | 18V Zener | | | 911123 | Mullard OAZ 234 |
| D1 | | Rectifier Unit | | | 909020 | Motorola MDA 920/3 |
| D2 | | Rectifier Unit | | | 909020 | Motorola MDA 920/3 |
| D3 | | 6.8V Zener | | | 908348 | Hughes HS2068 |
| | | | | | or 914064 | Mullard BZY 88C6V8 |
| D4 | | 4.7V Zener | | | 909717 | Mullard OAZ 240 |
| | | **Fuselinks** | | | | |
| 1FS1 | | Mains 250mA anti-surge (200-250V working) | | | 911700 | Beswick TDC 134 |
| | | Mains 500mA anti-surge (100-125V working) | | | 911834 | Beswick TDC 134 |
| 1FS2 | | H.T. 1A anti-surge | | | 912052 | Beswick TDC 134 |
| | | Fuseholders | | | 900412 | Belling Lee L575 |
| | | **Switches** | | | | |
| 1SA | | Slider Panel | | | 912063 | E.M.I. Type S5 |
| 1SB | | Slider Panel | | | 912063 | E.M.I. Type S5 |
| | | **Connectors** | | | | |
| 1SKT1 | | Socket: sub miniature 15 way | | | 908683 | Cannon DAMF 15S |
| PL1 | | Plug: fixed 3 pin brass | | | 900011 | Plessey Mk4 CZ 63953/5 |
| | | Free socket for power connection to PL1 | | | 905151 | Plessey Mk4 2CZ 83283/5 |
| | | Outlet Accessory Set for free socket | | | 905154 | Plessey 508/1/ 03008/205 |




TRANSFORMER CONNECTIONS

| WIRING CODE | |
|---|---|
| TERMINAL | COLOUR |
| 2 | RED/GREEN |
| 3 | RED/WHITE |
| 7 | BLUE/WHITE |
| 8 | RED/BLACK |
| 9 | BLACK |
| 13 | RED/BLUE |
| 14 | RED/BLUE |




IT1 TRANSFORMER TERMINALS

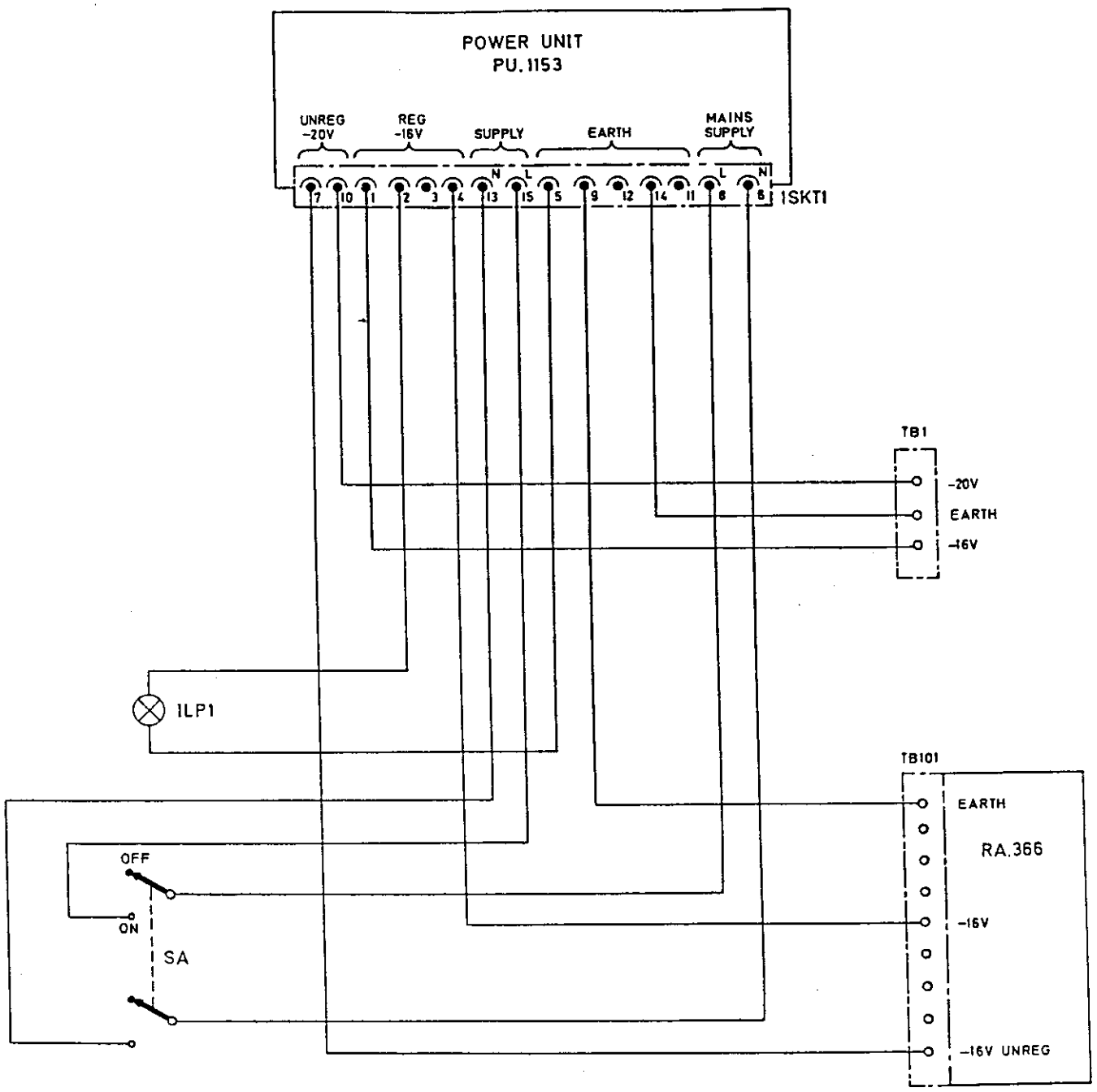
NOTES

1. WHEN OPERATING FROM 100 - 125V SUPPLY THE RATING OF FUSE IFS1 MUST BE 500mA
2. COMPONENTS PREFIXED I ARE NOT MOUNTED ON THE PRINTED CIRCUIT BOARD



Circuit: Power Unit Type PU.1153

App. Fig.1




| BC40880/B | H309/10 |
|---|---|
| 1 | |

Power Unit Connections To RA.366B

Fig. 10

## ORDERS FOR SPARE PARTS

In order to expedite handling of spare part orders, please quote:-

(1) Type and serial number of equipment.

(2) Circuit reference, description, Racal part number, and manufacturer of part required.

(3) Quantity required.

NOTE: If the equipment is designed on a modular basis, please include the type and description of the module for which the replacement part is required.

# CHAPTER 7

# LIST OF COMPONENTS

## ORDERS FOR SPARE PARTS

In order to expedite handling of orders for spare parts please supply the following information:-

(1) Type and Serial No. of equipment.

(2) Series No. shown on the circuit diagram.
(The appropriate Series No. is also stated at the beginning of each section in the parts lists).

(3) Circuit Reference No.

(4) Manufacturer's Part No.

(5) Description of part required and quantity.

# K4XL's  BAMA

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