TM200-GRC-VRC-B

I N S T R U C T I O N S M A N U A L

HF - SSB TRANSCEIVER

GRC 247/

VRC 247/ A

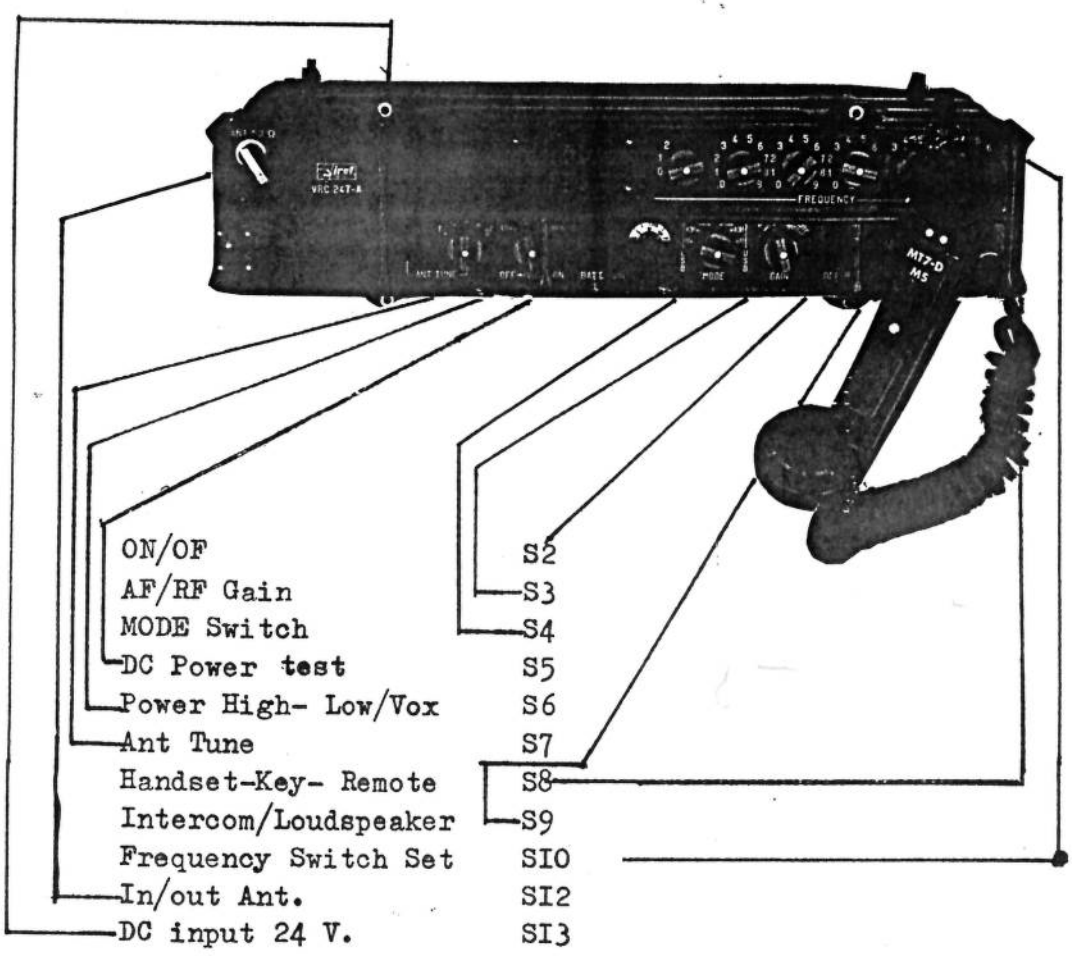
11.73

I.R.E.T. - INDUSTRIA RADIO ELETTRICA TELECOMUNICAZIONI

PART 1

OPERATING INSTRUCTIONS

VRC 247/A TRANCEIVER



1. INTRODUCTION

The VRC 247/A and the GRC 247/ HF-SSB 20 W Transceivers are primarily mobile or fixed-station synthesized radios for military use. They provide reliable communications in combat conditions for a complete range of military operations including infantry, mobile (from tanks to light transport vehicles) airborne, amphibious, offensive and defensive actions. Both sets can be used for either mobile or fixed-station applications but the VRC is more suitable for mobile units and GRC for fixed-station uses.

The transceivers are indentical except for the power supplies. The VRC operates from a nominal 24V d.c. source only, while the GRC can operate from either 220/110V a.c. 50 to 60Hz or the nominal 28V d.c.. A d.c. to d.c. converter type PU-48 is available which allows the sets to be operated from a 12V d.c. source.

Both transceivers cover the frequency band 2 to 30MHz. Frequencies can be selected over this range in increments of 100Hz to an accuracy of 1 p.p.m.. This makes 280000 discrete frequencies available for selection (for both sets, a model is available with a 1.6 to 30MHz range making 284000 discrete frequencies available). Each transceiver has an r-f output power of 20 W on transmit, and has the following modes of operation:

A1	CW Telegraphy (on-off keying)
A3J	SSB Suppressed Carrier Telephony
A3H	SSB Full Carrier Telephony
	FSK Telegraphy (with an external adaptor)

The antenna tuning unit (ATU) CU-5 and the 4-metre whip antenna AT-4.7 can be used with each set.

2. PHYSICAL DESCRIPTION

Both sets are physically identical. Each consists basically of a PRC 247 transceiver and a power amplifier to provide the 20 r-f power output. The sets are completely solid-state, modular in construction and are splashproof. They are built to strict mechanical and electrical specifications. A digital synthesizer is used for frequency control and stability, and

components have tight tolerances to give each set a large built-in reliability factor (this together with the modular construction reduces field maintenance work to simply replacing modules). Both sets can operate in temperature between -25 and +55°C, and can withstand shocks and vibrations to MIL-STD and DEF 133 levels.

Several views of the transceivers are shown in the illustrations. A list of the items required for a mobile set and a fixed-station is given in section 7.

Note: Since the two sets are identical except for the power supplies, the composite term VRC/GRC is sometimes used for brevity in the handbook.

3. FUNCTIONAL DESCRIPTION

A block diagram of the VRC/GRC is shown in fig. 1. Brief functional descriptions of the four main parts of the transceiver are given under their own headings.

3.1 Receiver

The receiver is a double-conversion superheterodyne type with broadband fixed tuned r-f input circuits. A bandpass filter suppresses signals below 2MHz and above 30MHz. The output from the filter is fed via an attenuator to a balanced mixer where it is combined with a 67 to 95MHz output from the synthesizer. The resultant output of 65MHz is the first stage i-f frequency and is fed to a 65MHz filter amplifier; a.g.c. is applied to this amplifier (see fig. 1-A).

A second mixer follows in which the first i-f signal is mixed with a 60MHz (LSB) or 70MHz (USB) input from the synthesizer to produce the second i-f of 5MHz. The signal is then routed to either the second AM-IF or SSB-I.F. filter-amplifier depending on the position of the MODE switch.

Following demodulation by AM or SSB detectors, the audio signal is fed via an amplifier to the handset or other audio equipment. The AM or SSB detectors provide the a.g.c. feedback for the receiver. A separate audio amplifier is provided for the speaker or intercom.

3.2 Transmitter

The audio from the microphone is fed to a balanced mixer either directly to a further mixer stage. In this stage the 5MHz is mixed with a 60MHz (LSB) or 70MHz (USB) output from the synthesizer, producing the upper or lower sideband as required. When operating in the AM mode a 5MHz carrier is re-inserted in the 5MHz amplifier before sideband mixing takes place. Further stages of amplification and mixing take place to produce the final frequency in the band 2 to 30MHz. The output signal is amplified in the broadband power amplifier to the rated 20W p.e.p. on SSB or to 4-5W when operating the driver for the power amplifier. From the power amplifier the r-f signal is fed to the antenna tuning section via a threeband lowpass filter. The appropriate band is selected by command signals from the synthesizer. A block schematic of the transmitter is shown in fig. 1-B.

3.3 Frequency Synthesizer (FS-4)

Frequency synthesizer FS-4 generates the frequencies required by the transceiver. The basis for this generation is a temperature-compensated crystal-controlled oscillator which produces a standard 10MHz frequency. This standard is used as the reference frequency within the unit itself. The synthesizer provides four outputs for the transceiver; the 5MHz carrier, the first and second stage conversion (local oscillator) frequencies, and the decoded output for the transceiver lowpass filter. The frequency is selected in 100Hz steps by the FREQUENCY decade switches on the front panel. A block diagram of the synthesizer is shown in fig. 1-C.

The 5MHz carrier is taken via an f/2 divider from the standard oscillator. The first and second-stage conversion frequencies are produced by three phase locked loops. Two loops are used to produce the first-stage frequency (the first loop provides the offset frequency for the second) and one loop for the second frequency. Each loop contains the appropriate phase comparator, programable divider, voltage controlled oscillators (VCO's), mixers, filters and amplifiers.

The VCO of the first loop produces a 6.000 to 6.999MHz output which is divided, mixed, filtered and amplified to provide the 55.015 to 55.1149MHz offset frequency to the

mixer of the second loop. Two operations take place. The output is first mixed with the standard 10MHz and then with a 64.415MHz frequency from a crystal oscillator. Each mixing operation is followed by a filter and amplifier stage. The VCO is controlled by a phase-comparator which receives a 1kHz reference inputand a feedback voltage. The feedback voltage is fed through a programable divider which is controlled by the setting of the 10kHz, 1kHz and 100Hz FREQUENCY switches.

The second loop operates in a similar fashion except that there is only one mixing stage, and the inputs to the phase-comparator are a 25kHz reference and a voltage-feedback programable divider which is controlled by the 10MHz, 1MHz and 100kHz FREQUENCY switches. Its VCO provides the first stage 65.015 to 95.0149MHz conversion frequency to the transceiver.

The third loop also operates in a similar manner except that its phase comparator receives a 400kHz reference input and the voltage-feedback programable divider is controlled by the USB-LSB settings of the MODE switch.

In addition to providing inputs to the programable divider of the second loop, the 10MHz and 1MHz switch positions are decoded to select the setting of the transceiver lowpass filter.

Any error introduced by the 64.415MHz crystal oscillator is cancelled out in the second mixer stage of the transceiver itself.

✳ 3.4 Power Amplifier -

The power amplifier is a linear broadband type for the 2 - to 30MHz frequency range with input and output impedances of 50 ohms. It provides a nominal 100W p.e.p. output for the A1, A3J and A3H transmit modes, and permits continuous FSK transmission (FSK teleprinter operation). An SWR detector circuit is incorporated in the amplifier to prevent the power transistor overheating due to a malfunction such as an open or shortcircuited antenna. The mismatch between the antenna and the transceiver sets up an r-f voltage which is rectified and fed back as the control voltage to the input of the transceiver amplifier. This feedback reduces the driver from the transceiver (the higher the feedback

✳ I paragrafi contrassegnati ✳ non sono pertinenti

voltage the lower the output power of the transceiver) and consequently reduces the output power of the amplifier (see fig. 1-D).

Compensation is also made for excess heat in the region of the power transistors. This is done by a negative temperature coefficient (NTC) component located on the inside of the front panel adjacent to the transistors. The front panel acts as a heatsink for the power transistors and the NTC component is connected in the feedback control circuit to the input of the transceiver amplifier.

When the heatsink is unable to adequately dissipate the heat caused by high ambient temperatures or mismatch conditions, the NTC component makes the necessary compensation by causing the feedback control circuit to act in the same manner as described in the previous paragraph (the hotter the component gets the lower the output power of the amplifier is reduced). Full output power is obtained when the ambient temperature returns to its normal level.

A meter is provided on the front panel to indicate the forward or reflected r-f power levels. The d.c. drive voltage for the required indication is taken from the SWR detector circuit when the meter switch is set to the FORWARD or REFLECTED position.

The lowpass filter of the power amplifier is divided into eight sections and is controlled, via a solenoid-controlled switch and decoder, from the 10MHz and 1MHz FREQUENCY selection switches of the front panel. The sections and the related frequency ranges are as follows:

Section	Frequency in MHz
8	20 to 30
7	15 to 20
6	12 to 15
5	9 to 12
4	6 to 9
3	4 to 6
2	3 to 4
1	1 to 2

The setting of the two MHz switches are decoded into 1 out

of 8 ways to select the required position of the solenoid controlled switch. The selection can be carried out only when the set is on receive.

3.5 Power Supplies

The VRC operates from 22 to 30V d.c. (V nominal) while the GRC can work from 220/110V a.c. 50 to 60Hz or from 22 to 30V d.c.. Both sets can operate from a 12V d.c. supply since the d.c. to d.c. converter PU 48 is available.

In the case of vehicles and fixed-station installations, the radio sets should be provided with their own separate power supply lines which should be fused as close as possible to the source. Heavy gauge wiring should be used to reduce line drop to a minimum. This applies particularly to vehicle installations since a large amount of current is drawn from the battery for transmit and channel change operations. The vehicle battery should be kept fully charged under all conditions.

The GRC is provided with a change-over relay in the power supply line which allows an emergency supply to be used in the event of a 220/110V a.c. mains failure. A 24V NiCad or lead battery can be used as the emergency supply. No interruption in communication takes place when a change-over occurs.

* 3.6 ATU CU-5

Being separate, the ATU (CU-5) fig. 1-E allows greater positional flexibility, when installing the radio set. It can be located as near as possible to the antenna base to allow the best possible antenna-transceiver matching. The ATU contains the coarse and fine tuning controls the tuning indicator, antenna load switch, and the r-f power indication meter.

4. SPECIFICATION

The specification applies to both the VRC and the GRC except where noted. The specifications of ATU CU-5 is also included.

4.1 General

Frequency range	2 to 29.9999MHz in increments of 100Hz (frequency range 1.6 to 29.9999MHz on request).
Channels available	280000 (284000 in the frequency range 1.6 to 29.9999MHz).
Frequency control	From built in digital synthesizer.
Frequency stability	1 p.p.m. in the temperature range.
Operating mode	A3J (LSB-USB) A3H (LSB-USB) AM compatibility A1 (LSB-USB) CW (1000Hz shifted) (FSK) with external adaptor.
	Note: A VOX (voice operated transmit) facility is also available.

4.2 Environmental

Operating temperature range	-25°C to +55°C

1) THE VRC/GRC CAN BE USED ONLY WITH A NEGATIVE EARTH SUPPLY

2) THE ATU SHOULD BE LOCATED AS NEAR AS POSSIBLE TO THE ANTENNA AND THE CONNECTING CABLE SHOULD BE 40 TO 70cm IN LENGTH.

Shock tested to	MIL-STD & DEF 133
Vibration tested to	MIL-STD & DEF 133

4.3 Receiver

Sensitivity A3J	1µV for 10dB S+N/N
A1	1µV for 10dB S+N/N
A3H	2,5µV for 10dB S+N/N

Selectivity A3J and A1	- 6dB 3 000Hz min. - 60dB 5 500Hz max.
A3H	- 6dB 6 000Hz min. - 60dB 15 500Hz max.
Internally generated spurious signals	Spurious will be below an equivalent signal input of 0.5µV on 99% or more of the channels.
Image and other spurious rejection	-60dB
I.F. rejection	-70dB
A.G.C. dynamic	80dB on A3J
Audio output	2mW into 300Ω (for handset) with no greater than 5% distortion at 1000Hz. 1W into 50Ω (for speaker or intercom with no greater than 10% distortion at 1000Hz.
Average power consumption	6W at 28 Volts d.c..

4.4 Transmitter

High power output (nominal)	A3J 20 W p.e.p. A3H 20 W p.e.p. (carrier 5W average) A1 20
Low power output	Approx. one tenth of nominal high power.
Output impedance	50Ω
Carrier suppression	At least -40dB with reference to p.e.p. level.
Unwanted sideband suppression	At least -50dB with reference to p.e.p. level at 1000Hz modulation frequency.
Harmonic suppression	-40dB (with tuned antenna circuits).

Intermodulation products	At least -26dB with reference to p.e.p. level (two tone test using equal amplitude a.f. tones).
Average power consumption	60 W at 24 Volts d.c.

4.5 Power Supplies

VRC 247- A	22 to 28 V d.c. (24 V nominal)
GRC 247-	220/110V a.c. 50 to 60Hz single phase 22 to 32V d.c. (28V nominal)

✳ 4.6 ATU CU-5

Frequency range	2-30MHz
Power rating	150W average power
Input impedance	50Ω
Matching capability	Designed to match a transmitter output of 50Ω
Dimensions, overall	195W x 225H x 210D mm
Weight	6.325kg

Intermodulation products	At least -26dB with reference to p.e.p. level (two tone test using equal amplitude a.f. tones).
Average power consumption	60 W at 24 Volts d.c.

4.5 Power Supplies

VRC 247- A	22 to 28 V d.c. (24 V nominal)
GRC 247-	220/110V a.c. 50 to 60Hz single phase 22 to 32V d.c. (28V nominal)

✳ 4.6 ATU CU-5

Frequency range	2-30MHz
Power rating	150W average power
Input impedance	50Ω
Matching capability	Designed to match a transmitter output of 50Ω
Dimensions, overall	195W x 225H x 210D mm
Weight	6.325kg

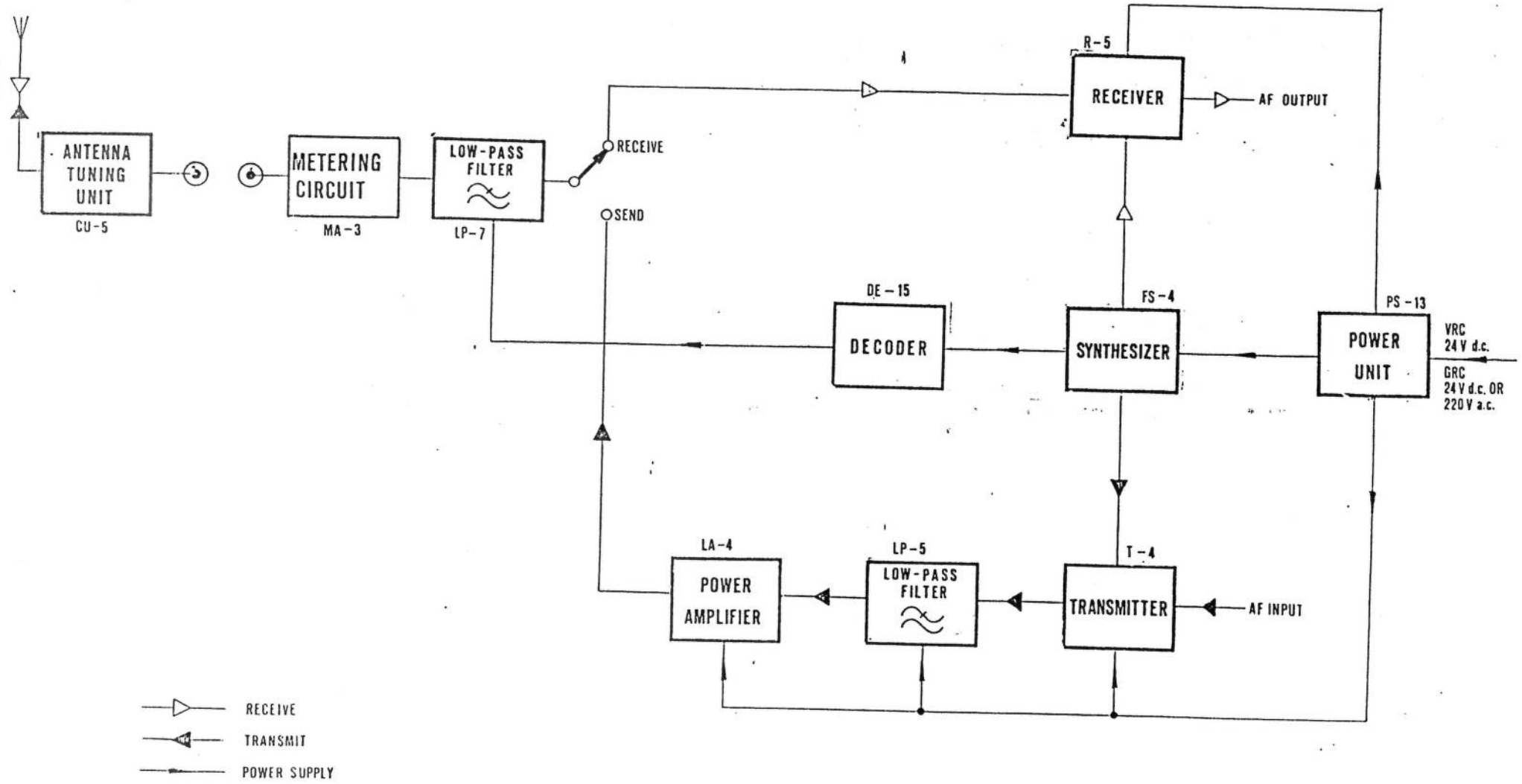


Fig. SIMPLIFIED BLOCK DIAGRAM VRC/GRC 247- TRANSCEIVER

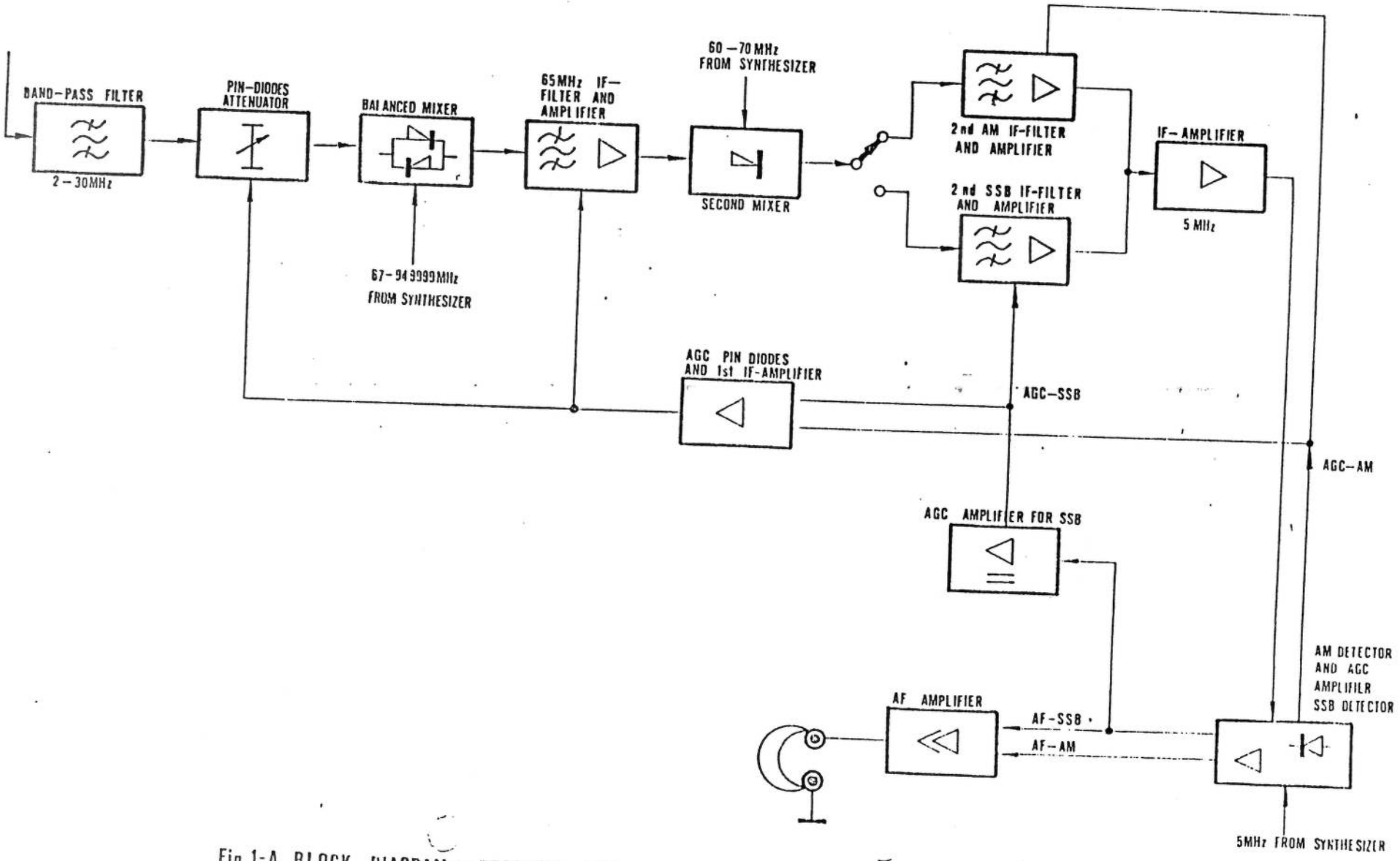


Fig. 1-A BLOCK DIAGRAM -- RECEIVER PRC 047

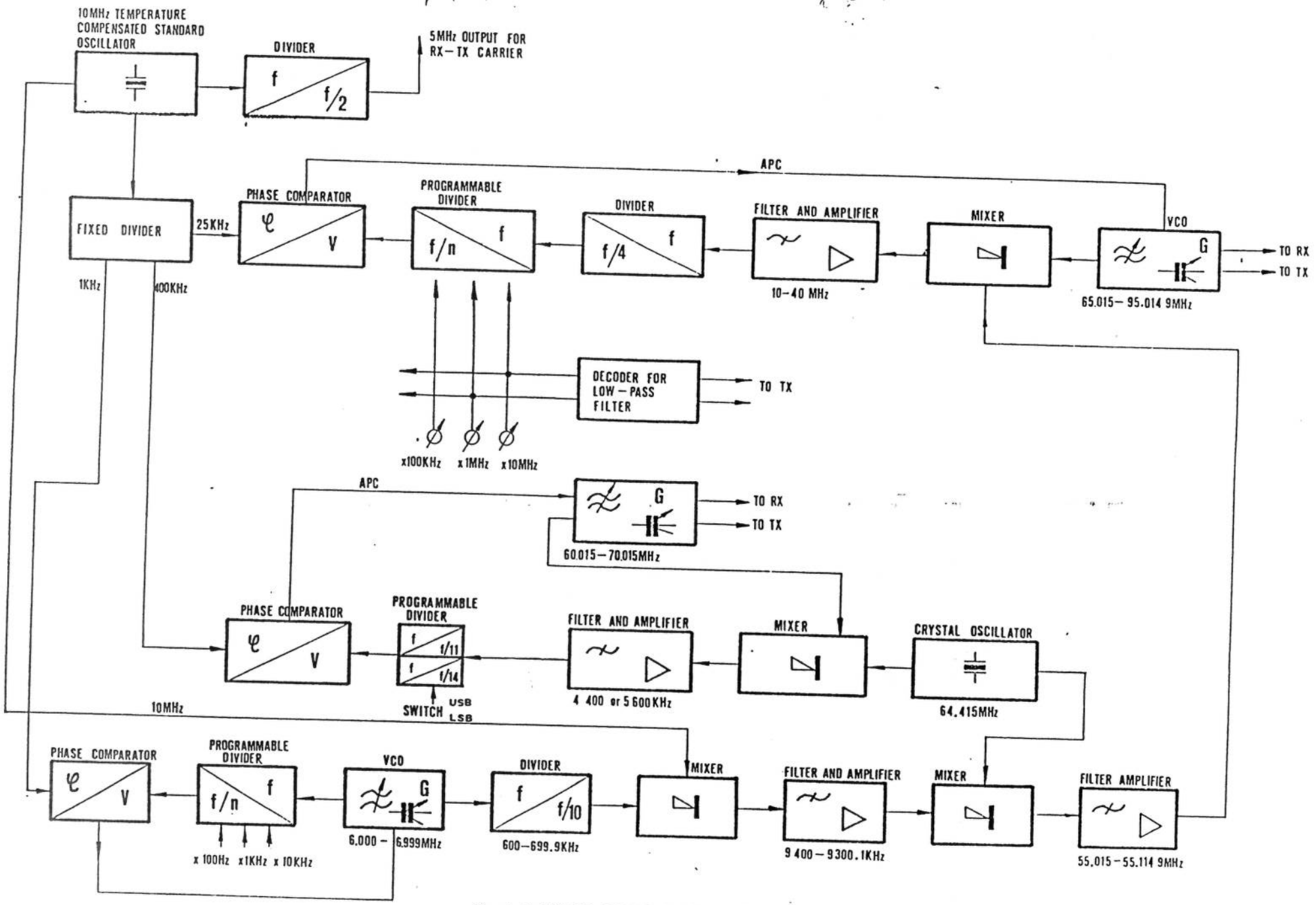


Fig. 1–C BLOCK DIAGRAM FS–4 SYNTHESIZER

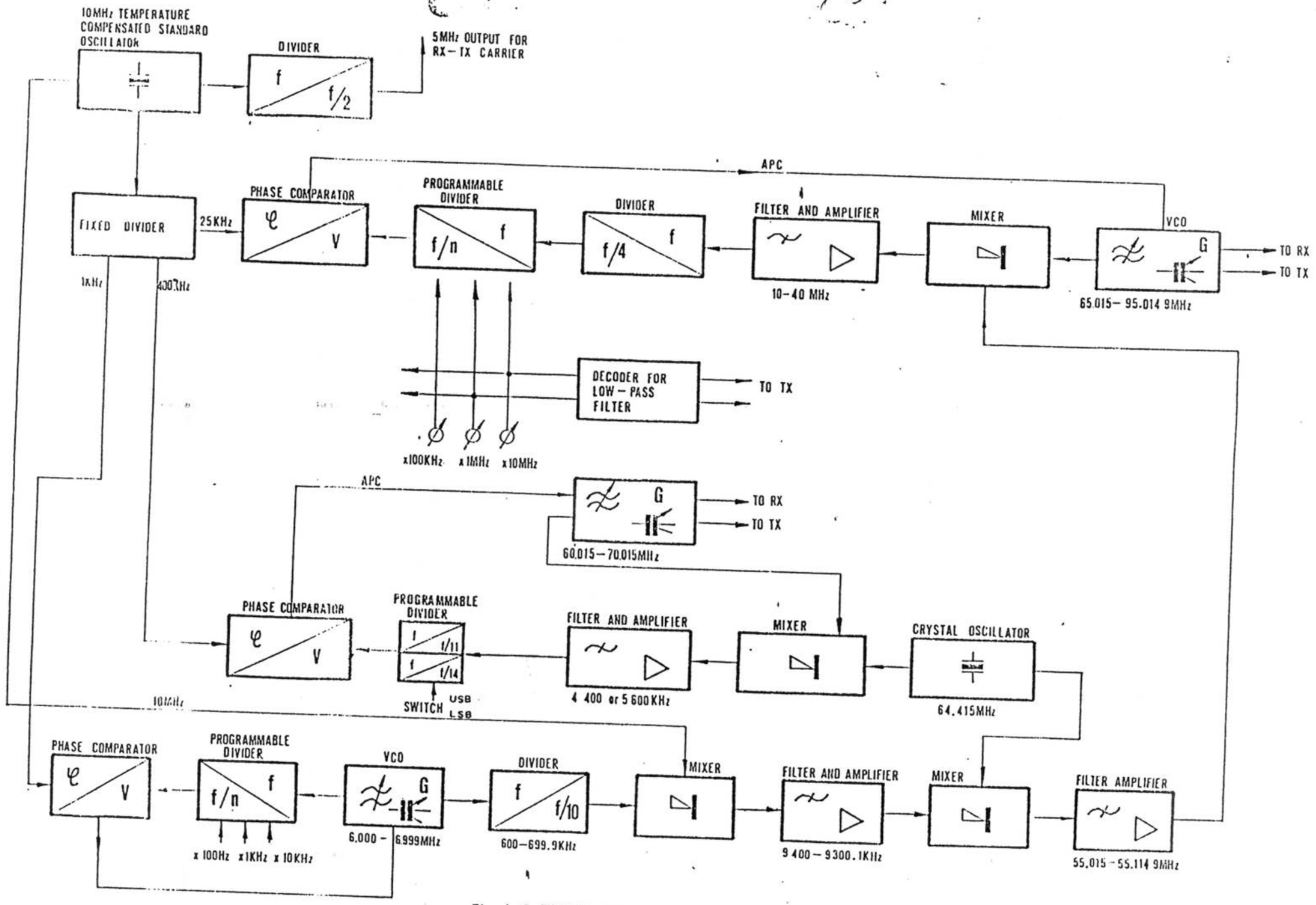


Fig. 1-C BLOCK DIAGRAM FS-4 SYNTHESIZ...

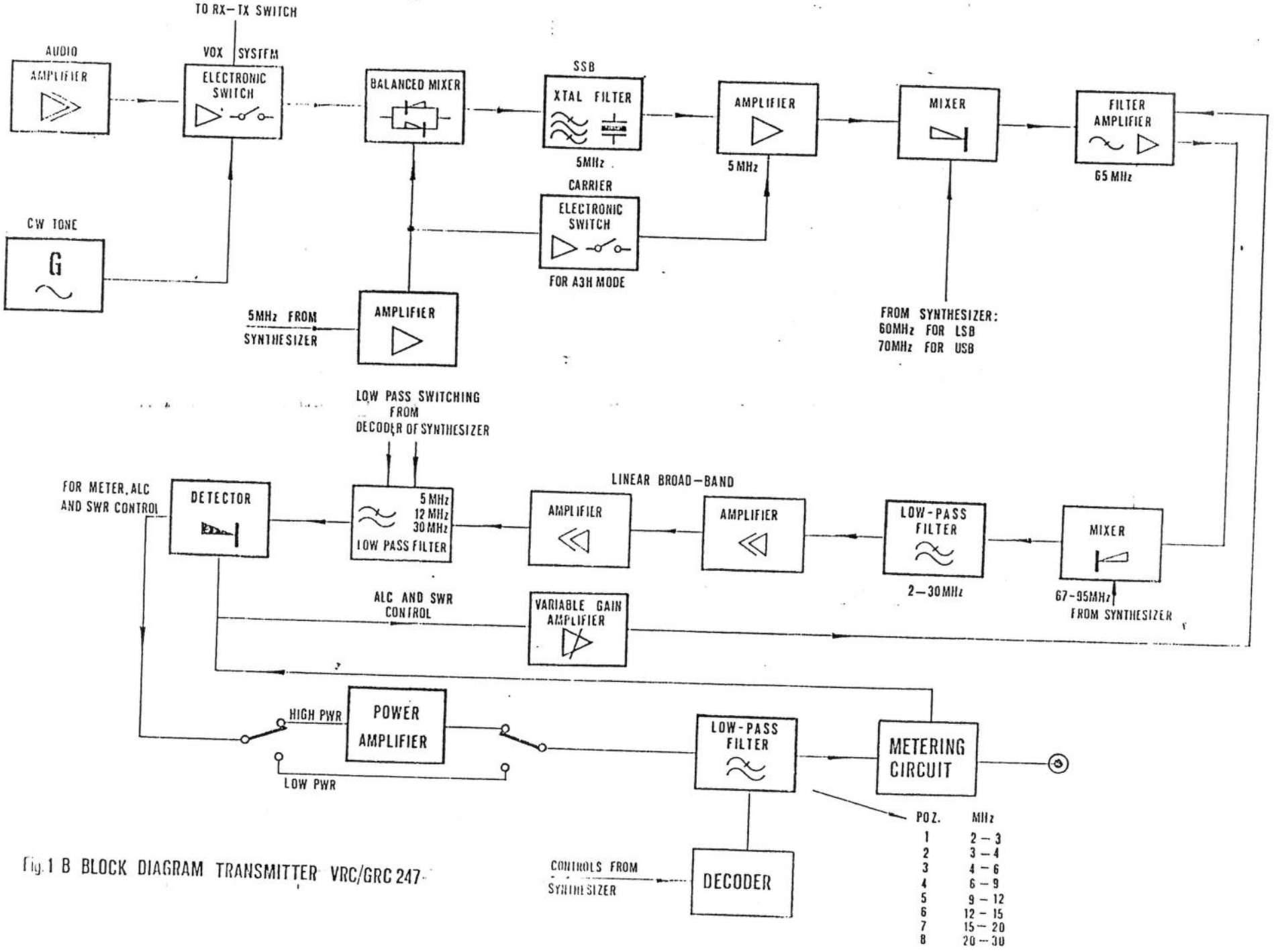


Fig. 1 B BLOCK DIAGRAM TRANSMITTER VRC/GRC 247

7. TESTING AND FAULT FINDING

7.1 Preliminary Servicing

Check the transceiver by working through the operating procedures. Before carrying out an internal investigation it is advisable to check the ancillary equipment such as handset, headset, p.t.t. switches morse key, antenna etc.

The easiest method of checking these items is by replacement with known serviceable units.

7.2 Voltage Level Checks at Test Points (TP)

7.2.1 General

This transceiver comprises a number of plug-in-modules and sub-assemblies. The appropriate tests listed in the table (receive and transmit condition) should be applied to each plug-in-module. The tests require the voltmeter type ICE 680 R to measure the voltages given in the table VOLTAGES AT TEST POINTS.

The tests assume that the transceiver has been found to be unserviceable and, hence it is known that the fault or faults lie in the radio set.

Note: These tests are intended to localize the fault to the module only. Further tests will be required to determine faulty component (see PARA 8 of this manual). A fault indication will normally be confined to one module, however, it is possible that a fault condition may have an apparent effect on more than one module i.e.: a faulty power supply should affect all modules. Care must therefore be exercised in fault location.

7.3 TEST EQUIPMENT

7.3.1 Test Instruments

The following test equipment is recommended to carry out maintenance and repair.

1) Test Set GRC 247/ . known to be serviceable.

2) Power Supply capable of continuously providing 15 Amps at 24V d.c. (22 to 32V). This power supply is required to power the GRC 247/ during d.c. operation.

3) Control Box type CB-11 (IRET Test Jig).

4) Multimeter, general purpose 20KΩ/V (ICE mod. 680 R).

5) Digital Frequency Counter having a range of up to 200 MHz at 50mV r.m.s. input.

6) Millivoltmeter, Electronic, AF, having a range of up to 10mV at 20Hz to 100kHz. The IRET type ACM 0.1A is suitable.

7) RF Wattmeter, having a range of 1 to 30MHz at 50Ω input impedance and capable of dissipating 50W and 100W.

8) RF Signal Generator having a range of 1 to 200MHz at 50Ω output impedance, which can be modulated up to 30% at 1000Hz. The HEWLETT PACKARD 8640B (0.5-512MHz) is suitable.

9) Oscilloscope having a frequency range of 75MHz and a sensitivity of 10mV/div. Impedance 1MΩ 20pF, with probe -20dB, 10MΩ 10pF.

10) Millivoltmeter, Electronic, R.F., having a frequency range up to 500MHz. Sensitivity 10mV. The IRET type VT-1A is suitable.

11) Digital Voltmeter, having an input impedance of 10MΩ. Number of digits: 3 1/2; voltage range: 1.5V f.s. and 15V f.s..

12) Harmonic Distortion Meter, having a frequency range of 20Hz to 20kHz. Distortion: 1-3-10-30-100% full scale. Minimum input voltage 0.3V. Input resistance 300KΩ.

Optional

1) Sweep Frequency Tester type "Polyskanner II", KNOTT. Used for frequency response measurement (up to 1200MHz) on the filters.

2) Attenuator, fixed; 20dB, 100W.

3) Attenuator, variable; 1W.

4) Spectrum Analyzer, having a frequency range up to 110MHz at 50Ω input impedance.

5) Audio Frequency Generator, having a frequency range of 300 to 3000Hz. Output impedance 600Ω. The IRET type AFG 300A is suitable.

7.3.2 Accessories

1) Extension Cable for Modules R-5, T-4, FS-4.

2) Extension Cable for Modules PS-13, DE-15, S-7/A.

3) Extension Cable for Module LP-5.

4) Coaxial T-Adaptors type BNC and/or N as required (for connection of instruments)

5) Material: Silicon Compound and Thermal Joint Compound

TABLE 1 VOLTAGE TEST POINTS SYNTHESIZER FS-4

TP	1	2	3	4	5	6	7	8	9	10	11
Receive	(NOTE 2) +3V	NOTE 1 +3V	0 V	0 V	0 V	+28V	(NOTE 3) +8.4V	(NOTE 4) +7.8V	+9V	+5V	+5V
Transmit	(NOTE 2) +3V	(NOTE 1) +3V	0 V	0 V	0 V	+28V	(NOTE 3) +8.4V	+7.8V	+9V	+5V	+5V

NOTE 1 Frequency band 2 - 2.999MHz

NOTE 2 Frequency band 12 - 29.999MHz

NOTE 3 Voltage only in LSB

NOTE 4 No voltage in A3H

TABLE 2

Voltage Test Points T-4

TP	12	13	14	15	16	17
LOW PWR			+50mV	+9V	A.C. 320mV	+50mV
HIGH PWR	+6mV	+12V	+50mV	+9V	A.C. 320mV	+50mV

All measurements are taken at 10MHz - A1 Key-down

TABLE 3

Voltage Test Points Receiver R-5

TP	18
GAIN RF max A1-A3H-A3J	+8V *
GAIN RF min A1-A3J	+2.4V*
GAIN RF min A3H	+3.6V*

* Ensure that no external signals are being received during tests

NOTE: An r-f signal tuned to the operating frequency and applied to the receiver input, develops a d.c. voltage at test point TP 18. This d.c. voltage varies inversely relative to the level of the r-f signal.

TABLE 4 VOLTAGE TEST POINTS LOWPASS FILTER AND SWITCH LP-5

TP	26	27	28	29	30	31	32	33
Receive				+24V	(NOTE 2) +3V	+24V		(NOTE 1) +3V
Transmit LOW-POWER					(NOTE 2) +3V	+24V	+24V	(NOTE 1) +3V
Transmit HIGH-POWER	(NOTE 3) +24V	+24V	+12V		(NOTE 2) +3V	+24V	+24V	(NOTE 1) +3V

NOTE 1 Frequency Band 2 - 4.999MHz

NOTE 2 Frequency Band 12 - 29.999MHz

NOTE 3 When used with LA-4

TABLE 5

Voltage Test Points LPA-13

TP		34	35	36	37
LOW	PWR	+1mW	+0.7V	+2mV	+0.8V
HIGH	PWR	+42mV	+0.68V	+4mV	+0.78V

All measurements are taken at 10MHz - A1 key-down

TABLE 6

Voltage Test Points PS-13

Test Point	19	20	21	22	23	24	25
OFF	+24V						
Receive	+24V	+24V	+5V	+9V		+9V	+32V
Transmit LOW-HIGH	+24V	+24V	+5V		+9V	+9V	+32V

7.4 SERVICEABILITY TEST

This section covers serviceability tests on the GRC 247/ . Each test can be carried out in isolation from the remainder, unless otherwise stated.

7.4.1 Transmitter

7.4.1.1 Test Equipment

The equipment required to test the transmitter is as follows:

1) HF Wattmeter
2) Oscilloscope
3) Control Box IRET CB 11
4) Power Supply 22 to 30V d.c. (set at 28V for the test)

Note: For detailed description of Test Instruments see para. 7.3.

7.4.1.2 Power Output

Connect the test equipment as shown in Fig. 7-7 and test the A1 power output as follows:

1) Set MODE switch to A1 or A1 USB.
2) Set FREQUENCY switches to test frequency.
3) Set VOX switch to OFF.
4) Set LOW/HIGH/TUNE switch to HIGH.
5) Set RF POWER switch to FORWARD.
6) Press the A1 (CW) push-button of the CB 11 control box; the r.m.s. power output for A1 is shown on the wattmeter.
7) Check that the r.m.s. indication conforms to the value given in para. 4.4.

7.4.1.3 A3J Power Output

With the test equipment connected as shown in Fig. 7-7 check the A3J power outputs as follows:

1) Set MODE switch to A3J LSB or A3J USB.

2) Set FREQUENCY switches to test frequency.

3) Set VOX switch to OFF.

4) Set LOW/HIGH/TUNE switch to HIGH.

5) Set RF POWER switch to FORWARD.

6) Set FUNCTION switch of control box to TX.

7) Set FUNCTION switch of control box to TWO TONE.

8) Adjust BAL control of box to obtain waveform A shown in Fig. 7-5 on the oscilloscope.

9) Note the value shown on the wattmeter and use it in the following equation to check that the A3J power output is correct:

W p.e.p. = 2Wo

where W p.e.p. = PEP value given in PARA 4.4

Wo = Indication shown on meter

7.4.1.4 A3H Power Output

With the test equipment connected as shown in Fig. 7-7 check the A3H power output as follows:

1) Repeat steps (1) to (5) of the previous section except MODE switch is set to A3H position.

2) Set the FUNCTION switch of the control box to OFF (switches of tones).

3) Check that the wattmeter indicates the r.m.s. value of the A3H carrier power (see PARA. 4.4).

4) Set the FUNCTION switch to TONE 1.

5) Adjust the OUTPUT LEVEL control of the control box to obtain waveform "A" shown in Fig. 7-5 on the oscilloscope.

6) Note the value shown on the wattmeter and use it in the following equation to check that the A3H power output is correct:

W p.e.p. = 2Wo

where W p.e.p. = PEP value given in PARA. 4.4

Wo = Indication shown on meter

7.4.2 Receiver

7.4.2.1 Test Equipment

The equipment required to test the receiver is as follows:

1) RF Generator
2) Oscilloscope
3) Control Box IRET CB 11
4) AF Millivoltmeter
5) Power Supply 22 to 30V d.c. (set to 28V)

Note: For detailed description of Test Instruments see para. 7.3.

7.4.2.2 A1 and A3J Sensitivity

Check the sensitivity of the receiver in the A1 and A3J modes in the following manner:

1) Connect the test equipment as shown in Fig. 7-6.

2) Set MODE switch to A3J LSB or A3J USB.

3) Set FREQUENCY switches to test frequency.

4) Set TX-RX switch of control box to RX.

5) Set LOW/HIGH/TUNE switch to LOW or HIGH.

6) Set GAIN switch fully clockwise.

7) Set the r-f generator 1kHz below the test frequency for LSB or 1kHz above for USB; adjust the output level to 1µV r.m.s. (2µV e.m.f.) unmodulated.

8) Note the level of the 1kHz tone on the a-f millivoltmeter connected (via the oscilloscope) to the control box.

9) Disconnect the r-f generator from the transceiver.

10) Note the indication of the millivoltmeter. This reading must be taken within 3 sec. of disconnecting the r-f generator.

11) Use the ratio of the two values to determine that the signal-to-noise ratio (dBs) of the receiver in the A1 and A3J modes, for an input of 1µV r.m.s., is within the value specified in PARA. 4.3.

7.4.2.3 A3H Sensitivity

Check the sensitivity of the receiver in the A3H mode in the following manner (test equipment also connected as shown in Fig. 7-6).

1) Set MODE switch to A3H LSB or A3H USB.

2) Repeat steps (3) to (6) of A1 or A3J sensitivity test.

3) Set the r-f generator to the test frequency at an output level of 2,5µV r.m.s. (5µV r.m.s.) and modulate it at 30% with an audio frequency of 1kHz.

4) Note the level of the 1kHz tone on the millivoltmeter.

5) Switch off the modulating tone at the r-f generator and note the indication on the millivoltmeter.

6) Use the ratio of the two values to determine that the signal to noise ratio (dBs) of the receiver in the A3H mode, for an input of 2µV r.m.s., is within the value specified in PARA. 4.3.

7.4.2.4 AF Output Power

Check the a-f output of the receiver in the following manner:

1) Repeat steps (1) to (7) of the A1 or A3J sensitivity test.

2) Connect a 300Ω 1/2W resistor between terminals AF--RX and the earth terminal of the control box (the millivoltmeter is connected to the same terminals).

3) Note the indication on millivoltmeter and calculate the a-f power using the equation:

$$P = \frac{V^2}{R}$$

where P = AF output power

W = Voltage shown on the millivoltmeter

R = 300Ω (the resistor)

4) Check that the result conforms with the value given in PARA. 4.3.

7.4.2.5 A.G.C. Dynamic

Check the a.g.c. of the receiver in the following manner:

1) Repeat steps (1) to (7) of the A1 or A3J sensitivity test.

2) Note the level of the 1kHz tone on the millivoltmeter.

3) Increase the output level of the r-f generator by 80dB and note the amount of increase shown on the millivoltmeter. This amount of change reflects the a.g.c. of the receiver and should not exceed 6dB.

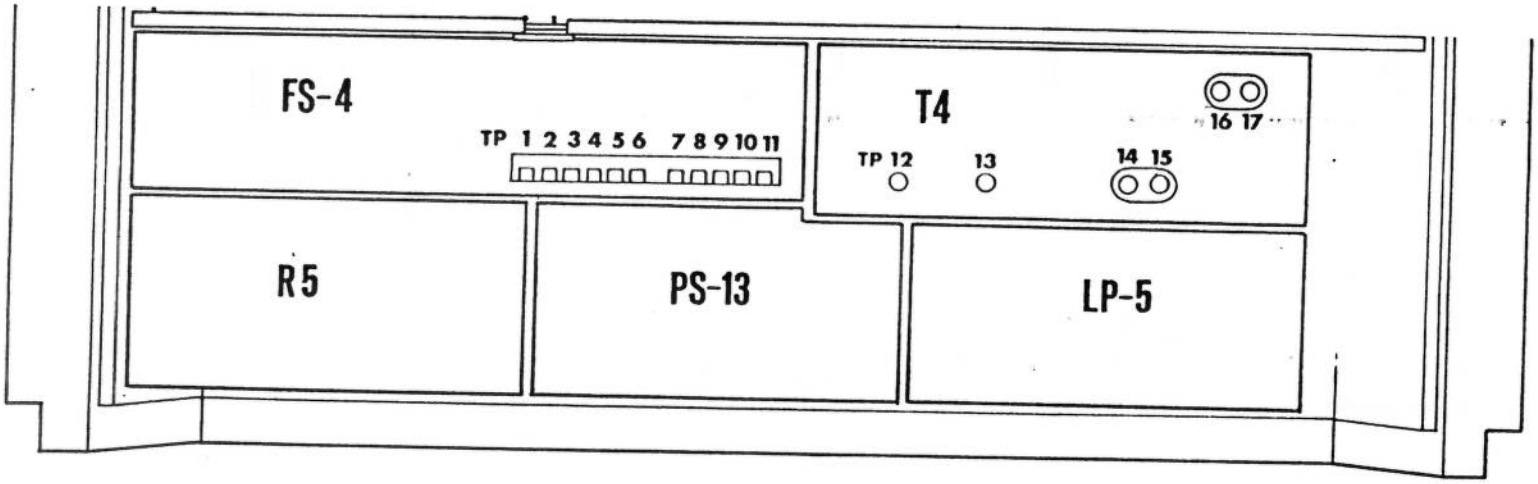


Fig.7-1 TEST POINT LOCATION -REAR VIEW VRC/GRC 247-100

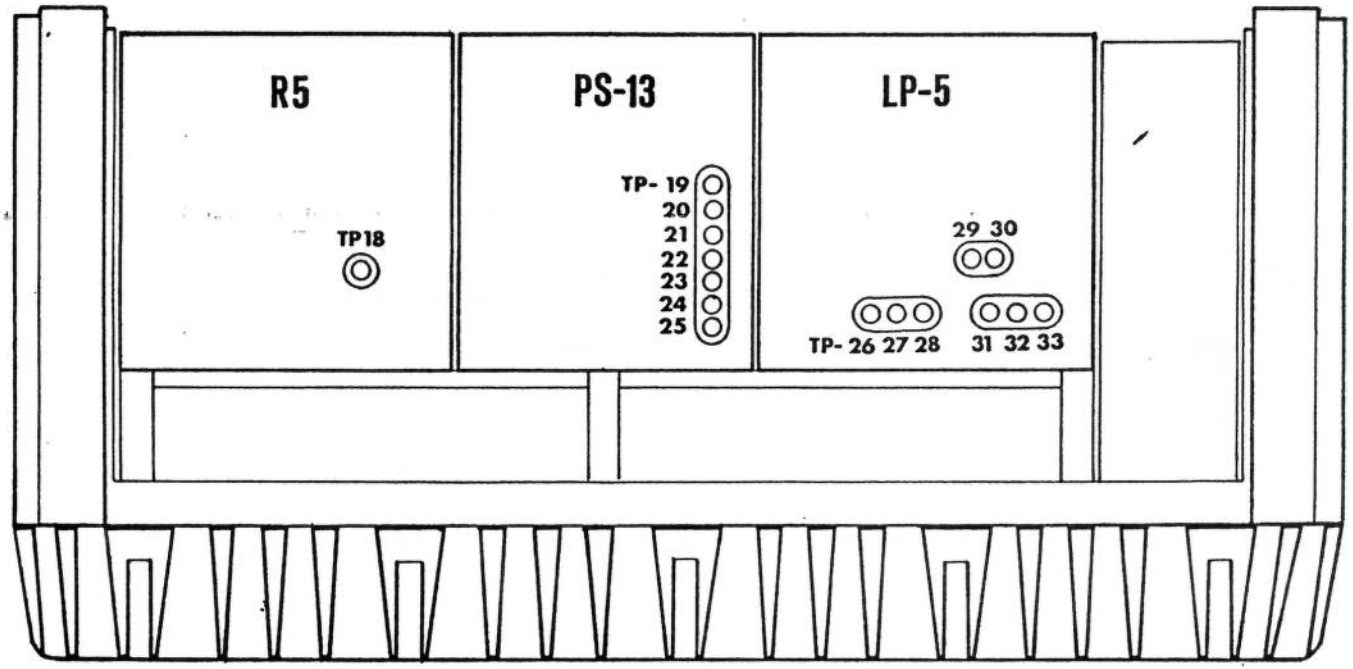


Fig.7-3TEST POINT LOCATION – BOTTOM VIEW VRC/GRC 247-100