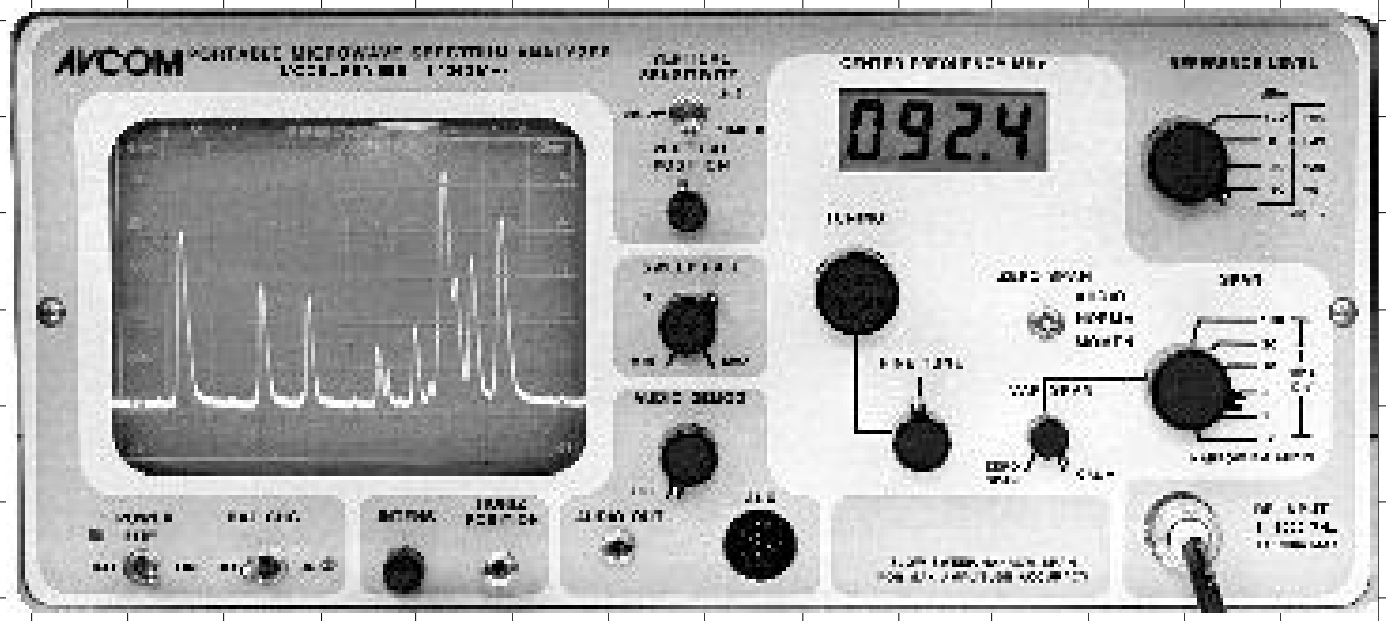
AVCOM®

PSA-65C

PORTABLE SPECTRUM ANALYZER



Preliminary Operating Instructions

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Preliminary Operating Instructions for AVCOM's

PSA-65C Portable Spectrum Analyzer

Whether you are a technician or engineer who is thoroughly versed in the applications of a spectrum analyzer or someone who has never used one, you will be surprised by the ease of operation and versatility of the PSA-65C. Usually when a spectrum analyzer is purchased, the customer has a specific application in mind however, as you become more familiar with the characteristics and performance of the PSA-65C, the number of applications will increase.The lightweight, battery or line operated PSA-65C portable spectrum analyzer from AVCOM is the perfect instrument for field testing of RF systems, classroom instruction, satellite system alignment, electronic countermeasures, cable TV maintenance, cellular and production use.

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IMPORTANT
READ CAREFULLY BEFORE USING INSTRUMENT

GENERAL SAFETY

Your PSA-65C is connected to an AC power source (110, 220 or 240 VAC depending on model) and it is important that all components of your test bench are properly grounded to reduce the possibility of electrical shock.

Use properly grounded electrical outlet or extension cord.

Do not cut grounding pin from line cord plug.

Use fuses of correct amperage.

Disconnect AC line cords when working inside electrical appliances or instruments.

Do not service equipment alone - Work with someone who can administer help and first aid.

Persons working with line voltages should be trained in and capable of performing first aid and resusitation techniques.

IMPORTANT CAUTIONS

Do not couple the input of the PSA-65C to high power RF sources such as walkie-talkies, CB radios, transmitters, etc. Signal levels in excess of +15 dBm can damage the sensitive mixers in the instrument resulting in otherwise unnecessary expense and repairs.

HANDLE WITH CARE - The PSA-65C Portable Spectrum Analyzer is a precision instrument designed for normal operating and handling conditions. It should be protected from abuse as dropping, throwing or other rough handling. When being transported in a vehicle or shipped, the PSA-65C must be cushioned and protected against shock and vibration.

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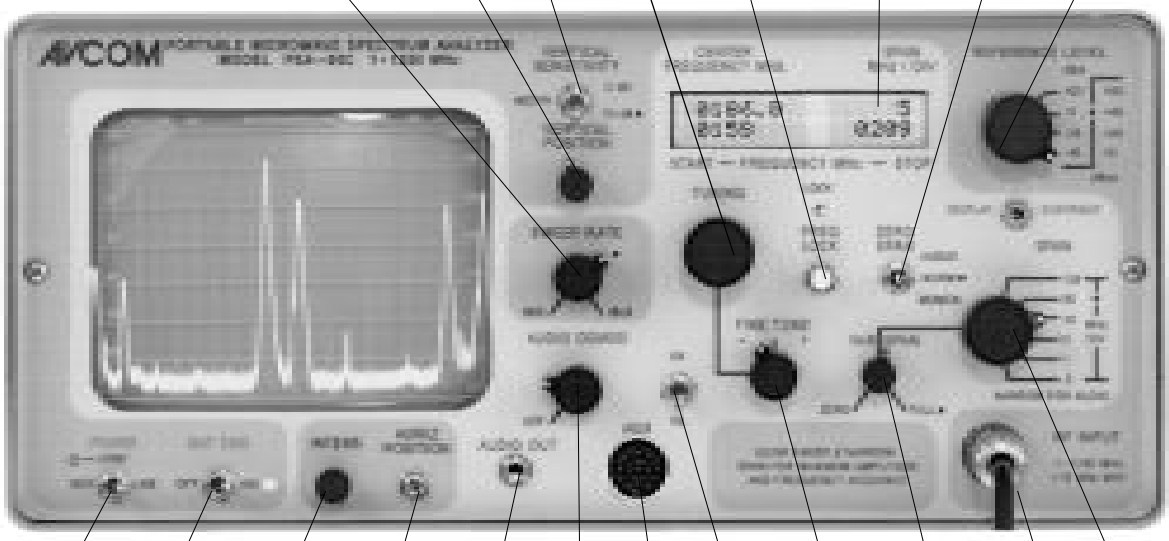

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FRONT PANEL FUNCTIONS

1. POWER

POWER SWITCH - The POWER switch has three positions; BATtery operation, STandBY, and LINE operation.

BAT - Turns instrument on and instrument is powered by internal rechargeable battery pack.

NOTE: An INTERNAL / EXTERNAL battery switch and EXTERNAL POWER jack are located on rear panel of the PSA-65C. When placed to "EXTERNAL" position, an external 11.5 - 15 VDC power source can provide power to the PSA-65C. This also charges internal batteries.

STBY - Amber LED is illuminated if line cord is connected to AC power source. Instrument is functionally off although power is present inside chassis. **NOTE**: In this position, the battery charger is operational and the internal battery pack can be re-charged.

LINE - Turns the PSA-65C on. All power is being provided by the AC line source.

2. BAT CHG/MON

The BATtery CHarGer is connected to internal battery pack when this switch is in the "ON" position. An amber LED is illuminated while battery charger is on. **NOTE**: For proper battery charger operation, the PSA-65C POWER switch should be in the "STBY" position. Then the PSA-65C will be recharged to approx. 80% in 6 hours and 100% when left on charge overnight.

NOTE: When BAT CHG and PSA-65C are on, the lower line of LCD display will indicate battery voltage.

3. INTENS

The INTENSity control sets the intensity of the trace.

4. HORIZ POSITION - *(Horizontal Calibration is factory set, however the unit can still be calibrated in the field by using a tuning tool to turn the recessed HORIZ POSITION control pot).* See horizontal calibration in user familiarization section.

The HORIZontal POSITION control positions the sweep horizontally on the screen. When properly adjusted, a signal located at the center of the screen will remain in the center of the screen in any SPAN position.

5. AUDIO OUT JACK

Drives a low impedance earphone or speaker when the AUDIO DEMODulator is turned on.

Using this jack disconnects the internal speaker.

6. AUDIO DEMOD

This control activates the AUDIO DEMODulator circuit and controls the output level of the demodulated audio output. **NOTE**: Audio can be heard anytime the AM-FM selector is in the AM position or when the ZERO SPAN toggle switch is placed in either the "AUDIO" or MOMENtary" position in the FM mode.

7. AUXILARY CONNECTOR

This AUXiliary socket supports present and future optional accessories for the PSA-65C.

8. RF INPUT

This BNC connector accepts RF signals to signals to be observed from less than 1 MHz to greater than 1250 MHz.

9. SPAN

The SPAN control sets the scale of the horizontal sweep presentation from 1250 MHz (125 MHz/div) to 2 MHz (.2 MHz/div). This control also automatically selects the optimum IF resolution filter.

10. VAR SPAN

The VARiable SPAN control reduces the width of the spectrum being displayed for closer signal examination and enhances amplitude accuracy.

11. ZERO SPAN

ZERO SPAN instantly places the analyzer into the zero span mode and activates the FM audio demodulator for convenient signal monitoring.

AUDIO - (Upward position and switch remains in this position until manually pushed again). This position switches on the FM demodulator circuit until the ZERO SPAN switch is returned to the NORMal position.

NORM - This is the normal position of the ZERO SPAN switch when not monitoring audio signals.

MOMEN - This is a momentary switch position that instantly places the analyzer into the zero span mode and activates the FM audio demodulator for convenient signal monitoring.

12. TUNING

This multi-turn control adjusts the center frequency of the analyzer so that signals of interest appear at the center of the display. The center frequency is also displayed by the LCD display.

13. FINE TUNE

FINE TUNE allows for fine adjustment of the center frequency. Greater adjustment range is on the left side of the control (-) and finer adjustment range is on the right side of the control (+).

14. MULTI-FUNCTION BACKLIT LCD DISPLAY

The new microprocessor allows the multifunction LCD to show center frequency of the CRT, span setting in MHz/Div, and the start and stop frequencies of the sweep. The CENTER FREQUENCY is displayed by either 4 or 5 digits that permits frequency measurements accurate to 100 KHz. **NOTE**: For accurate frequency measurements, the PSA-65C must be in ZERO SPAN. The start and stop frequencies of the sweep are displayed when the on-screen bandwidth is less than 270 MHz or 27 MHz/Div.

15. VERTICAL POSITION

Controls the position of the sweep.

TO SET: With no signal present, the "REFERENCE LEVEL" switch set to 0 dBm, the SPAN control set to 1MHz/div, and the VARSPAN control tuned to the FULL position, adjust the sweep to be centered between the two small "tic" marks located between -60 and -70 dBm at the bottom of the display. Do not readjust for any other reference level.

16. VERTICAL SENSITIVITY

Used to select vertical amplitude sensitivity of either 10 dBm/div or 2 dBm/div. Normally this switch should be in the "10 dBm/div" position. The 2 dBm/div is most helpful when observing very small signals. Readjustment of vertical position is normally required.

17. SWEEP RATE

SWEEP RATE controls the speed of the horizontal sweep across the CRT display. For general observation, a sweep rate just fast enough that "trace flicker" disappears should be used. For accurate amplitude measurements the sweep rate should be set to the slowest rate. Generally, the sweep rate should not be set to the fastest rate (fully clockwise).

18 REFERENCE LEVEL dBm/dBmv

The Reference Level control establishes the amplitude calibration for the display. When set at the 0 dBm position, with the scale switch in the 10 dB/DIV position, signals peaking at the 2nd line from the top, the -10 dBm / + 49 dBmv line, would have a strength or amplitude of -10 dBm / +49 dBmv, signals peaking at the -20 dBm / +29 dBmv line would have a signal strength of -20 / +29 dBmv, dBm and so on.

When the Reference Level control is set to -20 dBm the very top line represents an amplitude of -20 dBm / +29 dBmv and the second line down would be -20 dBm minus 10 or -30 dBm (+29 dBmv minus 10 equals +19 dBmv) subtract 10 for each line down to get the signal level represented by that line.

The same is true for the -40 dBm position except that -40 dBm / +9 dBmv signals would be at the top line. This is the most sensitive position and signals as weak as -90 dBm can be seen.

19. DIGITAL FREQUENCY LOCK

The Digital Frequency Lock (DFL) is a microprocessor function that prevents analyzer drift and is helpful when monitoring a discrete signal. Typical lock range ±100 KHz. Lock is normally on at start-up, push FREQ LOCK button to turn off. A flashing lock LED indicates lock circuit is active. LED illuminated indicates frequency is locked.

20. AM-FM SELECTOR SWITCH

The AM-FM SELECTOR SWITCH activates either the AM or FM demodulator.

PSA-65C USER FAMILIARIZATION
AND
PRELIMINARY CHECKOUT

It is very important that the spectrum analyzer is not stored in freezing temperatures. Operation can also be affected by cold or freezing temperatures. Cold battery capacity is lower, perhaps only 30% capacity available.

When operating in battery mode, turn off the spectrum analyzer when battery voltage falls to 11.4 volts (as read with Battery Monitor switch), not doing so will decrease capacity.

BATTERY PACK CHARGING/CARE

IMPORTANT - Charge battery a minimum of three hours before operation on battery. 80% or more charge will occur after six hours of charge.

1. Place POWER switch into STBY position.
2. Plug PSA-65C into a grounded outlet of correct voltage.
   NOTE: Amber STBY LED is illuminated.
3. Set INT/EXT switch on rear panel to "INT", for INTernal.
4. Turn BAT CHG to "ON" position.
   NOTE: Amber LED is illuminated.
5. Recharging time will vary depending on the discharge state of the battery. A fully discharged battery will recharge in 8 hours.

NOTE: An external set of 12 volt batteries may be recharged via the DC jack. Output of the DC jack is about 1/2 amp at 13 to 15 volts when the internal charger is on in the EXT position.

BATTERY RECHARGING OR OPERATING FROM AN EXTERNAL CHARGING SOURCE.

1. Plug the DC AUTO adapter cable into the DC Input Jack.
2. Set INT/EXT switch on rear panel to "EXT".
3. Connection to car adapter should only be made with car engine running.
4. Plug the DC AUTO adapter cable into the car's 12 volt socket.

NOTE: Recharging current can be as high as 4 amps at 13 to 15 volts. Keep a few spare 4 amp fuses for the adapter or analyzer with you in case of need. The spectrum analyzer can be operated off any external DC source (center pin positive) between 11.5 and 15 volts DC.

INITIAL TURN-ON & SETUP

1. Turn POWER switch to "LINE" and set the INTENSity control to approx. 80% of fully clockwise position.

2. Center the VERTICAL POSITION control.
   After 30 seconds, a trace should appear on the screen.

3. Set up the analyzer controls as follows:
   REFERENCE LEVEL to 0 dBm
   SPAN control to 125 MHz/div.
   VAR SPAN control to FULL position (Fully clockwise)
   SWEEP Rate to 3 o'clock position.
   VERTICAL SENSITIVITY to 10 dB/div.
   ZERO SPAN toggle switch to the NORMal position.

4. At this time a sweep should be displayed on screen with a large vertical spike (zero frequency) at the far left side of the display. NOTE: This large signal is ZERO FREQUENCY and is normal for all spectrum analyzers. (The first LO frequency is equal to the first IF frequency at that point).

VERTICAL CALIBRATION

1. Vertical calibration is very important for accurate absolute amplitude readings. Set SPAN Switch to 1MHz/DIV and set REF LEVEL SW to 0dBm. Adjust the VERTICAL POSITION control so that the horizontal baseline is centered between the "Tic" marks between -60 amd -70 dBm. The vertical deflection is now calibrated with the top grid line of the display equal in amplitude to the setting of the REFERENCE LEVEL control.
   NOTE: Once calibrated, <u>do not</u> readjust VERT POS when using other SPAN Settings or REFERENCE LEVELS.

HORIZONTAL CALIBRATION - *(Horizontal Calibration is factory set, however the unit can still be calibrated in the field by using a tuning tool to turn the recessed HORIZ POSITION control pot).*

1. Position the VAR SPAN control at FULL and using the tuning control, place a signal in the center in the display. The signal can be an off-the-air signal (set REF LEVEL to 40dBm for maximum sensitivity and connect a simple antenna to RF INPUT) or the zero frequency spike. "Expand" the signal spike by rotating the VAR SPAN control counter clockwise. The signal spike may move to the right or to the left. Adjust the TUNING control to keep the signal spike centered in the display until the VAR SPAN control is almost fully counterclockwise. Then rotate the VAR SPAN control clockwise back to FULL. If the HORIZ POSITION needs adjustment, the signal spike will be displaced to the left or to the right of the center of the graticule. Adjust the HOR POS control to place the signal back in the center of the screen. You may want to repeat this procedure and to perform it at narrow sweep widths for maximum accuracy of the frequency readout.

CONCLUSION

1. Note the position of the VERTICAL, HORIZontal, and INTENSity controls so the PSA-65C can be put into service rapidly the next time it is used.

2. This completes the User Familiarization and Preliminary Checkout of the PSA-65C.

PSA-65C SPECIFICATIONS

FREQUENCY COVERAGE
1 MHz to 1250 MHz in one sweep.
200 KHz to 1000 MHz when optional 10 KHz Res B.W. installed.

RESOLUTION BANDWIDTH
Automatically selectable by Span Control

a) 3 MHz Res B.W. (set span at 125 MHz/Div)
b) 1 MHz Res B.W. (set span at 50 MHz/Div)
c) 300 KHz Res B.W. (set span at 10 MHz/Div)
d) 150 KHz Res B.W. (set span at 5 MHz/Div)
e) 75 KHz Res B.W. (set span at 1 or .2 MHz/Div)
f) Optional 10 KHz Res B.W. (set span at .2 MHz/Div)
Extends lower frequency range to approximately 200 KHz

Note: A Narrow Band Cavity Oscillator is swept for .2 MHz/ Div span so that signals can be observed with low oscillator noise contribution.

REFERENCE LEVELS
+20, 0, -20, -40 dBm / +69, +49, +29, +9 dBmv

INPUT CONNECTOR
Type BNC (BNC to F adapter included)
Type N (optional)

DISPLAY
10 horizontal graticule Divisions (frequency) x 7 vertical graticule Divisions (amplitude). Each vertical Division equals 10 dB or 2 dB.

SENSITIVITY
-95 dBm

AMPLITUDE ACCURACY
± 2 dB typical

FREQUENCY DISPLAY
2 x 16 digit backlit LCD

DIMENSIONS
11.5"W x 5.5"H x 13.5"D

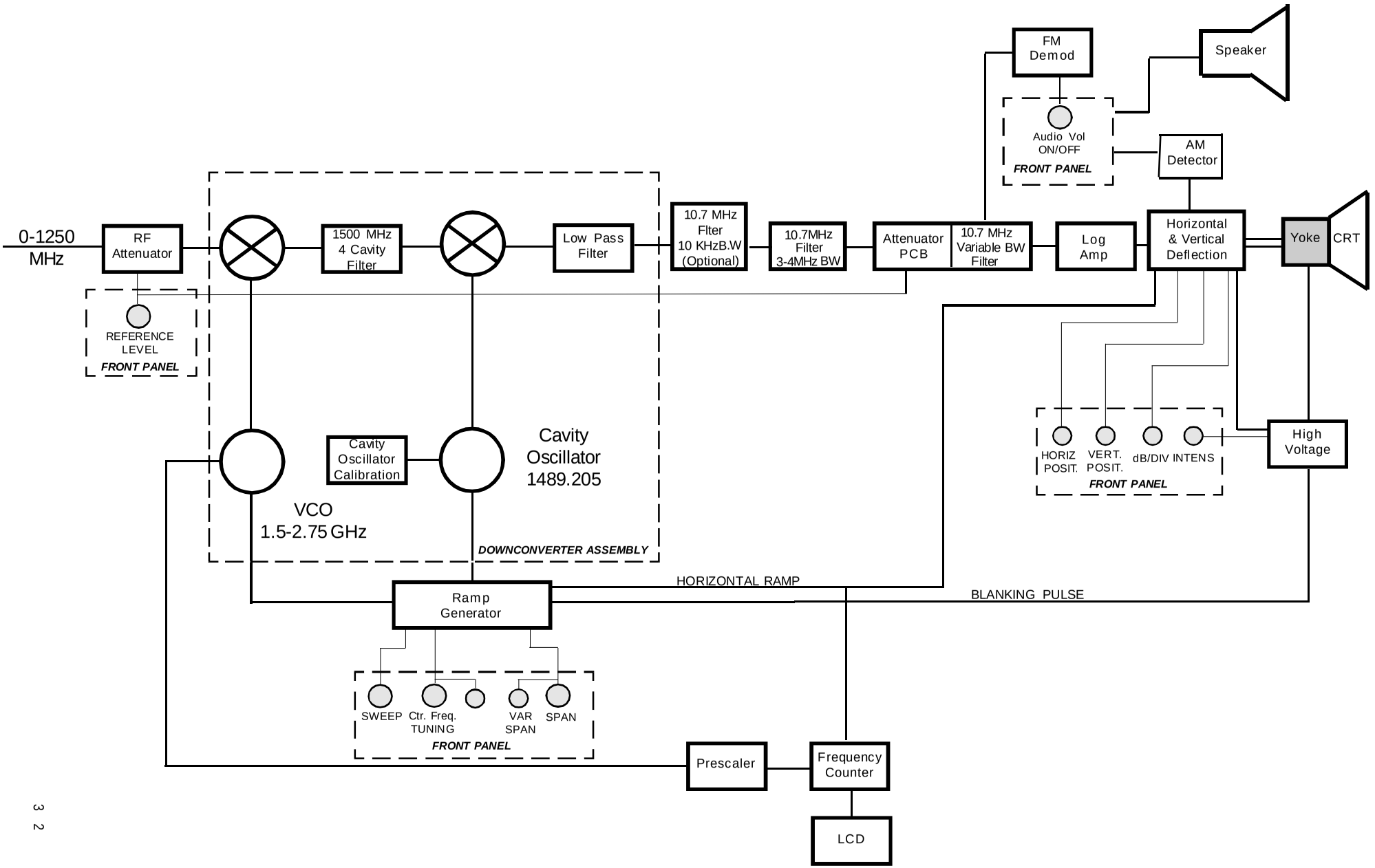
WEIGHT
18 Lbs / 8.18 Kg

POWER REQUIREMENTS
External 115 VAC 60Hz / 12 VDC
Internal 12V Gel Cell Battery
220/240 Volt models available

ACCESSORIES
1.25-2.50 GHz Frequency Extender
2.50-3.75 GHz Frequency Extender
950-1450 MHz Frequency Extender
3.7-4.2 GHz Frequency Extender
1.7-2.7 GHz Frequency Extender
DCP-20 DC Power Inserter / Block
AVSAC Carrying Case
LPA-1000 Log Periodic Antenna
RFP-24 Preamplifier
BNG-1000 Broadband Noise Generator
ADA-10A Analyzer Display Adapter
VDM-2 FM Video Demod/AM Video Conv.
MTG-1000A Microwave Tracking Generator
OSA-20A Oscilloscope Adapter

OPTIONS
10 KHz Resolution Bandwidth

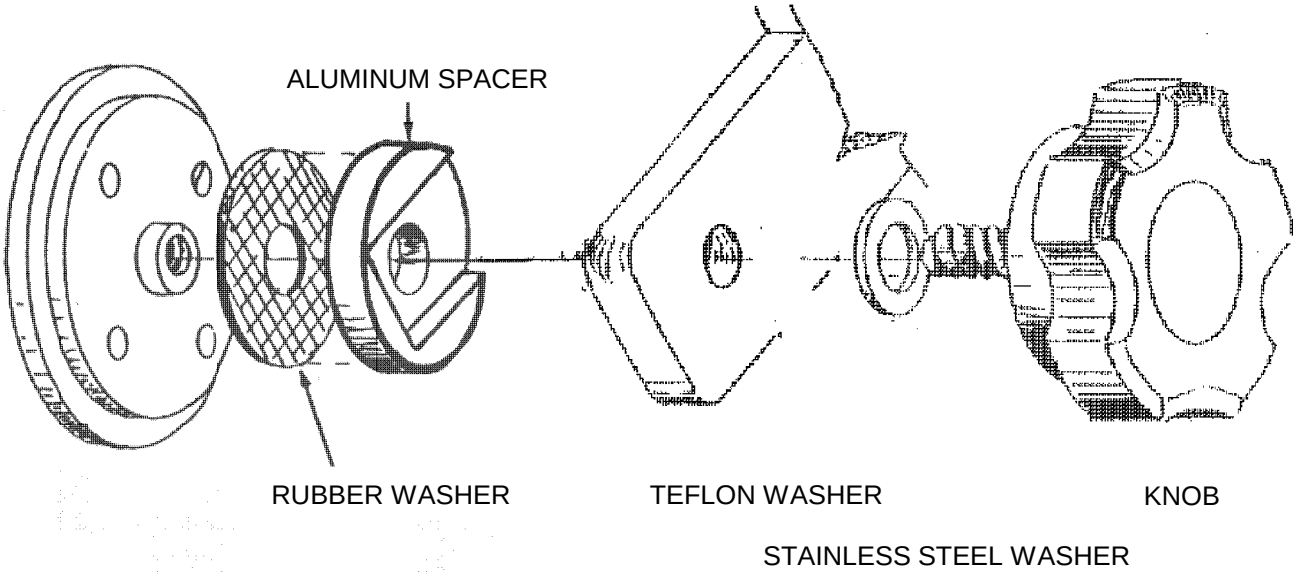
PSA-65C BLOCK DIAGRAM



BAIL HANDLE ASSEMBLY SEQUENCE

The bail handle friction knob must be assembled in the order shown below. The order of parts are (1)knob, (2) stainless steel washer, (3) teflon washer, (4) bail handle, (5) aluminum spacer and (6) rubber washer.

There are two of these assemblies mounted to either side of the chassis. If they are not attached in this way, the handle may not function properly as a prop stand.



CORD WRAP PROCEDURE

1. Wrap power cord in a counterclockwise direction around cord guides. Only top and bottom hooks of cord guides are to be used.
2. Tuck plug behind outermost strands of wrapped cord.

WRAP COUNTERCLOCKWISE

PSA-65C - REAR PANEL VIEW

PSA-65C BATTERY PACK REPLACEMENT PROCEDURE

Read the following instructions in their entirety before attempting battery replacement.

1. Unplug AC cord from unit.

2. Remove battery fuse, set aside to avoid loss.

3. Remove the four screws from battery access cover found on the bottom of the unit.

CAUTION: Care should be used so as not to let both terminals of a battery touch the bracket at the same time. Before removing old batteries, their polarity should be noted.

FOR REMOVAL - ALWAYS DISCONNECT THE BLACK (NEGATIVE) LEAD FIRST!

WHEN INSTALLING - RECONNECT THE BLACK (NEGATIVE) LEAD LAST!

4. Allow batteries to slowly drop out of cavity.

Note: Do not try to pull more than six inches of wire leads from battery wire exit point.

For additional clearance, the surrounding battery bracket and rear panel screws can be loosened slightly.

5. Carefully observe orientation of battery terminals and wiring when removing battery set.

6. Disconnect wires by sliding crimp connectors off battery terminals. Again note location of disconnected wires for reference in reassembly.

7. Make sure plastic insulation sheet inside of cavity is in place, rewire and install new batteries facing in the same direction as old batteries.

TIP: Taping the batteries together, above and below, makes it easier to handle batteries.

8. Replace the cover and hardware and tighten all screws.

9. Reinstall the battery fuse.

10. Test for proper battery operation.

LIMITED WARRANTY

AVCOM OF VIRGINIA, INC. (hereafter referred to as AVCOM) warrants to the original purchaser that this product shall be free from defects in workmanship for one hundred eighty days from the date of original purchase. During this warranty period AVCOM will provide free of charge the parts and labor necessary to correct defects in workmanship and materials.

AVCOM additionally warrants to the original purchaser that this product shall be free from defects in material until one year after the date of original purchase. During this additional warranty period, AVCOM will provide free of charge the parts necessary to correct defects in material. Labor charges are not included and will be based on current rates if product diagnosis, repair, alignment or inspection is required.

THIS WARRANTY DOES NOT INCLUDE batteries or cathode ray tubes. AVCOM cannot control the environment or usage of these components and therefore the customer is solely responsible for any cost of labor or material in conjunction with their maintenance and/or replacement.

To obtain this warranty service, the original purchaser must:

(1) Notify AVCOM if a possible defect is discovered, with the following information:
    (a) The model number and serial number.
    (b) A detailed description of the problem, including details of electrical connections to any associated equipment and a description of such equipment.
(2) Obtain authorization from AVCOM to return the spectrum analyzer for warranty repair.
(3) Deliver the spectrum analyzer to AVCOM or ship the same in its original shipping container or equivalent, fully insured and shipping charges prepaid.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore, carefully read instructions provided. This warranty does not apply to any defect that AVCOM determines is due to:

(1) Improper maintenance or repair by unauthorized personnel, including the removal of factory seals or rivets, or the installation of parts or accessories that do not conform to the quality and specifications of the original parts.
(2) Misuse, abuse, lightning damage, alteration, neglect or improper installation.

All implied warranties, if any, terminate one hundred eighty days from the date of the original purchase.

AVCOM makes no warranty, representation or guarantee regarding the suitability and/or fitness of its products for any particular purpose, nor does AVCOM assume any liability arising out of the application or use of this product or circuit, and specifically disclaims any and all liability including, without limitation, consequential or incidental damages.

AVCOM products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the AVCOM product could create a situation where personal injury or death may occur. Should purchaser buy or use AVCOM products for any such intended and/or unauthorized application, purchaser shall indemnify and hold AVCOM and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that AVCOM was negligent regarding the design or manufacture of the product.

The above constitutes AVCOM's entire obligation with respect to this product, and the original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives specific legal rights and you may also have other rights which vary from state to state.

Manufacturer reserves the right to change specifications or design of this product without notice.