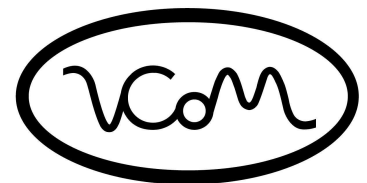




# **700 MHz Band Power Amplifier**

## **PA700-T740 746**

INSTALLATION AND OPERATION GUIDE  
FOR SYSTEM OPERATORS



**VCom<sup>®</sup> Inc.**  
[www.vcom.com](http://www.vcom.com)  
*Advanced Broadband Products*

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*Specifications subject to change without notice — Printed in Canada*

VCom Inc.

PA700 Manual; ml\_pa700\_03 (January 2005)

Approved: C.H.

**Thank-you for purchasing this product  
and welcome to VCom!**



You have chosen an innovative solution from a leading technology design center in the ongoing TV & data delivery revolution.

No doubt you've been thinking that the future of your television delivery system includes new technologies such as **Digital TV, Internet Over Cable, Wireless Cable**. **By selecting VCom**, you are benefiting from the same design powerhouse that since 1988 has created custom RF and digital products for technology leaders such as AT&T, Cisco Systems, Cogeco, Comcast, and Cox Communications.

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- ✓ 256 QAM Upconverters
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**VCom's Corporate Mandate**

is to be a leading worldwide designer and manufacturer of state-of-the-art communications equipment and components. Through the remarkable success of our customers and business partners, VCom innovations are achieving this goal.



## **SAFETY PRECAUTIONS**

1. Before installing and operating this equipment, read all Safety, Installation and Operating sections. Retain this manual for future reference.
2. Follow all instructions — Failure to do so may result in damage to the unit or severe personal injury.
3. Servicing should not be attempted by the user. There are no user serviceable parts inside. Refer all servicing to factory qualified personnel.
4. Cleaning — Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.

**Warning** Do not work on the system or connect or disconnect cables during periods of lightning activity.

## **LES PRÉCAUTIONS DE SÉCURITÉ**

1. Avant d'installer ou d'opérer cet équipement, lisez, toutes les sections de sécurités, d'installations et d'opérations. Gardez ce manuel comme source de référence.
2. Suivez toutes instructions - si non, vous risquez d'endommager la machine ou de vous blesser sérieusement.
3. N'essayez, pas de réparer cet équipement vous même. Référez toutes revisions nécessaire au personnel qualifié de la manufacture.
4. Le nettoyage - n'utilisez pas de nettoyeurs aérosols ou liquides. Utilisez un tissu humide pour nettoyer.

**Attention** Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage du foudre.

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# 1.0 GENERAL INFORMATION

## 1.1 Functional Overview

The PA700-T740\_746 is a solid state, fixed gain power amplifier for operation in the US 700 MHz frequency band. Advanced LDMOS design permits the PA700 to operate with high level digital signals such as 64QAM, DVB-T or 8-VSB DTV. The PA700 can be operated on a stand-alone basis or controlled via SNMP or front panel display when serially connected to a UCD4940. Together, the PA700 and UCD4940 offer a complete solution for up-conversion, down-conversion and high linearity amplification in a rack mount configuration requiring only 4U of rack space\*. This advanced, cost effective power amplifier offers high performance and flexibility in a space-efficient design. The unit is state of the art in terms of easy assembly, reliability and performance.

The PA700 is factory configured and calibrated for operation at a specific band.

## 1.2 Features

### 1.2.1 Amplifier Features:

- 80W typical transmit power with 64QAM or DVB-T modulation
- Alarms and automatic protection for RF faults, over-temperature, over-drive, output VSWR, and over-current
- Enable/disable via front panel switch or two pole rear connector
- Monitor and control via RS232/RS485
- International switching power supply (100 to 240 V<sub>AC</sub>)

### 1.2.2 System Features (with UCD4940):

- Local control via LCD and 4 soft touch push buttons
- Remote control and monitoring via RS232/RS485, Terminal or optional SNMP
- Automatic level control
- 44 MHz input for up-conversion and amplification of IF modulators or Cable Modem Termination Systems

## 1.3 Specifications

### RF

Output Frequency	740 to 746 MHz
Linear Output Power	+49 dBm (80W)
Gain	56 dB $\pm$ 2 dB, fixed
Gain Flatness	$\pm$ 0.3 dB over 6 MHz
Spurious	
Inband	-55 dBc
Out of band	-55 dBc
Input/Output Connectors	N female, 50 ohms
Input Return Loss	16 dB
Output Return Loss	18 dB
RF Monitor	SMA female, 50 ohms
RF Monitor Port	-42.5 $\pm$ 2 dB

### MONITORING AND ALARMS

Remote Control Interface	
Standalone	RS232 via DB9, RS485 via RJ45
With UCD4940**	Front panel LCD push button, RS232/RS485, Terminal (RJ45) or optional SNMP over 10BaseT ethernet
Status/Alarms	Enable, RF fault, Over-temperature, Input Over-drive, Over-current, Max. Reflected Output power Exceeded
Monitors (with UCD4940)	RF Input Power, RF Output Power, Temperature, Supply Voltage, Automatic Protection
LED Indicators	Over-temperature, Input Over-drive, Reflected Output Power, Over-current Power Supply OK, Alarm, Enable

### MISCELLANEOUS

Dimensions	17.25" (w) x 18" (d) x 5.25" (h) (43.8 x 45.7 x 13.3 cm)
Mounting	Standard 19" rack - 3U (5.25")
Weight	33 lbs. (15 kg.)
Operating Temperature	0 to 45°C
Power Requirements	100 to 240 Vac, 50 to 60 Hz\
Power Consumption	500W maximum

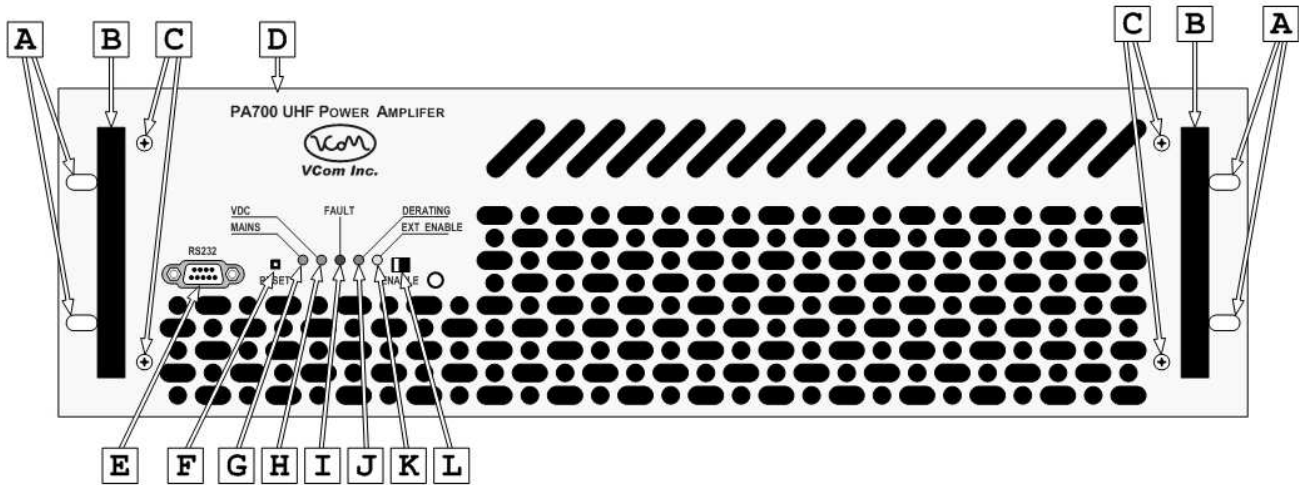
\* Rack space for output filtering not included.

\*\* When configured for monitoring via the UCD4940, the standalone terminal interface is disabled.

Specifications subject to change without notice.

## 1.4 Front Panel

**DIAGRAM 1.4A: PA700 FRONT PANEL**



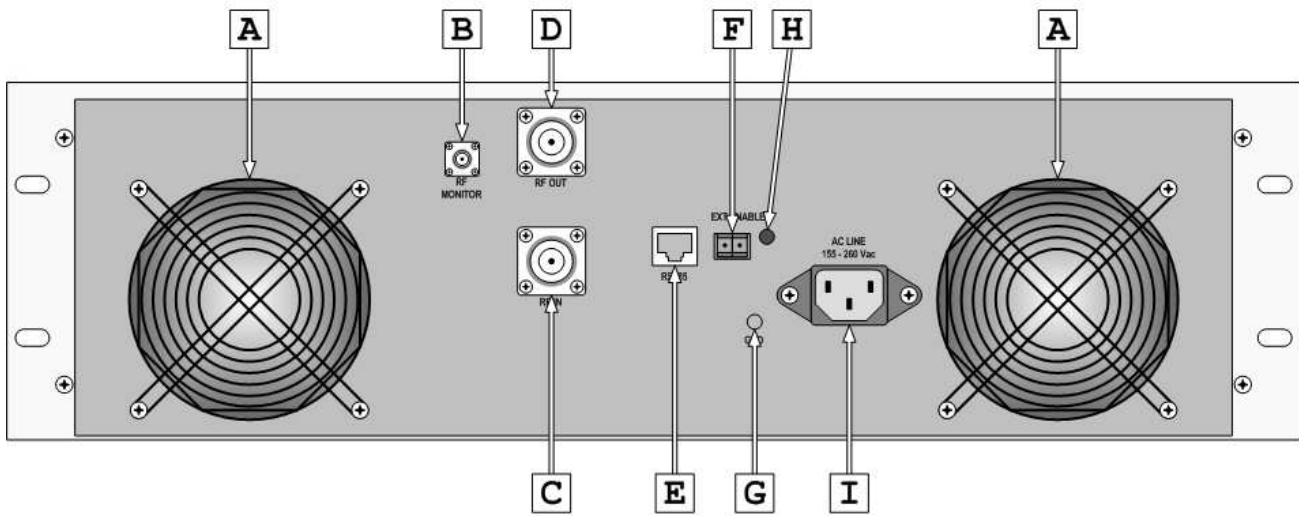
- A** Rack Mount Holes
- B** Handles
- C** Front Panel Screws
- D** Label
- E** RS232 Connector
- F** Reset Button
- L** Local Enable Switch

### LED INDICATORS

- G** MAINS LED (ON when AC power connected)
- H** VDC LED (ON when RF stages are powered)
- I** Fault LED (ON when the amplifier gain is 6dB less than normal. If the LED flashes, the amplifier is in a self-protection condition)
- J** Derating LED (ON when the output power has been automatically reduced due to high operating temperatures)
- K** Enable (Active when the amplifier is ON)

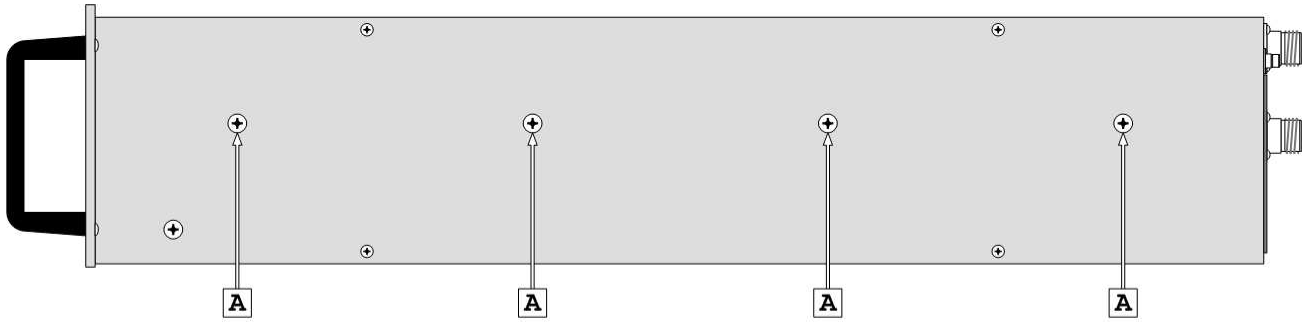


**DIAGRAM 1.4B: PA700 REAR PANEL**

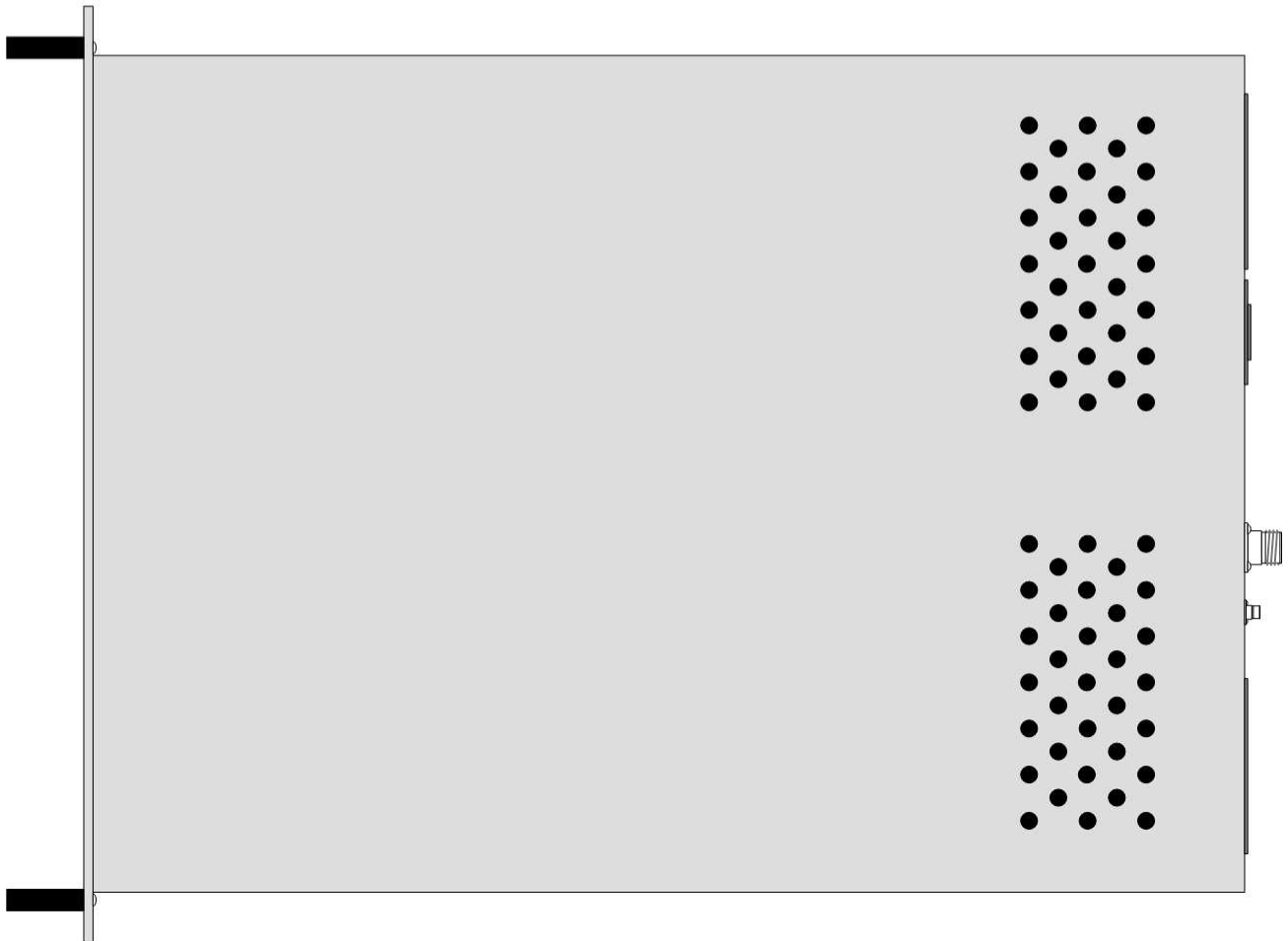


- A** Fan
- B** RF Monitor SMA Connector
- C** RF In N Type Connector
- D** RF Out N Type Connector
- E** RS485 Connector
- F** External Enable Connection
- G** Ground Stud
- H** Fuse
- I** AC Power Supply Input 160/230 VAC (standard)

**DIAGRAM 1.4C: PA700 SIDE AND TOP VIEW**



**A** Fixing screws (usable as rack mount screws if the amplifier is rack mounted)



# 2.0 INSTALLATION

## 2.1 Unpacking the Unit

Carefully remove the equipment from its packing material and set it on a solid surface, such as a table or desk. If it appears damaged in any way, notify the carrier, and keep all packing materials for inspection by the carrier's agent.

## 2.2 Installing the Unit

Note: This unit should be installed by qualified service personnel only.

Diagram 2.2 details the input and output connections for the PA700.

1. Carefully identify between the electrical ground of the AC power supply and the station ground that is common to the antenna system, other RF components and the transmitter rack cabinet. Ensure that the PA700 and the CMTS ground points are connected to the station ground and not the electrical ground.
2. If installing the PA700 into an equipment rack, use the 4 mounting holes on the front of each cabinet. It is also important to connect the rear side of the PA700 chassis to the same rack cabinet using a rear support bracket (not supplied).
3. It is suggested that a heavy gauge line cord (No. 10 AWG stranded) with connector be used in most applications for connection to the AC power supply. The AC power connector and station ground stud are located on the rear panel (refer to Diagram 1.4B).
4. Prior to connection, please ensure that the frequency, modulation and BW of the CMTS or CMTS/upconverter are set for the application. PA700 type approval for the US lower 700 MHz band under FCC Part 27 is only valid for the following input frequency and modulation combinations and only when the VCom duplexer is connected between the output and the antenna.

Carrier Bandwidth	Center Frequency Range	Modulation
2 MHz	741-745 MHz	QPSK, 16QAM, 64QAM
6 MHz	743 MHz only	QPSK, 16QAM, 64QAM

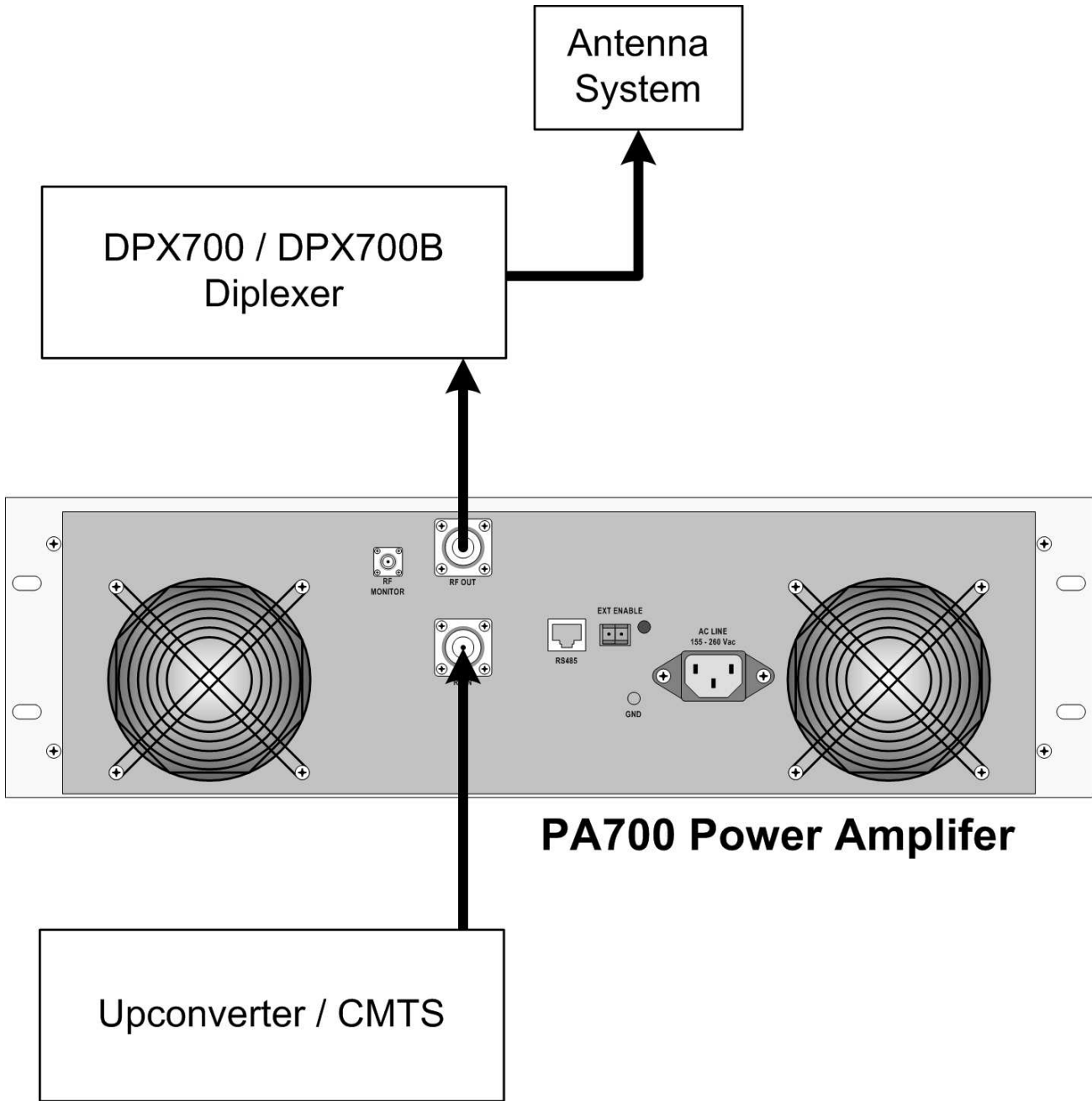
5. Adjust the input level so that the input power to the unit is nominally -7 dBm.
6. Connect both upconverter/CMTS to unit and duplexer/antenna assembly
7. Adjust input level so that output power is +48 to +49 dBm as reported by MSM server or the UCD4940. Operation below this level will result in less than optimal performance and operation above this level may violate regulatory emissions requirements.



### WARNING!

Maintain a distance of at least 10mm (3/8 ") between PA700 units when mounting several units in a rack. The rear air outlets should be unobstructed.

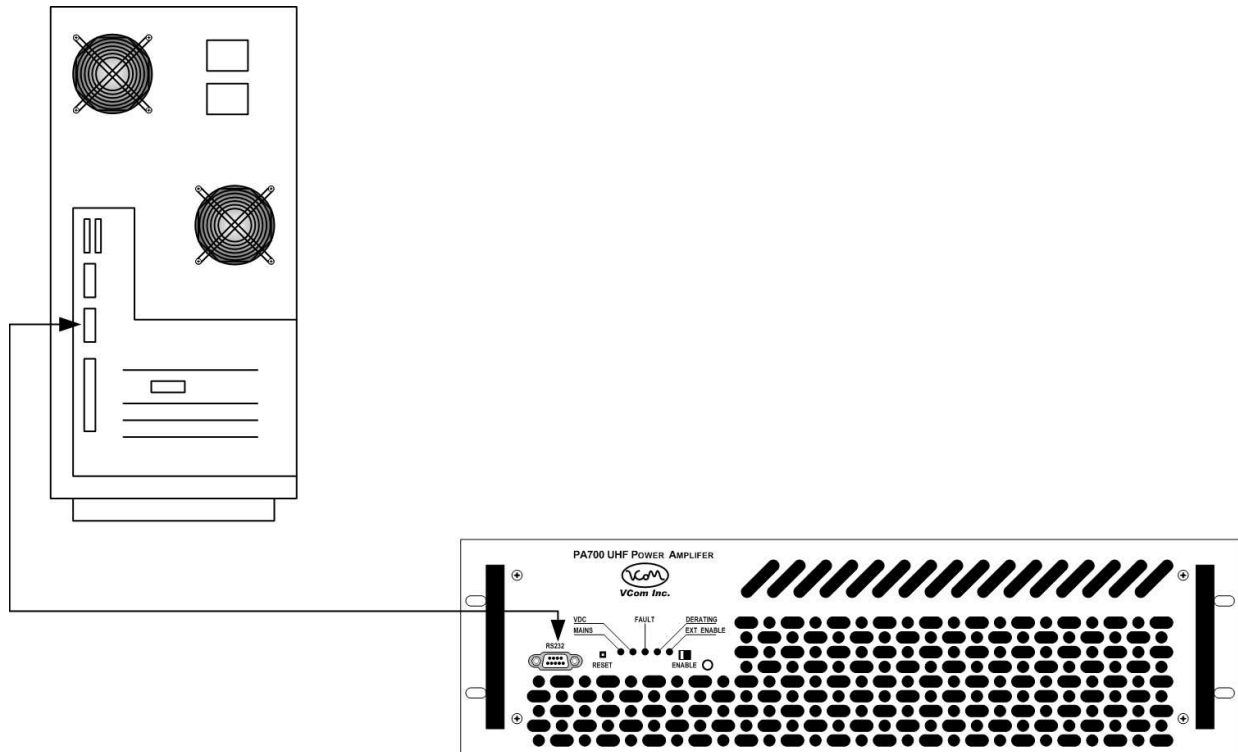
**DIAGRAM 2.2: PA700 SYSTEM CONNECTIONS**



### 3.0 CONNECTION WITH MSM

In order for the PA700 to be monitored by the MSM software package, the PA700 must be connected to the MSM server computer as illustrated in diagram 3.1. The required cables are included with the AC3000 kit.

**DIAGRAM 3.1: CONNECTION WITH MSM**



## 4.0 TROUBLE SHOOTING

### “My amp is cutting-in/cutting-out repeatedly”

#### “My amp is unstable”

The amp may be in shutdown mode due to an input level that is too high, or due to a high amount of reverse-power being detected. Reverse-power is really reflected power – often caused by a fault between the PA700 and the antenna, or by operation at a frequency outside of the DPX700 passband.

#### All LEDs are off

- Ensure that the PA700 is plugged in to the power source
- Check the FUSE led on rear panel; if the light is on, replace the fuse
- If failure persists please contact technical support

#### Only the MAINS led light is on, but enable does not work

- Check that all three enables (LOCAL, REMOTE, SOFTWARE) are present
- Check RF IN, RF REF and TEMPERATURE alarms

#### Enable ON, V<sub>dc</sub> absent

- Possible power supply fault

#### Enable and V<sub>dc</sub> ON, RF Output Power Absent

- Check that the input is valid
- Check for alarms. Some conditions result in muted output power.

#### Frequently occurring thermal protection conditions

- Check that air outlets are not obstructed
- Check the amount of dust on heatsink

#### Amplifier VSWR alarm condition

- Too much power is being reflected by the antenna/duplexer/cable feed
- Verify that connections and cables are intact
- Impedance at the duplexer must be 50 ohm

#### Amplifier mute due to over-drive

- Check the input level
- Input level and amplifier gain should not exceed +49 dBm

#### No gain

- Check the input and alarms

#### Too high output distortion

- Check the output power level. Output should not exceed 49 dBm.

**No RS232 communication**

- Press reset (this may result in a service interruption)
- Check the connector on front panel
- If failure persists please contact technical support

**No RS485 communication**

- Press reset (this may result in a service interruption)
- Check the connector on rear panel
- Disconnect RS232 com and press reset
- If failure persists please contact technical support

## 5.0 WARRANTY STATEMENT AND SERVICE POLICY

### 5.1 Warranty Statement

VCom warrants its products to be free from defects in workmanship or materials for a period of two years. The warranty begins on the date of the original shipment from VCom to its customer. No claim may be allowed for expenses incurred in installation or use. No other expressed or implied warranties shall apply to the goods sold. VCom is not responsible for delayed shipments, other loss beyond VCom's control, or consequential damages of any kind arising in connection with the use of its products. This warranty is a return-to-factory warranty only. During the warranty period VCom will at its option, replace, repair or refund the price paid for any item which is returned for service. This warranty does not apply to units that have been physically or environmentally abused.

### 5.2 Service Policies: How to Return an Item for Service:

Before returning any item for service, an R.M.A. (Returned Material Authorization) number must be assigned by VCom. A unique R.M.A. number will be assigned for each item being returned. When requesting an R.M.A. number, please be prepared to provide the model, VCom serial number, original invoice number, your purchase order number and an adequate fault description. The serial number of a unit can be found on a barcode label similar to the one pictured below. R.M.A. service is available Monday to Friday from 8:30 a.m. to 4:30 p.m. CST (statutory holidays excepted).



To obtain an R.M.A. number you may:

**Call: (306) 955-7075, press '0' for Operator, or '3' for Service Dept.**

**Fax: (306) 384-0086 — Attention: R.M.A. Request**

**Email: support@vcom.com**

Once an R.M.A. number has been assigned, please refer to it in all correspondence and make certain that all applicable R.M.A. numbers are clearly marked on the outside of each package being returned. You must also ensure that each product is shipped to VCom in its original shipping container (or equivalent) via Prepaid carrier, with appropriate insurance and customs documentation (where required). VCom will not accept collect shipments, damaged shipments or shipments unaccompanied by an R.M.A. number.

**For items still under Warranty** – Items will be returned from VCom Inc. to its customer via prepaid ground carrier. The customer is responsible for any additional costs incurred, including custom clearance and duties. Any alternate means of shipment must be requested by the customer and will be subject to additional charges.

**For items no longer under Warranty** – Items will be returned from VCom Inc. to its customer via prepaid ground carrier at the customer's expense. The customer is responsible for any additional costs incurred, including custom clearance and duties. Any alternate means of shipment must be requested by the customer and will be subject to additional charges.

**Shipping Instructions will be provided by the repair center when the RMA number is sent to the customer.**

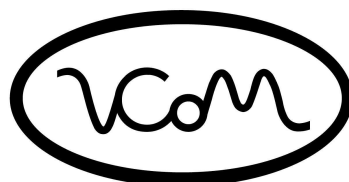


### **5.3 Repair Charges and Warranty Exemptions**

Items returned beyond the warranty period or items that do not qualify for warranty service are subject to additional out-of-warranty repair charges. Descriptions of these charges and warranty exemptions are below:

- 1) Repair turnaround time is typically 5-14 business days after receipt of the item at VCom. A Flat Rate Repair Charge will apply to all out-of-warranty items. Flat Rate Repair Charges are subject to change without notice.
- 2) Any faults due to customer error (ie - incorrect set-up or configuration settings) are subject to the current Test Fee and will be exempt from warranty.
- 3) Items returned with inadequate fault descriptions are subject to the current Test Fee and are exempt from warranty.
- 4) In the event that no fault is found, the item is subject to the current Test Fee and will be exempt from warranty.
- 5) Any product exhibiting external damage (either from shipping, improper handling or use) will be subject to inspection. If said damages are determined to be the cause of failure, the item will be exempt from warranty.  
All repairs to correct the external damage are subject to Time & Materials Charges (parts and labor at current rates).
- 6) Items with damage caused by unauthorized repairs or by external devices are subject to current out-of-warranty Flat Rate Repair Charges and are exempt from warranty.
- 7) All products returned for Factory Optioning are subject to the applicable current Option Charge plus Test Fee. Factory-optioned products carry the balance of the original warranty or a 90-day warranty, whichever is greater.

All out-of-warranty repairs must be approved by the customer in writing. No repairs will be made until the customer's Purchase Order or Out-Of-Warranty Repair Authorization is received.



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