



GoPAC

Docking Station and Amplifier



User Manual

M13-0002-00A - REV D.4

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CAUTION!

RISK OF ELECTRICAL SHOCK. DO NOT REMOVE COVERS.

- Do not remove any covers.
- Refer servicing to qualified technicians only.
- Disconnect all power before servicing.
- Read and perform all instructions carefully. Failure to follow suggested instructions and guidelines may void all warranties.

FCC STATEMENT

This equipment has been tested and found to comply with Part 74.637 (a) (2) of the FCC Rules and Regulations. Any unauthorized changes or modifications not expressly approved by Nucomm, Inc. could void the user's authority to operate the equipment, and invalidate the equipment's warranty.

Operation of this device is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device".

RF Exposure Warning

This unit is a radio transmitter designed to permit, produce and emit RF radiation into an antenna for the purpose of delivering RF to an appropriate receiving device.

The Maximum Permissible Exposure (MPE) limit for units of this type is 1.0mW/cm². This low-powered device will generally not create RF exposure in excess of the MPE limits issued by the FCC (US) in OET Bulletin 65; 97-01, unless properly connected to an antenna, at which time the radiated power can exceed the MPE limits.

Antenna Gain	Min. Allowable Distance from Antenna @	
	5W Power	12W Power
0 dBi	20 cm	31 cm
5 dBi	35 cm	55 cm
16 dBi	126 cm	195 cm
30 dBi	631 cm	977 cm

The user is solely and exclusively responsible for determining the level of RF exposure when connecting the unit to an antenna or other equipment, taking appropriate steps to limit RF exposure, and for ensuring compliance with the FCC requirements in OET Bulletin 65.

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Warranty

Equipment manufactured by Nucomm, Inc. is warranted to meet all customer specifications and to be free from defects in material and workmanship within a period of two years from date of shipment from Nucomm. The company's liability under this warranty is limited to:

- Servicing or adjusting equipment.
- Replacement of defective parts.

Any equipment returned to the factory shall have the freight paid for by the buyer.

Equipment showing damage by misuse, abnormal conditions of operation, or attempts to repair by other than authorized service personnel shall be excluded from this warranty. Nucomm, Inc. shall in no event be responsible for incidental injury or property damage. Since Nucomm, Inc. has no control over conditions of use, no warranty is made or implied as to suitability for the customer's intended use, beyond such performance specifications as are made part of the purchase order. There are no warranties expressed or implied, except as stated herein. This limitation on warranties shall not be modified by verbal representations.

Shipping Damage

Equipment shipped FOB Nucomm, Inc.; shall become the property of buyer upon delivery to and receipt from carrier. Any damage in shipment should be handled by the buyer directly with the carrier. Immediately request the carrier's inspection upon evidence of damage in shipment.

Field Service

Nucomm products are designed with easy access to components to facilitate service. However, to prevent voiding of the Nucomm warranty that protects the equipment, please contact Nucomm before servicing or making any repairs. When troubleshooting, the user is cautioned to read all module descriptions in this manual. Some Nucomm modules cannot be serviced in the field. Warnings are included in the circuit descriptions and on certain modules themselves.

Replacement Modules

Troubleshooting to the component level is often not cost-effective and frequently impossible. Often the practical method of effecting field repairs is to substitute known good spare modules for suspect units. Nucomm maintains an inventory of replacement modules for its standard line of products.

Customer Service Information

Telephone Consultation

Customer Service technicians at Nucomm are available to extend technical assistance to customers installing, operating or troubleshooting Nucomm equipment

Should there be a need for telephone consultation, please have your model number and serial number available for the Customer Service technician.

Contact Information

Telephone:

During Nucomm business hours, 8:30am – 5:30pm EST (-5:00 GMT):

US:(908) 852-3700

International:001 - 1 - (908) 852-3700

24-Hour Hotline:

US:(888) 531-3892

International:001 - 1 - (888) 531-3892

Equipment Returns

If equipment cannot be successfully restored through telephone consultation, the equipment may be returned to the factory for repair. Loaner equipment is often available until Nucomm is able to return the repaired unit(s).

For out-of-warranty equipment only: Nucomm evaluates all returned units, and then confers with the client on corrective action. If no fault is found, or no corrective action is authorized, a diagnostic fee may be charged.

Do not return any Nucomm product to the factory until you have received a return material authorization (RMA) number and shipping instructions from Nucomm.

When returning equipment to Nucomm, it is very helpful to enclose a letter containing the following:

- RMA number.
- Model number.
- Serial number.
- Frequency operating range (*especially when returning modules only*).
- A detailed description of the problem.
- Name of an engineer or technician we may contact in regards to this problem.
- A “ship to” and “bill to” address.

Ship all returns to:

Nucomm, Inc
101 Bilby Rd
Hackettstown, NJ 07840, USA
Attn: RMA# (your RMA number)
(908) 852-3700

For International returns:

In addition to the instructions above, when shipping internationally Nucomm recommends the use of a courier such as Federal Express, UPS, etc, and that the goods be shipped DOOR-TO-DOOR PRE-PAID. This will reduce Customs costs, handling charges and delays. Enclose all the information above, plus a statement that the equipment was manufactured in the United States (*the latter is needed to expedite customs processing*).

Table of Contents

1.	Description & Features.....	9
1.1	Description.....	9
1.2	Features.....	9
2.	Theory of Operation	11
3.	Specifications	13
4.	Installation	15
4.1	Unpacking and Inspection.....	15
4.2	Mechanical Installation	15
5.	Operation.....	19
5.1	CONTROLS AND INDICATORS	19
5.2	POWER ON / OFF (1).....	19
5.3	RF MODE (2).....	19
5.4	STATUS LEDS (3).....	19
5.5	Power Up.....	19
5.6	NORMAL SCREEN	19
5.7	RF SETUP	20
5.8	RF OUPUT POWER.....	20
5.9	ALARMS	20

Figures

Figure 1:	System Block Diagram.....	12
Figure 2:	GoPac Guide Pins & RF Connectors	16
Figure 3:	GoPac fitted with RF cables.....	16
Figure 4:	Input Power & Breakers location	17
Figure 5:	Input Power Connector pinout	17
Figure 6:	GoPac Front Panel.....	19
Figure 7:	Controls & Indicators	19
Figure 8:	Normal Screen.....	19
Figure 9:	RF INPUT LOW	20

Document Revision

Date Modified	Revision	Modified by	Modification Detail
April 9, 2007	D.2	M Hardy	Added extra FCC language
April 10, 2007	D.3	M Hardy	Added RF Exposure warning
April 10, 2007	D.4	G Williamson	Added minimum allowable distance from antenna table



1. DESCRIPTION & FEATURES

1.1 DESCRIPTION

The GoPac is a multi-functional transmitter docking station and amplifier, designed specifically to provide extended range operation for low power camera back transmitters, however the GoPac can also be used with units other than camera back transmitters.

A camera back transmitter can be mounted onto the GoPac using standard Anton Bauer Battery (or IDX) mounting clips, and the RF output is routed to the GoPac input via N-type connectors. If desired, the two units can be separated up to 100 feet using SF214 RF cable. In either configuration, an appropriate antenna either attaches directly to the RF output of the GoPac, or can be remoted using RF cable.

The standard GoPac is pre-configured for either single or dual band operation, with coverage of the following US frequency bands:

- 1.99 – 2.70 GHz
- 6.40 – 7.10 GHz

Other frequency coverage may be available, please contact Nucomm for specifics.

This manual is written in general form to cover all typical configurations and options for the GoPac.

1.2 FEATURES

The GoPac was specifically designed to support ultra portable ENG.

POWER OUTPUT

Typically camera back transmitters are limited to less than 250 mW of output power, limiting their range. For extended range operation, the GoPac docking station/amplifier outputs up to 5W digital (optional up to 8W digital).

POWER SOURCES

The GoPac features a built-in universal power supply which operates on power ranging from 90 to 240 VAC (40 to 60Hz), or +11 to +32 VDC without the need for internal jumpers or switch settings.

A camera back transmitter can be attached to the GoPac and be powered via the integrated IDX (Sony "V" clip) or Anton Bauer battery adapter plates.

STANDBY MODE

The GoPac has a rotary switch for selecting the unit to Standby mode; however an integrated detector circuit inhibits the GoPac from transmitting in the absence of an RF signal from the external device.

In Standby Mode the RF output is muted. If an external RF source is applied to the input connector, rotating the GoPac selector switch to one of the transmit modes will result in an instantaneous *on-frequency* transmission.

INTERNAL SELF-TEST

The GoPac has a built-in self-test feature, which checks the unit for functionality and several internal parameters. Should an error or malfunction be detected, the red alarm LED will illuminate and an alarm message will be displayed on the LCD.



2. THEORY OF OPERATION

The GoPac Power amplifier has been designed to receive the output from a low power transmitter and amplify it. The following discussion assumes that the external transmitter has output power less than 250mW and has been verified to abide by all FCC rules and regulations.

The RF output from the low power transmitter is applied to the *RF Input Connector* (J1) as shown in Figure 1. The signal is passed through a power coupler (C1). This coupler feeds two circuits: a variable attenuator (U1), and a power detector (D1). This power detector (the first of two) is designed to detect the presence of an RF signal at J1. If the signal is too high or too low, the main power amplifier (A1) will be forced into standby by the internal controller. This is to prevent the power amplifier from going into transmit mode without a signal applied, or with a signal that is too high for the system to handle.

Power control:

After the RF signal from the coupler (C1) is applied to variable attenuator (U1), it is routed to a high gain high power amplifier (A1). The output of the amplifier is then applied to a

power coupler (C2). A portion of the output power is applied to a second power detector (D2) that is then fed back through an automatic gain control loop (AGC). The output of the AGC loop controls the variable attenuator. An analog signal from the microprocessor is applied to the AGC controller. This signal is compared to the power level from the main power detector (D2). If the signal from (D2) is higher than the signal from the microprocessor, the attenuator is increased therefore reducing the total output power, reducing the voltage from (D2). If the signal from (D2) is lower than the signal from the microprocessor, the attenuator is reduced therefore increasing the total output power, and increasing the voltage from (D2). This process is performed continuously until a steady state output power has been reached.

Main RF output:

The RF output from the amplifier is routed through a low pass filter and an output isolator. The low pass filter is used to remove any unwanted harmonics created inside the power amplifier. The output isolator is used to protect the power amplifier from being damaged when devices with poor RF match are applied.

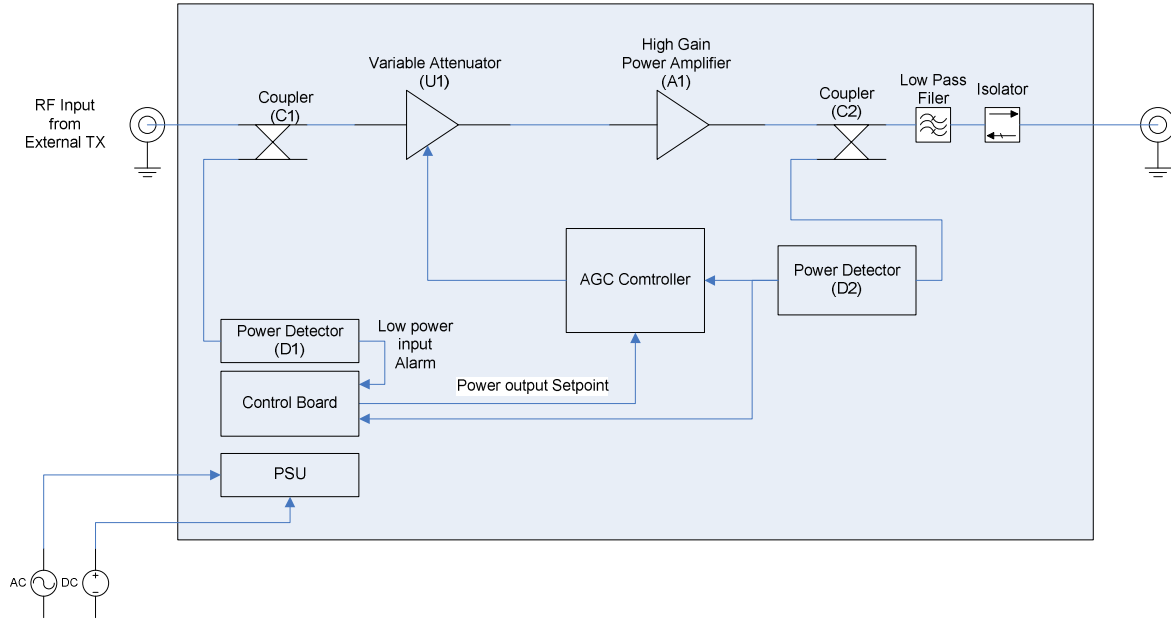


Figure 1: System Block Diagram

3. SPECIFICATIONS

RF Performance

Frequency band:.....1.99 GHz – 2.70 GHz
6.40 GHz – 7.10 GHz
 Frequency tuning step size:.....50 KHz (*United States*)
 RF Output Power:1 to 5W (digital) standard (8W optional)

RF Power Modes

Standby:No RF out
 Tx:.....Instant on-frequency transmission
 Stability:.....+/- 2.5 PPM

Power Requirements

Input Range.....90 to 240 VAC (40 to 60Hz), or +11 to +32 VDC
 (without the need for internal jumpers or switch settings)
 Consumption:.....80 watts (with attached camera back transmitter)

Physical Characteristics

Dimensions:6.8”(17.27cm) x 13”(33cm) x 17”(43.2cm)
 Weight:.....8.8 lbs (4 kg)

Environmental

Temperature:-20°C to +65°C (*operational*)
 Humidity:95% (+10°C to +50°C)

Connectors

PowerMulti-pin MS Type(Detoronics DT02H-14-18PN)
 RF:.....Type “N” (*Female*) (50 ohms)



4. INSTALLATION

4.1 UNPACKING & INSPECTION

Unpack and visually inspect the unit for LCD, connector, and surface area damage. All claims should be filed with the carrier. Save all shipping and packing materials for possible re-use.

4.2 MECHANICAL INSTALLATION

The GoPac comes standard with an Anton Bauer Mounting Bracket Assembly. This allows a camera back transmitter to be quickly attached or removed from the docking station.

To mount a camera back transmitter to the GoPac, perform the following:

1. Orient the camera back transmitter mounting slots to align with the GoPac guide pins as shown in (Figure 2).
2. Slide the camera back transmitter onto the GoPac guide pins until you hear the thumb-catch lock. Ensure that there is no play between the camera back transmitter and the GoPac.
3. Connect an appropriate RF jumper between the RF output of the camera back

transmitter, and the RF input of the GoPac. (Figure 3).

To connect a power source to GoPac:

The built-in power supply accepts 90 to 240 VAC (40 to 60 Hz) or +11 VDC to +32 VDC without requiring any jumper or switch settings.

Nucomm ships a DC cable, and the appropriate local AC line cord. Alternate line cords are available upon request.

Connect the supplied cable between an appropriate power source and the GoPac front panel power connector. (Figures 4 & 5).

CIRCUIT BREAKERS

The GoPac is protected against over/under voltage and reverse polarity conditions. The unit has AC & DC circuit breakers, as shown in Figure 4. The breakers will trip at 10 Amps.

If a breaker trips, check and verify all power connections and specs, then reset the breaker by pushing it back into position.

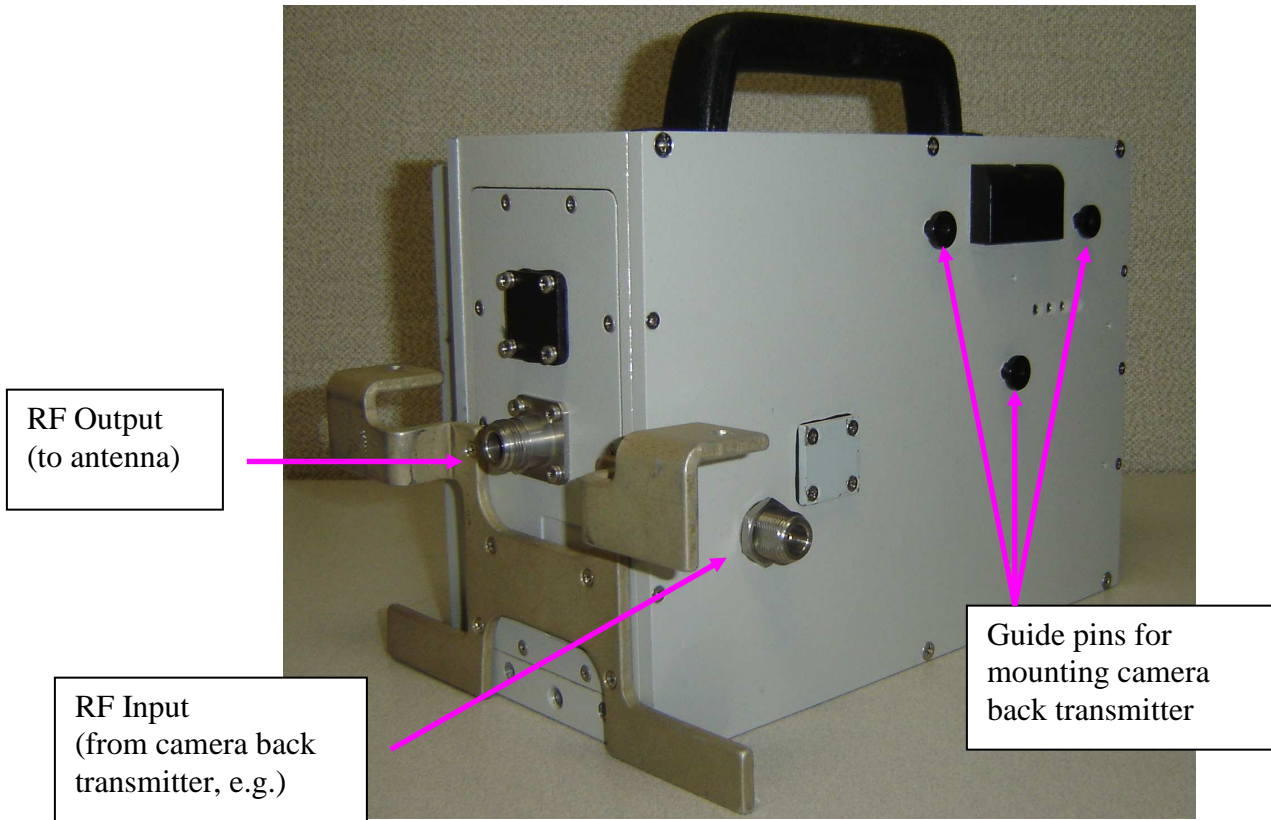


Figure 2: GoPac Guide Pins & RF Connectors

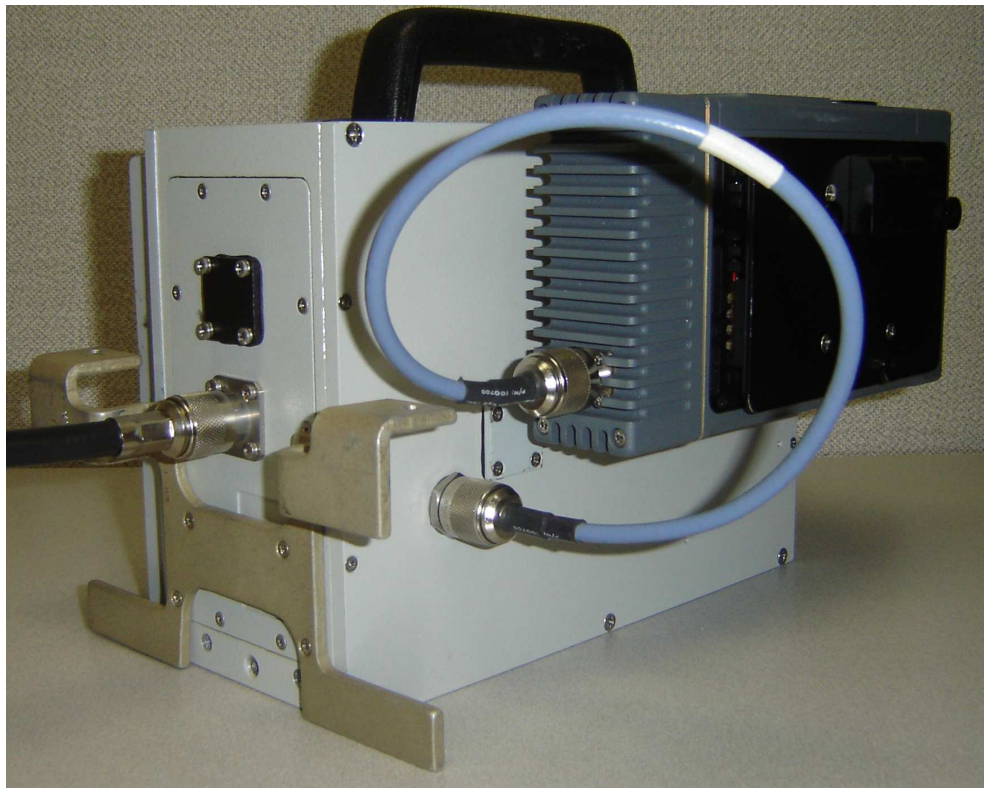
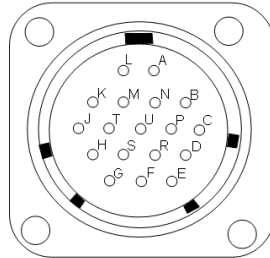


Figure 3: GoPac fitted with RF cables



Figure 4: Input Power & Breakers location



PIN-OUT	DESCRIPTION
C	AC Neutral
E	Chassis GND
G	AC Line
H, S	GND
P, U, B	+DC IN
Nucomm P/N: 512-M2001-000 Detronics P/N: DT02H-14-18PN Mating Connector Nucomm P/N 512-F3001-000 Mil-C-26482, Series 1 P/N: MS3116F-14-1PS	

Figure 5: Input Power Connector pinout



5. OPERATION



Figure 6: GoPac Front Panel



Figure 7: Controls & Indicators

The GoPac operations and functions are all controlled from the front panel, with status information shown via the LCD display and/or the LED indicators.

5.1 CONTROLS AND INDICATORS

5.2 POWER ON / OFF (1)

5.3 RF MODE (2)

- STANDBY
- LOW
- MEDIUM
- HIGH

5.4 STATUS LEDES (3)

- POWER (GREEN) – Power is on.
- TX (GREEN) – Unit is transmitting.
- ALARM (RED) – Unit is in alarm.

5.5 POWER UP

The CamPac2 is turned on by rotating the POWER switch to the ON position. The unit will boot-up and go immediately to the Normal Screen.

5.6 NORMAL SCREEN

Once the unit has initialized, the Normal Screen will appear as illustrated in Figure 8.

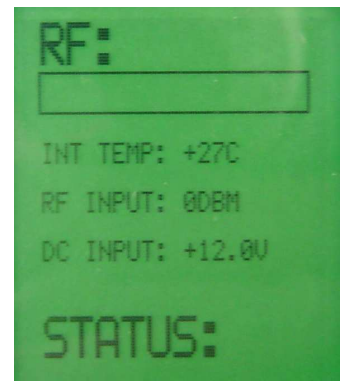


Figure 8: Normal Screen

The Normal Screen displays the following:

- RF Level (bar graph of RF output)
- Internal Temperature
- RF input level
- DC input voltage
- Status/Alarm messages

5.7 RF SETUP

All frequency selection is done via the attached input device, typically a camera back portable transmitter. As such, the only RF setting available on the GoPac is the adjustment of the RF Power Output level.

5.8 RF OUTPUT POWER

The RF Power Output is adjustable from 1 to 5 Watts digital (8 watts optional) via the RF switch (2), which has the following selections:

- STANDBY
- LOW
- MEDIUM
- HIGH

In Standby Mode the RF output is muted. If an external RF source is applied to the input connector, rotating the GoPac selector switch to one of the transmit modes will result in an instantaneous *on-frequency* transmission. When transmitting, the bar graph will display the relative output power.

NOTE: If there is no RF input from the connected device (typically a camera back transmitter), the GoPac will not transmit, regardless of the mode selected, and an “RF INPUT LOW” alarm will be displayed, as in the following figure.

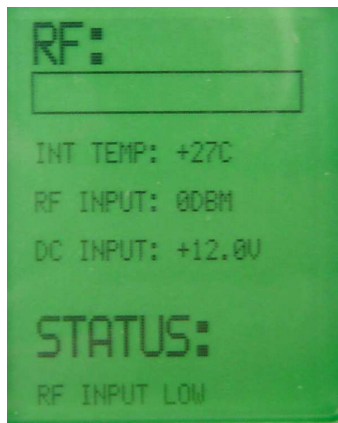


Figure 9: RF INPUT LOW

5.9 ALARMS

The GoPac “STATUS” display section will detail any errors that may occur in the unit.





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