

Technical Information

for

FCC CERTIFICATION

FOR THE

**KMH 820 MULTI-HAZARD AWARENESS UNIT
KTA 810 TRAFFIC ADVISORY UNIT**

Revised March 30, 2001

Written by:

Rex Darrow & Terry Michie
Staff Engineers

Reviewed by:

David Nelson
IPDS Team Leader

Date

1. General

This Technical Information is in support of Honeywell's application for certification of the KTA 810 / KMH 820 unit.

1.1 System Description.

The KTA 810 / KMH 820 is the processing unit for the Honeywell KTA 870 / KMH 880 system respectively and contains two separate processors: the TAS processor and the GA EGPWS processor (the KTA 810 contains only the TAS processor). The TAS portion of the KTA 810 / KMH 820 provides intruder surveillance and tracking for transponder-equipped aircraft and generates traffic advisories for these intruders. The TAS portion of the KTA 810 / KMH 820 tracks intruders under surveillance and analyzes range and range rate data, and altitude and altitude rate of the traffic to determine whether the intruder represents a threat. KTA 810 / KMH 820 communicates this information to the pilot via a display and/or aural annunciations. Pilot selectable functions of the KTA 810 / KMH 820 are controlled from a control panel or discrete controls.

The TAS portion of the KTA 810 / KMH 820 is very similar to a "baseline" TCAS I (AlliedSignal TPU 66A) as described in RTCA DO-197A. For example, the TAS portion only performs omni-directional Mode C interrogations. It does not perform Mode S interrogations.

The GA EGPWS display functionality has been previously certified and is being used without modification. This GA EGPWS portion provides a visual representation of the terrain ahead and around the aircraft. The flight crew is alerted of impending terrain by voice and by terrain color on the display.

The KTA 810 / KMH 820 interfaces to the following systems on board the aircraft: altitude encoding altimeters, magnetic heading, GPS (KMH 820 only), outside air temperature (KMH 820 only), optional radar altitude (TAS only), optional attitude, aircraft weight-on-wheels, landing gear position, and L Band suppression bus.

1.2 Model Numbers Being Certified.

The KMH 820 with the GPS card, represents the most complete unit and therefore it will be the unit tested. The KTA 810 (traffic only) and KMH 820 without GPS are to be covered by similarity.

Models being certified:

KMH 820 Part No. 066-01175-2101

KMH 820 Part No. 066-01175-0101 (same as 066-01175-2101 except without GPS card)

KTA 810 Part No. 066-01152-0101 (same as 066-01175-2101 except without EGPWS module)

Note: FCC ID:ASYKMH820 is to be applied to all above models.

2. Required Items

2.1 (2.1033,c,1) Name

Note: Parentheses in titles indicate applicable paragraphs in CFR.

The name of the manufacturer and the name of the applicant, which are the same is:

Honeywell International Inc.
One Technology Center
23500 W. 105 th Street
Olathe, Kansas 66061

2.2 (2.1033,c,2) FCC Identifier

FCC Identifier is ASYKMH820.

2.3 (2.1033,c,3) Installation

See the Installation Manual in the document package.

2.4 (2.1033,c,4) Type of Emission

Emission type is 18M0V1D.

2.5 (2.1033,c,5) Frequency Range

The transmission frequency is 1030 $\pm$ 0.200 MHz only.

2.6 (2.1033,c,6) Range of Operating Power Values

The rated output power is +53 dBm +/- 2.0 dB. There is no means of manually varying power. Power is automatically reduced in 3 dB steps down to +29 dBm by means of a built-in step attenuator as part of normal system operation. See schematic 002-09038-0010 sheet 2 transmitter schematic under Confidential Materials in document package.

2.7 (2.1033,c,7) Maximum Operating Power

The maximum output power is 316 Watts referenced at the unit.

2.8 (2.1033,c,8) Voltage and Current Applied

The voltage applied to Q102 is 50 VDC from a regulated supply included in the unit. The pulse current during an RF power pulse is 16 amps.

2.9 (2.1033,c,9) Tune-up Procedure

- 2.9.1 Set up equipment as in Figure 2.
- 2.9.2 Refer to schematic 002-09038-0010 and adjust C144, C147, C151, C153, and C155 for peak power at 1030 MHz.
- 2.9.3 Replace the spectrum analyzer with HP 8991A Peak Power Analyzer as in Figure 1 and further adjust the same capacitors to obtain pulse risetime of 50 to 100 uS, falltime of 50 to 200 uS, and power of 200 to 316 Watts.
- 2.9.4 Re-connect spectrum analyzer and check for frequency of 1030 ± 0.200 MHz.

2.10 (2.1033,c,10) Schematic Diagrams and Descriptions

See schematic 002-09038-0010 sheet 2 transmitter schematic under Confidential Materials in document package.

The KTA 810/KMH 820 transmitter includes a 1030 MHz synthesizer for the frequency source. This source is fed through a 6 dB pad and two MMIC switches to the transmitter input stage. The pad and switches provide isolation between the synthesizer source and the transmitter for low leakage during non-transmit times. The transmitter input stage is a low RF power MMIC followed by a 2 W stage which then drives the 1015MP class C medium power amplifier. This is followed with a one pole ceramic band pass filter to reduce the broadband emissions. A 90 W class C power amplifier pre-driver then provides the drive power needed for the TPR400R 400 W class C final power amplifier. The whisper shout attenuator follows this to provide attenuation levels needed for the interrogation with its incremental size of 3 dB (0dB, 3dB, 6dB, 24dB). The output of this is steered to either top antenna or bottom antenna by a top/bottom antenna switch circuit and its associated harmonic rejection filter circuit. The output of the unit is +53 dBm +/-2 dB.

2.11 (2.1033,c,11) Identification Plate Drawing

See "Equipment Drawing and Nameplate" in documentation package.

2.12 (2.1033,c,12) Equipment Photographs

See "Equipment Drawing and Nameplate" in documentation package.

2.13 (2.1033,c,13) Digital Modulation

The equipment uses pulse modulation as prescribed by FAA TSO-C147.

2.14 (2.1046,a)(87.131) RF Power

Equipment should be set up as in Figure 1.

With the transmitter aligned using its normal current and voltage the RF power should be measured into a 50 ohm load system which simulates its normal antenna load.

Requirements: 87.131 note 4. The unit is designed in conformance with FAA TSO-C147. To meet requirements the typical unit must produce a peak power of +53 dBm measured at the unit. This assumes normal aircraft installation cable and system antenna.

2.15 (2.1047,d)(87.141) Modulation Characteristics

The unit employs pulse modulation prescribed by FAA TSO-C147. This requires pulses of 0.800 ± 0.075 microseconds with risetimes of 0.100 microsecond maximum and falltimes of 0.200 microseconds maximum.

Pulses may be measured using the setup of Figure 1 .

2.16 (2.1049,i)(87.135,b)(87.139,a) Occupied Bandwidth

The unit has been designed for maximum powers and pulse rates which are in conformance with FAA TSO-C147. Using the setup of Figure 2 measurements may be made with the transmitter connected to a 50 ohm load system which simulates its normal antenna load.

The equipment is a secondary surveillance radar type of system. The authorized frequency band is 960 to 1215 MHz. The authorized bandwidth is 255 MHz. Pulse duration (T) is 0.80 microsecond. $1.5/T = 1.875$ MHz.

Requirement: Maximum emission must occur between 961.875 MHz and 1213.125 MHz. The equipment must also meet FAA TSO-C147 requirements of 1030 ± 0.200 MHz.

The power ratio in dB representing 0.5% of the total mean power is given by the following formula:

$$\text{dB} = 10 \log 0.5/100 = -23 \text{ dB}$$

So the frequency difference between the lower and upper frequency points which are 23 dB down from the peak power frequency will show the occupied bandwidth.

2.17 (2.1051)(87.133,d)(87.139,a) Spurious Emissions

Using the setup of Figure 2 measurements may be made with the transmitter connected to a 50 ohm load system which simulates its normal antenna load.

Center frequency is 1030 MHz. Authorized bandwidth is 255 MHz.

Requirement:

From 775 to 902.5 MHz and from 1157.5 to 1285 attenuation must be 25 dB or more.

From 392.5 to 775 MHz and from 1285 to 1667.5 attenuation must be 35 dB or more.

Below 392.5 MHz and above 1667.5 MHz attenuation must be 40 dB or more.

2.18 (2.1053) Field Strength of Spurious Emissions

Equipment should be set up as in Figure 3.

2.19 (2.1055)(87.133,d) Frequency Stability

The equipment is a secondary surveillance radar type of system. The authorized frequency band is 960 to 1215 MHz. The authorized bandwidth is 255 MHz.

Pulse duration (T) is 0.80 microsecond. $1.5/T = 1.875$ MHz.

Requirement: Maximum emission must occur between 961.875 MHz and 1213.125 MHz. The equipment must also meet FAA TSO-C147 requirements of 1030 ± 0.200 MHz.

2.20 (2.1057) Frequency Spectrum to be investigated

The transmitter operates at 1030 MHz. It utilizes a synthesizer having a 24.000 MHz crystal base which stabilizes a 1030 MHz voltage controlled oscillator.

Requirement:

Investigate all harmonics up to the tenth of 1030 MHz .

Investigate subharmonics of 1030 MHz ($1/3$, $1/2$, $2/3$)

Investigate 24 MHz and 1030 ± 24 MHz.

KMH 820 Test Setup

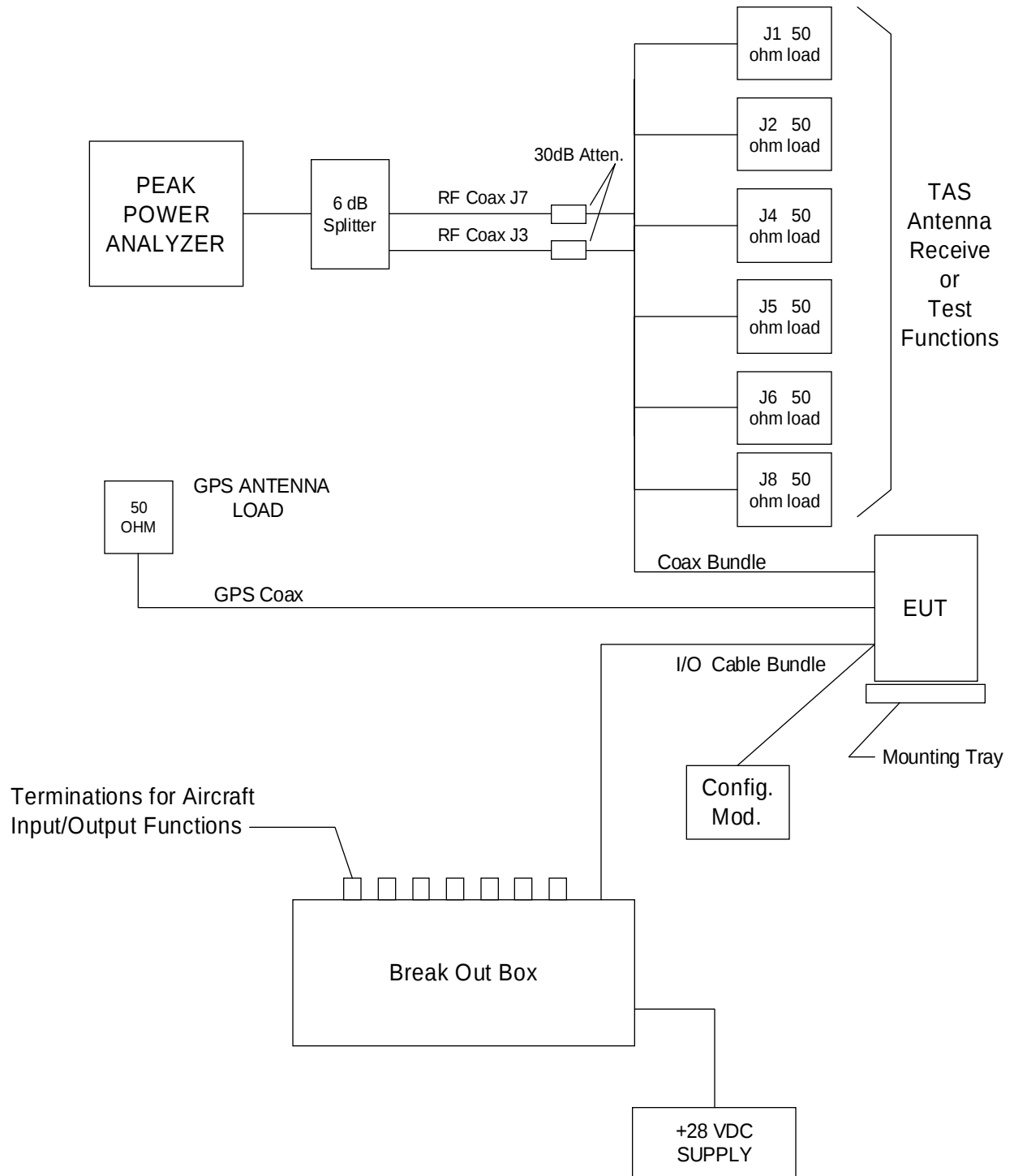


FIGURE 1

KMH 820 Test Setup

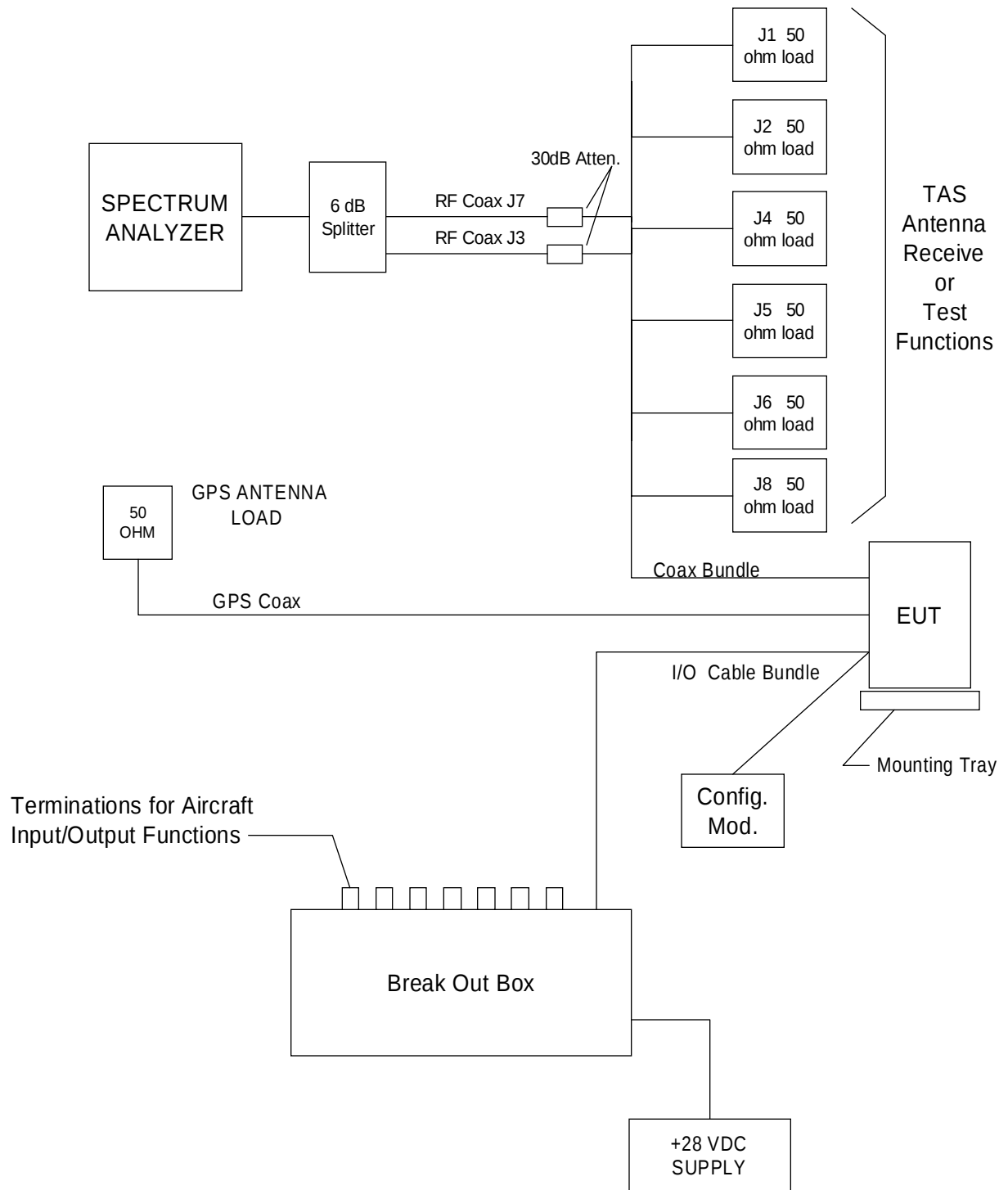


FIGURE 2

KMH 820 Test Setup

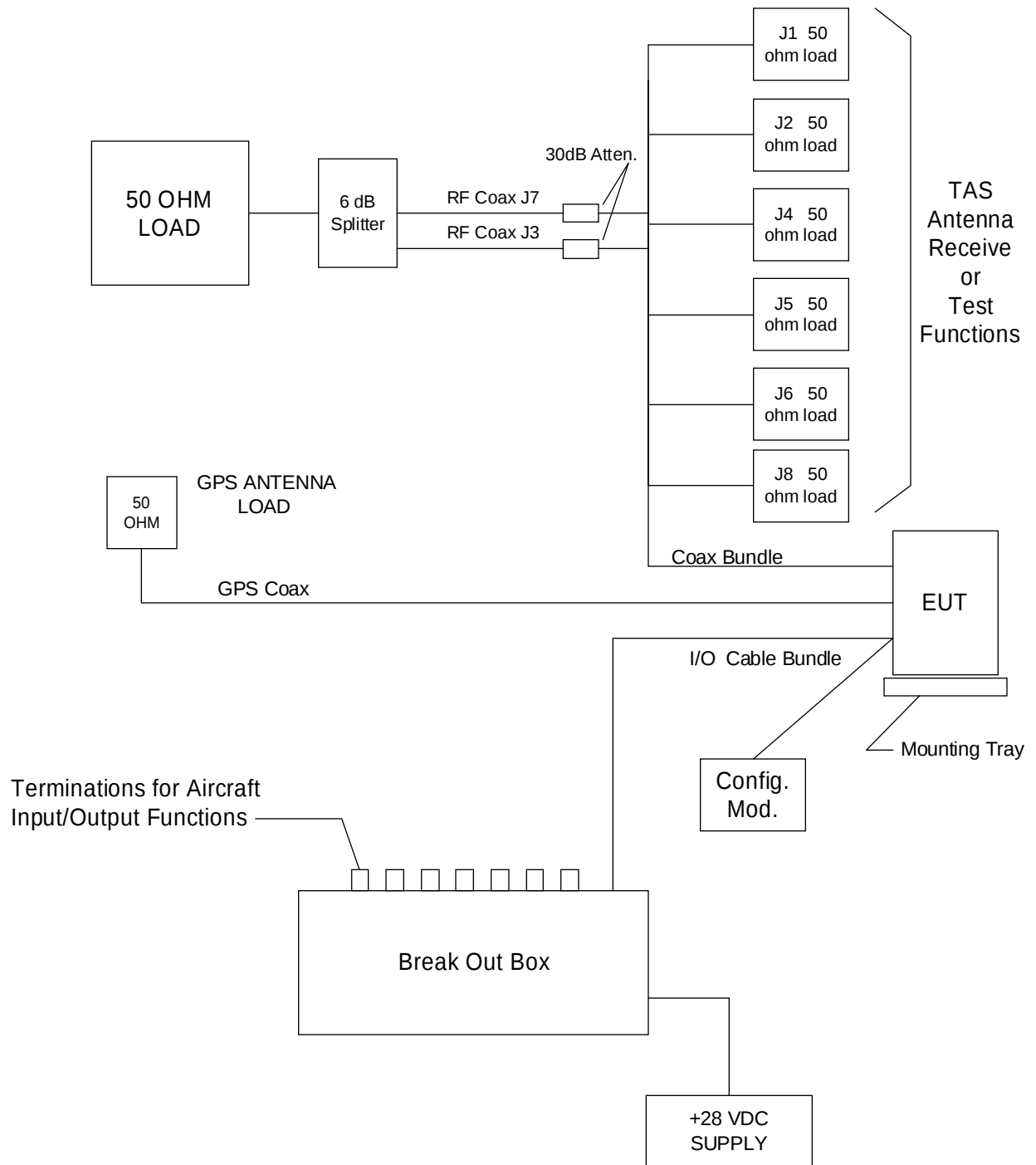


FIGURE 3