

**TMA 230**  
**AUDIO PANEL/MARKER BEACON RECEIVER**  
INSTALLATION MANUAL



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TERRA CORPORATION  
TMA 230 AUDIO MARKER RECEIVER  
OPERATION/INSTALLATION MANUAL

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Part Number 1900-0230-00  
Rev. B  
ECO #695

TMA 230 AUDIO MARKER RECEIVER

TERRA CORPORATION

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## SECTION I

### 1. INTRODUCTION

#### 1.1. SCOPE

This manual provides installation and operating instructions for Terra TMA 230 Audio Panel/Marker Beacon receiver manufactured by Terra Corporation of Albuquerque, New Mexico.

#### 1.2. DESCRIPTION

The TMA 230 is a small, lightweight, solid-state audio selector panel and marker beacon receiver. The unit is equipped with a speaker isolation amplifier. It also provides a 2 station intercom system.

The controls consist of selector switches for both speaker and headphone outputs and a microphone selector switch with an intercom select position. The TMA 230 has switched 500 ohm audio inputs for three transceivers and up to five receivers. Also there are three unswitched audio inputs. The auto function automatically selects the audio output of the transceiver being used. The auto switch can be selected for speaker or headphones. Speaker output is provided for an external (ramp hail) speaker. An unamplified, non-muted, unisolated emergency phones output is also provided.

Cabin speaker output is typically between 10 and 12 Watts. Internal resistors are provided for speaker loads for each of the three transceivers.

When a microphone is keyed, all audio inputs except altimeter are muted to speaker. Headphones are not muted.

The marker beacon receiver is a crystal-controlled superheterodyne receiver. It features the standard three-light display with remote light capabilities. Another feature is the auto function which switches the marker receiver from high to low sensitivity and mutes the audio automatically.

The TMA 230 is designed to be panel mounted in a custom installation by means of a factory supplied tray. Power, control wiring and the antenna connection are all made to the 44 pin connector. The TMA 230 will operate from either 14 VDC or 28 VDC aircraft power system.

### 1.3. SPECIFICATIONS

#### General Characteristics

##### Power Requirements:

TMA 230 Idle Current: 150ma @ 13.75VDC; 150ma @  
27.5VDC

TMA 230 Max Operating Current: 1.5AMPS  
1.5AMPS

Instrument Lights: 126ma 65ma

Weight: 1.05 lbs. (.476 kg)

Physical Dimensions: Length behind panel:

5.5 in. (14cm)

Width: 6.3 in. (16cm)

Height: 1.2 in. (3.05cm)

Temperature Range: -20 degrees C to +55 degrees C

##### Marker Beacon Receiver

Frequency: Crystal controlled @ 75 MHz

Sensitivity:

Low: 1000 uV with 90% modulation

High: 200 uV with 90% modulation

Auto: Switches from high to low  
sensitivity and mutes audio  
automatically.

Selectivity: 6dB  $\pm$ 7KHz 60dB  $\pm$ 20KHz

Frequency Stability: .005%

AGC Control: 10dB audio deviation from  
200 uV to 10 mV

Lamps: Auto dimming with remote 3 lamp  
capability. 12 VDC @ 150 ma max  
per lamp.

Phone Output: 50 milliwatts into 600 ohms

##### Speaker Isolation Amp

Inputs: 7 switchable inputs: 2 comms, 2  
navs, ADF, DME and aux for HF  
or telephone 3 unswitched  
inputs: radar altimeter DH and  
telephone rings. (Possible  
inputs)

Input Selector: Each switched audio input uses  
one switch to select either  
speaker, off or phones.

Mic Selector: Selects either Comm 1, Comm 2,  
Aux, (HF or telephone) and EXT  
or IC/X. EXT or IC/X position  
can be used for intercom or  
ramp hailer.

Input Impedance: 510 ohms

Input Isolation: 40 dB between inputs

Input Muting: 60 dB when the mic is keyed

### 1.3. SPECIFICATIONS (Continued)

Speaker Output: With 13.75 VDC supply: 10 Watts  
typical into 3.2 ohm load.  
With 27.5 VDC supply: 12 Watts  
typical into 3.2 ohm load.

Frequency Response: 300 Hz - 3 KHz

Total Harmonic Distortion: 10% max @ rated  
output.

Headphone: Input: same as speaker amp.

Input Source Impedance: 500 ohms recommended.

Input Isolation: Not specified, depends on  
output impedance and number of  
inputs selected.

Phone Output: Depends on level of input and  
number of other inputs  
selected.

### 1.4. ADDITIONAL EQUIPMENT REQUIRED

Sufficient RG-58A/U, 50 ohm coaxial antenna cable  
to reach from marker beacon receiver to marker  
beacon antenna. One marker beacon antenna and BNC  
coaxial fittings as required for the particular  
installation. Suggested antennas:

Aviation Development - AD-8  
Dorne & Margolin - DMN 43-1; 43-3  
Commant - C1-102; C1-118

## SECTION II

### 2. INSTALLATION AND OPERATION

#### 2.1. GENERAL

This section contains all necessary installation and operating instructions for the Terra TMA 230.

#### 2.2. PREPARATION FOR USE

Every precaution has been taken to protect your TMA 230 during shipment. Upon receipt of the unit, perform the following instructions:

1. Remove the unit from the shipping container and visually inspect for damage.
2. Check controls and switches to determine if they may have been damaged.
3. Make sure that all hardware and connectors listed in Section I, under "Equipment Supplied", are present.

If the unit is damaged, a claim must be filed with the carrier. Retain the shipping carton and contact Terra Corporation for shipping instructions.

#### 2.3. INSTALLATION

The following items and suggestions should be considered prior to installation of your Terra TMA 230 Marker Beacon Audio Panel:

1. Select a location that provides ease of operation.
2. Avoid installing the TMA 230 near heat sources. If it is mounted in a high heat area, additional cooling provisions are recommended.
3. Insure that adequate clearance exists behind the panel for sleeve and connector assemblies. A minimum of 6" is recommended.
4. Refer to Terra TMA 230 outline drawings (Fig 2-1) for panel cutout details and mounting dimensions.
5. Install the sleeve assembly on the instrument panel. Comply with standards set forth in the FAA Aircraft Inspection and Repair document AC 43.13.2.

### 2.3. INSTALLATION (Continued)

6. The 44 pin connector supplied with the Terra TMA 230 must be wired correctly to connect to the aircraft avionics system. The leads from the marker beacon antenna to the connector should be kept as short as possible to prevent any electrical problems. The interconnecting wiring for the 44 pin connector is shown in Fig 2-2. Comply with standards set forth in FAA Aircraft Inspection and Repair Document AC 43.13.1.
7. Install the TMA 230 in the mounting tray assembly. Insert a 3/32" Allen wrench in the front panel hole and engage the locking screw. Turn clockwise until the unit is fully secured in the tray. Use caution to prevent stripping the threads.
8. To remove the unit from the mounting tray, insert the 3/32" Allen wrench in the locking screw and turn counter-clockwise until the unit is no longer secured. The unit may now be pulled out of the mounting tray by hand.

### 2.4. OPERATION

The TMA 230 is equipped with the "Auto" Comm select feature. The transmitter selected on the microphone selector switch will be matched automatically with the appropriate comm receiver audio in either speaker or headphone by simply selecting speaker or headphone on the "auto" select switch.

The audio select switches any or all the receiver audios to be heard on either speaker or headphones. In the up position, the audio will be routed to the aircraft speaker, in the down position, the audio is routed to the aircraft headphones, and the center position is to turn off the audio from that particular unit.

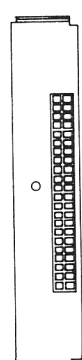
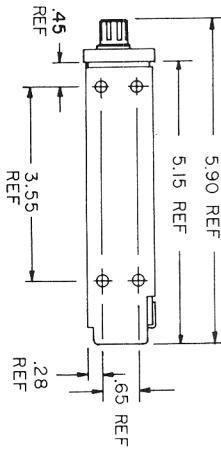
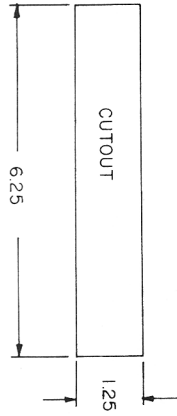
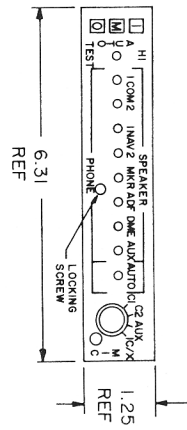
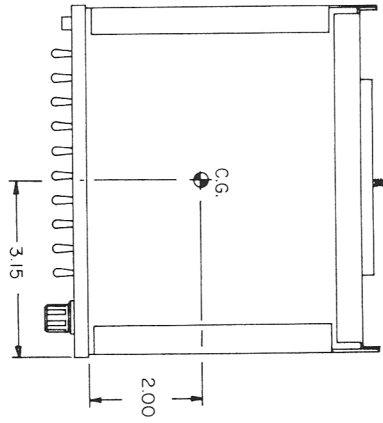
The EXT or IC/X position on the microphone selector switch can be used either for a ramp hailer or as intercom depending upon the installation.



#### 2.4. OPERATION (Continued)

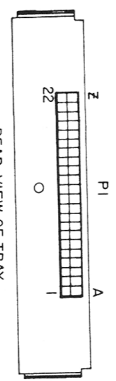
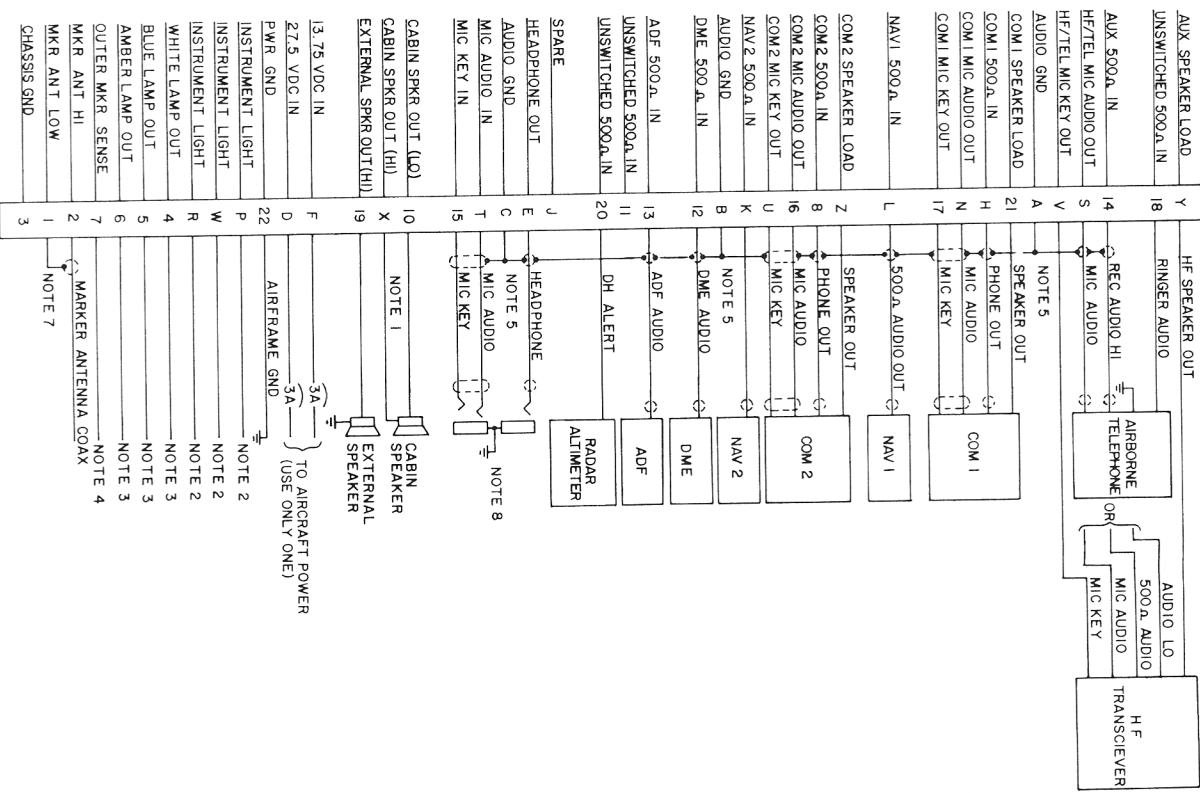
The TMA 230 includes a complete marker beacon receiver. This will give you both a visual and audio signal when you pass over a marker beacon. The three lights and the audio tone will identify which beacon type you are passing over. The marker beacon switch is normally in one of the two positions. The first being up, or Hi, will keep the receiver sensitivity high continuously. In the middle position, or Auto, the receiver sensitivity starts out in the high position then switches to low sensitivity and will automatically mute the marker beacon audio.

Holding the marker beacon switch in the down, or test position, simply applies a voltage to all three lamps to indicate that they are functioning correctly.



NOTES:  
1. WEIGHT 1.03 LBS (1.476 Kg)

REV	DATE	BY	CHKD	DESCRIPTION
B	5-8-85			RELEASE
A	5-7-84			ORIGINAL
TERRA CORP 11111 TERRA CORP BLVD AUSTIN, TEXAS 78741 TITLE: TMA230 AUDIO PANEL DRAWING: OUTLINE DRAWING QDS 247-0020-000				



- NOTES:
- FOR NEW SPEAKER INSTALLATIONS, CONNECT THE SPEAKER TO PINS X AND IO, FOR 10 WATT AUDIO AMP. FOR EXISTING SPEAKER INSTALLATIONS WITH SPEAKER LOW GROUNDED TO AIRFRAME, CONNECT PIN X TO HIGH SIDE OF SPEAKER FOR 5 WATT AUDIO AMP.  
CAUTION: DO NOT GROUND PIN IO.
  - FOR 28 VOLTS DIMMER BUSS CONNECT PIN P TO 28V BUSS AND PIN R TO GND.  
FOR 14 VOLTS DIMMER BUSS CONNECT PIN W TO 14V BUSS AND PINS P AND R TO GND.
  - MAXIMUM EXTERNAL LAMP LOAD 14V @ 150 MA EACH.
  - OUTER MARKER SENSE IS AN OUTPUT FROM THE TMA230 FOR CONNECTION TO AUTOPILOTS UTILIZING OUTER MKR SENSE FOR AUTOPILOT SENSITIVITY ADJUSTMENT (ACTIVE HI)
  - ALL SHIELDS SHOULD BE GROUNDED ON ONE END ONLY. THE END THAT IS GROUNDED SHOULD BE LOAD END AS SHOWN.
  - WIRE SIZE: POWER INPUT & POWER GND 20 AWG ALL OTHERS 24 AWG
  - MKR ANT SHIELD CONNECTION MUST BE LESS THAN 1/2 INCH LONG.
  - FOR INTERCOM USE — PARALLEL TWO MICS AND HEADPHONES TO TMA-230 INPUTS AND USE MIC SELECTOR POSITION "EXT" OR "IC/X".

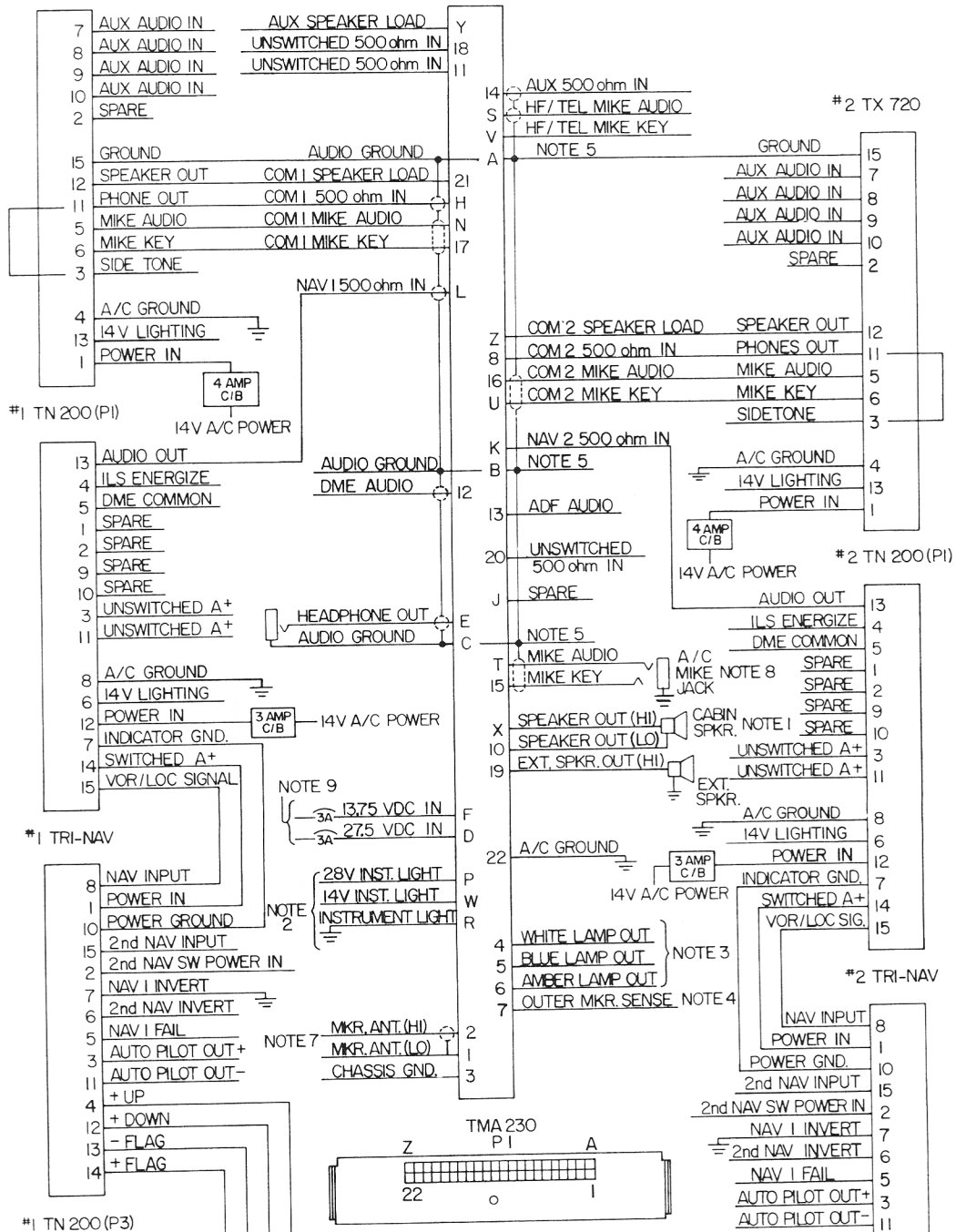
DATE	3-25-87	SCALE	NONE
REV	5	DESIGNED BY	XXX
DATE	5-7-87	CHECKED BY	XXX
REV	4	DATE	5-13-87
REV	3	DATE	5-13-87
REV	2	DATE	5-13-87
REV	1	DATE	5-13-87

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**INTERCONNECT AUDIO PANEL**  
 SHEET 1 OF 2  
 47-0019-000

#1 TX 720

TMA-230 (PI)



REAR VIEW OF TRAY

NOTES:  
 1. FOR NEW SPEAKER INSTALLATIONS (10 WATTS):  
 CONNECT TO PINS 10 AND X.  
 FOR EXISTING SPEAKER INSTALLATIONS

- (5 WATTS): CONNECT HIGH SIDE TO PIN X, LOW SIDE TO AIRFRAME GROUND. (DO NOT GROUND PIN 10).
- 2. FOR 28 VOLTS DIMMER BUSS CONNECT PIN P TO 28V BUSS AND PIN R TO GROUND.  
 FOR 14 VOLTS DIMMER BUSS CONNECT PIN W TO 14V BUSS AND PINS P AND R TO GROUND.
- 3. MAXIMUM EXTERNAL LAMP LOAD 14V AT 150 MA EACH.
- 4. OUTER MARKER SENSE IS AN OUTPUT FROM THE TMA 230 FOR CONNECTION TO AUTOPILOTS UTILIZING OUTER MKR. SENSE FOR AUTOPILOTS SENSIVITY ADJUSTMENT. (ACTIVE HI)
- 5. ALL SHIELDS SHOULD BE GROUNDED ON ONE END ONLY.  
 THE END THAT IS GROUNDED SHOULD BE LOAD END AS SHOWN.
- 6. WIRE SIZE : POWER INPUT AND POWER GROUND 20 AWG, ALL OTHERS 24 AWG.
- 7. MKR. ANT SHIELD CONNECTION MUST BE LESS THAN 1/2 INCH LONG.
- 8. FOR INTERCOM USE - PARALLEL TWO MICS AND HEADPHONES TO TMA-230 INPUTS AND USE MIC SELECTOR POSITION "EXT" OR "IC/X".
- 9. TO A/C POWER, USE ONLY ONE.

REV	NO	DATE	DESCRIPTION
0	182 S	6/17/91	
1	306	3-25-87	
2	259	3-13-86	
ORIGINAL RELEASE			
REV	NO	DATE	DESCRIPTION
1	1		TRAVELER DURING REPAIR
2	2		TRAVELER DURING REPAIR
3	3		TRAVELER DURING REPAIR
4	4		TRAVELER DURING REPAIR
5	5		TRAVELER DURING REPAIR
6	6		TRAVELER DURING REPAIR
7	7		TRAVELER DURING REPAIR
8	8		TRAVELER DURING REPAIR
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10	10		TRAVELER DURING REPAIR
11	11		TRAVELER DURING REPAIR
12	12		TRAVELER DURING REPAIR
13	13		TRAVELER DURING REPAIR
14	14		TRAVELER DURING REPAIR
15	15		TRAVELER DURING REPAIR
16	16		TRAVELER DURING REPAIR
17	17		TRAVELER DURING REPAIR
18	18		TRAVELER DURING REPAIR
19	19		TRAVELER DURING REPAIR
20	20		TRAVELER DURING REPAIR
21	21		TRAVELER DURING REPAIR
22	22		TRAVELER DURING REPAIR

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## SECTION III

### 3. WARRANTY

#### 3.1. LIMITED WARRANTY OF TERRA PRODUCTS

All equipment manufactured by TERRA Corporation is guaranteed against defective materials and workmanship for a period of one year from the date of shipment. An extended second and third year limited warranty becomes valid at the end of the first year, which warrants that the original owner will not pay more than \$100.00 in each of the second and third years should repairs be necessary. Should warranty not be required in the second and only in the third year, then the original owner will not pay more than \$200.00 should repairs be necessary. Any unit found to be defective due to material and workmanship during the warranty period will be repaired and put in original manufactured operating condition. Any labor charges which are incurred as a result of said defects are included in this warranty.

TERRA Corporation's liability under this warranty is limited to servicing, repairing, or adjusting any equipment returned prepaid to the factory by express written or oral authorization for that purpose and to repair or replace defective parts thereof. Fuses and batteries are specifically excluded from any liability.

If, upon examination, it is determined that a malfunction has been caused by misuse of the equipment, installation or operation not in accordance with factory instructions, accident or negligent damage, alternations of any manner, or repair by other than the factory, the repairs will be billed. In such cases, an estimate will be submitted for approval before repair is initiated.

This TERRA Corporation Limited Warranty is void unless the Warranty Registration Card is filled out and returned within 10 days after purchase.

3.1. LIMITED WARRANTY OF TERRA PRODUCTS (Continued)

Warranty Assurance to the aircraft owner/end-user cannot be maintained if the equipment is not installed in a certified aircraft by an authorized TERRA dealer. Exception, to assure warranty for the aircraft owner/end-user, for homebuilt/experimental aircraft without installation by an authorized TERRA dealer, is allowed when the end-user notifies TERRA that the homebuilt/experimental aircraft has been issued a special airworthiness certificate by the FAA.

No warranty will be activated for TERRA products unless the installation is approved and the warranty card is completed by the supplying dealer or upon receipt by TERRA of FAA form(s) 337 or 8130-( ).

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THE IMPLIED WARRANTY AND ALL OTHER IMPLIED  
WARRANTIES ARE HEREBY EXCLUDED.