

**Note:** The “NIC” field is closely associated with the “SIL” field (defined in §2.2.4.5.4.6). The value of the “SIL” field is the probability of the true position lying outside the containment radius,  $R_C$ , without alerting, including the effects of airborne equipment condition, which airborne equipment is in use, and which external signals are used.

#### 2.2.4.5.2.5 “A/G STATE” Field Encoding

The Air/Ground State (“A/G STATE”) field is a 2-bit (bits 1 and 2 of byte 13) field that indicates the format used for representing horizontal velocity. The value of this field determines the encoding of the “HORIZONTAL VELOCITY” field. The “A/G STATE” field is composed of two (2) 1-bit fields used as follows:

1. The Vertical Status bit (bit 1 of byte 13) is used to reflect the AIRBORNE or ON-GROUND condition as determined in §2.2.4.5.2.5.1.
2. The Subsonic/Supersonic bit (bit 2 of byte 13) is used to indicate the scale factor for the velocity information. The Subsonic/Supersonic bit (bit 2 of byte 13) **shall** be set to ONE (1) if either the East – West velocity OR the North – South velocity, exceeds 1022 knots. The Subsonic/Supersonic bit (bit 2 of byte 13) **shall** be reset to ZERO (0) if the East - West and the North - South velocities, drop below 1000 knots.

The encoding of “A/G STATE” field **shall** be as indicated in [Table 2-16](#).

**Table 2-16: “A/G STATE” Field Encoding**

Ownship Conditions	“A/G STATE” Field Encoding			Resulting “HORIZONTAL VELOCITY” Subfield Formats	
	MSB	LSB	(decimal)	“North Velocity or Ground Speed” Subfield Meaning	“East Velocity or Track Angle/Heading” Subfield Meaning
	Vertical Status (bit 1 of byte 13)	Subsonic/Supersonic (bit 2 of byte 13)			
AIRBORNE condition. Subsonic condition.	0	0	0	North Velocity (LSB = 1 kt)	East Velocity (LSB = 1 kt)
AIRBORNE condition. Supersonic condition.	0	1	1	North Velocity (LSB = 4 kts)	East Velocity (LSB = 4 kts)
ON GROUND condition.	1	0	2	Ground Speed (LSB = 1 kt)	Track/Heading
<Reserved for TIS-B Uplink Messages>	1	1	3		

##### 2.2.4.5.2.5.1 Determination of Vertical Status

The UAT ADS-B Transmitting Subsystem **shall** determine its Vertical Status (i.e., AIRBORNE or ON-GROUND condition) using the following procedures:

- a. If a UAT ADS-B Transmitting Subsystem participant is equipped with a means to determine whether it is airborne or on the surface, then such information **shall** be used to determine the Vertical Status.

*Note:* *An “automatic” means of determining Vertical Status could come from a weight-on-wheels or strut switch, etc. Landing gear deployment is not considered a suitable automatic means.*

b. If a UAT ADS-B Transmitting Subsystem participant is not equipped with a means to determine whether it is airborne or on the surface, and that participant’s Emitter Category is one of the following, then that participant **shall** set its Vertical Status to “AIRBORNE:”

- Glider or Sailplane
- Lighter Than Air
- Parachutist or Skydiver
- Ultralight, Hang Glider or Paraglider
- Unmanned Aerial Vehicle
- Point Obstacle (includes tethered balloons)
- Cluster Obstacle
- Line Obstacle

**Notes:**

1. *Because of the unique operating capabilities of “Lighter-than-Air” vehicles, e.g., balloons, an operational “Lighter-than-Air” vehicle will always report the AIRBORNE condition unless the ON-GROUND condition is specifically declared in compliance with subparagraph “a.” above.*

2. *For the Point, Cluster and Line Obstacles, the Vertical Status reported should be appropriate to the situation. In any case, the Altitude is always present in the transmitted message.*

c. If a UAT ADS-B Transmitting Subsystem participant’s Emitter Category is one of the following, then that participant **shall** set its Vertical Status to the “ON-GROUND” condition:

- Surface Vehicle – Emergency Vehicle
- Surface Vehicle – Service Vehicle

d. If a UAT ADS-B Transmitting Subsystem participant is not equipped with a means to determine whether it is airborne or on the surface, and that participant’s Emitter Category is “Rotorcraft,” then that participant **shall** set its Vertical Status to “AIRBORNE.”

*Note:* *Because of the unique operating capabilities of rotorcraft, i.e., hover, etc., an operational rotorcraft will always report the AIRBORNE condition unless the ON-GROUND condition is specifically declared in compliance with subparagraph “a.” above.*

e. If a UAT ADS-B Transmitting Subsystem participant is not equipped with a means to determine whether it is airborne or on the surface, and that participant's Emitter Category is "Light Aircraft," then that participant shall set its Vertical Status to "AIRBORNE," unless the participant can alternatively determine that it is on the surface using the following test: If the participant's Ground Speed (GS) is available and is less than an aircraft specific Threshold Level (TL) value, the participant may set its Vertical Status to "ON-GROUND." The Ground Speed Threshold Level chosen for an aircraft type must reliably indicate "ON-GROUND" conditions.

*Note: The appropriate Ground Speed Threshold Level is chosen to provide, except under unusual operating conditions, a reasonable assurance that the participant will not set the AIRBORNE/ON-GROUND condition to "AIRBORNE" while taxiing on the airport surface and will not give false indications of being in the "ON-GROUND" condition while still "AIRBORNE."*

f. If a UAT ADS-B Transmitting Subsystem participant is not equipped with a means to determine whether it is airborne or on the surface, and that participant's Emitter Category is not one of those listed in tests "b," "c," "d," or "e" above (i.e., Small, Large, High Vortex Large, Heavy, or Highly Maneuverable), then the following tests will be performed to determine the Vertical Status:

1. If the UAT ADS-B Transmitting Subsystem participant's Radio Height (RH) parameter is available, and  $RH < 50$  feet, and at least Ground Speed (GS) or Airspeed (AS) is available, and the available  $GS < 100$  knots, or the available  $AS < 100$  knots, then that participant shall set its Vertical Status to "ON-GROUND."

*Note: If all three parameters are available, the Vertical Status may be determined by the logical "AND" of all three parameters.*

2. Otherwise, if Radio Height (RH) is not available, and if the participant's Ground Speed (GS) and Airspeed (AS) are available, and  $GS < 50$  knots and  $AS < 50$  knots, then that participant shall set its Vertical Status to "ON-GROUND."

3. Otherwise, the participant shall set its Vertical Status to "AIRBORNE."

~~The ADS-B Transmitting Subsystem shall determine its Vertical Status (i.e., AIRBORNE or ON-GROUND condition) using the procedure below:~~

~~a. If there is a means to automatically determine the Vertical Status of the ADS-B emitter target category, then such information shall be used to determine the Vertical Status.~~

~~*Note: An "automatic" means of determining vertical status could come from a weight-on-wheels or strut switch, etc. Landing gear deployment is not considered a suitable automatic means.*~~

~~b. If there is no means to automatically determine the Vertical Status of the ADS-B Transmitting Subsystem, or the automatic means becomes unavailable after the data timeout value listed in Table 2-64, then the ADS-B Transmitting Subsystem shall assume the AIRBORNE condition except under the conditions given for each of the ADS-B Emitter Category types given in Table 2-17. If the conditions given in Table 2-17 are met for the given ADS-B Emitter Category, then the ADS-B Transmitting Subsystem shall be in the ON-GROUND condition.~~

**Table 2-17: Determination of ON-GROUND Condition  
when there is no means to automatically determine Vertical Status**

Emitter Category	Ground Speed		Airspeed (if available)		Radio Altitude (if available)
No aircraft type information	Always declare AIRBORNE condition				
Light (ICAO) <15,500 lbs	Always declare AIRBORNE condition				
Small—15,500 to 75,000 lbs	<100 knots	or	<100 knots	or	<100 feet
Large—75,000 to 300,000 lbs	<100 knots	or	<100 knots	or	<100 feet
High Vortex Large (e.g., B757)	<100 knots	or	<100 knots	or	<100 feet
Heavy (ICAO) > 300,000 lbs	<100 knots	or	<100 knots	or	<100 feet
Highly Maneuverable > 5G acceleration and high speed	<100 knots	or	<100 knots	or	<100 feet
Rotorcraft	Always declare AIRBORNE condition (See Note 1)				
Glider/sailplane	Always declare AIRBORNE condition				
Lighter than air	Always declare AIRBORNE condition (See Note 2)				
Parachutist/sky diver	Always declare AIRBORNE condition				
Ultra light/hang glider/paraglider	Always declare AIRBORNE condition				
Unmanned aerial vehicle	Always declare AIRBORNE condition				
Space/trans atmospheric vehicle	<100 knots	or	<100 knots	or	<100 feet
Surface vehicle—emergency vehicle	Always declare ON-GROUND condition				
Surface vehicle—service vehicle	Always declare ON-GROUND condition				
Point Obstacle (includes tethered balloons)	See note 3				
Cluster Obstacle					
Line Obstacle					

**Notes:**

~~1. Because of the unique operating capabilities of rotorcraft, i.e., hover, etc., an operational rotorcraft will always report the AIRBORNE condition unless the ON-GROUND condition is specifically declared in compliance with subparagraph “a.” above.~~

~~2. Because of the unique operating capabilities of “Lighter than Air” vehicles, e.g., balloons, an operational “Lighter than Air” vehicle will always report the AIRBORNE condition unless the ON-GROUND condition is specifically declared in compliance with subparagraph “a.” above.~~

~~3.1. The Vertical Status reported will be appropriate to the situation. In any case the altitude is always present in the transmitted message.~~

If any of the inputs used to derive the ON-GROUND condition as specified in [Table 2-17](#) above are “unavailable” for the “Data Lifetime” timeout duration listed in [Table 2-64](#), then the input **shall** no longer be used for the purposes of determining the ON-GROUND condition.

### 2.2.4.5.2.5.2 Validation of Vertical Status

When an automatic means of determining Vertical Status indicates the “ON-GROUND” condition, then the following additional tests **shall** be performed to validate the “ON-GROUND” condition:

*Note: The Vertical Status can be used by UAT ADS-B Transmitting Subsystems to select only the TOP antenna when in the ON-GROUND condition. A false indication of the automatic means could therefore impact signal availability. To minimize this possibility, this validation procedure has been established.*

a. If one or more of the following parameters is available to the UAT ADS-B Transmitting Subsystem participant:

Ground Speed (GS), or  
Airspeed (AS), or  
Radio Height (RH) from radio altimeter

and of the following parameters that are available:

GS > 100 knots, or  
AS > 100 knots, or  
RH > 50 feet

then, the participant **shall** set its Vertical Status to the “AIRBORNE” condition

Otherwise, the participant **shall** set its Vertical Status to the “ON-GROUND” condition.

~~When an automatic means of determining Vertical Status indicates ON-GROUND, the Vertical Status shall be changed to AIRBORNE under the conditions listed in Table 2-18.~~

If any of the inputs used to derive the override of the ON-GROUND condition as specified ~~in Table 2-18 above~~ are “unavailable” for the “Data Lifetime” timeout duration listed in [Table 2-64](#), then the input **shall** no longer be used for the purposes of overriding the ON-GROUND condition.

~~*Note: The Vertical Status can be used by ADS-B Transmitting Subsystems to select only the TOP antenna when in the ON-GROUND condition. A false indication of the automatic means could therefore impact signal availability. To minimize this possibility, this validation procedure has been established.*~~

**Table 2-18: Criteria for Overriding an ON-GROUND Condition Determined by Automatic Means**

Emitter Category	Ground Speed		Airspeed (if available)		Radio Altitude (if available)
No aircraft type information	No Change to condition				
Light (ICAO) < 15 500 lbs	No Change to condition				
Small 15 500 to 75 000 lbs	>100 knots	<del>or</del>	>100 knots	<del>or</del>	>50 feet
Large 75 000 to 300 000 lbs	>100 knots	<del>or</del>	>100 knots	<del>or</del>	>50 feet
High Vortex Large (e.g., B757)	>100 knots	<del>or</del>	>100 knots	<del>or</del>	>50 feet
Heavy (ICAO) > 300 000 lbs	>100 knots	<del>or</del>	>100 knots	<del>or</del>	>50 feet
Highly Maneuverable > 5G acceleration and high speed	>100 knots	<del>or</del>	>100 knots	<del>or</del>	>50 feet
Rotorcraft	No Change to condition				