1. Predicate Analysis

Predicate	**Predicate Value**	**Case**
arg < 13	true	arg = 10
arg < 13	false	arg = 50
enabled && ((tcas_equipped && intent_not_known) || !tcas_equipped	true	enabled = true tcas_equipped = true intent_not_known = true **For enabled = true:** High_Confidence = 10000 Own_Tracked_Alt_Rate = 250 Cur_Vertical_Sep = 750 **For tcas_equipped = true:** Other_Capability = 1 **For intent_not_known = true:** Two_of_Three_Reports_Valid = true Other_RAC = 0
enabled && ((tcas_equipped && intent_not_known) || !tcas_equipped	false	enabled = false tcas_equipped = false intent_not_known = false **For enabled = false:** High_Confidence = 0 Own_Tracked_Alt_Rate = 700 Cur_Vertical_Sep = 200 **For tcas_equipped = false:** Other_Capability = 0 **For intent_not_known = false:** Two_of_Three_Reports_Valid = false Other_RAC = 1

need_upward_RA && need_downward_RA	true	need_upward_RA = true need_downward_RA = true **For need_upward_RA = true:** Non_Crossing_Biased_Climb() && Own_Below_Threat() **For Non_Crossing_Biased_Climb() = true:** **result** depends on predicate: **upward_preferred** **For Own_Below_Threat() = true:** Own_Tracked_Alt < Other_Tracked_Alt Own_Tracked_Alt = 10 Other_Tracked_Alt = 20 **result :** **Case 1:** **result** = ! (Own_Below_Threat()) || ((Own_Below_Threat()) && (!(Down_Separation >= ALIM()))) **Case 2:** **result** = Own_Above_Threat() && (Cur_Vertical_Sep >= 300) && (Up_Separation>= ALIM()); **For need_downward_RA = true** Non_Crossing_Biased_Descend() && Own_Above_Threat() **For Non_Crossing_Biased_Descend() = true:** **result** depends on predicate: **upward_preferred** **For Own_Above_Threat() = true:** Other_Tracked_Alt < Own_Tracked_Alt Own_Tracked_Alt = 20 Other_Tracked_Alt = 10 **result :** **Case 1:** **result** = ! (Own_Below_Threat()) || ((Own_Below_Threat()) && (!(Down_Separation >= ALIM()))) **Case 2:** **result** = Own_Above_Threat() && (Cur_Vertical_Sep >= 300) && (Up_Separation>= ALIM());

need_upward_RA && need_downward_RA	false	need_upward_RA = false need_downward_RA = false **For need_upward_RA = false:** Non_Crossing_Biased_Climb() && Own_Below_Threat() **For Non_Crossing_Biased_Climb() = false:** **result** depends on predicate: **upward_preferred** **For Own_Below_Threat() = false:** Own_Tracked_Alt < Other_Tracked_Alt Own_Tracked_Alt = 50 Other_Tracked_Alt = 10 --- **result :** **Case 1:** **result** = Own_Below_Threat() && (Cur_Vertical_Sep >= 300) && (Down_Separation >= ALIM()) **Case 2:** **result** = !(Own_Above_Threat()) ‖ ((Own_Above_Threat()) && (Up_Separation >= ALIM())) --- **For need_downward_RA = false** Non_Crossing_Biased_Descend() && Own_Above_Threat() **For Non_Crossing_Biased_Descend() = false:** result = false depends on predicate: **upward_preferred** **For Own_Above_Threat() = false:** Other_Tracked_Alt < Own_Tracked_Alt Own_Tracked_Alt = 10 Other_Tracked_Alt = 50 --- **result :** **Case 1:** **result** = Own_Below_Threat() && (Cur_Vertical_Sep >= 300) && (Down_Separation >= ALIM()) **Case 2:** **result** = !(Own_Above_Threat()) ‖ ((Own_Above_Threat()) && (Up_Separation >= ALIM()))

upward_preferred	true	Inhibit_Biased_Climb() > Down_Separation **For Inhibit_Biased_Climb() to be greater:** Go to predicate **Climb_Inhibit true case** Down_Separation = 0
upward_preferred	false	Inhibit_Biased_Climb() < Down_Separation **For Inhibit_Biased_Climb() to be greater:** Go to predicate **Climb_Inhibit false case** Down_Separation = 0
Climb_Inhibit	true	Climb_Inhibit = 1
Climb_Inhibit	false	Climb_inhibit = 0
! (Own_Below_Threat()) ‖ ((Own_Below_Threat()) && (!(Down_Separation >= ALIM()))))	true	Own_Below_Threat() = false Down_Separation = true ALIM()
Other_Tracked_Alt < Own_Tracked_Alt	false	Other_Tracked_Alt Own_Tracked_Alt
Alt == 0	true	Alt = 0
Alt == 0	false	Alt = 3
Alt == 1	true	Alt = 1
Alt == 1	false	Alt = 6
Alt == 2	true	Alt = 2
Alt == 2	false	Alt = 8

Possible input values for the arguments

Argument	Possible Range	Testcase
Cur_Vertical_Sep	**integers > 0**	**> 600**
High_Confidence	**integers > 0**	
Two_of_Three_Reports_Valid	**integers > = 1**	**>=1**
Own_Tracked_Alt	**integers > 0**	
Own_Tracked_Alt_Rate	**integers < = 600**	**<=600**
Other_Tracked_Alt	**integers > 0**	**< Own_Tracked_Alt** **or** **> Own_Tracked_Alt**
Alt_Layer_Value	**{ 0, 1, 2, 3}**	**0**
Up_Separation	**integers > 0**	
Down_Separation	**integers > 0**	
Other_RAC	**integers > 0**	**0**
Other_Capability	**0 or 1**	**1**
Climb_Inhibit	**0 or 1**	**1**