TCAS II CHANGE PROPOSAL (CP)

DATE: 12 / 06 / 07 **No.:** 122

TCAS II Version: **DO-185A (v7)** X **Other (Specify)** _____

MOPS Function Area: **Surveillance** ____ **Display Req'ts** ____ **CRS** ____

CAS Pseudocode ____ **Test Suites** ____ **Other** X

Priority: **URGENT** ____ **Necessary** X **Optional** ____

CP Type: **ERROR** ____ **Enhancement** X **Evaluation Request** ____

Editorial (Logic) ____ **Editorial (Text)** ____

Description of Problem/Issue:

ARINC Characteristic 735B defines a "software part number enable discrete input" and states that the "TCAS computer should transmit its current software part number file no less than three times when this input is enabled."

ARINC 735B defines formats for the "ACAS unit part number," which is transmitted by the TCAS unit to transponder register E5 hex, and for the "software part number," which is transmitted by the TCAS unit to transponder register E6 hex. These formats are defined in ARINC 735B, Attachment 19L (attached).

The purpose of the change is to enable monitoring and diagnosis of events by identifying the particular hardware and software version carried aboard the aircraft.

Proposed Resolution:

Add the following new section to DO-185B, Volume I:

"2.2.3.10.4.2.1 TCAS Unit Part Number and TCAS Software Part Number

If the DO-185B TCAS unit is paired with a Mode S transponder reporting DO-185A compatibility (see 2.2.3.13.2.1.1), then TCAS shall determine whether the software part number enable discrete input is enabled. If so, TCAS shall transmit its TCAS unit part number to transponder register E5 hex and shall transmit its TCAS software part number to transponder register E6 hex. TCAS shall initiate the E5 and E6 transmissions to the transponder once per 10 seconds with a tolerance of plus one or minus one second.

Formats for transponder registers E5 and E6 are defined in Attachment 19L of ARINC Characteristic 735B [ref x]."

Requester: Andy Zeitlin/Ann Drumm

Organization: MITRE/Lincoln Lab

DISPOSITION OF CHANGE PROPOSAL (Per RWG):

DATE OF DISPOSITION 12 / 11 / 07

Rejected _____ **Deferred** _____ **[Review Date:** ____ / ____ / ____ **]**

Accepted x **Modified** _____ **Withdrawn** _____

DISPOSITION OF CHANGE:

On Hold _____ **Designing** _____ **Testing** _____ **Done** x **[Date:** 12 / 11 / 07 **]**

Final Approval of Changes:

Signature: Andy Zeitlin, RWG Chair
Date: 12 / 11 / 2007

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-1: Using Unit Part Number Coding
Using Part Number Coding (Sample Part Number = 123-456-789-147

Table 19L-1a: Label 270: SEGMENT **0**
TCAS TO TRANSPONDER (Tx)
TX Coordination #1 Out Bus
TX Coordination #2 Out Bus

Bit	Function	Coding		RF Msg Bit	Notes
1	Label 1 st Digit (MSB)	2	1		
2	Label 1 st Digit (LSB)		0		
3	Label 2 nd Digit (MSB)	7	1		
4	Label 2 nd Digit		1		
5	Label 2 nd Digit (LSB)		1		
6	Label 3 rd Digit (MSB)	0	0		
7	Label 3 rd Digit		0		
8	Label 3 rd Digit (LSB)		0		
9	GICB 1 (MSB)	E	1		
10	GICB 1		1		[1]
11	GICB 1		1		
12	GICB 1 (LSB)		0		
13	GICB 2 (MSB)	5	0		
14	GICB 2		1		[1]
15	GICB 2		0		
16	GICB 2 (LSB)		1		
17	ACAS Unit Part Number Status		0 or 1	33	[2]
18	Format Type (MSB)	0	0	34	[3]
19	Format Type (LSB)		0	35	
20	Part Number Digit 1 (MSB)	1	0	36	
21	Part Number Digit 1		0	37	
22	Part Number Digit 1		0	38	
23	Part Number Digit 1 (LSB)		1	39	
24	Part Number Digit 2 (MSB)	2	0	40	
25	Segment Number Bit_0 (LSB)		0		
26	Segment Number Bit_1		0		
27	Segment Number Bit_2		0		
28	Segment Number Bit_3 (MSB)	0	0		
29	Continuation Bit		1		
30	Request/Delivery Bit		0		[4]
31	Pad		0		[4]
32	Parity		(Odd)		

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-1: Using Unit Part Number Coding
Using Part Number Coding (Sample Part Number = 123-456-789-147

Table 19L-1b: Label 270: SEGMENT **1**
TCAS TO TRANSPONDER (Tx)
TX Coordination #1 Out Bus
TX Coordination #2 Out Bus

Bit	Function	Coding		RF Msg Bit	Notes
1	Label 1 st Digit (MSB)	2	1		
2	Label 1 st Digit (LSB)		0		
3	Label 2 nd Digit (MSB)	7	1		
4	Label 2 nd Digit		1		
5	Label 2 nd Digit (LSB)		1		
6	Label 3 rd Digit (MSB)	0	0		
7	Label 3 rd Digit		0		
8	Label 3 rd Digit (LSB)		0		
9	Part Number Digit 2	2	1	41	
10	Part Number Digit 2		0	42	
11	Part Number Digit 2 (LSB)		0	43	
12	Part Number Digit 3 (MSB)	3	0	44	
13	Part Number Digit 3		0	45	
14	Part Number Digit 3		1	46	
15	Part Number Digit 3 (LSB)		1	47	
16	Part Number Digit 4 (MSB)	4	0	48	
17	Part Number Digit 4		1	49	
18	Part Number Digit 4		0	50	
19	Part Number Digit 4 (LSB)		0	51	
20	Part Number Digit 5 (MSB)	5	0	52	
21	Part Number Digit 5		1	53	
22	Part Number Digit 5		0	54	
23	Part Number Digit 5 (LSB)		1	55	
24	Part Number Digit 6 (MSB)	6	0	56	
25	Segment Number Bit_0 (LSB)		1		
26	Segment Number Bit_1		0		
27	Segment Number Bit_2		0		
28	Segment Number Bit_3 (MSB)	1	0		
29	Continuation Bit		1		
30	Request/Delivery Bit		0		[4]
31	Pad		0		[4]
32	Parity		(Odd)		

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-1: Using Unit Part Number Coding
Using Part Number Coding (Sample Part Number = 123-456-789-147

Table 19L-1c: Label 270: SEGMENT **2**
TCAS TO TRANSPONDER (Tx)
TX Coordination #1 Out Bus
TX Coordination #2 Out Bus

Bit	Function	Coding		RF Msg Bit	Notes
1	Label 1 st Digit (MSB)	2	1		
2	Label 1 st Digit (LSB)		0		
3	Label 2 nd Digit (MSB)	7	1		
4	Label 2 nd Digit		1		
5	Label 2 nd Digit (LSB)		1		
6	Label 3 rd Digit (MSB)	0	0		
7	Label 3 rd Digit		0		
8	Label 3 rd Digit (LSB)		0		
9	Part Number Digit 6	6	1	57	
10	Part Number Digit 6		1	58	
11	Part Number Digit 6 (LSB)		0	59	
12	Part Number Digit 7 (MSB)	7	0	60	
13	Part Number Digit 7		1	61	
14	Part Number Digit 7		1	62	
15	Part Number Digit 7 (LSB)		1	63	
16	Part Number Digit 8 (MSB)	8	1	64	
17	Part Number Digit 8		0	65	
18	Part Number Digit 8		0	66	
19	Part Number Digit 8 (LSB)		0	67	
20	Part Number Digit 9 (MSB)	9	1	68	
21	Part Number Digit 9		0	69	
22	Part Number Digit 9		0	70	
23	Part Number Digit 9 (LSB)		1	71	
24	Part Number Digit 10 (MSB)	1	0	72	
25	Segment Number Bit_0 (LSB)		0		
26	Segment Number Bit_1		1		
27	Segment Number Bit_2		0		
28	Segment Number Bit_3 (MSB)	2	0		
29	Continuation Bit		1		
30	Request/Delivery Bit		0		[4]
31	Pad		0		[4]
32	Parity		(Odd)		

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-1: Using Unit Part Number Coding
Using Part Number Coding (Sample Part Number = 123-456-789-147

Table 19L-1d: Label 270: SEGMENT **3**
TCAS TO TRANSPONDER (Tx)
TX Coordination #1 Out Bus
TX Coordination #2 Out Bus

Bit	Function	Coding		RF Msg Bit	Notes
1	Label 1 st Digit (MSB)	2	1		
2	Label 1 st Digit (LSB)		0		
3	Label 2 nd Digit (MSB)	7	1		
4	Label 2 nd Digit		1		
5	Label 2 nd Digit (LSB)		1		
6	Label 3 rd Digit (MSB)	0	0		
7	Label 3 rd Digit		0		
8	Label 3 rd Digit (LSB)		0		
9	Part Number Digit 10	1	0	73	
10	Part Number Digit 10		0	74	
11	Part Number Digit 10 (LSB)		1	75	
12	Part Number Digit 11 (MSB)	4	0	76	
13	Part Number Digit 11		1	77	
14	Part Number Digit 11		0	78	
15	Part Number Digit 11 (LSB)		0	79	
16	Part Number Digit 12 (MSB)	7	0	80	
17	Part Number Digit 12		1	81	
18	Part Number Digit 12		1	82	
19	Part Number Digit 12 (LSB)		1	83	
20	Reserved	0	0	84	
21	Reserved		0	85	
22	Reserved		0	86	
23	Reserved		0	87	
24	Reserved		0	88	
25	Segment Number Bit_0 (LSB)		1		
26	Segment Number Bit_1		1		
27	Segment Number Bit_2		0		
28	Segment Number Bit_3 (MSB)	3	0		
29	Continuation Bit		0		
30	Request/Delivery Bit		0		[4]
31	Pad		0		[4]
32	Parity		(Odd)		

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-2: Using Unit Character Coding
Using Character Coding (Sample Character Coding = AB-CDE-FGH)

Table 19L-2a: Label 270: SEGMENT **0**
TCAS TO TRANSPONDER (Tx)
TX Coordination #1 Out Bus
TX Coordination #2 Out Bus

Bit	Function	Coding		RF Msg Bit	Notes
1	Label 1 st Digit (MSB)	2	1		
2	Label 1 st Digit (LSB)		0		
3	Label 2 nd Digit (MSB)	7	1		
4	Label 2 nd Digit		1		
5	Label 2 nd Digit (LSB)		1		
6	Label 3 rd Digit (MSB)	0	0		
7	Label 3 rd Digit		0		
8	Label 3 rd Digit (LSB)		0		
9	GICB 1 (MSB)	E	1		
10	GICB 1		1		[1]
11	GICB 1		1		
12	GICB 1 (LSB)		0		
13	GICB 2 (MSB)	5	0		
14	GICB 2		1		[1]
15	GICB 2		0		
16	GICB 2 (LSB)		1		
17	ACAS Unit Part Number Status		0 or 1	33	[2]
18	Format Type (MSB)	1	0	34	[3]
19	Format Type (LSB)		1	35	
20	Character 1 (MSB)	A	0	36	
21	Character 1		0	37	
22	Character 1		0	38	
23	Character 1		0	39	
24	Character 1		0	40	
25	Segment Number Bit_0 (LSB)		0		
26	Segment Number Bit_1		0		
27	Segment Number Bit_2		0		
28	Segment Number Bit_3 (MSB)	0	0		
29	Continuation Bit		1		
30	Request/Delivery Bit		0		[4]
31	Pad		0		[4]
32	Parity		(Odd)		

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-2: Using Unit Character Coding
Using Character Coding (Sample Character Coding = AB-CDE-FGH)

Table 19L-2b: Label 270: SEGMENT **1**
TCAS TO TRANSPONDER (Tx)
TX Coordination #1 Out Bus
TX Coordination #2 Out Bus

Bit	Function	Coding		RF Msg Bit	Notes
1	Label 1 st Digit (MSB)	2	1		
2	Label 1 st Digit (LSB)		0		
3	Label 2 nd Digit (MSB)	7	1		
4	Label 2 nd Digit		1		
5	Label 2 nd Digit (LSB)		1		
6	Label 3 rd Digit (MSB)	0	0		
7	Label 3 rd Digit		0		
8	Label 3 rd Digit (LSB)		0		
9	Character 1 (LSB)	A	1	41	
10	Character 2 (MSB)	B	0	42	
11	Character 2		0	43	
12	Character 2		0	44	
13	Character 2		0	45	
14	Character 2		1	46	
15	Character 2 (LSB)		0	47	
16	Character 3 (MSB)	C	0	48	
17	Character 3		0	49	
18	Character 3		0	50	
19	Character 3		0	51	
20	Character 3		1	52	
21	Character 3 (LSB)		1	53	
22	Character 4 (MSB)	D	0	54	
23	Character 4		0	55	
24	Character 4		0	56	
25	Segment Number Bit_0 (LSB)		1		
26	Segment Number Bit_1		0		
27	Segment Number Bit_2		0		
28	Segment Number Bit_3 (MSB)	1	0		
29	Continuation Bit		1		
30	Request/Delivery Bit		0		[4]
31	Pad		0		[4]
32	Parity		(Odd)		

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-2: Using Unit Character Coding
Using Character Coding (Sample Character Coding = AB-CDE-FGH)

Table 19L-2c: Label 270: SEGMENT **2**
TCAS TO TRANSPONDER (Tx)
TX Coordination #1 Out Bus
TX Coordination #2 Out Bus

Bit	Function	Coding		RF Msg Bit	Notes
1	Label 1 st Digit (MSB)	2	1		
2	Label 1 st Digit (LSB)		0		
3	Label 2 nd Digit (MSB)	7	1		
4	Label 2 nd Digit		1		
5	Label 2 nd Digit (LSB)		1		
6	Label 3 rd Digit (MSB)	0	0		
7	Label 3 rd Digit		0		
8	Label 3 rd Digit (LSB)		0		
9	Character 4	D	1	57	
10	Character 4		0	58	
11	Character 4 (LSB)		0	59	
12	Character 5 (MSB)	E	0	60	
13	Character 5		0	61	
14	Character 5		0	62	
15	Character 5		1	63	
16	Character 5		0	64	
17	Character 5 (LSB)		1	65	
18	Character 6 (MSB)	F	0	66	
19	Character 6		0	67	
20	Character 6		0	68	
21	Character 6		1	69	
22	Character 6		1	70	
23	Character 6 (LSB)		0	71	
24	Character 7 (MSB)	G	0	72	
25	Segment Number Bit_0 (LSB)		0		
26	Segment Number Bit_1		1		
27	Segment Number Bit_2		0		
28	Segment Number Bit_3 (MSB)	2	0		
29	Continuation Bit		1		
30	Request/Delivery Bit		0		[4]
31	Pad		0		[4]
32	Parity		(Odd)		

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-2: Using Unit Character Coding
Using Character Coding (Sample Character Coding = AB-CDE-FGH)

Table 19L-2d: Label 270: SEGMENT **3**
TCAS TO TRANSPONDER (Tx)
TX Coordination #1 Out Bus
TX Coordination #2 Out Bus

Bit	Function	Coding		RF Msg Bit	Notes
1	Label 1 st Digit (MSB)	2	1		
2	Label 1 st Digit (LSB)		0		
3	Label 2 nd Digit (MSB)	7	1		
4	Label 2 nd Digit		1		
5	Label 2 nd Digit (LSB)		1		
6	Label 3 rd Digit (MSB)	0	0		
7	Label 3 rd Digit		0		
8	Label 3 rd Digit (LSB)		0		
9	Character 7	G	0	73	
10	Character 7		0	74	
11	Character 7		1	75	
12	Character 7		1	76	
13	Character 7 (LSB)		1	77	
14	Character 8 (MSB)	H	0	78	
15	Character 8		0	79	
16	Character 8		1	80	
17	Character 8		0	81	
18	Character 8		0	82	
19	Character 8 (LSB)		0	83	
20	Reserved	0	0	84	
21	Reserved		0	85	
22	Reserved		0	86	
23	Reserved		0	87	
24	Reserved		0	88	
25	Segment Number Bit_0 (LSB)		1		
26	Segment Number Bit_1		1		
27	Segment Number Bit_2		0		
28	Segment Number Bit_3 (MSB)	3	0		
29	Continuation Bit		0		
30	Request/Delivery Bit		0		[4]
31	Pad		0		[4]
32	Parity		(Odd)		

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-3: Using Software Part Number Coding
Using Part Number Coding (Sample Part Number = 123-456-789-147

Encoding of the "270" Words for transfer of the Software Part Number using Part Number Coding proceeds exactly as for transfer of the Unit Part Number using Part Number Coding as defined in Attachment L-1 with the following exception:

The GICB1__GICB2 encoding in Segment "**0**" shall be set to "**E6**" hex ("1110 0110" binary).

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT
Attachment L-4: Using Software Character Coding
Using Character Coding (Sample Part Number = 123-456-789-147

Encoding of the "270" Words for transfer of the Software Part Number using Character Coding proceeds exactly as for transfer of the Unit Part Number using Character Coding as defined in Attachment L-2 with the following exception:

The GICB1__GICB2 encoding in Segment "**0**" shall be set to "**E6**" hex ("1110 0110" binary).

ATTACHMENT 19L
TCAS TO TRANSPONDER (TX) ACAS UNIT and SOFTWARE PART NUMBER
RTCA/DO-185B COMPATIBLE EQUIPMENT

The following notes apply equivalently to Attachments L-1 –through- L-4.

NOTES:

[1]. For the ACAS Unit Part Number, Segment 0, the GICB Register or Buffer Number is equivalent to the BDS register in which the data should be stored in the transponder.

[2]. ACAS Unit Part Number Status:0 = INVALID, 1 = VALID

[3]. Format Type Coding:

Format Type Coding		
Bit 2	**Bit 3**	**Meaning**
0	0	Part Number (P/N) Coding
0	1	Character Coding
1	0	Reserved
1	1	Reserved

1). When available it is recommended to use the part number.

P/N Digits are BCD encoded. Digit 1 is the first left digit of the part number.

2). If the part number is not available, the first 8 characters of the commercial name can be used with the format type "01".

3). If format type "01" is used, the coding of character 1 to 8 shall be as defined in Table 3-7 of Chapter 3, ICAO Annex 10, Volume IV. Character 1 is the first left character of the ACAS unit type.

4). For operational reasons, some military installations may not implement this format.

[4]. The "SSM" field is not required for the TGD protocol since it is assumed that the data being sent to the Transponder is valid; otherwise, the TCAS should not be sending it.