Range Commanders Council

IRIG STANDARD 216-02

Telecommunications and Timing Group

ASYNCHRONOUS ASCII
COMPOSITE COUNT DATA FORMAT

WHITE SANDS MISSILE RANGE
REAGAN TEST SITE
YUMA PROVING GROUND
DUGWAY PROVING GROUND
ABERDEEN TEST CENTER
NATIONAL TRAINING CENTER

ATLANTIC FLEET WEAPONS TRAINING FACILITY
NAVAL AIR WARFARE CENTER WEAPONS DIVISON
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July 2002

Prepared by

**TELECOMMUNICATIONS AND TIMING GROUP
RANGE COMMANDERS COUNCIL**

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ACRONYMS

Term	Meaning
ALT	Actual launch time
ASCII	American Standard Code for Information Interchange
COTS	Commercial off-the-shelf
IRIG	Inter-Range Instrumentation Group
Kbps	Kilo Bits Per Second
L-Count	Launch Count
MDU	Message Display Unit
PLT	Predicted launch time
T-Count	Terminal Count
T = 0	Terminal count equal to zero
UTC	Universal Coordinated Time

1.0   <u>General Description of Standard</u>

This standard describes an American Standard Code for Information Interchange (ASCII) count data format used to transfer count data (See appendix A) over conventional asynchronous telecommunications circuits. This standard provides formats for count data information suitable for commercial-off-the-shelf (COTS) message display units (MDUs).

2.0   <u>General Description of Format</u>

The IRIG standard supports range composite count data transfer for data processing equipment and for static and dynamic, alphanumeric messaging. This range composite count data provides all pertinent data related to normal range operations. The user would be able to uniquely address several MDUs to correspond with mission static and dynamic count data. This format allows alphanumeric messages to a maximum length of 24 ASCII characters.

The IRIG standard is the composite count data format listed below. The ASCII expression for this format is

<STX>AN<ADRS>TEXT#<NUMBER>[<ATTRIBUTE>]=<DATA> <ETX>

The options identified below may be deleted and an abbreviated form may be used.

<STX><ADRS><DATA><ETX>

where

<STX>	= start-of-text character
AN	= ASCII text string (Optional)
<ADRS>	= 3-digit ASCII number unit address of the MDU that will receive the text message
TEXT#	= ASCII text string TEXT# (Optional)
<NUMBER>	= 2-digit ASCII number identification number assigned to the text for multiple message storage in the MDU for later selection and display. (Optional)
[	= ASCII character [(Optional)
<ATTRIBUTE>	= either the ASCII string NORMAL, BLINK or SCROLL. Default is NORMAL for the MDU. (Optional)
]	= ASCII character] (Optional)
=	= ASCII character = (Optional)
<DATA>	= 0 to 24 character text to be displayed
<ETX>	= ASCII end-of-text character

The format is not limited to 12 characters as might be implied by the table presentation. The format allows up to 24 character messages. An example COTS MDU presents 12 characters and is readily available from manufacturers of time and count information equipment.

Table 1 lists the elements of the composite count data format assignments. Addresses 001 through 128 are assigned to dynamic data messages. Addresses 035 through 128 are available for future use. Addresses 129 through 255 are assigned to static data messages. Addresses 162 through 253 are available for future use. All other addresses are reserved. The terms used in Table 1 are

S/N	=	ASCII synchronize character (hex 16)
S/X	=	ASCII start of text character (hex 02)
E/X	=	ASCII end of text character (hex 03).
X	=	Characters to ignore
b̶	=	Blank space
x	=	Either a zero or a one
D_{100}	=	Hundreds of days
D_{10}	=	Tens of days
D_1	=	Units of days
H_{10}	=	Tens of hours
M_{100}	=	Hundreds of minutes
M_{10}	=	Tens of minutes
M_1	=	Units of minutes
S_{10K}	=	Tens of thousands of seconds
S_{1K}	=	Thousands of seconds
S_{100}	=	Hundreds of seconds
S_{10}	=	Tens of seconds
S_1	=	Units of seconds
$S_{1/10}$	=	Tenths of seconds
$S_{1/100}$	=	Hundredths of seconds
$S_{1/1K}$	=	Milliseconds

Message	Address (dec)	Address (hex)	Message Content
UTC	001	0000 0001	$^S/_X$AN001TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
PLT UTC of T=0 (12 characters) (16 characters)	002	0000 0010	$^S/_X$AN002TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$ $^S/_X$AN002TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$.S$_{1/10}$S$_{1/100}$S$_{1/K}$S$/_X$
L-Count Time until T=0	003	0000 0011	$^S/_X$AN003TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
T-Count (W missile count) (day/hr/min/sec)	004	0000 0100	$^S/_X$AN004TEXT#0x=$\pm$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
T-Count (W missile count) (min/sec)	005	0000 0101	$^S/_X$AN005TEXT#0x=$\pm$ƀƀƀƀƀ$\pm$ M$_{100}$M$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
T-Count (W missile count) (sec)	006	0000 0110	$^S/_X$AN006TEXT#0x=$\pm$ƀƀƀƀƀ$\pm$ S$_{100K}$S$_{10K}$S$_{1K}$S$_{100}$S$_{10}$ S$_1$$^E/_X$
ALT first motion	007	0000 0111	$^S/_X$AN007TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Time in hold	020	0001 0100	$^S/_X$AN020TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Time until restart	021	0001 0101	$^S/_X$AN021TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Total holdtime	022	0001 0110	$^S/_X$AN022TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Holdtime used	023	0001 0111	$^S/_X$AN023TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Holdtime Remaining (Available)	024	0001 1000	$^S/_X$AN024TEXT#0x=$\pm$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Window used	025	0001 1001	$^S/_X$AN025TEXT#0x=$\pm$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Window remaining	026	0001 1010	$^S/_X$AN026TEXT#0x=$\pm$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Start of Window	029	0001 1101	$^S/_X$AN029TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
End of Window	030	0001 1110	$^S/_X$AN030TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Functional Time	031	0001 1111	$^S/_X$AN031TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Local Time of year	032	0010 0000	$^S/_X$AN032TEXT#0x=D$_{100}$D$_{10}$D$_1$ƀH$_{10}$H$_1$ƀM$_{10}$M$_1$ƀS$_{10}$S$_1$$^E/_X$
Operation number	033	0010 0001	$^S/_X$AN033TEXT#0x=OPƀNOƀANNNNNƀ$^E/_X$

TABLE 1. IRIG CS – 6X COMPOSITE COUNT DATA FORMAT ASSIGNMENT

Local Time Label	160	1010 0000	LOCAL TIME
UTC of Start of Operation	034	0010 0010	$^S/_X$ AN034TEXT#0x=$D_{100}D_{10}D_1$♭$H_{10}H_1$♭$M_{10}M_1$♭$S_{10}S_1$ $^E/_X$
Future use	035 -128	0010 0011	$^S/_X$ AN035TEXT#0x=$D_{100}D_{10}D_1$♭$H_{10}H_1$♭$M_{10}M_1$♭$S_{10}S_1$ $^E/_X$
UTC label	129	1000 0001	UTC
UTC of T=0 label	130	1000 0010	UTC OF T-0
L count label	131	1000 0011	L COUNT
T count label	132	1000 0100	T COUNT
W count label	133	1000 0101	W COUNT
First motion label	134	1000 0110	FIRST MOTION
W broach label	135	1000 0111	W BROACH
X count label	136	1000 1000	X COUNT
X broach label	139	1000 1011	X BROACH
Y count label	141	1000 1101	Y COUNT
Y broach label	143	1000 1111	Y BROACH
Z count label	145	1001 0001	Z COUNT
Z broach label	147	1001 0011	Z BROACH
Time in hold label	148	1001 0100	TIME IN HOLD
Restart label	149	1001 0101	RESTART IN
Total holdtime label	150	1001 0110	TOTAL HOLD
Holdtime used label	151	1001 0111	HTU
Holdtime remaining label	152	1001 1000	HTA
Window used label	153	1001 1001	WINDOW USED
Window remaining label	154	1001 1010	WINDOW LEFT
Start of Holdfire label	155	1001 1011	START OF HOLD
UTC of Restart label	156	1001 1100	UTC RESTART
Start of Window label	157	1001 1101	START WINDOW
End of Window label	158	1001 1110	END WINDOW
Functional Time label	159	1001 1111	FUNCTIONAL

Local Time Label	160	1010 0000	LOCAL TIME
UTC of Start of Operation Label	161	1010 0001	OP STARTS AT
Future Use	162-253		
Display Test	254	1111 1110	*8*8*8*8*8*8 or 8*8*8*8*8*8*
Status	255	1111 1111	current status message

3.0   Word Description

Each ASCII word (character position) contains exactly 10 bits.

b_0 = start bit

b_1 = 7 bit sequence for ASCII character (lsb first)

b_s = odd parity bit

b_9 = stop bit

4.0   Parity

This standard employs ODD parity only.

5.0   Data Rate

This standard employs up to 19.2 kilo bits per second (Kbps).

6.0   IRIG CS – 6x Format Designation Description

Specifying x in the IRIG CS-6x can uniquely describe the IRIG CS format and data rate.

Where

x   =   1 for 4800 bit per second

=   2 for 9600 bits per second

=   3 for 19,200 bits per second

APPENDIX A

TYPES OF COUNT DATA
AND COUNT DATA TERMS AND DEFINITIONS

TABLE A – 1. TYPES OF COUNT DATA		
Count Clocks	**Count Status Data**	**Count Events** (UTC value)
UTC Time of Year	Operation Number	Launch Time (LT)
Local Time of Year	Mission Number	Predicted Launch Time (PLT)
Count	Sup-Op Identifier	Actual Launch Time (ALT)
Countdown, a.k.a. Minus Count	Sign: Minus (-), Plus (+), Space Implies "+"	Time of Vehicle First Motion (TVFM)
Terminal Count (T-Count) Pad Count	Count Status, a.k.a. Hold Status	Sea Launch Broach Time

Launch Count (L-Count) Range Count	Hold ASCII "H"
	  Recycle ASCII "R"
	  Counting ASCII Space Character
		First Motion Time Decoder (FMTD)

Plus Count, a.k.a. Count Up	Hold the Minus Count (H-)	UTC of Start of Operation
Terminal Plus Count (T+Count) Range Count	Hold the Plus Count (+)	UTC of Operation Resumption

Elapsed Holdtime Used	Launch Time Information (LTI) P/A
	    Predicted ASCII "P"
	    Actual ASCII "A"
		UTC of End of Operation

Current Holdtime used	First Motion, a.k.a. Lift-Off, Fire Event, Broach Event, Missile Lift-Off, Ignition, FM Indication	UTC of Window Close
Time Remaining in Current Hold	Simulated First Motion	UTC of Window Open
Hold Time Remaining	Standby	
Window Time Used	End of Operation	
Window Time Remaining	Operation will Resume	
Functional Time	Clear	
Functional Count (F-Count)	Operation will Start	
Datum time (arbitrary countdown or plus count) a.k.a. Datum Count	Test (test pattern for transmission link test)	
Event Count	Operation has Terminated	
Mission Count (M-Count)	Labels for Data Displayed	

Type[1] Label		Term	Definitions
TABLE A – 2. COUNT DATA TERMS AND DEFINITIONS			
E	ALT	Actual launch time	Defined in IRIG 215-96, CS-524z format as the UTC time the plus count started.
S		Broach	Sea-based launch first motion event, missile breaking the water surface, or telemetry signal strength above threshold.
S		Clear	Mission or operation support has ended.
		Clock	1. An instrument other than a watch for measuring or indicating time, esp. … one with a digital display. 2. A time clock[2].
C		Count	The time to/from an epoch or event
C	CD	Countdown	1. The act or process of counting backwards from an arbitrary starting number to show the amount of time remaining before a scheduled event or operation, as the launch of a space vehicle[2].
S		Count Status	Counting or Holding may recycle during hold. Existing state of the count, i.e. proceeding, hold, recycling to new discontinuous value.
C		Count Up	See Plus Count
C		Current Holdtime Used	Accumulated time in current Hold
C		Current Hold Holdtime Used	See Current Holdtime Used
C		Datum Count	Count to/from arbitrary future event. Examples: countdown to separation, staging, or intercept.
C		Datum Time	See datum count
C		Elapsed Holdtime Used	Accumulated time of time in Holds
S		End of Operation	Self explanatory
		Epoch	3. *Astron*. An instant in time arbitrarily selected as a point of reference[2].
C	EC	Event Count	Countdown or plus count, including delimiters, contained in the IRIG CS-524z format word positions 3 through 17.
S	F+	Fire Event	Defined in IRIG 203-64, A Test Zero to be accompanied by a Plus Count, which recycles when Lift Event occurs. This event shall be defined by the launch range for each operation: e.g., Fire event will be manually initiated upon visual observation of the first flame of the test vehicle motor.
S	FM	First Motion	Vehicle moves a defined distance. Same as MLO
S	FMI	First Motion Indication	Contact closure or continuity break, through which a signal passes to indicate first motion.
E	FMTD	First Motion Time Decoder	The equipment at the control center end of the sea-based launch broach indication.
C	F-Count	Functional Count	The time remaining until the window closes.
S		Hold Status	Counting or Holding, may recycle during hold.

S	H-	Hold the Minus Count	Stop the countdown.
S		Hold the Plus Count	Stop the count. Usually indicates end of the mission count.
C		Hold Time Remaining	Sum of all unused portions of planned Holds.
S		Ignition	Signal to ignite a rocket motor, or beginning of chemical reaction
S		Label(s)	Description of count data displayed.
E	LT	Launch Time	Defined in IRIG 215-96 as UTC of the program specific event that starts the plus count.
S	LTI	Launch Time Information	Before launch time is predicted (P), after LT is actual (A).
C	L-Count	Launch Count	The anticipated time to the launch event, or start of the plus count; increments during planned holds and may increment during unplanned Holds.
S	LO	Lift-off	Missile moves a defined distance. Same as FM.
C		Local Time	See Local TOY
C	Local TOY	Local Time of Year	UTC adjusted days and hours to show selected time zone local time.
C		Minus count	See countdown
S	MLO	Missile Lift-off	Missile moves a defined distance. Same as FM.
C	M-Count	Mission Count	Countdown to the termination of the mission or to the end-of-mission epoch.
S		Mission Number	See Operation Number
N		Operation has Terminated	Self explanatory
S	OpNo	Operation Number	A unique identifier assigned to an operation or mission.
S		Operation will Resume	Self explanatory
S		Operation will Start	Self explanatory
C		Pad Count	See terminal count
C		Plus Count	The ascending count starting at the launch time event.
E	PLT	Predicted Launch Time	Defined in IRIG 215-96 as the planned time to start the plus count. The expected UTC time of the terminal countdown equaling zero.
S	P/A	Predicted/Actual	Defined in IRIG 215-96, CS-513z character Wp 36 and CS-524z character Wp **38** indicates launch time information.
E		Resume Count at UTC	See UTC of operation resumption
E		Sea Launch Broach Time	UTC of vehicle immerging from the water.
S		Sign	Minus (-), plus (+), space implies "+"

S		Simulated First Motion	See Simulated Lift-Off
S		Simulated Lift-Off	Provides for system checkout of first motion distribution systems. Pseudo MLO or FM. Commonly used for simulated operations.
S		Standby	Operation count(s) is (are) holding pending continuation decision.
E		Start Operation at Time	See UTC of Start of Operation
S		Sub-Op identifier	Secondary operation number, for example: W, X, Y, & Z.
C	T-Count	Terminal Count	The program processing time to the launch event, or start of the plus count. Does not increment during holds. AKA Pad Count.
C	T+Count	Terminal Plus Count	The Range Plus Count
		Time	1. Time of year of an epoch or event. 2. The elapsed time from an epoch or event. 3. The countdown time to/from an epoch or event[2].
C	TOY	Time of Year	Day of year, time of day.
C		Time Remaining in Current Hold	Self-Explanatory
E	TVFM	Time of Vehicle First Motion	Time of year when First Motion (FM) occurs.
E	UTC of T=0	UTC of T=zero	UTC when terminal count is equal to zero.
E	E+	UTC of End of Operation	Self explanatory
E		UTC of Operation Resumption	Self explanatory
E	S-	UTC of Start of Operation	Self explanatory
E		UTC of Window Close	Self explanatory
E		UTC of Window Open	Self explanatory
	UTC	Universal Coordinated Time	A coordinated time scale maintained by the Bureau International des Poids et Mesures (BIPM), which forms the basis of a coordinated dissemination of standard frequencies and time signals.
C		Window Time Remaining	Difference between current T-0 time and time at the end of the window
C		Window Time Used	Difference between initial T-0 time and current T-0 time Restated: Window Time Used = current PLT - initial PLT
		Window	Time period during which the vehicle can launch and meet mission objectives.

Note 1: The types of Count Data are identified C for Count Clocks, S for Count Status Data, N for not applicable and E for Count Events (UTC value).

Note 2: Definition from Webster's II New Riverside University Dictionary, copyright 1988, ISBN 0-395-33957-X.