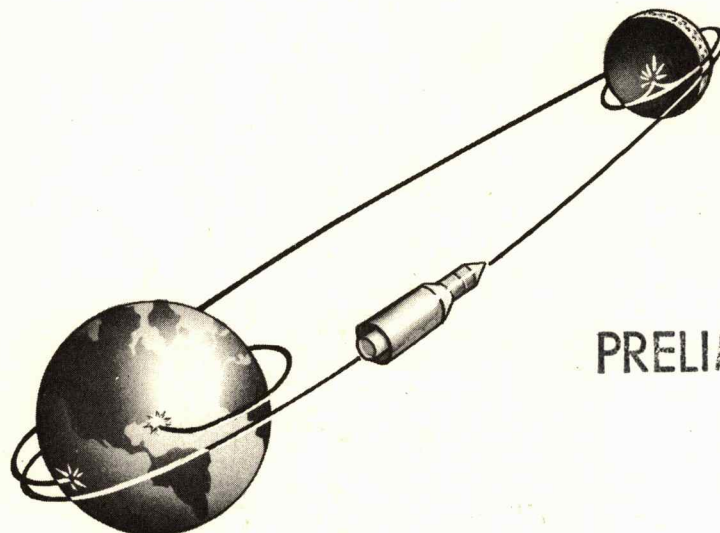


APOLLO

INTERFACE

65ICD9304

OCT - 7 1970



PRELIMINARY ISSUE

FOR NASA
APPROVAL

**MSFC/KSC
INTERFACE CONTROL DOCUMENT
DEFINITION OF ELECTRICAL INTERFACE
SATURN IB**

**100 DAY TYPE I
COUNT CLOCK SYSTEM/KSC TIMING**

PREPARED BY:

**GENERAL ELECTRIC COMPANY
APOLLO SYSTEMS
HUNTSVILLE, ALABAMA**

PREPARED FOR:

**ELECTRICAL SYSTEMS BRANCH
SYSTEMS DIVISION
ASTRONICS LABORATORY
MARSHALL SPACE FLIGHT CENTER**

**EFFECTIVE ON: LC-39/AS-206
& SUBSEQUENT**

**NAS8-25155
LINE ITEM NO.
DRL 192**

National Aeronautics and Space Administration



EFFECTIVE ON: LC-39/AS-206 &
SUBSEQUENT

MSFC/KSC
INTERFACE CONTROL DOCUMENT

65ICD9304

DEFINITION OF ELECTRICAL INTERFACE

SATURN IB 100 DAY TYPE I

COUNT CLOCK SYSTEM TO

KSC TIMING

D						
C						
B						
A						
ORIG.						
SYM	NAME	DATE	NAME	DATE	NAME	DATE
	MSC		KSC		MSFC	

APPROVAL

REPOSITORY:

THE GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PREPARED FOR:

LAUNCH OPERATIONS ELECTRICAL SUB-PANEL

PANEL

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APOLLO INTER-CENTER INTERFACE CONTROL DOCUMENT

EFFECTIVE ON: LC-39/AS-206 &
SUBSEQUENT

MSFC/KSC
INTERFACE CONTROL DOCUMENT

65ICD9304

DEFINITION OF ELECTRICAL INTERFACE

SATURN IB 100 DAY TYPE I

COUNT CLOCK SYSTEM TO

KSC TIMING

NOTE: SIGNATURES ON THIS SHEET SIGNIFY TECHNICAL CONCURRENCE
ONLY AND DO NOT CONSTITUTE DOCUMENT APPROVAL.

E							
D							
C							
B							
A							
ORIG	<i>M. Q. Langston</i>	<i>10/5/70</i>	<i>L. A. V. Heston</i>	<i>10/6/70</i>			
SYM	GENERAL ELECTRIC ENGINEERING SERVICES - ICD		GENERAL ELECTRIC DESIGN CONCURRENCE		NASA CONCURRENCE		NASA CONCURRENCE
	NAME	DATE	NAME	DATE	NAME	DATE	DATE

PREPARED BY:

GENERAL ELECTRIC COMPANY
APOLLO SYSTEMS, HUNTSVILLE PROGRAMS
HUNTSVILLE, ALABAMA

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INTERFACE CONTROL DOCUMENT

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	KSC				
CONN	MSFC	CABLE	CONNECTS	LOCATION	
NO.	CONN	CONN	WITH		
1	1372A1J13	UNKNOWN <i>INS-G14J3</i>	MILA	LCC	PAGE 16
2	1254A1J14	UNKNOWN <i>INS-G14J4</i>	MILA	LCC	PAGE 19

MSFC/KSC
INTERFACE CONTROL DOCUMENT
DEFINITION OF ELECTRICAL INTERFACE
SATURN IB 100 DAY TYPE I
COUNT CLOCK SYSTEM TO
KSC TIMING

I. CHANGE HISTORY

AS REQUIREMENTS CHANGE, APPROVED CHANGES WILL BE ISSUED AGAINST THIS DOCUMENT. REQUESTS FOR CHANGES OR QUESTIONS PERTAINING TO THIS DOCUMENT SHOULD BE DIRECTED TO THE LAUNCH OPERATIONS ELECTRICAL SUB-PANEL.

THIS ICD ALSO INCLUDES A HISTORICAL RECORD OF ICD REVISION/IRN BASELINE AT TIME OF LAUNCH. SEE PAGE 2.

HISTORICAL RECORD OF ICD REVISION/IRN BASELINE AT TIME OF LAUNCH

HISTORICAL RECORD OF ICD REVISION/IRN BASELINE AT TIME OF LAUNCH															
NON-INCORPORATED IRN's															
REVISION															
LAUNCH DATE															
EFFECTIVITY: SC LV															
	206														

II. INTRODUCTION

THE PURPOSE OF THIS DOCUMENT IS TO ESTABLISH AND DEFINE THE CONNECTOR TYPES, CONNECTOR NUMBERS, PIN FUNCTIONS AND OTHER REQUIREMENTS PERTAINING TO THE SATURN IB COUNT CLOCK SYSTEM TO KSC TIMING ELECTRICAL INTERFACE. SPECIAL REQUIREMENTS AND RESTRICTIONS DEFINED IN THIS DOCUMENT SHALL BE IMPOSED BY BOTH KENNEDY SPACE CENTER AND MARSHALL SPACE FLIGHT CENTER TO ENSURE COMPATIBLE ELECTRICAL MATING AND PROPER SYSTEM PERFORMANCE.

III. TERMINOLOGY

AN EXPLANATION OF THE TERMINOLOGY USED IN THE BODY OF THIS DOCUMENT IS PRESENTED IN THE FOLLOWING PARAGRAPHS:

PN - PIN DESIGNATION

THIS IDENTIFIES THE PIN TO WHICH THE INTERFACE SIGNAL IS ASSIGNED AND DEFINES BOTH ENDS OF THE CABLE ASSOCIATED WITH THE INTERFACE CONNECTOR.

III. TERMINOLOGY - CONTINUED

F - FUNCTION

CLASSIFIES THE TYPE OF SIGNAL AS FOLLOWS:

C - COMMAND

H - SHIELD

M - MEASUREMENT

S - SUPPLY

TITLE

TITLE BRIEFLY STATES THE PURPOSE AND NEED FOR THE SIGNAL.

LOGIC 1 - LOGIC ONE

DEFINES THE CONDITION AND SPECIFIES THE MAXIMUM ALLOWABLE
TOLERANCE OF A LOGIC ONE OUTPUT.

LOGIC 0 - LOGIC ZERO

DEFINES THE CONDITION AND SPECIFIES THE MAXIMUM ALLOWABLE
TOLERANCE OF A LOGIC ZERO OUTPUT.

III. TERMINOLOGY - CONTINUED

MAX DRIVE - MAXIMUM DRIVE

THIS SPECIFIES EITHER THE LOAD CURRENT OR RESISTANCE VALUE.

REMARKS

PROVIDES ADDITIONAL INFORMATION OR REFERS TO NOTE NUMBERS
THAT ARE LISTED IN PARAGRAPH V OF THIS DOCUMENT.

EFFEC - EFFECTIVITY

BLANK	VEHICLE EFFECTIVITY OF DOCUMENT
8	VEHICLE EFFECTIVITY AGAINST AS-208 ONLY
6, 8, 10	VEHICLE EFFECTIVITY AGAINST AS-206, AS-208 AND AS-210 ONLY
8 - 10	VEHICLE EFFECTIVITY AGAINST AS-208, AS-209 AND AS-210 ONLY
8 SUBS	VEHICLE EFFECTIVITY AGAINST AS-208 AND SUBSEQUENT

IRN - INTERFACE REVISION NOTICE

REFERS TO THE IRN NUMBER BY WHICH THE SIGNAL WAS CHANGED, ADDED
OR DELETED.


IV. ABBREVIATIONS

THE FOLLOWING IS A LIST OF ABBREVIATIONS USED IN THIS DOCUMENT WHICH ARE NOT LISTED IN OR IN AGREEMENT WITH MSFC-STD-350A OR MIL-STD-12C:

CCS	-	Count Clock System
DUR	-	Duration
IRIG	-	Inter Range Instrumentation Group
MA	-	Milliamps
MILA	-	Merritt Island Launch Area
MS	-	Milliseconds
PPS	-	Pulse Per Second
TBD	-	To Be Determined
V	-	Volt

V. NOTES

1. POSITIVE GOING EDGE IS COHERENT WITH TIME DATA.

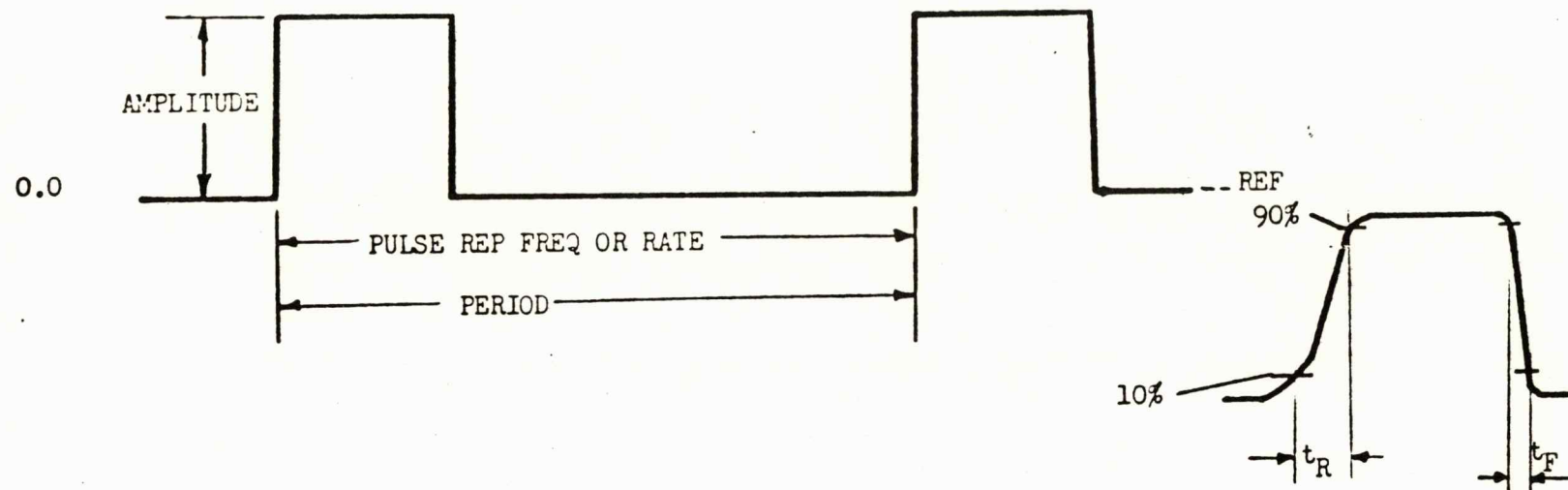
2.  SEE PAGES 8, 9, 10, 11 AND 12 FOR TIMING SIGNAL CHARACTERISTICS.

3. AUTOMATIC IS DEFINED AS A LOGIC ONE.

4. CONTROLLED 1PPS DOES NOT EXIST DURING HOLD. DUTY CYCLE IS 0.5 PER CENT.

2.

TIMING SIGNAL CHARACTERISTICS AND FORMAT

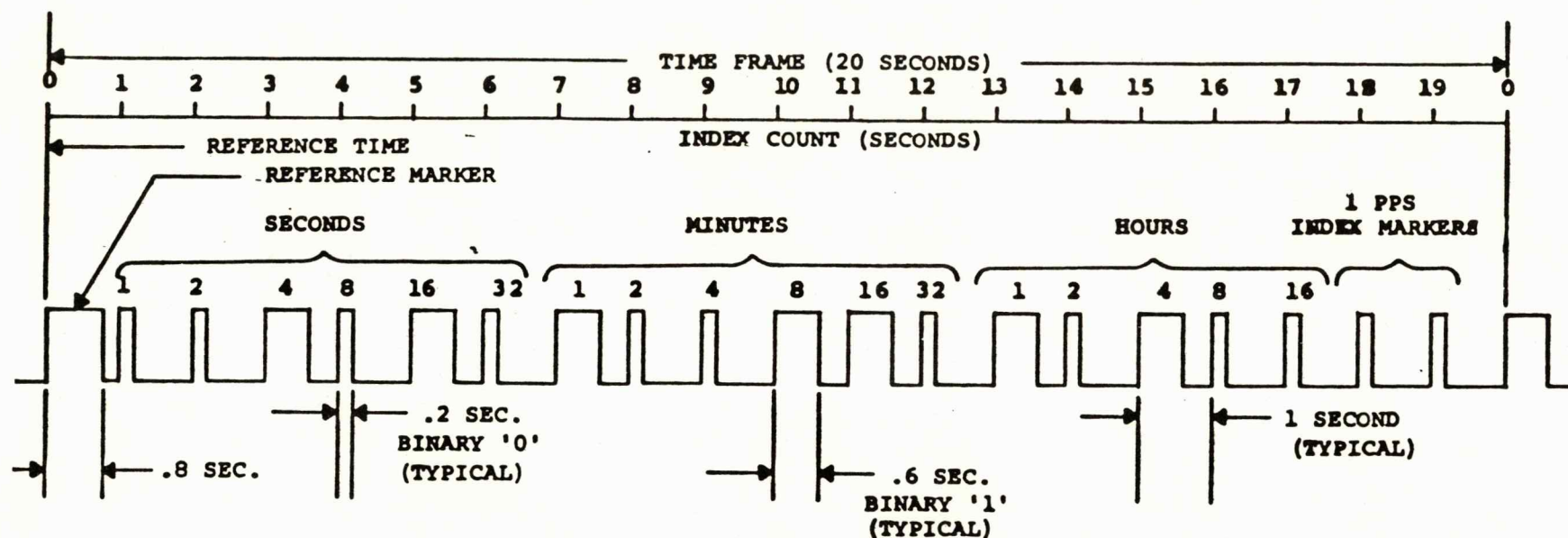


RISE TIME & FALL TIME

PULSE REP FREQ OR RATE	1 PPS	100 PPS	2 000 PPS
WAVEFORM	SQUARE WAVE	SQUARE WAVE	SQUARE WAVE
AMPLITUDE	0 \rightarrow -8V \pm 1V	0 \rightarrow -3V \pm 1V	0 \rightarrow -8V \pm 1V
DUTY CYCLE	50%	50%	40%
RISE TIME t_R	$\leq 5 \mu s$	$\leq 5 \mu s$	$\leq 5 \mu s$
FALL TIME t_F	$\leq 5 \mu s$	$\leq 5 \mu s$	$\leq 5 \mu s$
PERIOD 1/PRF	1 SEC	10 ms	0.5 ms

2.

- CONTINUED



The AMR B-1 Time Code is a 17-digit width modulated code. The code is composed of a Reference Marker, three sub-code words of seconds, minutes and hours and index markers. Each sub-code word is weighted in binary fashion.

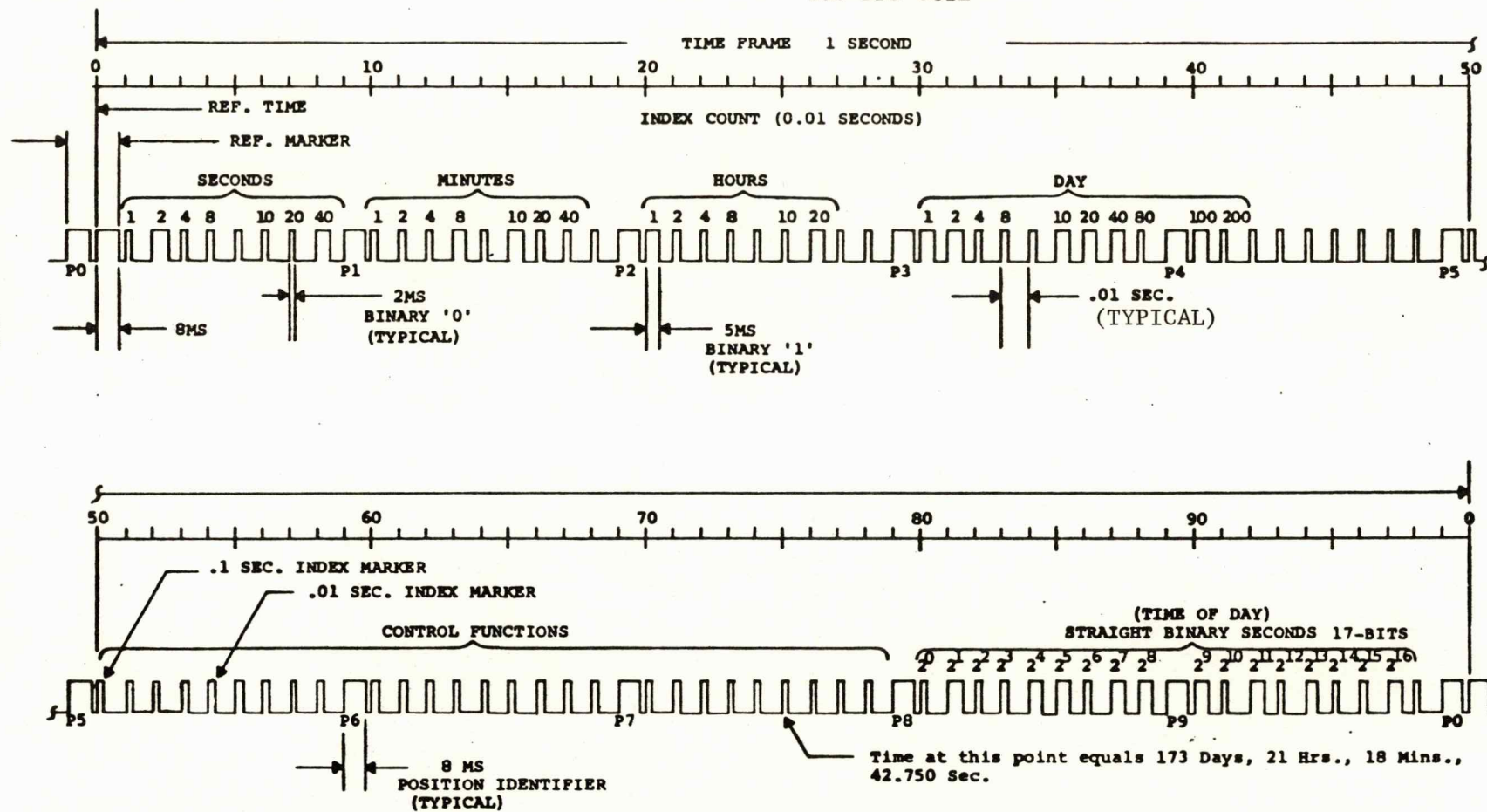
The leading edges of all pulses are precisely spaced at 1-second intervals.

The code Time Frame is 20 seconds. The sum of the coded time refers to the leading edge of the code word Reference Marker.

2.

- CONTINUED

IRIG STANDARD TIME CODE (FORMAT B) 100 PPS CODE



2. - CONTINUED

IRIG FORMAT B - CONT'D

TIME: UNIVERSAL TIME (UTC)

TIME FRAME: 1.0 SECOND

BINARY CODED DECIMAL TIME-OF-YEAR CODE WORD-30 BINARY DIGITS

(1) SECONDS, MINUTES, HOURS AND DAYS

(2) RECYCLES YEARLY

STRAIGHT BINARY TIME-OF-DAY CODE WORD-17 BINARY DIGITS

(1) SECONDS ONLY

(2) RECYCLES EACH 24 HOURS

CODE WORD STRUCTURE:

BCD: WORD BEGINS AT INDEX COUNT 1. BINARY CODED ELEMENTS OCCUR BETWEEN POSITION IDENTIFIER ELEMENTS (7 FOR SECONDS; 7 FOR MINUTES; 6 FOR HOURS; 8 AND 2 FOR DAYS) UNTIL THE CODE WORD IS COMPLETE. ONE OR MORE INDEX MARKERS OCCUR BETWEEN DECIMAL DIGITS IN EACH GROUP TO PROVIDE SEPARATION FOR VISUAL RESOLUTION.

SB: WORD BEGINS AT INDEX COUNT 80. FIVE DECIMAL DIGITS (17 BINARY CODED ELEMENTS) OCCUR WITH A POSITION IDENTIFIER BETWEEN THE 9TH AND 10TH BINARY CODED ELEMENTS.

LEAST SIGNIFICANT DIGIT OCCURS FIRST.

ELEMENT RATES AVAILABLE:

a. 100 PER SECOND (BASIC ELEMENT RATE)

b. 10 PER SECOND

c. 1 PER SECOND

2.

- CONTINUED

ELEMENT IDENTIFICATION.

- a. "ON TIME" REFERENCE POINT FOR ALL ELEMENTS IS THE LEADING EDGE.
- b. INDEX MARKER.....2 MILLISECONDS.
(BINARY ZERO OR UNCODED ELEMENT)
- c. CODE DIGIT.....5 MILLISECONDS.
(BINARY ONE)
- d. POSITION IDENTIFIER - 10 PER SECOND.....8 MILLISECONDS.
(REFERS TO THE LEADING EDGE OF THE SUCCEEDING ELEMENT)
- e. REFERENCE MARKER - 1 PER SECOND.....TWO CONSECUTIVE POSITION IDENTIFIERS.

(THE "ON TIME" POINT, TO WHICH THE CODE WORD REFERS, IS THE LEADING EDGE OF THE SECOND POSITION IDENTIFIER.)

RESOLUTION: 10 MILLISECONDS (UNMODULATED)

REP RATE: 100 PPS

VOLTAGE LEVEL: LOGIC 0 $-8\pm 1V$, LOGIC 1 $0\pm 1V$

POLARITY: NEGATIVE

VI. INTERFACE CONNECTOR TABLE

THE SATURN IB COUNT CLOCK SYSTEM TO KSC TIMING ELECTRICAL INTERFACE
SHALL CONSIST OF TWO CONNECTORS THAT MATE TO THE MERRITT ISLAND LAUNCH
AREA FROM THE COUNT CLOCK SYSTEM.

INTERFACE CONN NO 1

MSFC CONN 1372A1J13

CONN TYPE MS3124E-24-61P

CABLE CONN TBD

CONN TYPE MS3126E-24-61S

THIS CONNECTOR SHALL PROVIDE COUNT TIME INCREMENTS OF SECONDS, MINUTES
HOURS, AND DAYS TO THE MERRITT ISLAND LAUNCH AREA AT THE LCC.

VI. INTERFACE CONNECTOR TABLE - CONTINUED

INTERFACE CONN NO 2

MSFC CONN 1254A1J14

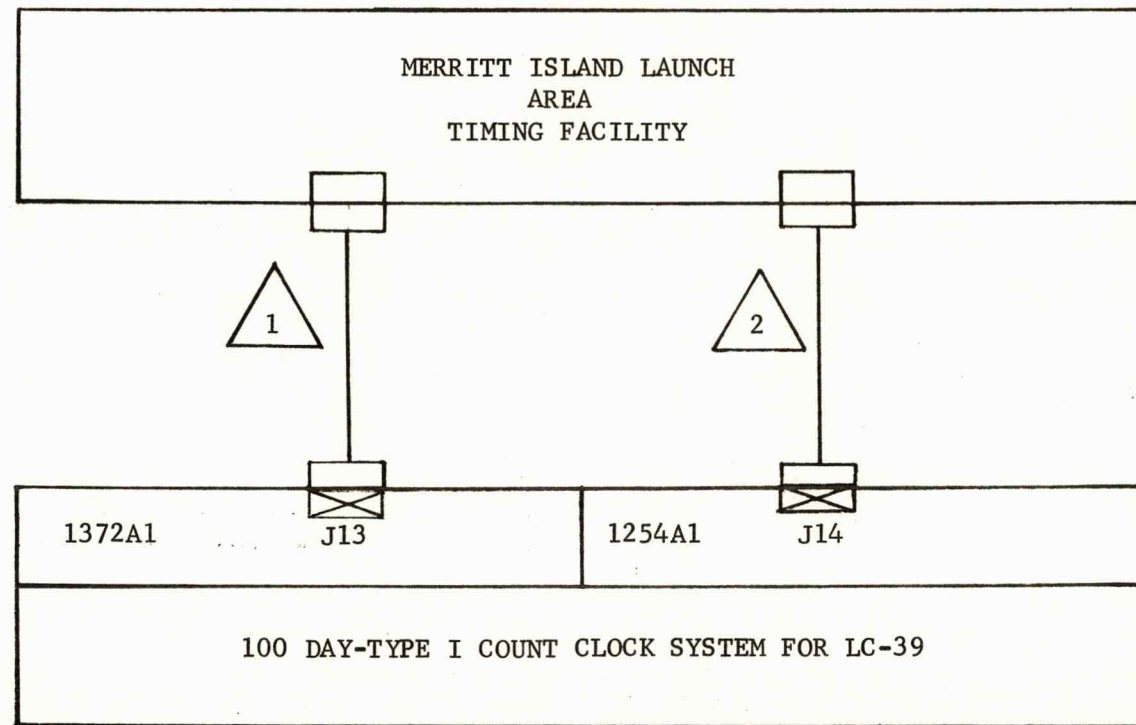
CONN TYPE MS3124E-24-61P

CABLE CONN



CONN TYPE MS3126E-24-61S

THIS CONNECTOR SHALL PROVIDE IRIG TIME CODE AND TIMING PULSES TO THE CCS
FROM THE MERRITT ISLAND LAUNCH AREA AT THE LCC.

VII. INTERFACE SCHEMATIC



NOTES:

1. SYMBOL  DENOTES INTERFACE CONNECTOR NUMBER.
2. SYMBOL  DENOTES MSFC INTERFACE CONNECTOR.

PN	F	T I T L E	LOGIC 1	LOGIC 0	MAX DRIVE	REMARKS	EFF	IRN
A	M	SECONDS X 1	0+-1 V	-8+-1 V	10 MA			
B	M	SECONDS X 2	0+-1 V	-8+-1 V	10 MA			
C	M	SECONDS X 4	0+-1 V	-8+-1 V	10 MA			
D	M	SECONDS X 8	0+-1 V	-8+-1 V	10 MA			
E	M	SECONDS X 10	0+-1 V	-8+-1 V	10 MA			
F	M	SECONDS X 20	0+-1 V	-8+-1 V	10 MA			
G	M	SECONDS X 40	0+-1 V	-8+-1 V	10 MA			
H	M	MINUTES X 1	0+-1 V	-8+-1 V	10 MA			
J	M	MINUTES X 2	0+-1 V	-8+-1 V	10 MA			
K	M	MINUTES X 4	0+-1 V	-8+-1 V	10 MA			
L	M	MINUTES X 8	0+-1 V	-8+-1 V	10 MA			
M	M	MINUTES X 10	0+-1 V	-8+-1 V	10 MA			
N	M	MINUTES X 20	0+-1 V	-8+-1 V	10 MA			
P	M	MINUTES X 40	0+-1 V	-8+-1 V	10 MA			
R	M	HOURS X 1	0+-1 V	-8+-1 V	10 MA			
S	M	HOURS X 2	0+-1 V	-8+-1 V	10 MA			
T	M	HOURS X 4	0+-1 V	-8+-1 V	10 MA			
U	M	HOURS X 8	0+-1 V	-8+-1 V	10 MA			
V	M	HOURS X 10	0+-1 V	-8+-1 V	10 MA			
W	M	HOURS X 20	0+-1 V	-8+-1 V	10 MA			
X	M	DAYS X1	0+-1 V	-8+-1 V	10 MA			
Y	M	DAYS X2	0+-1 V	-8+-1 V	10 MA			
Z	M	DAYS X4	0+-1 V	-8+-1 V	10 MA			
A+	M	DAYS X8	0+-1 V	-8+-1 V	10 MA			
B+	M	DAYS X10	0+-1 V	-8+-1 V	10 MA			
C+	M	DAYS X20	0+-1 V	-8+-1 V	10 MA			
D+	M	DAYS X40	0+-1 V	-8+-1 V	10 MA			

PN	F	T I T L E	LOGIC 1	LOGIC 0	MAX DRIVE	REMARKS	EFF	IRN
E+	M	DAYS X80	0+-1 V	-8+-1 V	10 MA			
F+	M	CARRY NOT IN PROGRESS	0+-1 V	-8+-1 V	10 MA			
G+	M	AUTO/MANUAL	0+-1 V	-8+-1 V	10 MA	SEE NOTE 3		
H+	M	COUNTING DOWN INDICATION	0+-1 V	-8+-1 V	10 MA			
I+	M	COUNTING UP INDICATION	0+-1 V	-8+-1 V	10 MA			
J+	M	HOLDING INFORMATION	0+-1 V	-8+-1 V	10 MA			
K+	S	1 PPS UNCONTROLLED	0+-1 V	-8+-1 V	10 MA	SEE NOTE 2		
M+	S	SIGNAL GROUND						
N+	S	SIGNAL GROUND						
P+	S	1 PPS CONTROLLED 5 MS DUR	0+-1 V	-8+-1 V	10 MA	SEE NOTE 4		
Q+		SPARE						
R+	C	TIMED OUTPUT CMD	28 VDC	0 VDC	10 MA			
S+		SPARE						
T+		SPARE						
U+		SPARE						
V+		SPARE						
W+		SPARE						
X+		SPARE						
Y+		SPARE						
Z+		SPARE						
AA		SPARE						
BB		SPARE						
CC		SPARE						
DD		SPARE						
EE		SPARE						
FF		SPARE						
GG		SPARE						

PN	F	T I T L E	LOGIC 1	LOGIC 0	MAX DRIVE	R E M A R K S	EFF	IRN
HH		SPARE						
JJ		SPARE						
KK		SPARE						
LL		SPARE						
MM		SPARE						
NN		SPARE						
PP	H	SHIELD CONNECTED AT CCS ONLY						

PN	F	T I T L E	LOGIC 1	LOGIC 0	MAX DRIVE	REMARKS	EFF	IRN
A	M	B1 CODED TIMING SIGNAL	0+-1 V	-8+-1 V	1K OHM	SEE NOTES 1&2		
B	S	SIGNAL RETURN						
C	M	100 PPS SQUARE WAVE	0+-1 V	-8+-1 V	1K OHM	SEE NOTES 1&2		
D	S	SIGNAL RETURN						
E	M	2000 PPS SQUARE WAVE	0+-1 V	-8+-1 V	1K OHM	SEE NOTES 1&2		
F	S	SIGNAL RETURN						
G	M	IRIG FORMAT B	0+-1 V	-8+-1 V	1K OHM	SEE NOTES 1&2		
H	S	SIGNAL RETURN						
J		SPARE						
K		SPARE						
L		SPARE						
M		SPARE						
N		SPARE						
P		SPARE						
R		SPARE						
S		SPARE						
T		SPARE						
U		SPARE						
V		SPARE						
W		SPARE						
X		SPARE						
Y		SPARE						
Z		SPARE						
A+		SPARE						
B+		SPARE						
C+		SPARE						
D+		SPARE						

PN	F	T I T L E	LOGIC 1	LOGIC 0	MAX DRIVE	REMARKS	EFF	IRN
E+		SPARE						
F+		SPARE						
G+		SPARE						
H+		SPARE						
I+		SPARE						
J+		SPARE						
K+		SPARE						
M+		SPARE						
N+		SPARE						
P+		SPARE						
Q+		SPARE						
R+		SPARE						
S+		SPARE						
T+		SPARE						
U+		SPARE						
V+		SPARE						
W+		SPARE						
X+		SPARE						
Y+		SPARE						
Z+		SPARE						
/ AA		SPARE						
BB		SPARE						
CC		SPARE						
DD		SPARE						
EE		SPARE						
FF		SPARE						
GG		SPARE						

PN	F	T I T L E	LOGIC 1	LOGIC 0	MAX DRIVE	R E M A R K S	EFF	IRN
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MH		SPARE						
----	--	-------	--	--	--	--	--	--

JJ		SPARE						
----	--	-------	--	--	--	--	--	--

KK		SPARE						
----	--	-------	--	--	--	--	--	--

LL		SPARE						
----	--	-------	--	--	--	--	--	--

MM		SPARE						
----	--	-------	--	--	--	--	--	--

NN		SPARE						
----	--	-------	--	--	--	--	--	--

PP	H	SHIELD GROUNDED AT CCS ONLY						
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