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DESIGN DATA SPECIFICATION

FOR A MODIFICATION TO THE

ARTS IIIA A3.05 PROGRAM

FOR THE

FINAL APPROACH

SPACING TOOL (FAST)

PHASES 1 AND 2A

FEDERAL AVIATION ADMINISTRATION
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1.0 SCOPE

This specification describes the modifications (Phases 1 and 2) that are required to the ARTS IIIA program for the ARTS IOP/TIU interface, keyboard entries, data transfers, error detection and TTY/MSP printouts for the Final Approach Spacing Tool (FAST) system. These modifications are not complete, but are sufficient to test for the feasibility of the implementation of the FAST system for field evaluation. Field evaluation of the FAST system will initially occur in the training environment only. The design described in this specification is for the ARTS IIIA dual sensor systems and shall be implemented in the level 0 ARTS IIIA program.

2.0 GOVERNMENT DOCUMENTS

The following documents may include specifications, standards, guidelines and other special publications and form a part of this specification to the extent specified herein.

NAS-MD-631	NAS En Route Stage A - ARTS IIIA, A3.05
NAS-MD-632	Conflict Alert Adaptation Standards and guidelines, A3.05
NAS-MD-633	Standards for Defining and Adapting Values for MSAW Site Variables, A3.05
NAS-MD-634	System Description and Specification series, A3.05
NAS-MD-635	Multiprocessor Executive (MPE), A3.05
NAS-MD-636	Parallel SRAP Processing, A3.05
NAS-MD-637	Target Processing (Tracking) and ISL, A3.05
NAS-MD-638	Keyboard, A3.05
NAS-MD-639	Display Output Processing, A3.05
NAS-MD-640	Interfacility Data Transfer, A3.05
NAS-MD-641	Bulk Store Flight Plans, A3.05
NAS-MD-642	ASR-37 Non-Executive Error and Status Messages, A3.05
NAS-MD-643	Site Adaptation, A3.05
NAS-MD-644	MSAW and Altitude Tracking, A3.05
NAS-MD-645	Non-Executive Console Teletype Input Processing and On-Call Tasks, A3.05

NAS-MD-646	Builder/BUP and CDR Editor, A3:05
NAS-MD-647	Recovery, A3.05
NAS-MD-648	Continuous Data Recording Processing, A3.05
NAS-MD-649	Remote Display Processing, A3.05
NASP-2501-05	ARTS IIIA Systems Operators Manual, A3.05
ARTS IIIA Program Coding Spec.	Volume I of III, A3.05
ARTS IIIA Program Coding Spec.	Volume II of III, A3.05
ARTS IIIA Program Coding Spec.	Volume III of III, A3.05

2.1 OTHER DOCUMENTS

ARTS/TIU Workshop Minutes	14 May 1991
TATCA Phased Approach Interface Solution	7 June 1991
Specification for a Modification of the ARTS Input/Output Processor (IOP) Software For the Final Approach Spacing Tool System	7 June 1991
CTAS ARTS/TIU Project Meeting Minutes	18 July 1991
CTAS Meeting Minutes	6 August 1991

3.0 MODIFICATIONS TO THE MULTIPROCESSOR EXECUTIVE (MPE)

3.1 Multiprocessor Executive Adaptation

The MPE will be modified to include the TIU/FAST as a peripheral to the ARTS IIIA system. Appropriate channel assignment for each of the two processors shall be defined. One processor and the appropriate channel shall be designated as the primary and the other processor and the appropriate channel shall be designated as the alternate.

4.0 MODIFICATIONS TO ARTS IIIA TASK PROGRAMS

4.1 FAST Error Processing

If a input parity error is received by ARTS from the FAST system shall cause a FAST failure to be declared and the FAST function shall be disabled. An ASR-37 or MSP printout (TIME) TIU INPUT BUFFER PARITY XXXX shall be requested of the error and status message function and FAST FAIL shall be displayed in the systems Area.

When illegal interrupts are received by ARTS from the FAST system it shall cause a FAST failure to be declared and FAST shall be automatically disabled. An ASR-37 or MSP printout (TIME) TIU ILLEGAL INTERRUPT XXXX shall be requested of the error and status message function and FAST FAIL shall be displayed in the systems Area.

When any TIU heartbeat messages are not received in a system parameter of time or the heartbeat message is out of sequence they will cause a FAST failure to be declared and the FAST function will automatically be disabled. An ASR-37 or MSP printout (TIME) TIU HEARTBEAT FAILURE XXXX or (TIME) TIU HEARTBEAT SEQUENCE FAILURE XXXX shall be requested of the error and status message function and FAST FAIL shall be displayed in the systems Area.

If the FAST system detects a input parity error, FAST shall transmit a message to ARTS advising of the parity error condition. This message shall cause a FAST failure to be declared and the FAST function will automatically be disabled. An ASR-37 or MSP printout (TIME) TIU RECEIVED DATA WITH BAD PARITY XXXX shall be requested of the error and status message function and FAST FAIL shall be displayed in the systems Area.

When the FAST system detects a bad message code from ARTS, FAST shall transmit a message to ARTS advising of the bad message code condition or the ARTS system detects a bad message code from FAST. These messages shall cause a FAST failure to be declared and FAST function will automatically be disabled. An ASR-37 or MSP printout (TIME) TIU DETECTED BAD MESSAGE CODE XXXX or (TIME) ILLEGAL INPUT MESSAGE CODE XXXX shall be requested of the error and status message function and FAST FAIL shall be displayed in the systems Area.

When it is detected that the transmission of output data to the Terminal Air Traffic Control Automation (TATCA) Interface unit (TIU) is obstructed, the FAST function will automatically be disabled. An ASR-37 or MSP printout (TIME) TIU OUTPUT CHANNEL TIMEOUT XXXX shall be requested of the error and status message

function and FAST FAIL shall be displayed in the systems area.

When the ARTS IIIA program detects that the target processing (tracking) function is tardy by five sectors, a FAST failure shall be declared and FAST shall be disabled. An ASR-37 or MSP printout (TIME) TIU AUTO DISABLE SECTORS BEHIND XXXX shall be requested of the error and status message function and FAST FAIL shall be displayed in the systems area.

If the ARTS IIIA program detects that either the high or low priority buffers have overflown a FAST failure shall be declared and the FAST function will automatically be disabled. An ASR-37 or MSP printout (TIME) TIU LOW/HIGH PRIORITY OUTPUT STACK OVERFLOW XXXX shall be requested of the error and status message function and FAST FAIL shall be displayed in the systems area.

NOTE: XXXX = 1 TO 99 or MANY

All of the above error conditions shall be accompanied by an ASR-37 or MSP printout (TIME) TIU SYSTEM FAILURE indicating that the FAST system was automatically disabled.

4.2 Final Approach Spacing Tool Keyboard Messages

This section presents the purpose, format requirements and the output associated with the Final Approach Spacing Tool (FAST) functions.

4.2.1 Enable/Inhibit FAST Processing

FORMAT REQUIREMENTS

The proper procedure for entering this message is:

1. Depress F12 key

2. Depress E (enable)

   or

   I (inhibit)

3. Depress ENTER

LOGIC REQUIREMENTS

- Verify that extraneous data has not been entered
- If FAST is disabled verify that an E is entered
- Verify that an active printout does not exist for the function
- Verify that FAST is not in the requested state
- Verify that the position entering the message is a supervisory position
- Verify that the position entering the message is not maintenance position
- Verify that the position entering the message is a valid FAST position

OUTPUT

Enabled

If the message has been successfully processed, the FAST program

shall be enabled and an ASR-37 or MSP printout ((TIME) FAST (S)(K) ENABLED (OPNL or TRNG)) shall be requested of the error and status message function. If the position entering the message has training status FAST shall be enabled for training. When the position entering the message does not have training status FAST shall be enabled for the operational mode. FAST cannot be enabled for training and operational modes simultaneously

When FAST is enabled, all pertinent ARTS IIIA data required for FAST initialization shall be transmitted to the FAST program. ARTS shall continue to transmit the required ARTS data to the FAST program until the FAST program is inhibited.

Disabled

If the message has been successfully processed, the FAST program shall be disabled and an ASR-37 or MSP printout ((TIME) FAST (S)(K) DISABLED) shall be requested of the error and status message function. When disabled all FAST display data shall be erased and all FAST keyboard entries (except F12 E) shall be inhibited. Attempts to enter FAST keyboard entries (except F12 E) shall result in the error condition of "ILL FNCT".

Error Condition	Error Message Presented In Display Readout area
Extraneous data has been entered	FORMAT
FAST is disabled and the character entered is not an E	FORMAT
Position entering the message is not a valid FAST position	ILL FNCT
Printout is active on entered function	ILL FNCT
FAST is in the requested state	ILL FNCT
Entering position is not supervisory	ILL POS
Position entering the message is a maintenance position	ILL POS

4.2.2 All ARTS Keyboard Entries for FAST processing

When the FAST program is enabled and the ARTS program detects an F12 entry, it will be directed to the FAST program for processing. All of the FAST keyboard entries (F12) will be processed by the FAST program. All error conditions that are detected in the FAST keyboard entries (F12) will be displayed in the FAST display readout area.

4.2.3 Test Patterns for FAST

FORMAT REQUIREMENTS

The proper procedure for entering this message is:

1. Depress F12 key
2. Depress T
3. Depress 1 or 2 or 3 or 4
4. Depress n (optional for test patterns 1 ,2 or 3)
5. Depress Enter

Where n = the number of words that shall be sent to FAST with the test pattern. This option is for test patterns 1, 2 and 3.

LOGIC REQUIREMENTS

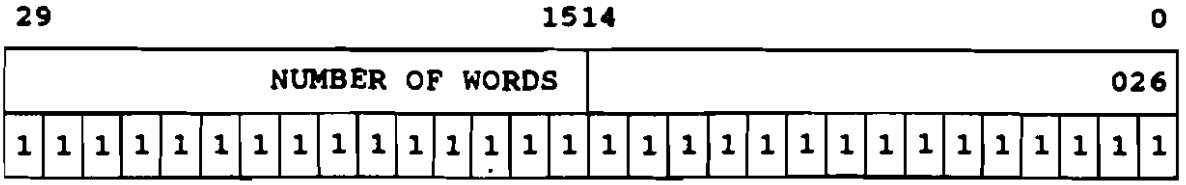
- Verify that extraneous data has not been entered
- Verify that a T has been entered
- Verify that the valid numeric character is entered
- Verify that the position entering the message is a valid FAST position

OUTPUT

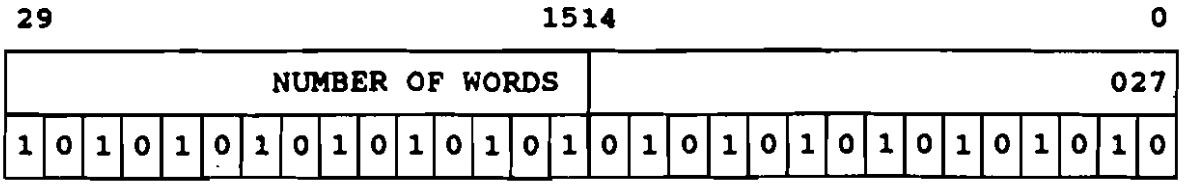
If the message has been successfully processed, the specified TEST pattern shall be Transmitted to FAST. If the optional field is missing 10 words shall be sent to FAST containing the specified

test pattern.

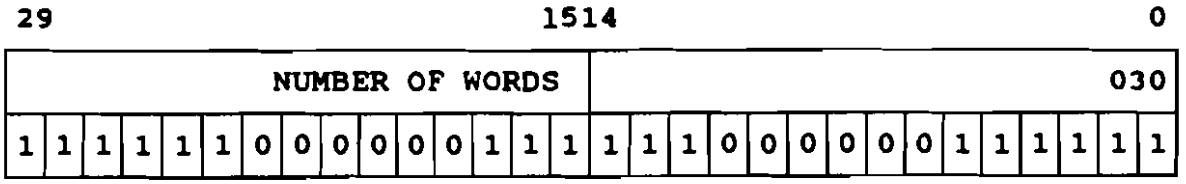
If TEST pattern one was requested the following shall be Sent to FAST.



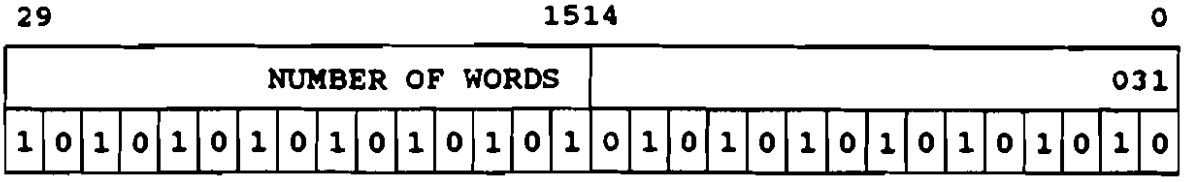
If TEST pattern two was requested the following shall be sent to FAST.



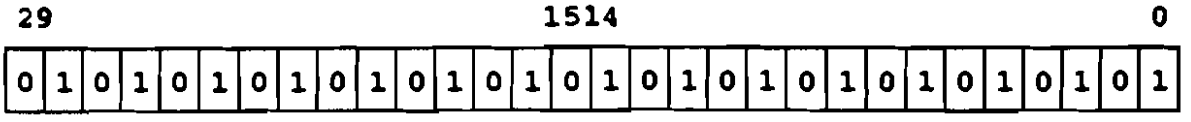
If TEST pattern three was requested the following shall be sent to FAST.



If TEST pattern four was requested, 10 words of the following data shall be sent to FAST.



After the initial 10 words there shall be a break in data transmissions followed by 10 words containing the following.



Error Condition	Error Message Presented In Display Readout area
Illegal test pattern specified	ILL FNCT
Position entering the message is not a valid FAST position	ILL FNCT
Extraneous data has been entered	FORMAT

4.2.4 Channel Selection for FAST

This section presents the purpose, format requirements and the output associated with the assignment of I/O to the primary or alternate FAST channel.

FORMAT REQUIREMENTS

The proper procedure for entering this message is:

1. Depress MULTIFUNC key
2. Depress 2
3. Depress F
4. Depress ENTER

LOGIC REQUIREMENTS

- Verify that extraneous data has not been entered
- Verify that an active printout does not exist for the function
- Verify that FAST is disabled
- Verify that the enterer is a supervisory position
- Verify that the position entering the message is a valid FAST position

OUTPUT

If the message has been successfully processed, the selected channel shall be enabled and an ASR-37 or MSP printout ((TIME) RCFG (S)(K) FAST CHAN SELEC PRIIM/ALT) shall be requested of the error and status message function.

Error Condition	Error Message Presented In Display Readout area
Extraneous data has been entered	FORMAT
Printout is active on entered function	ILL FNCT
FAST is not disabled	ILL FNCT

Position entering the message is not a valid FAST position	ILL FNCT
Entering position is not supervisory	ILL POS

4.2.5 ARTS IIIA Keyboard Entries Modified for FAST

The following ARTS IIIA keyboard entries had additional logic requirements added to the existing logic requirements.

All keyboard entries in the Configuration (CFGD) Multifunction set will be inhibited and will generate "ILL FNCT" when the FAST initialization message is being composed.

The keyboard entry to disable training status of a display will be inhibited and will generate "ILL FNCT" when FAST is on for training and this is the last display with training status.

4.3 Alphanumeric Keyboard (Teletype) Request Messages

Format	Description
(TIME) FAST (S)(K) ENABLED !! OPNL/TRNG	The Final Approach Spacing Tool program has been enabled (Initial selection)
(TIME) FAST (S)(K) DISABLED **	The Final Approach Spacing Tool program has been disabled (last selection)
(TIME) FAST (S)(K) ON OPNL/TRNG	The Final Approach Spacing Tool program has been enabled (Intermediate selection)
(TIME) FAST (S)(K) OFF OPNL/TRNG	The Final Approach Spacing Tool program has been disabled (Intermediate selection)
(TIME) RCFG (S)(K) FAST CHAN SELEC PRIM/ALT	The Primary or alternate channel for the Final Approach Spacing Tool program has been enabled.

LEGEND

S = Subset number

K = Identifier of keyboard that initiated the action

PRIM = Primary Fast Channel

ALT = Alternate FAST Channel

4.4 Internal Alarm Teletype Messages

INTERNAL ALARM MESSAGES GENERATED
AS A RESULT OF THE ARTS/FAST INTERFACE

(TIME) TIU SYSTEM FAILURE	The FAST function has been automatically disable.
(TIME) TIU INPUT BUFFER PARITY XXXX	TIU input parity error
(TIME) TIU ILLEGAL INTERRUPT XXXX	TIU is sending illegal interrupts
(TIME) TIU HEARTBEAT FAILURE XXXX	TIU heartbeat messages are not received
(TIME) TIU HEARTBEAT SEQUENCE FAIL XXXX	TIU heartbeat messages are out of sequence
(TIME) TIU RECEIVED DATA WITH BAD PARITY XXXX	FAST system detected input parity error
(TIME) TIU DETECTED BAD MESSAGE CODE XXXX	FAST has detected a bad message code
(TIME) ILLEGAL INPUT MESSAGE CODE XXXX	ARTS has detected a bad message code
(TIME) TIU OUTPUT CHANNEL TIMEOUT XXXX	The ARTS/TIU output channel has timed out.
(TIME) TIU LOW PRIORITY OUTPUT STACK OVERFLOW XXXX	Low priority buffer overflow
(TIME) TIU HIGH PRIORITY OUTPUT STACK OVERFLOW XXXX	High priority buffer overflow
TIU AUTO DISABLE SECTORS BEHIND XXXX	Tracking is five sectors behind

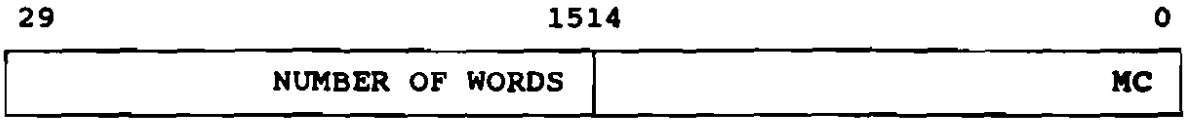
NOTE: Where XXXX = 1 to 99 or MANY

4.5 Message Codes for the ARTS IIIA/FAST Interface

TYPE OF MESSAGE	CONTENTS	MESSAGE CODE (MC)	NUMBER OF WORDS THAT FOLLOW
INITIALIZATION DATA	LEAD PACKET NEG. DIVIDER PAIRT/QUIKT/ SYMT/PREVT/ PULST NEG. DIVIDER DCONT/DFLAGT/ TYP1T NEG. DIVIDER AQLRNGT NEG. DIVIDER APT/FIXCVT CFGN1T/CFGS1T/ CFGN2T/CFGS2T/ NCNT/NCNAT	020	VAR
KEYBOARD MESSAGES	ARTS VALID KBD MSGs./ FAST KBD MSGs.	011	14
CENTRAL TRACK STORE (CTS)	CTS WORDS 1 THROUGH 26	012	26
INTERFACILITY	ALL IF MSGs.	013	VAR
ASSOCIATED THREAD DROP	CTS WORDS 25 AND 26	021	2
TRACK DROP	CTS WORDS 25 AND 26	022	2
DISPLAY RANGE/ OFF-CTR COORD.	TYP1T WORD	024	2
DISABLE FAST		025	0
TEST PATTERN	PATTERN 1	026	MAX 10
TEST PATTERN	PATTERN 2	027	MAX 10
TEST PATTERN	PATTERN 3	030	MAX 10
TEST PATTERN	PATTERN 4	031	20

TYPE OF MESSAGE	CONTENTS	MESSAGE CODE (MC)	NUMBER OF WORDS THAT FOLLOW
TROUT DEMARCATION SUBSYSTEM ZERO		040	0
TROUT DEMARCATION SUBSYSTEM ONE		041	0
OFFSET DIRECTION	CFLGT WORD AND ACID	050	3
LEADER DIRECTION	CFLGT WORD AND ACID	051	3

4.5.1 Message Header



4.6 Initialization Data

When the ARTS IIIA keyboard entry is made to initialize the TIU/FAST programs, an initialization data packet shall be built, added to the output chain for the high priority buffer and forwarded to the TIU/FAST. The information contained in the initialization data packet shall consist of the following;

a. A lead packet consisting of four words

b. Selections from the Keyboard and display tables.

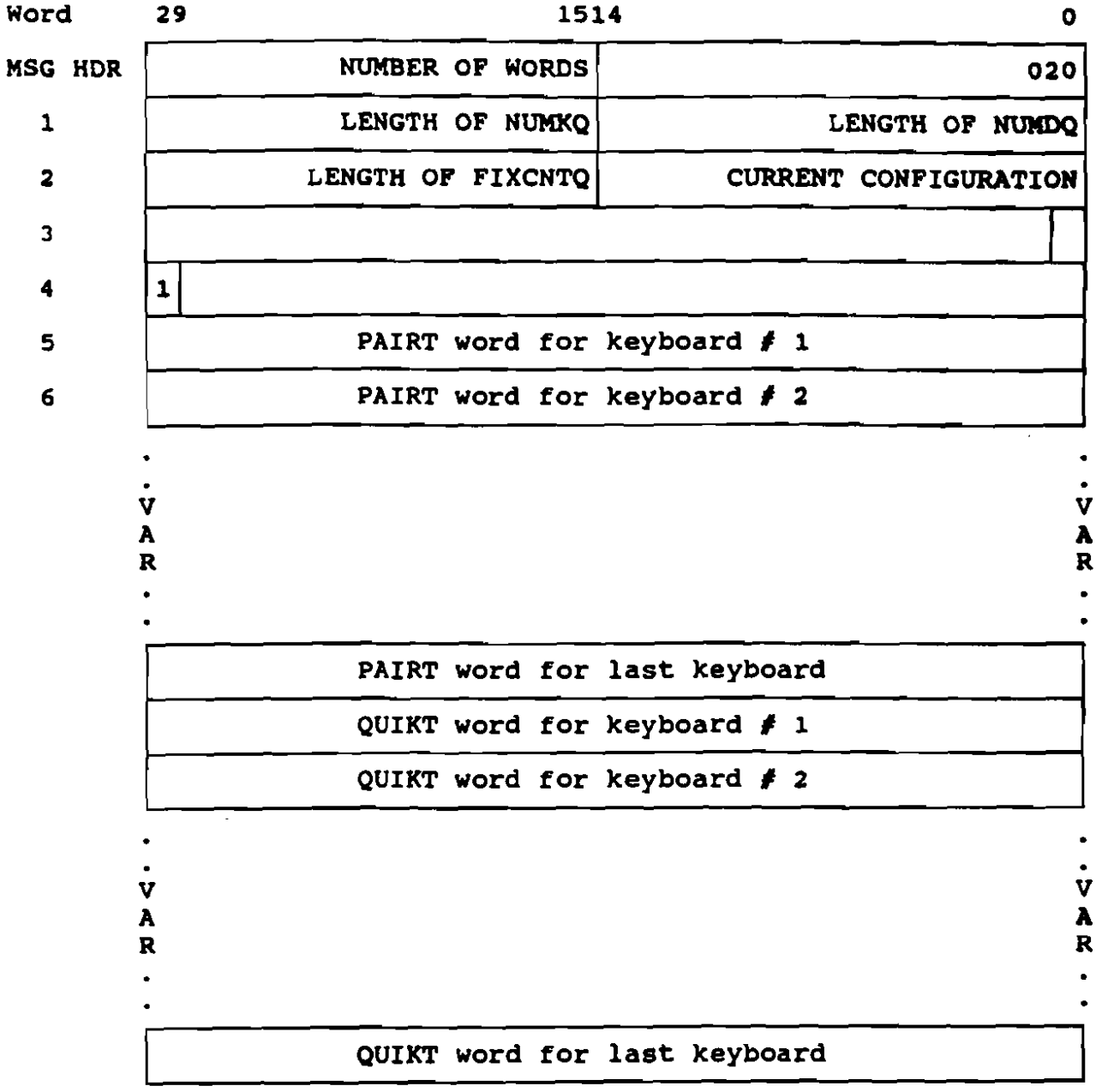
c. The configuration tables including the airport and airport fix tables.

This initialization data packet shall be built in keyboard processing (KOFA). A data packet shall be built by collecting and organizing the required data.

During the collection of data for the initialization packet, all of the ARTS IIIA keyboard entries (configuration) shall be inhibited until the collection is completed. When these entries are made during FAST initialization, the enterer shall be presented with Illegal Function (ILL FNCT) in the display readout area.

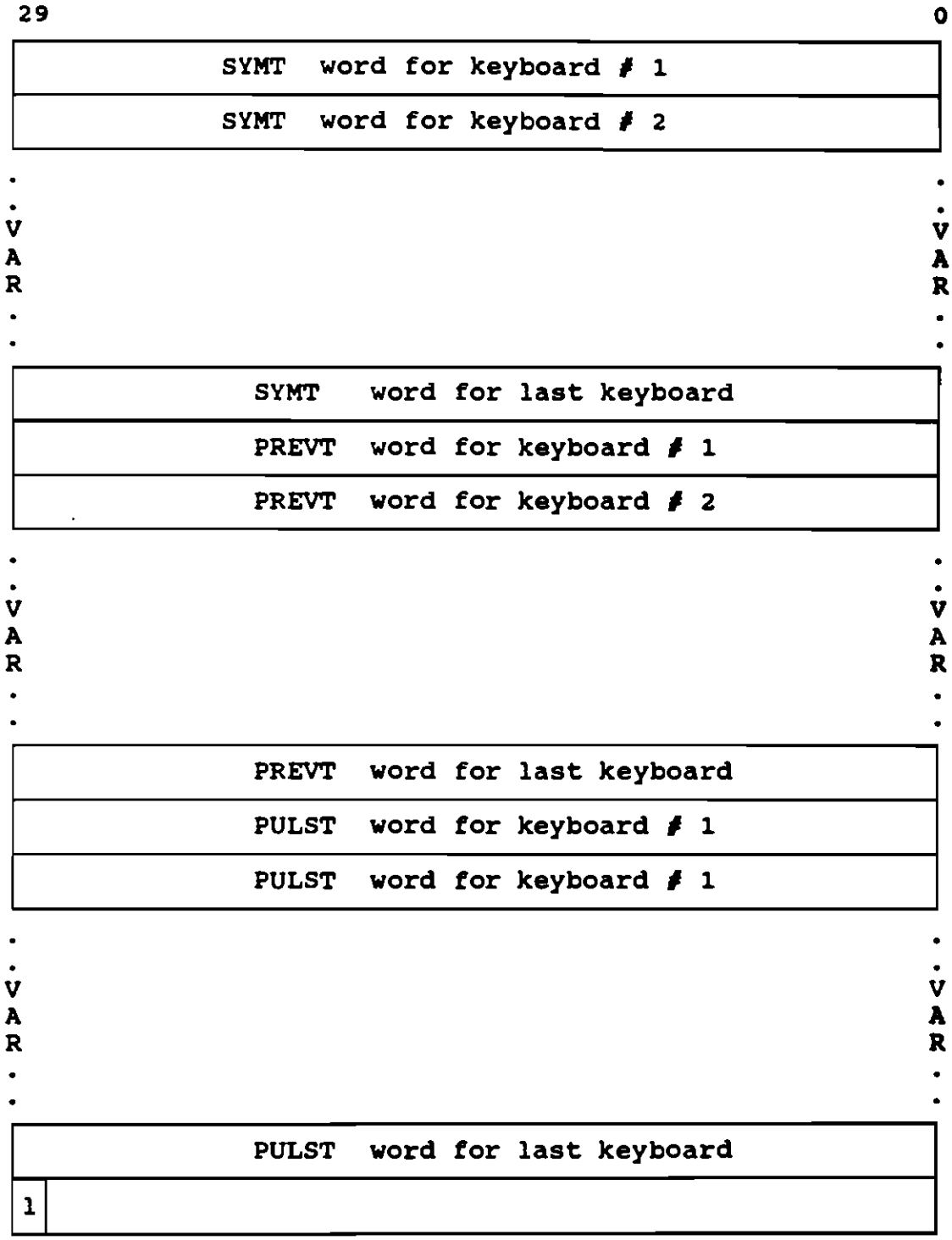
Most of the unique data words and tables shall be separated by a negative word. The following figure represents the initialization data packet.

INITIALIZATION DATA TRANSFERRED TO FAST

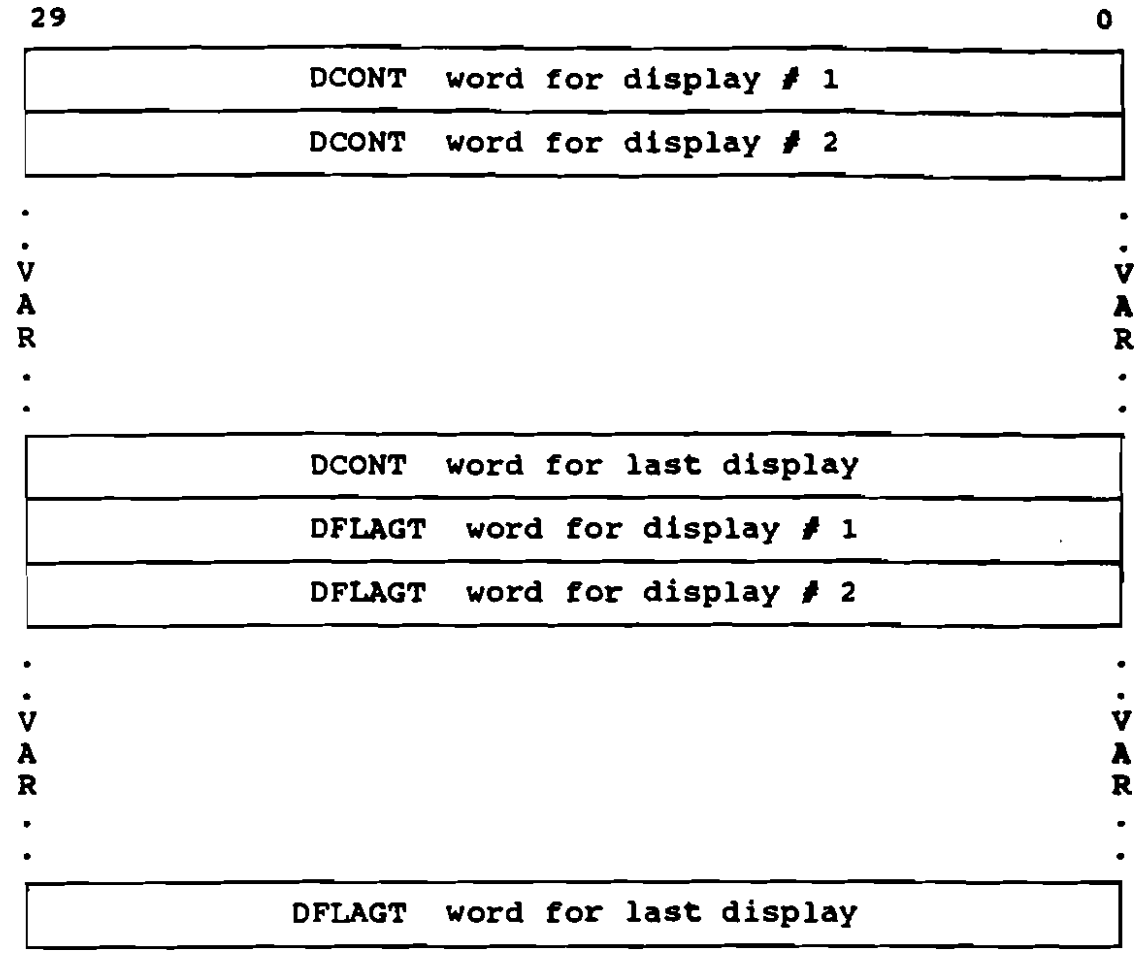


NOTE: When bit zero is set in word 3, FAST has been enabled for the training environment, if bit zero is not set, FAST has been enabled for the operational environment.

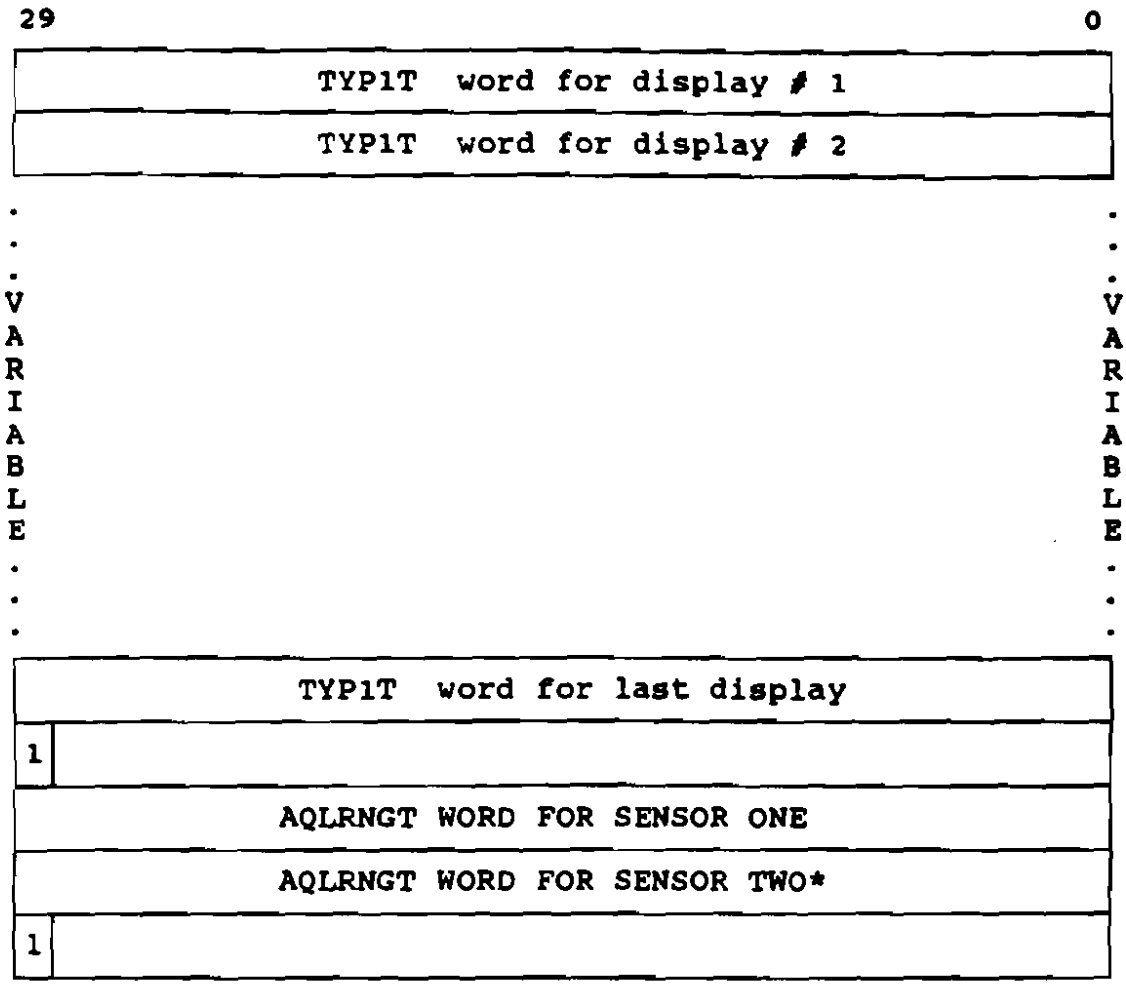
INITIALIZATION DATA TRANSFERRED TO FAST (cont.)



INITIALIZATION DATA TRANSFERRED TO FAST (cont.)

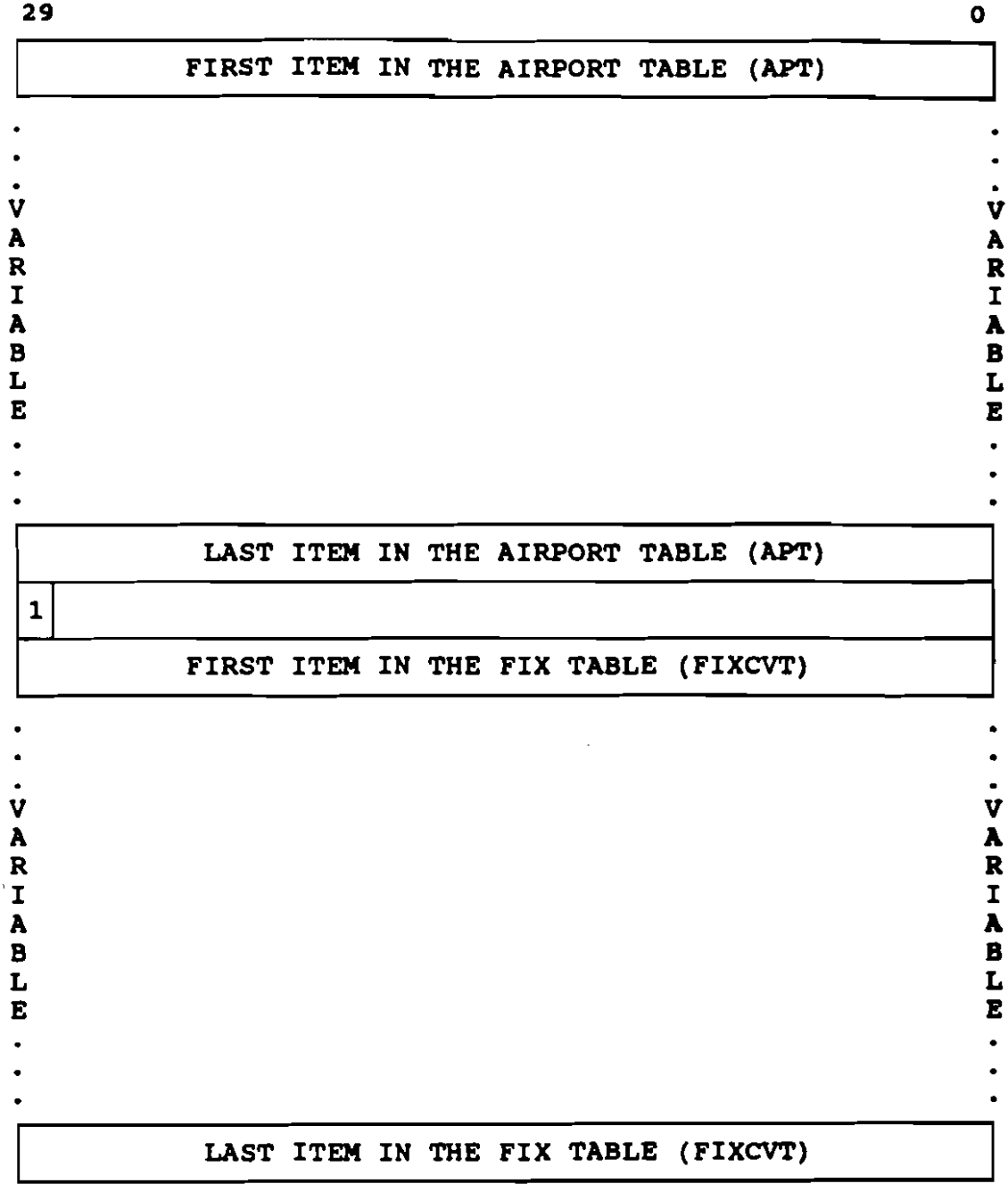


INITIALIZATION DATA TRANSFERRED TO FAST (cont.)



* NOTE: AQLRNGT word for sensor two is not required for a single sensor system.

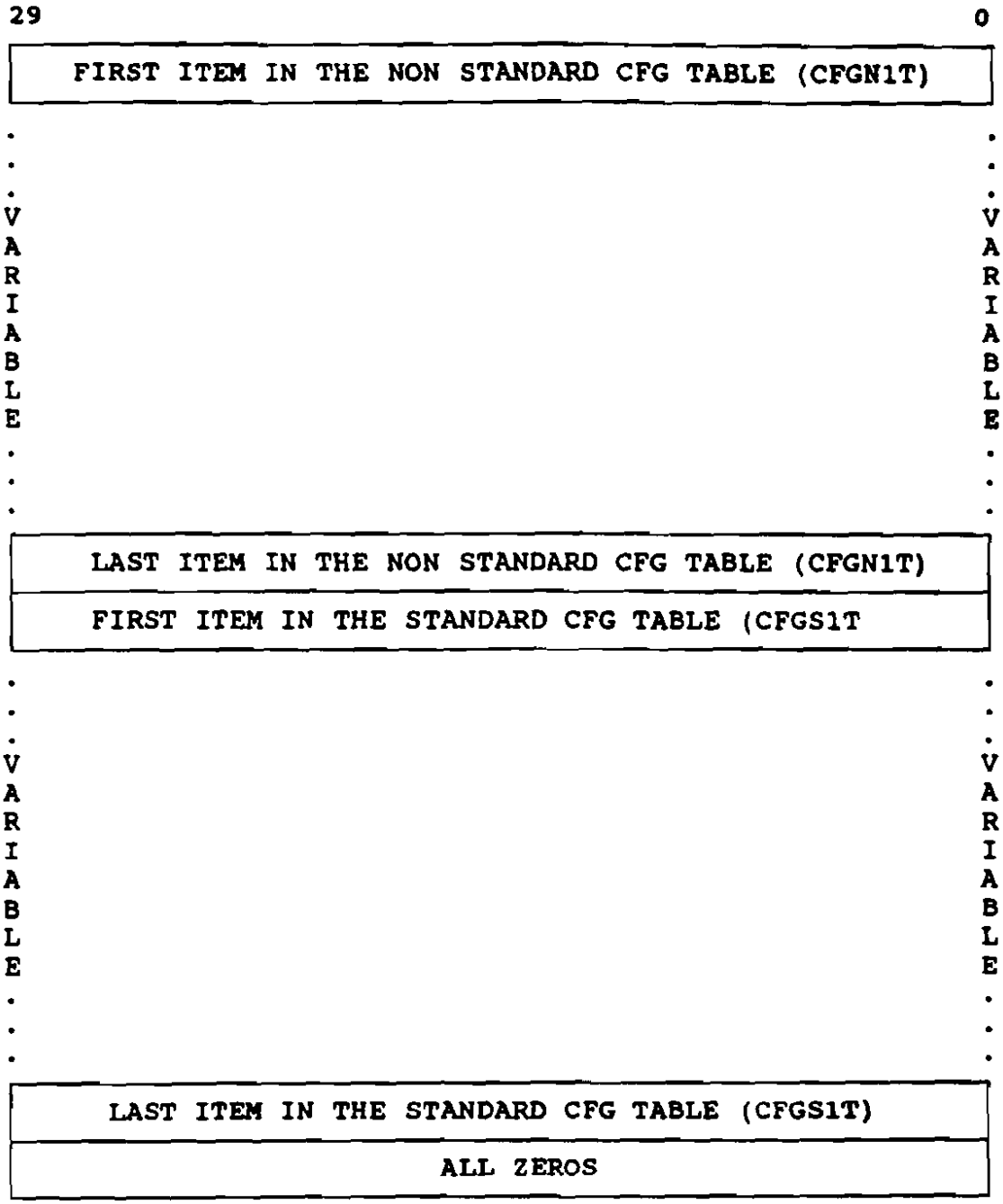
INITIALIZATION DATA TRANSFERRED TO FAST (cont.)



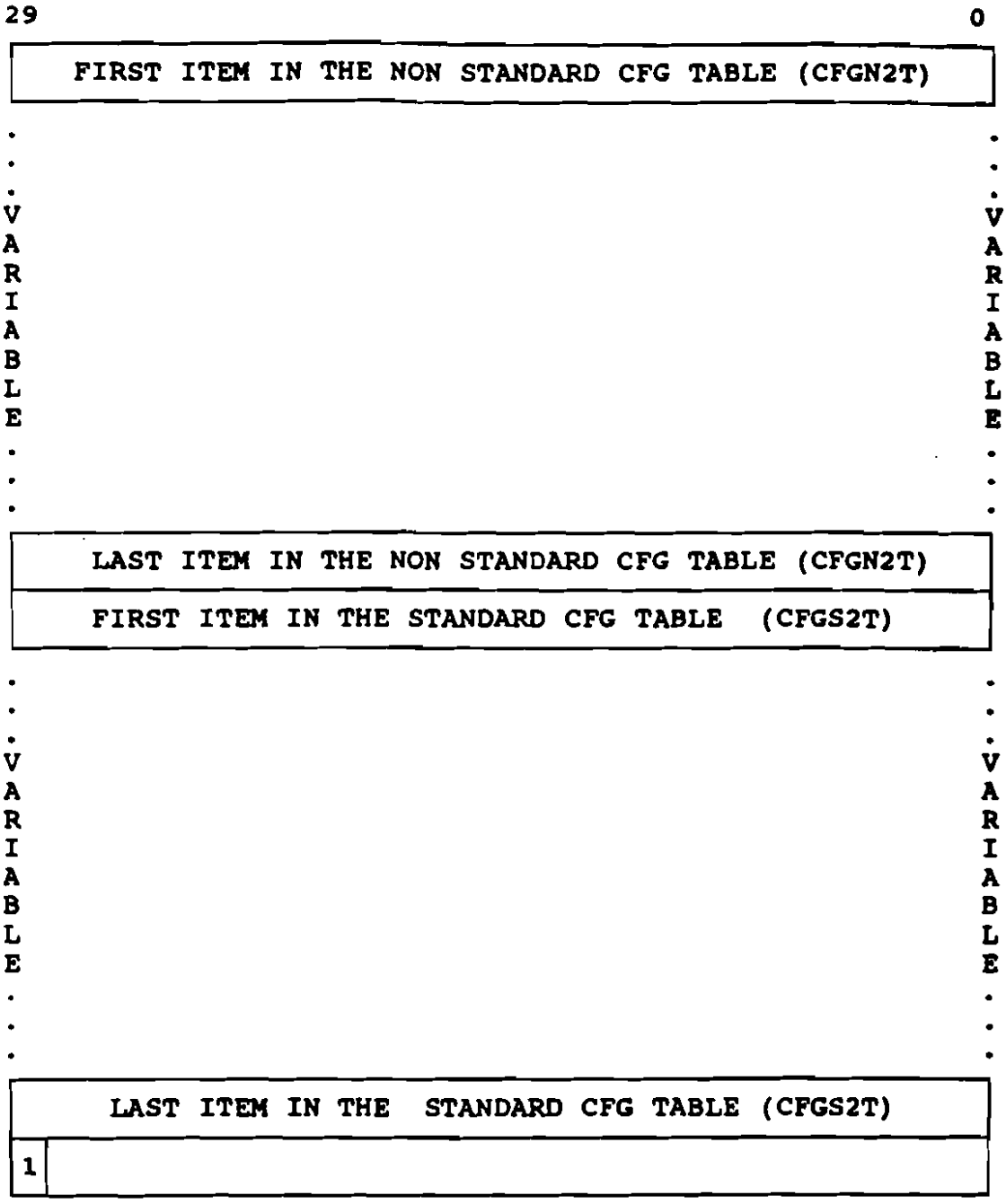
INITIALIZATION DATA TRANSFERRED TO FAST (cont.)

There is no separation between the nonstandard and standard CFG tables (CFGN1T and CFGS1T, CFGN2T and CFGS2T) Part 1.

CFGN1T/CFGS1T and CFGN2T/CFGS2T shall be separated by a word containing all zeros.

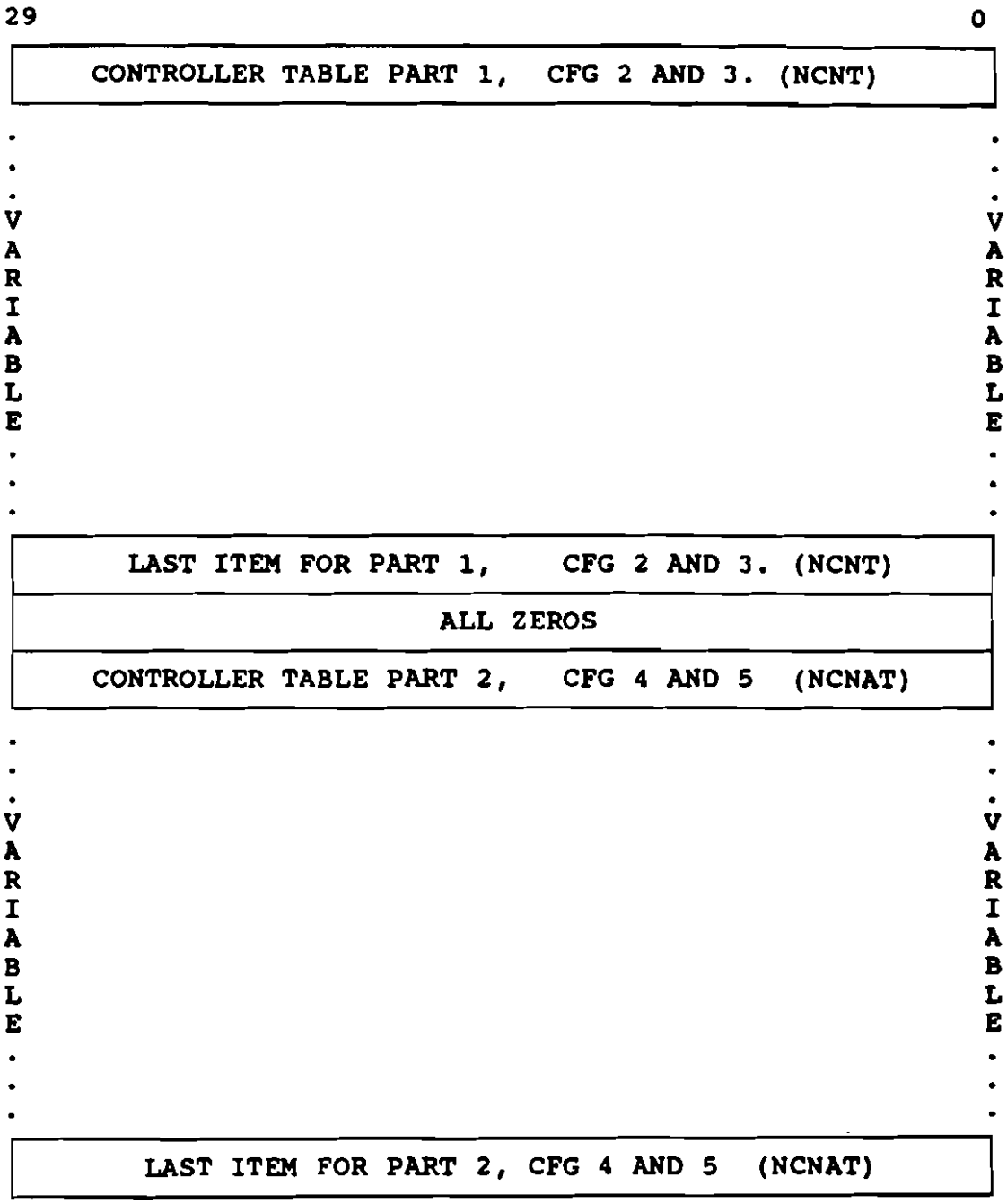


INITIALIZATION DATA TRANSFERRED TO FAST (cont.)



INITIALIZATION DATA TRANSFERRED TO FAST (cont.)

NCNT and NCNAT shall be separated by a word containing all zeros.



4.7 Central Track Store Data (CTS) (Tracking Data)

CTS data for all associated tracks shall be extracted in the tracking output (TROUT) program. This is a planned task which searches the sector thread track by track for required updates.

Since the timely forwarding of CTS data to TIU/FAST is essential, this CTS data shall have to be transmitted, track by track, providing TIU/FAST with updates almost parallel to the display updates in ARTS IIIA.

To accomplish this, the data shall be extracted immediately preceding the PPL to PAUSTACK at label CNT1+3. At this point, the data for the track has been fully updated and is being slotted for display output (PAUSTACK). As each track is updated, the CTS data is added to the output chain for the low priority stack for output to the TIU/FAST.

The CTS data to be sent shall consist of the following;

CTS DATA TRANSFERRED TO FAST

	29 1514	0
MSG HDR	NUMBER OF WORDS	012
WORD 1	CONTENTS OF CTST	
WORD 2	CONTENTS OF RGAZT	
WORD 3	CONTENTS OF XCORT	
WORD 4	CONTENTS OF YCORT	
WORD 5	CONTENTS OF XYDOT	
WORD 6	CONTENTS OF TIMET	
WORD 7	CONTENTS OF ASOCT	
WORD 8	CONTENTS OF ABEAT	
WORD 9	CONTENTS OF CFLGT	
WORD 10	CONTENTS OF RBEAT	
WORD 11	CONTENTS OF SLIDT	
WORD 12	CONTENTS OF TNT	
WORD 13	CONTENTS OF LGCT	
WORD 14	CONTENTS OF FILT	
WORD 15	CONTENTS OF CTSST	
WORD 16	CONTENTS OF RECRT	
WORD 17	CONTENTS OF TNPT	
WORD 18	CONTENTS OF LNKT	
WORD 19	CONTENTS OF ALT	

CTS DATA TRANSFERRED TO FAST (cont.)

	29	0
WORD 20	CONTENTS OF PALT	
WORD 21	CONTENTS OF SALT	
WORD 22	CONTENTS OF DALT	
WORD 23	CONTENTS OF ACTYPT	
WORD 24	CONTENTS OF CATB	
WORD 25	CONTENTS OF CATC1	
WORD 26	CONTENTS OF CATC2	

4.8 Associated Thread Drop

CTS words for associated tracks that are removed from the associated thread shall be extracted in the tracking output (TROUT) and track prediction (TPRED) programs. Program exits at TR1A+6 in TROUT and PR47EB+13 in TPRED to an output routine that shall add the following data packet into the low priority stack for chain output to the TIU/FAST.

a. MSG HDR = Number of words/Message code

b. Words 1 and 2 = Aircraft Identification (ACID)

ASSOCIATED THREAD DROP DATA PACKET

	29 — 15	14 — 0
MSG HDR	NUMBER OF WORDS	021
WORD 1	CONTENTS OF CATC1	
WORD 2	CONTENTS OF CATC2	

4.9 Track Drop Messages

CTS words for Associated tracks that are dropped shall be extracted in the following program elements.

- Keyboard Operational Function Processing, segment "A" (KOFA)
- Common Routines, segment "A" (COMA)
- Monitor Associated Tracks (MAT)

In each program element an output routine will prepare to send the track drop data packets to TIU/FAST. The exit point to the output routines shall be located in the following label areas for each of the program elements.

- KOFA = DP6AL+4 and DP9AL+4
- COMA = SHO6B+17
- MAT = CSTCNT1+6

The track drop data packets consists of the following three words.

a. MSG HDR = Number of words/Message code

b. Words 1 and 2 = Aircraft Identification (ACID)

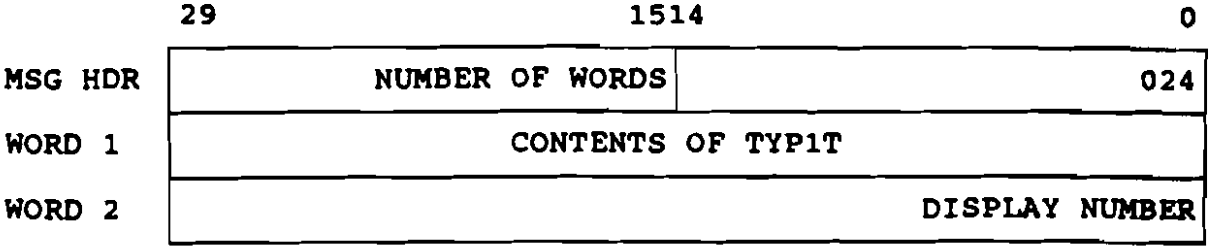
At each exit point the output routine will add the following track drop data packet (3 words) into the chain output for the low priority stack output to the TIU/FAST.

TRACK DROP DATA PACKET

	29 — 15	14 — 0
MSG HDR	NUMBER OF WORDS	022
WORD 1	CONTENTS OF CATC1	
WORD 2	CONTENTS OF CATC2	

4.10 Displays Range/off-center Coordinates

When Keyboard Input Processing (KIP) detects a change in the type one (console) input Buffer. A data packet shall be organized that shall consist of the message header, the display number that is associated with the TYP1T word and the Display TYP1T word. The following data packet will be added into the chain output for the low priority stack for output to the TIU/FAST.



4.11 Keyboard Data

The keyboard data required by FAST is to include all correctly formatted and finalized (good) ARTS IIIA entries and all FAST (F12) entries. This data is available in final form in the planned task, keyboard output (KOFA), after label GOKOFK. GOKOFK is the common exit for all good keyboard entries and it is where this data is set aside for Continuous Data Recording (CDR).

The FAST modification is designed to extract and send ARTS good keyboard packets whether Continuous Data Recording (CDR) is on or off. In addition, other filters and conditions which would negate CDR collection in specific cases are bypassed to send FAST the data. The specified format for TIU/FAST transfer is the CDR K/B packet. The packet must be formed and its location identified. This occurs at GOKOFK+15 during the exit (PPL) to CDKEYF (CDR). In CDKEYF, B6 is set to the correct buffer address by subroutine CDBIC referenced at CDKF1+16. At CDKF1+19 B6 is saved for FAST during a CDR collection pass. The packet itself is completed at CDKF5 and will be added to the chain output for the high priority stack for output to the TIU/FAST.

At the following label locations exits are made to set up data collection for FAST when CDR collection is not available.

- CDKEYF+2
- CDKEYF+4
- CDKEYF+11
- CDKYF1+6
- CDKYF1+10
- CDKYF1+17

To collect and/or send FAST K/B packets the FAST function must be enabled.

An output routine will place the keyboard packet into a high priority stack for chain output to the TIU/FAST. This occurs during the exit at CDKF5.

KEYBOARD DATA TRANSFERRED TO FAST

29	23 18	17 15	14 11	10 6	5 0
NUMBER OF WORDS					011

S		FN	I	B	E	T	ERROR NO.	011

ZULU TIME (LSB = 1/1024 SECOND)				
ACID 1	ACID 2	ACID 3	ACID 4	ACID 5
ACID 6	ACID 7			
P1	P2	P3	P4	P5
P6	P7	P8	P9	P10
P11	P12	P13	P14	P15
P16	P17	P18	P19	P20
P21	P22	P23	P24	P25
P26	P27	P28	P29	P30
P31	P32	P33	P34	P35
P36	P37	P38	P39	P40
P41	P42		KS	CONTR.

	TBALL YCOR. LSB=1/16		TBALL XCOR. LSB=1/16		
	25 23	17 14	10 8	5 0	

S = SUBSYSTEM (1 bit)
FN = FUNCTION NUMBER (4 bits)
I = IMPLIED FUNCTION INDICATOR (1 bit)
B = 1 IF ACID IS PRESENT (1 bit)
E = ETG INDICATOR (1 bit)
T = TRACKBALL ENTERED INDICATOR (1 bit)
ERROR NUMBER = 0 NO ERROR, REMAINING NUMBERS NOT REQUIRED (5 bits)
P1 THROUGH P42 = ENTERED PREVIEW DATA
KS = KEYBOARD SUBSET (3 bits)
CONTR. = ENTERING CONTROLLERS FDB SYMBOL (6 bits)
TBALL COR = Y AND X COORDINATES (1 SIGN BIT PLUS 10 BITS, LSB = 1/16 NM)

4.12 Interfacility Data

All interfacility (IF) messages (input and output) shall be forwarded to the TIU/FAST.

The format selected for the data transfer is the interfacility Continuous Data Recording (CDR) packet. The packet must be formed and its location identified, as with keyboard messages. This occurs at two locations in Interfacility Input (IFI). The first (input) at label IFINP+22 with an exit (PPL) to CDINFM (CDR). The second (output) is found at label IFSM1+1, also with an exit (PPL) to CDINFM (CDR). Thus, both the input and output branches arrive at a common point in CDR collection.

Within CDINFM:

At CDINFM+2 and CDINFM+4, when CDR is off or it is not enabled, exits are made to ascertain that FAST is on. If FAST is off normal exits are made. When FAST is on a flag is set to indicate IF data collection for FAST and a return is made to the normal CDR collection routine.

At CDIF2+6 an exit is made to handle the completion of buffer selection (CDR or FAST) and to save the appropriate buffer address.

At CDIF5 an exit is made to an output routine that will add the interfacility packet to a output chain for the high priority stack for output to the TIU/FAST. The only criterion here being whether FAST is enabled or disabled.

The individual packets are identified as input or output (word 1 bit 14).

To collect and/or send FAST Interfacility packets the FAST function must be enabled.

INTERFACILITY DATA TRANSFERRED TO FAST

29 15	14 0
NUMBER OF WORDS	013
NUMBER OF WORDS	1 013
ZULU TIME (LSB = 1/1024 SECOND)	
CHAR 1	CHAR 2	CHAR 3
CHAR N-2	CHAR N-1	CHAR N
29 23 16	15 8	7 0

HEADER WORD, BIT 14 = 1 FOR INPUT, 0 FOR OUTPUT

4.13 Disable FAST Processing

When an ARTS keyboard message is detected that request the disabling of FAST processing the following message shall be added to the output chain for the low priority stack for output to the TIU/FAST.

29	15	14	0
NUMBER OF WORDS			025

4.14 TRacking OUTput (TROUT) Demarcation

TROUT processes targets for three sectors (n-2, n-9 and n-14) and after processing targets in sector n-14 and prior to label TRT3 the following Trout demarcation message for each beacon (sensor) system will be added to the output chain for the low priority stack for output to the TIU/FAST.

Subsystem Zero

29	15	14	0
NUMBER OF WORDS			040

Subsystem One

29	15	14	0
NUMBER OF WORDS			041

4.15 Automatic Offset Change Packet

CTS words for associated tracks that qualify for the offsetting of the FDB shall be extracted in the automatic offset (AUT) program. An output routine will add the following data packet to the output chain for the low priority stack for output to the TIU/FAST. The program exit to the output routine is at MAR4CZ+8.

a. MSG HDR = Number of words/Message code

b. Words 1 and 2 = Aircraft Identification (ACID)

c. Word 3 = New leader direction change

d. Word 4 = Radar Subsystem

e. Word 5 = Number of non-space characters in the ACID

OFFSET CHANGE DATA PACKET

	29 — 15	14 — 0
MSG HDR	NUMBER OF WORDS	050
WORD 1	CONTENTS OF CATC1	
WORD 2	CONTENTS OF CATC2	
WORD 3	CONTENTS OF CFLGT	
WORD 4	CONTENTS OF CTST	
WORD 5	CONTENTS OF RECRT	

4.16 Leader Direction Change Packet

CTS words for associated tracks that have leader changes to the FDB shall be extracted in the keyboard operational function, segment "C" (KOFC) program. An output routine will add the following data packet to the output chain for the low priority stack for output to the TIU/FAST. The program exits to the output routine are at LDR1L+11 and LDR6L+16.

a. MSG HDR = Number of words/Message code

b. Words 1 and 2 = Aircraft Identification (ACID)

c. Word 3 = New leader direction change

d. Word 4 = Radar Subsystem

e. Word 5 = Number of non-space characters in the ACID

LEADER CHANGE DATA PACKET

	29	15	14	0
MSG HDR	NUMBER OF WORDS			051
WORD 1	CONTENTS OF CATC1			
WORD 2	CONTENTS OF CATC2			
WORD 3	CONTENTS OF CFLGT			
WORD 4	CONTENTS OF CTST			
WORD 5	CONTENTS OF RECRT			

4.17 Site Variable Parameters

One set of Site Variable (SV) parameters will be used to identify how many keyboards and displays are eligible for FAST processing. Another set of SV parameters will identify what displays are eligible and the last set will identify what keyboards are eligible.

The keyboards that are identified in these parameters must be associated with the displays that are defined.

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The keyboards that are identified in these parameters must be associated with the displays that are defined.

5.0 Abbreviations and Acronyms

ACID	Aircraft Identification
APT	Airport Table
ARTS	Automated Radar Tracking System
CDR	Continuous Data Recording
CFG	Configuration
CTS	Central Track Store
DDD	Detail Design Data
FAST	Final Approach Spacing Tool
IF	Interfacility
IFI	Interfacility Input
IFO	Interfacility Output
IOPB	Input/output processor, modification B
ILL FNCT	Illegal Function
ILL POS	Illegal Position
KOFA	Keyboard Program
MC	Message Code
MIT	Massachusetts Institute of Technology
MPE	Multiprocessor Executive
MSP	Medium Speed Printer
PPL	Push P to List
SP	System Parameter
SV	SITE Variable parameter
TATCA	Terminal Air Traffic Control Automation
TIU	TATCA Interface Unit
TTY	Teletype