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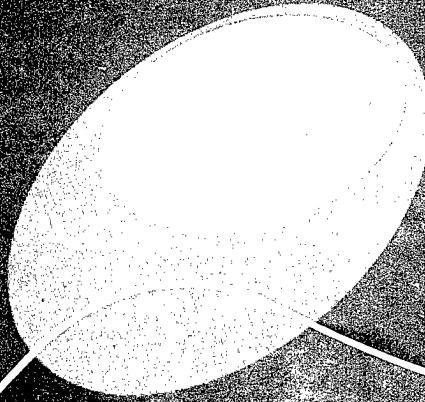**PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-FDAC**

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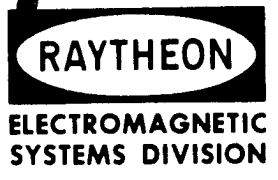
APPENDIX 17
IEWS DATA TRANSFER (XFER)
FINAL SOFTWARE REPORT
DATA ITEM NO. A005

INTEGRATED ELECTRONIC WARFARE SYSTEM
ADVANCED DEVELOPMENT MODEL (ADM)

18009877-17

PREPARED FOR

NAVAL AIR DEVELOPMENT CENTER
WARMINSTER, PENNSYLVANIA

CONTRACT N62269-75-C-0070

RAYTHEON

ELECTROMAGNETIC
SYSTEMS DIVISION

1 OCTOBER 1977

APPENDIX 17
DATA TRANSFER SOFTWARE DESIGN SPECIFICATION
FINAL SOFTWARE REPORT
DATA ITEM A005

INTEGRATED ELECTRONIC WARFARE SYSTEM (IEWS)
ADVANCED DEVELOPMENT MODEL (ADM)

Contract No. N62269-75-C-0070

Prepared for:

Naval Air Development Center
Warminister, Pennsylvania

Prepared by:

RAYTHEON COMPANY
Electromagnetic Systems Division
6380 Hollister Avenue
Goleta, California 93017

1 OCTOBER 1977

TYPE OF SPEC

Computer Program Design Specification

TITLE OF SPEC

IEWS Special Test Equipment Data Transfer (XFER)

FUNCTION	APPROVED	DATE	FUNCTION	APPROVED	DATE
WRITER	T. Chernesky				

REVISIONS

CHK	DESCRIPTION	REV	CHK	DESCRIPTION	REV

REVISION																
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1.0 Scope

1.1 Identification

This document specifies the detailed design requirements of XFER, a stand-alone non-operational software package for IEWS. XFER shall provide the STE with a memory dump or memory modify capability without requiring the IEWS operational software to be resident in IEWS. Communication to and from the STE shall follow the same protocol as that between the STE and the IEWS operational software.

1.2 Subprogram Tasks

XFER shall consist of five modules:

1) Resource management processor: XFRMP
2) Classification processor: XFCP
3) Analysis processor: XFAP
4) Techniques generator: XFTG
5) Signal sorter: XFSS

Each module shall have the capability of processing memory dump/modify requests destined for the host processor, and the capability of passing requests destined for slave processors to those slave processors.

2.0 Applicable Documents

The following documents, of the exact issue shown, form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of the Computer Program Design Specification for the Integrated Electronic Warfare System (IEWS) Advanced Development Model (ADM) Program shall be considered superseding requirements.

2.1   Computer Program Performance Specification

Computer Program Performance Specification for the Integrated Electronic Warfare System (IEWS) Advanced Development Model (ADM) Program (U), Raytheon Company, Electromagnetic Systems Division, (Number 0612905029), (date 1 June 1976), (classification U).

2.2   Computer Program Design Specification

Computer Program Design Specification for the Integrated Electronic Warfare System (IEWS) Advanced Development Model (ADM) Program (U), Raytheon Company, Electromagnetic Systems Division, (Number 53959-GT-0750), (date TBD), (classification U).

2.3   Data Base Design Document

The Common Data Base Design Document, System Controller Unit, IEWS, ADM, document No. 53959-GR-0751, shall apply to this subprogram.

2.4   Miscellaneous Documents

The following documents shall apply to this subprogram.

Document No.	Document Title
53959-GR0756	Computer Subprogram Design Document, Executive, IEWS, ADM
WS-8506 Revision 1, 1 November 1971	Requirements for Digital Computer Program Documentation

3.0   Requirements

3.1   Subprogram Detailed Description

Each of the five XFER modules (XFRMP, XFCP, XFAP, XFTG, and XFSS) shall have a similar structure.

Each shall have two sections:

1) Initializer

2) Query

Each of the initializers shall:

1) Initialize (master clear) any slave processors

2) Clear all message flags of to-slave message buffers and from slave message buffers.

3) Newstart (put into run mode) any slave processors

4) Pass control to Query

Each of the Query sections shall poll the master and any slave processors for messages. If there is a message from the master, the XFER module shall determine if the message is destined for the host processor or a slave. If for a slave, the message shall be relayed to that slave. If not for a slave, then the message (a memory dump or memory modify) shall be processed locally. That is, local memory shall be modified, or an Executive message type 5 shall be generated (see CDBDD) as a response to the local memory dump request all messages from slaves shall be relayed to the master processor.

3.2   Subprogram Flow Diagram

Figure 1 shows a flowchart which is applicable to each of the five XFER modules.

3.3   Computer Subprogram Environment

3.3.1   Tables

Each XFER module (with the exception of the RMP) shall have an input buffer and output buffer (IN BUFF and OUT BUFF, respectively)

XFRMP
XFCP
XFAP
XFSS
XFTG

START

SET S-REG.
TO
INITIAL
VALUE

INITIALIZE
SLAVES

CLEAR ALL MSG
FLAGS FOR
MSG TO SLAVES

CLEAR ALL MSG
FLAGS FOR
MSG FROM SLAVES

NEWSTART
SLAVES

A

QUERY

A

ANYTHING
FROM
MASTER

Y

B

N

ANYTHING
FROM
SLAVES

Y

C

N

XFER (ALL MODULES)

5

MASTFR

XFER
(ALL MODULES)

SLAVER

```
        ( C )
          │
   ┌──────────────┐
   │     GET      │
   │  TO-MASTER   │◄──────┐
   │  MSG. BUFFER │       │
   │     FLAG     │       │
   └──────────────┘       │
          │               │
         ╱ ╲              │
        ╱   ╲      N      │
       ╱ =0  ╲────────────┘
        ╲   ╱
         ╲ ╱
          │ Y
   ┌──────────────┐
   │ COPY SLAVE'S │
   │   MSG  TO    │
   │  MASTER'S    │
   │   BUFFER     │
   └──────────────┘
          │
   ┌──────────────┐
   │    CLEAR     │
   │   SLAVE'S    │
   │     MSG      │
   │     FLAG     │
   └──────────────┘
          │
   ┌──────────────┐
   │     SET      │
   │   MASTERS    │
   │     MSG      │
   │     FLAG     │
   └──────────────┘
          │
        ( A )
```

XFER
(ALL MODULES)

7
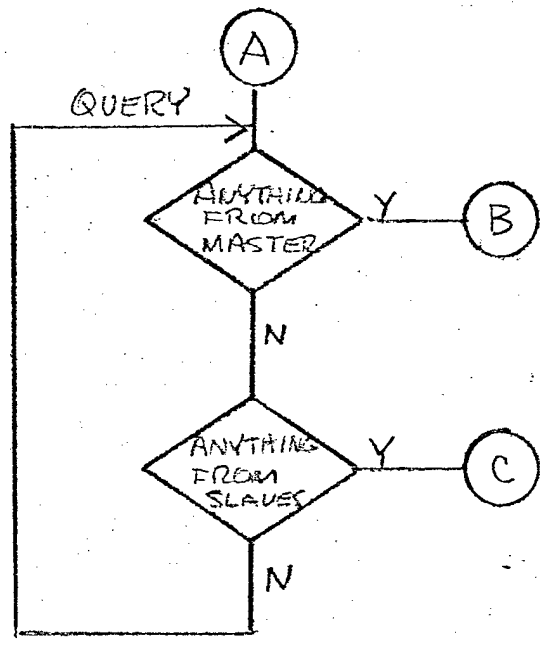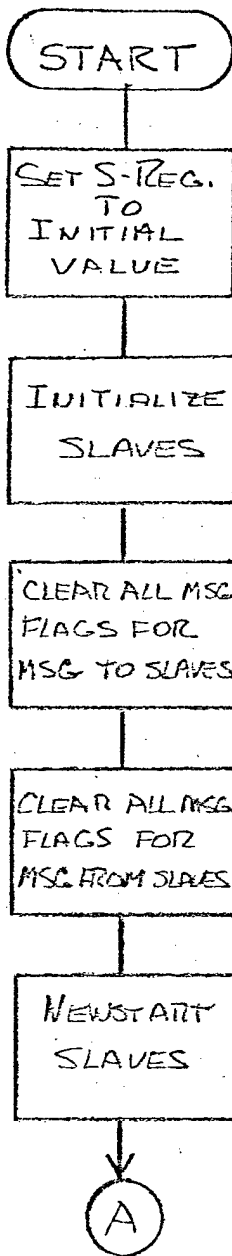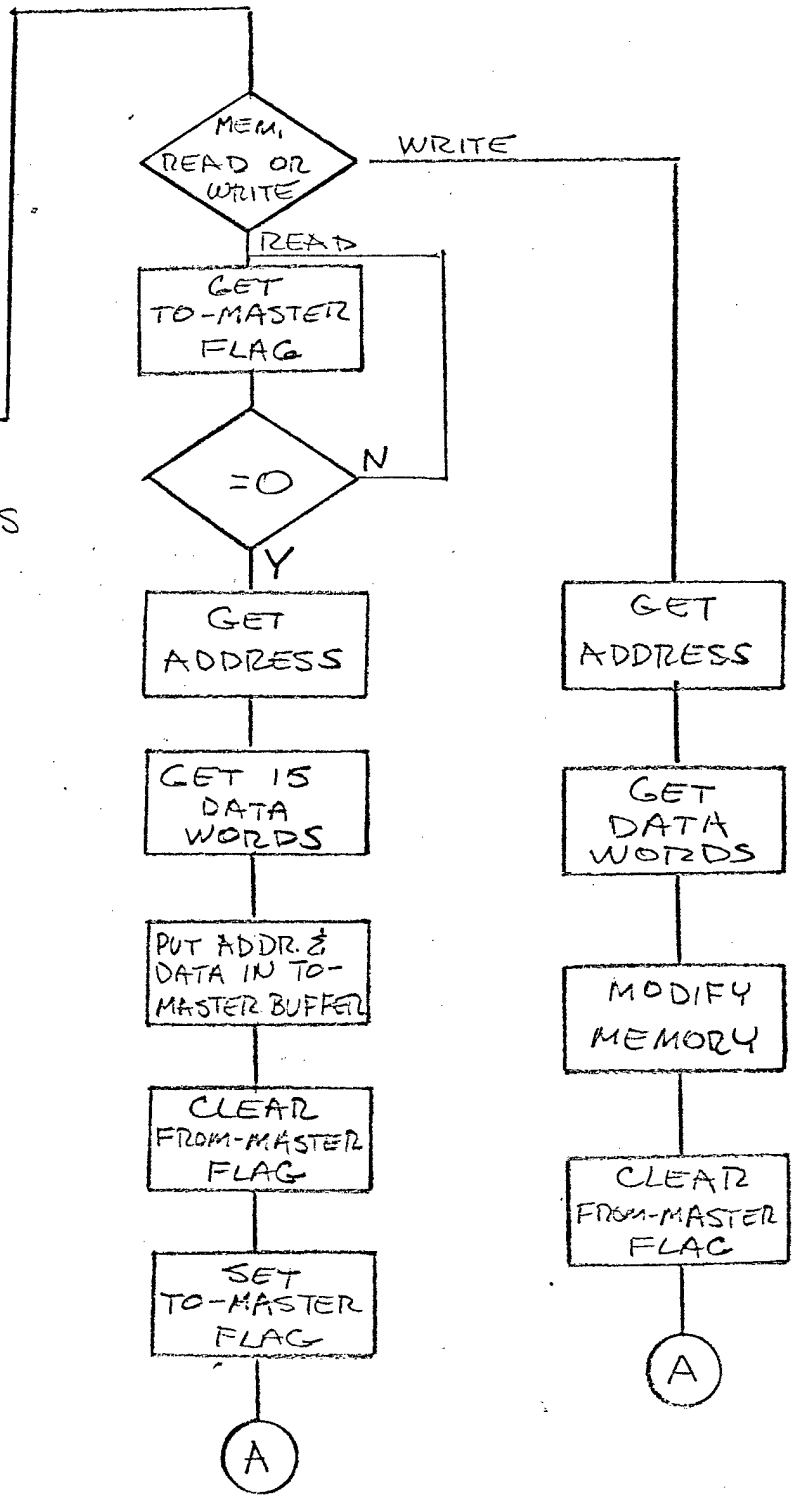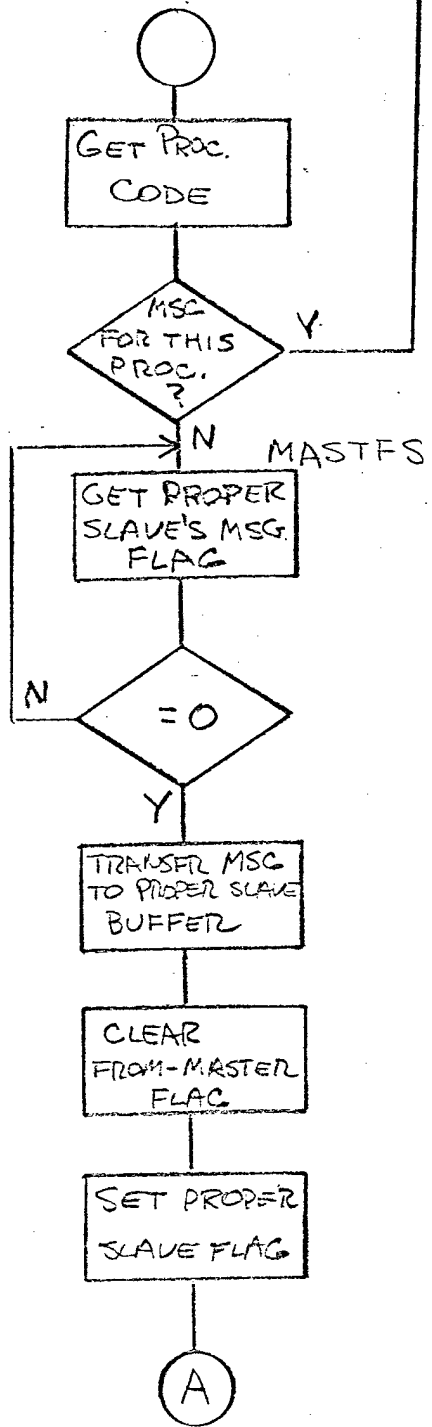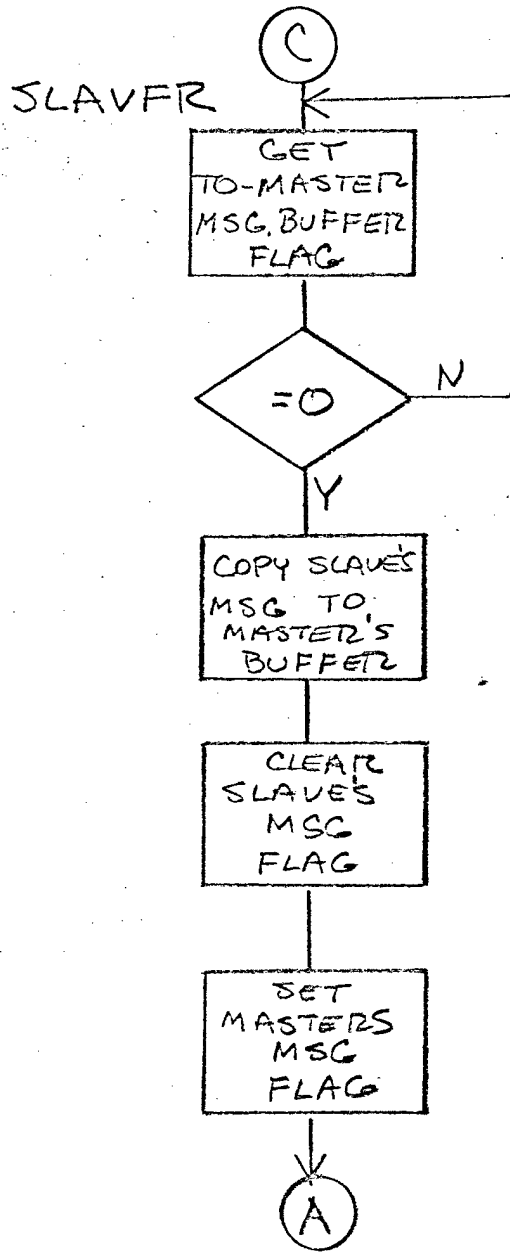
3.3.1.1   IN BUFF

IN BUFF shall be used as the input message buffer for messages from the master IN BUFF shall be 25 16-bit words in length. Word 0 shall be a flag word (non-zero contents mean a message is present) Remaining words shall contain an Executive message type 27 or 28 (memory dump or memory modify, respectively).

3.3.1.2   OUT BUF

OUT BUF shall be used as the output message buffer for messages to the master OUT BUF shall be 25 16-bit words in length. Word 0 shall be a flag word (non-zero contents means a message is present). Remaining words shall be available for storage of an Executive message type 5 (memory dump response).

3.3.1.3   RMP XFER Input Buffer

The equivalent of IN BUFF in XFRMP shall be the STE - to - SC message buffer defined as 7004_{16} through 7017_{16}. The format of this message buffer shall be the same as IN BUFF (word 0 shall be a flag).

3.3.1.4   RMP XFER Output Buffer

Communication from the RMP to the STE shall utilize the circular buffer defined by the contents of the following locations:

7000_{16} Address of next message to be read by the STE

7001_{16} Address of next available word in buffer

7002_{16} Address of lower memory bound buffer

7003_{16} Address +1 of upper memory bound of buffer

The contents of these locations must be initialized by the STE program, SYSTEST. A copy of the IEWS operational software EXSTE subroutine shall be used to store data in the circular buffer.

3.3.2   Variables

           None

3.3.3   Constants

           None

3.3.4   Flags

           None

3.3.5   Indices

           None

3.3.6   Common Data Base References

           None

3.4   Input/Output Formats

Xfer shall receive executive messages (type 27 and 28) from the STE and shall output executive messages (type 5) to the Message type 27 is a "read memory" message. Type 28 is a "write memory" message. Type 5 is a STE - destined data extraction message. The format of these message types is shown in the following figures.

3.5   Required System Library Subroutines

           None

3.6   Conditions for Initiation

           Unconditional

3.7   Subprogram Limitations

           None

15	12 11	8 7	4 3	0
Φ		5		
1	No. of Words To Follow			
2	Op-Code		EFN	
3	Time Tag		(MSB's)	
4	Time Tag		(LSB's)	
5	Data Word 1			
6			2	
7			3	
8				
•				
•				
•				
•				
•				
20				
21	Data Word 16			
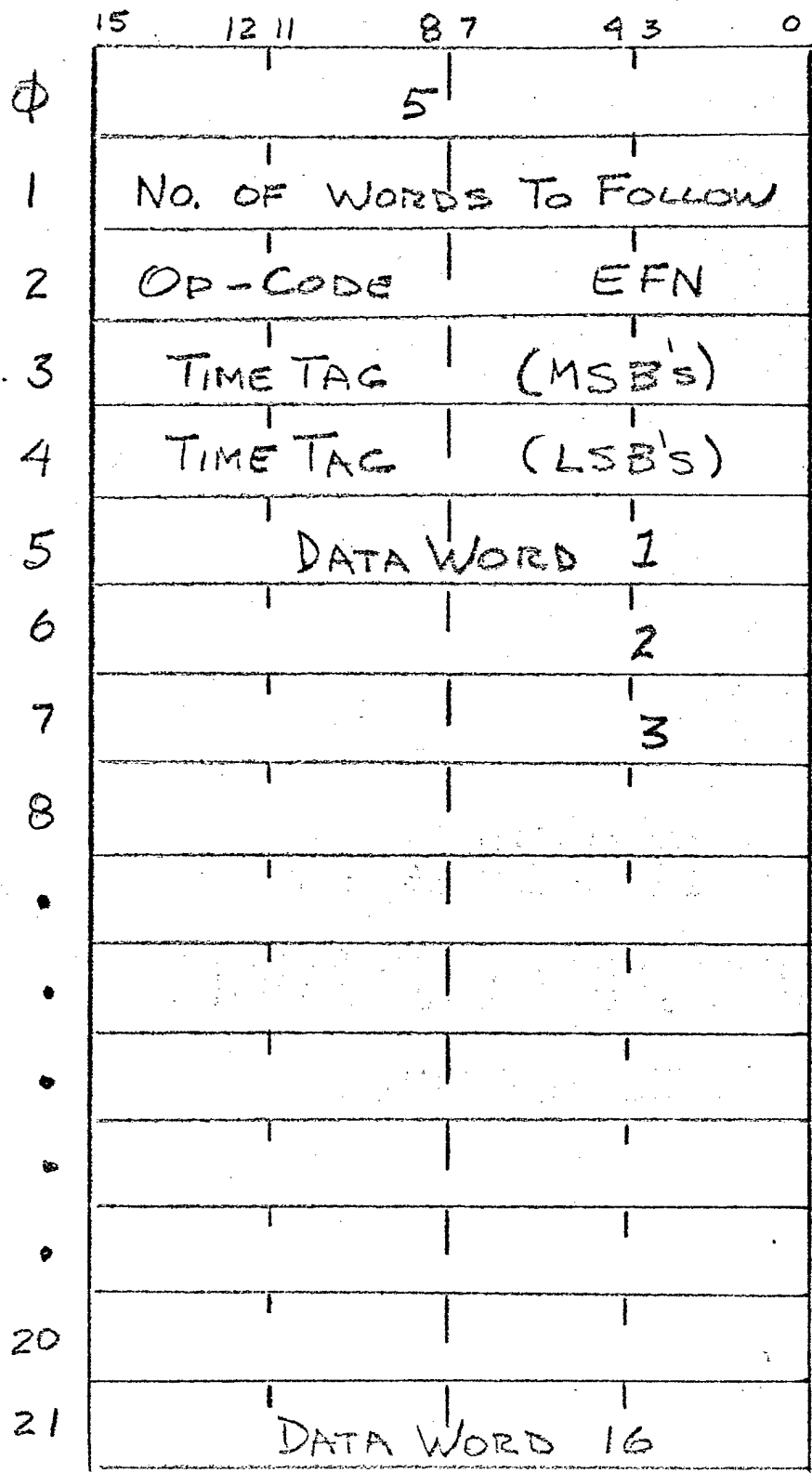
STE-Destined Data Extraction Message
(Exec Message Type 5)

10

	15	12	11	8	7	4	3	0
φ				27				
1	No. OF WORDS TO FOLLOW							
2	PROCESSOR No.							
3	ADDRESS							
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
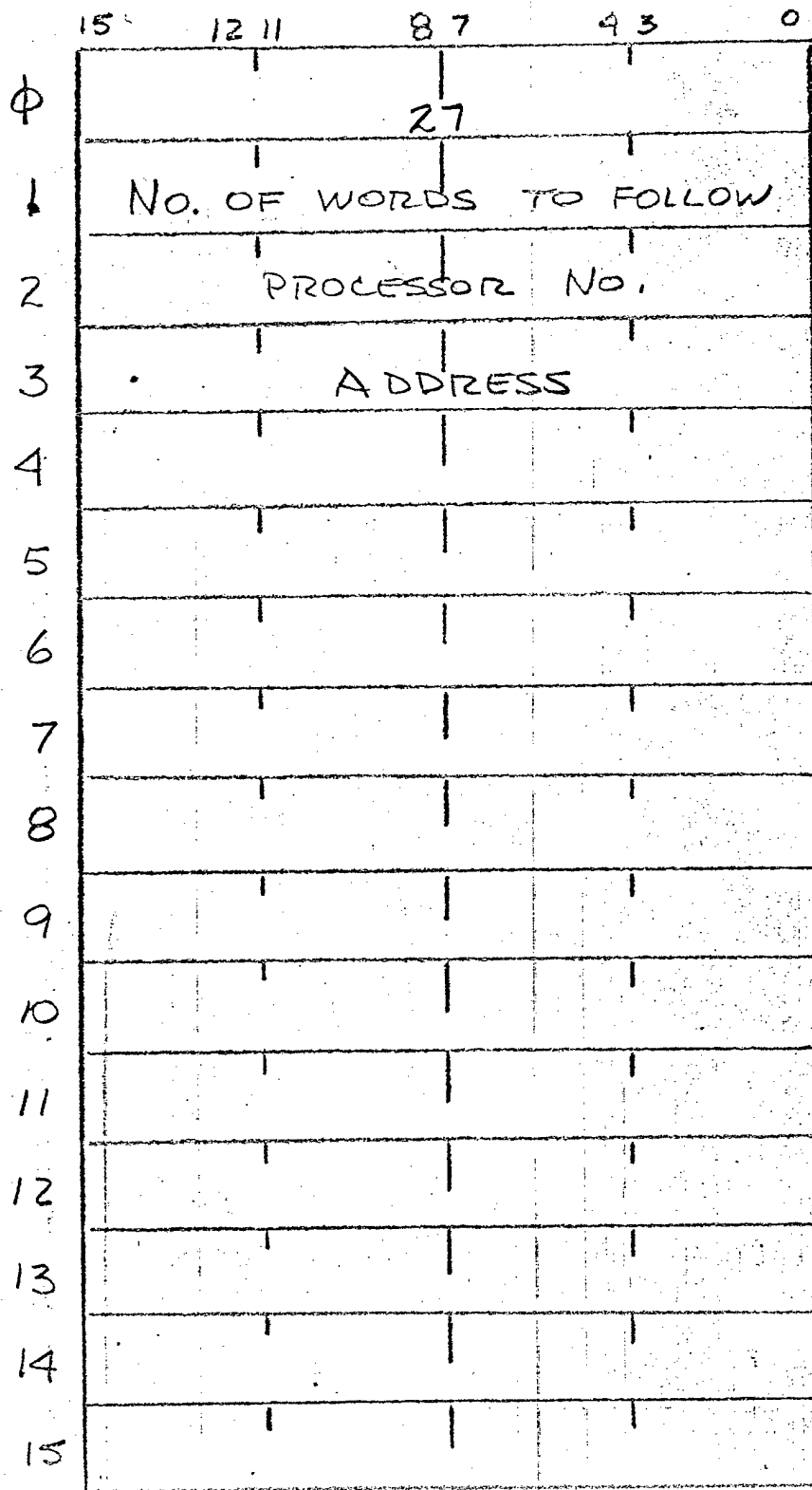
READ MEMORY MESSAGE FORMAT
(EXEC, MESSAGE TYPE 27)

	15	12 11	8 7	4 3	0
0	28				
1	No. OF WORDS TO FOLLOW				
2	PROCESSOR No.				
3	ADDRESS				
4	No. WORDS OF DATA				
5	1ST DATA WORD				
6	2ND DATA WORD				
7	3RD DATA WORD				
8	•				
9	•				
10	•				
11	•				
12	8TH DATA WORD				
13					
14					
15					
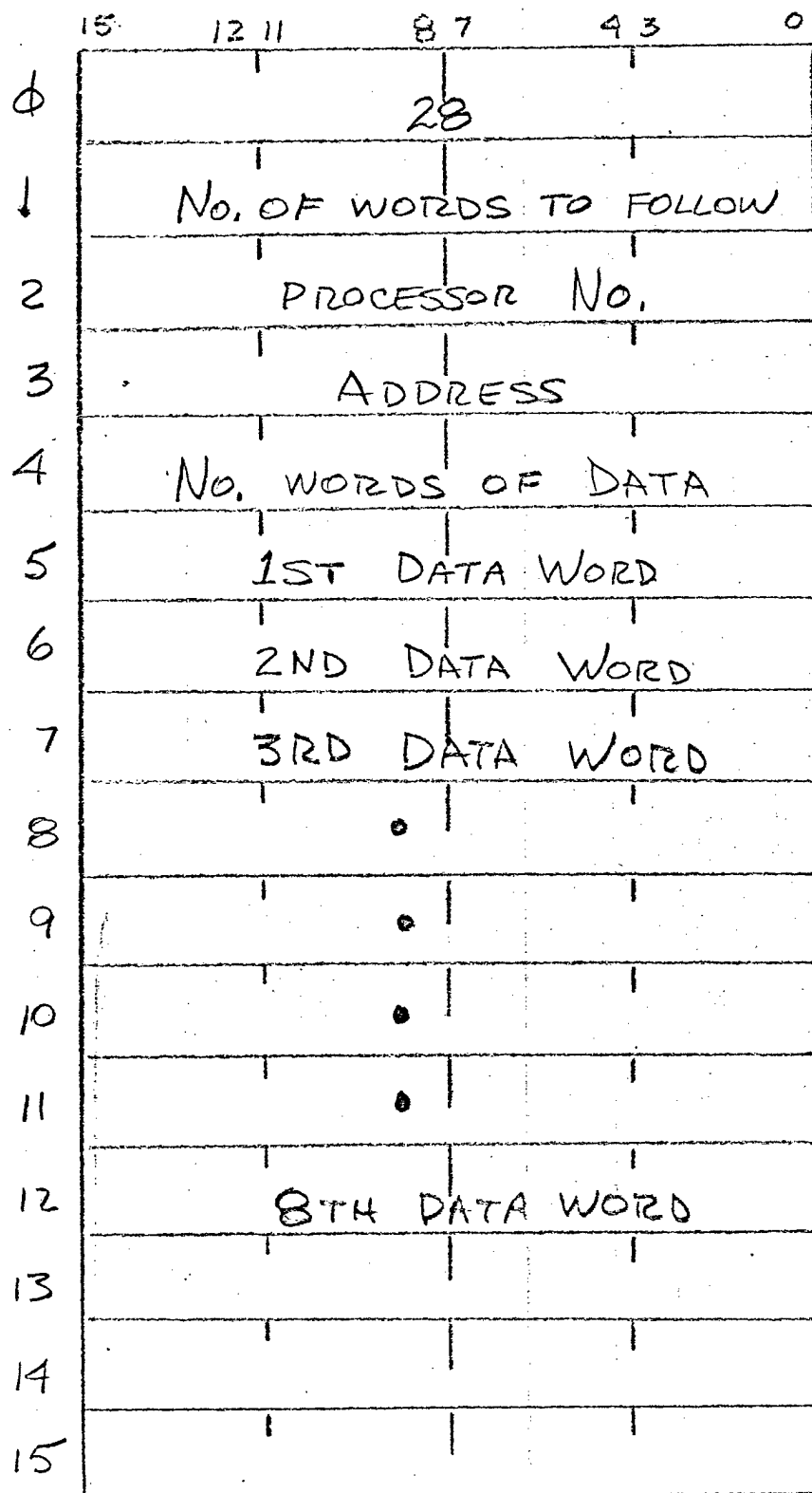
WRITE MEMORY MESSAGE FORMAT
(EXEC. MSG. TYPE 28)

12

3.8 Interface Description

The following block diagram shows the relationship between the subprograms of the Xfer software module.

```
                    ┌─────────────┐
                    │    STE      │
                    │  SYSTEST    │
                    │  PROGRAM    │
                    └──────┬──────┘
                           │
                    ┌──────┴──────┐
                    │ RMP  XFER   │
                    │  MODULE     │
                    │ (XFRMP)     │
                    └──────┬──────┘
              ┌────────────┼────────────┐
       ┌──────┴──────┐ ┌───┴──────┐ ┌───┴──────┐
       │    CP       │ │    AP    │ │   TG     │
       │  XFER       │ │ XFER.MOD.│ │ XFER.MOD.│
       │  MODULE     │ │ (XFAP)   │ │ (XFTG)   │
       │  (XFCP)     │ └──────────┘ └──────────┘
       └──────┬──────┘
       ┌──────┴──────┐
       │    SS       │
       │ XFER.MOD.   │
       │ (XFSS)      │
       └─────────────┘
```

INTERFACE
DESCRIPTION
XFER