SDC FIELD NOTE A WORKING PAPER

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FN - LO - 199

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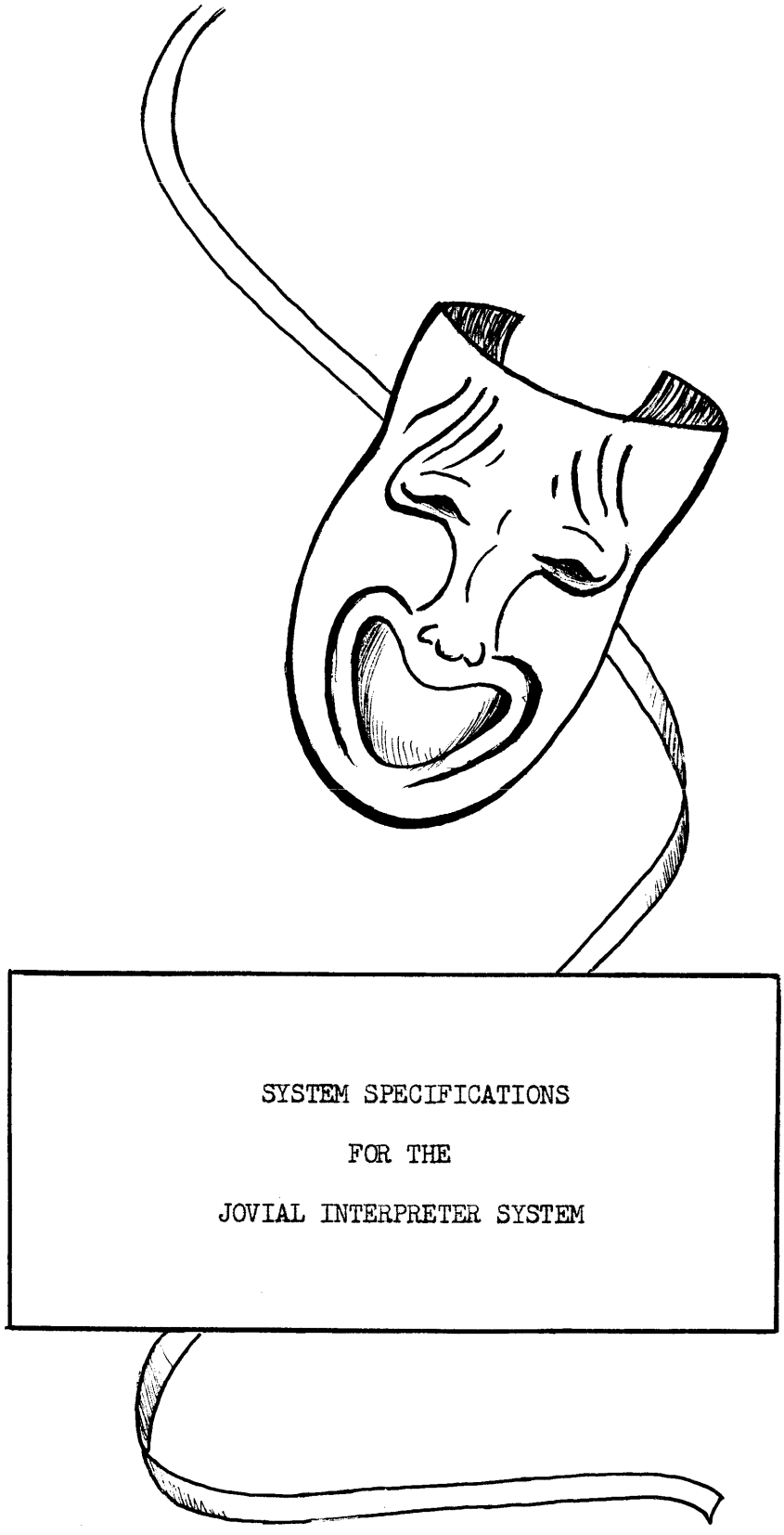
(Produced under System Development Corporation subcontract No. 202 issued by International Electric Corporation in performance of contract AF-30(635)-11583)

1 February 1960



SYSTEM SPECIFICATIONS

FOR THE

JOVIAL INTERPRETER SYSTEM

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INTRODUCTION

The purpose of this document is to include, in one ready reference, general system specifications that are not readily apparent from a reading of other documents on the JOVIAL Interpreter System (JIS). Such topics as the organization and format of the master tape, identification conventions for JIS programs, a brief description of the operation of JIS, tape allocation, permanent core allocation, sense indicators, and sense switch settings are included.

JOVIAL INTERPRETER SYSTEM (JIS) FUNCTIONS AND OPERATION

All operations of JIS are supervised by the Test Control Program, JTCPZ, the primary purpose of which is to control the operation of the subprograms in JIS.

JIS' main function is the testing of JOVIAL object programs. JIS also performs two support functions. The first support function is provided by a tape-loading program, JMSTZ. This program accepts control card inputs and uses this control data to produce a System Master Tape. This tape is created by a selective duplication process which copies programs and data from various input sources, such as binary decks and binary tapes, and orders them onto the output tape. The second support function is that of assembling the data definitions needed to create a Master Compool. The Assemble Master Compool Program, JAMCZ, accepts input cards which describe common data. It uses the information from these cards to produce the Master Compool, which is then used by the tape-loading program, JMSTZ.

The major function of JIS, as was mentioned above, is the checking of the logic of JOVIAL-coded programs. All input data cards are either prestored off-line onto tape, or are introduced via the card reader. Different tests may be stacked, with the sequence of job operation being controlled by a deck of test control cards in the card reader. Control card data is used by JTCPZ to select the proper input data and to initiate the test. If at any time during the testing cycle the intermediate results indicate that further operation would be meaningless, the test is discontinued and another operation is initiated.

The first JIS subprogram to operate is known as the First Pass of the Interpreter (JALLZ). The JOVIAL input cards are read in by JALLZ, and after being checked for logical inconsistencies, are translated to an intermediate language which describes the operations necessary to perform the function(s) contained in the original JOVIAL statement. JALLZ then produces a Variable Definition Table entry for each item of variable data referenced by the object program. This table of definitions is derived from either of two sources -- the Master Compool associated with this test, or a definition contained in the JOVIAL object program. Once the total operating environment has been defined, it is possible to efficiently allocate core storage to the various tables and items. The Variable Definition Table is updated to reflect these storage addresses. The Master Compool is used to supply definitions for all data not defined in the JOVIAL object program. The option exists, on the test control card, of choosing one of the several Master Compools contained on the System Master Tape as the data definition source for this particular test, thus allowing testing of the JOVIAL-coded programs with the various versions of system Compools. Another option available on the test control card allows the introduction of revisions to the JOVIAL program deck through the card reader. This allows prestored input tapes to be updated without having to prestore the entire input array.

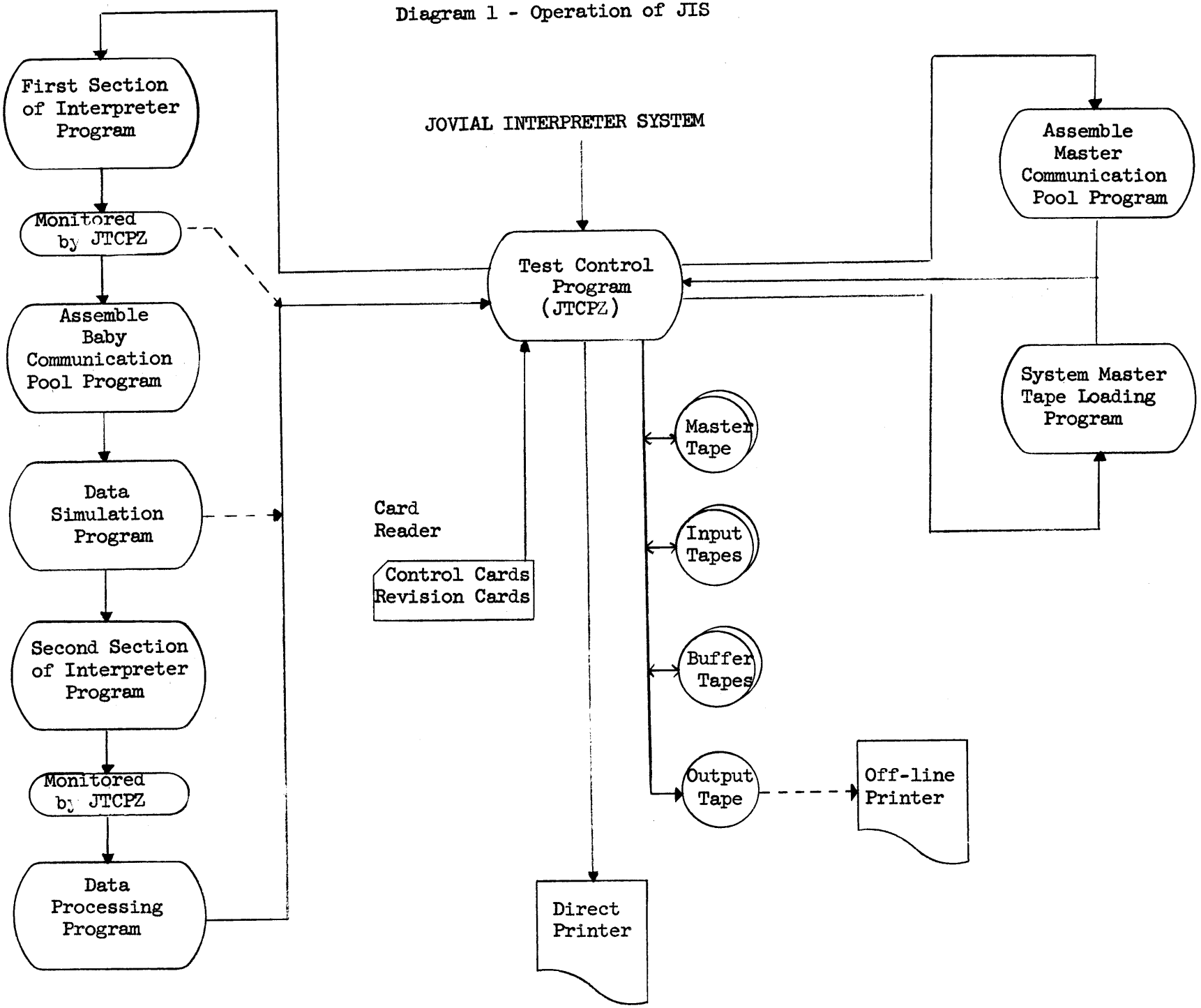
The Assemble Baby Compool Program, JABCZ, operates next. Using the Intermediate Language Tables and the data definitions constructed by JALLZ, JABCZ constructs the Baby Compool. This Compool contains information relating solely to the data referenced by the JOVIAL object program under test, and provides a control medium for use by the Data Simulation and the Data Processing Programs. The Baby Compool is saved on tape for later system use.

The next program to operate in the test sequence is the Data Simulation Program, JSTRZ. This program provides the controlled environment necessary for program testing. The predicted final values of data acted on by the object program may also be introduced through JSTRZ.

The Second Pass of the Interpreter Program, JOLLZ, now operates. The Intermediate Language statements are sequentially decoded, and the indicated operation is performed. These operations may be arithmetic, data storage, or transfers to some other statement. The final output consists of data that the object program would normally produce. Another feature of JOLLZ is that it assists the Data Processing Program in the performance of the interpretive trace function. A buffer tape containing dynamic "snapshots" of certain interpretive operations is produced for later use by the Data Processing Program.

The last system subprogram to operate is the Data Processing Program, JDSYZ. This produces output which includes an English language translation of the Intermediate Language Tables, definitions of all data referred to by the program, final values of all data, and initial and final values where previously introduced. An internal comparison is made of all data where expected values are present. These expected values are compared to the final values and, where differences exist, a search is made to determine the Intermediate Language statement(s) which store(s) values into this data location. These statements are output for debugging purposes. Another output is a dynamic trace of the interpretive execution of the Intermediate Language. Output data for all tests is stacked on magnetic tape for off-line printing.

Diagram 1 - Operation of JIS



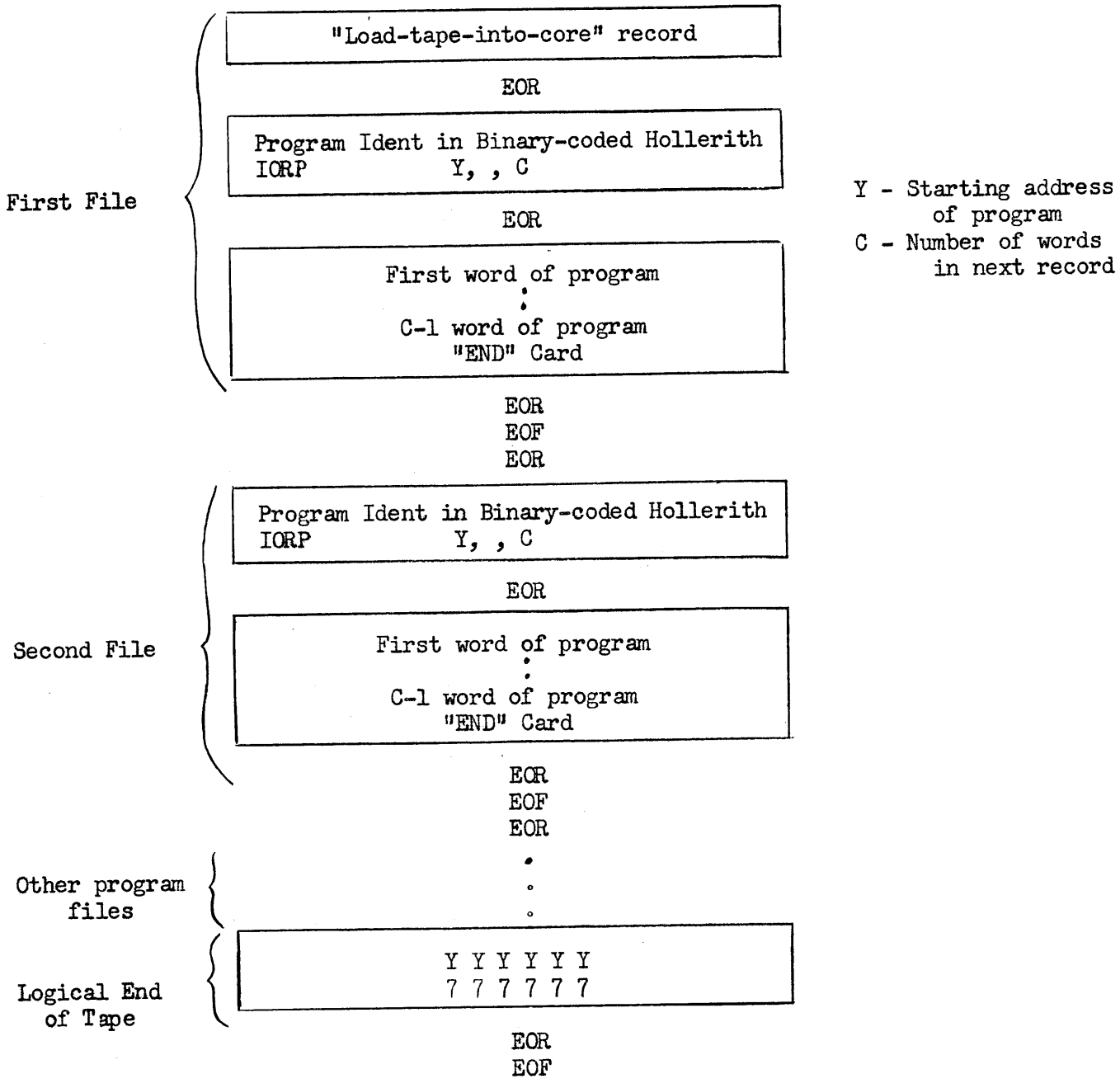
MASTER TAPE

JIS, complete and autonomous, is self-contained on its own physical tape, hereafter referred to as the System Master Tape. There are eight subprograms comprising JIS, each of which forms a file on the Master Tape. There is also a control area, which along with one of the eight subprograms, JTCPZ, constitutes the first file on the Master Tape. This file, when read in, is permanently affixed in the low part of core. All other subprograms are read in from the Master Tape by JTCPZ, control branched to each in turn, and scratched from core by the next operating subprogram. The order of files need not be in the sequence of program operation. There is, however, the mandatory feature that the first file must be the permanent core configuration. This prerequisite is justified by the "Load-from-Tape" action implemented in the tape-loading function of JMSTZ. In initiating the system operation, the "Load-from-Tape" button on the console is depressed and the first file on the Master Tape is read into core. The first record of this file is the "Load-tape-into-core" record which, in effect, initiates the reading of the control area into core. The "END" card of this file is an unconditional branch to the first operating instruction of the Test Control Program, JTCPZ. From this initiating control point, the system cycles through the sequential order of operating subprograms.

Compool outputs from JAMCZ are also stored as separate files on the Master Tape. There is the possibility of having any number of Compools on the tape.

FORMAT OF MASTER TAPE

Each program file except the first file is made up of two records. This exception contains one other record, the "Load-tape-into-core" record.



NOTE: Where individual program coding includes the use of TCD (transfer) cards, an end-of-record gap is written on the tape when such a type of card is encountered. However, the program sequence is not hindered because of this, and the program continues to be loaded as part of another record.

TAPE ALLOCATIONS

Tape	Description
A1	System Master Tape.
A2	Prestored input cards for JTCPZ, JALLZ, JSTRZ, JAMCZ.
A3	New/partial Compool output from JAMCZ; new Compool input to JMSTZ.
A4	Prestored binary deck input to JMSTZ.
B1	All DLO.
B3	New Master Tape output from JMSTZ.
C1	Internal table output from JALLZ; Baby Compool output from JABCZ; Initial Tabsim output from JSTRZ.
C3	Partial Compool input to JAMCZ; new Master Tape output from JMSTZ.
D1	Additional table data output from JALLZ; additional table data input to JSTRZ; trace output from JOLLZ; trace input to JDSYZ.
D2	Expected Tabsim output from JSTRZ; expected Tabsim input to JDSYZ.
D3	New Master Tape output from JMSTZ.

IDENTIFICATION CONVENTIONS FOR THE JOVIAL INTERPRETER SYSTEM (JIS)

Program Identification

Each program will be identified by eight symbols:

L System	LLL Sub- program	L Model	D Version	DD Modification

For the Interpreter System, the first letter is "J."

The three-letter subprogram identifications are as follows:

ABC	Assemble Baby Compool Program
ALL	Interpreter First Pass -- Assemble, expand and insert logical language
AMC	Assemble Master Compool Program
DSY	Data Reduction Program
MST	Tape Loading Program
OLL	Interpreter Second Pass -- Operate logical language
STR	Data Simulation Program
TCP	Test Control Program

For model, version and modification clarification, refer to FN-LO-71-1, paragraphs 2.1.4, 2.1.5, and 2.1.6 respectively.

The following identification will appear at the beginning of every program. The first word will be tagged with the address of the "END" card, and will contain a transfer to the first operating instruction of the program. The second word will contain the five-letter program identification. The third word is the version and modification of the program. Example:

```
GO      TRA     START
        BCI     1,LLLLL
        BCI     1,DDD
         .
         .
         .
START   BEGIN   1,7,1
         .
         .
         .
         .
        END     GO
```

NOTE: For JTCPZ, the fourth register must be BCI 1,IM. This allows JMSTZ to insert the version number of the Master Tape in this register when buiding a new System Master Tape.

Compool Identification

Each Compool will be identified by six letters:

L	C	L	D	DD
System	Compool	Model	Version	Modification

For the Interpreter System the first letter is "J."

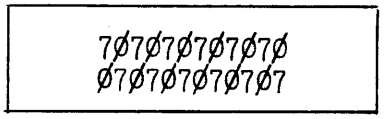
This method uses one word for identification and allows more than one modification of a Compool to be stored on the Master Tape.

End of Logical Tape

The logical end of tape used in the Interpreter System will be a two-word record containing BCD registers of YYYYYY and 777777 respectively, followed by an EOR and an EOF. The sum of these two words will give a maximum register of all ones.

Last record of last program

EOR
EOF
EOR



EOR
EOF

OPERATING ENVIRONMENT

A specific area in core is permanently affixed to contain intercommunication, I/O transmission and other helpful assistance routines. All subprograms of the system use some part of this configuration. Consequently the low part of core, from register Ø to register 4037_8 has been allocated to contain this helpful package, which will remain permanently in core during system cycling.

Communication Registers

Octal Address	Location Tag	Contents
31	BILT	Intermediate Language Table (ILT) for "B" series. Address = absolute address of ILT Table. Decrement = # of words in ILT Table.
32	BSWT	Switch Table (SWT) for "B" series. Address = absolute address of SWT Table. Decrement = 3 of words in SWT Table.
33	BSTAT	Status Table (STAT) for "B" series. Address = absolute address of STAT Table.
34	BVAT	Variable Table (VAT) for "B" series. Address = absolute address of VAT Table. Decrement = # of words in VAT Table.
35	TRAP2	"N" = Full trace; "N" = Automatic trace.
36	COMREG	Decrement = # of words in Baby Compool. Address = current address of Baby Compool.
37	MATTBL	Constant Table (CON) Address = absolute address of CON Table. Decrement = # of words in CON Table.

40	MATTBL+1	Subscript Table (SUB) Address = absolute address SUB Table. Decrement = # of words in SUB Table.
41	MATTBL+2	Variable Table (VAT) Address = absolute address of VAT Table. Decrement = # of words in Vat Table.
42	MATTBL+3	Switch Table (SWT) Address = absolute address of SWT Table. Decrement = # of words in SWT Table.
43	MATTBL+4	Intermediate Language Table (ILT). Address = absolute address of ILT Table. Decrement = # of words in ILT Table.
44	MATTBL+5	Statement Lable Table (SLT) Address = absolute address of SLT Table. Decrement = # of words in SLT Table.
45	TABREG	Decrement = # of words in table area. Address = starting address of table area.
46	TRAP1	"N" = Full trace; Ø = Automatic trace.
47	PRGID	Ident of program now operating.
50	TSSI	Sense Indicator storage.
51	DSYLMT	Data Processing Table data limit.
52	DATE	Contents of test.
53	DATE+1	Date Card.
54	HPARAM	Address of parameters to be used by Interpreter Second Pass, set by Interpreter First Pass.

NOTE: The series "B" notation refers to the location in the environment of JALLZ.

Permanent Core Configuration

Location Tag	Contents
SYSERR	Any error detected within the helpful package causes an automatic transfer to this location. The test being operated is discontinued and a return to the Test Control Program is initiated.
M SPAN	Routine to save the panel.
M RPAN	Routine to restore the panel.
P L323	Routine to convert up to 12 packed BCD registers to card image.
SEL	Routine which will select an I/O unit for the programmer after first insuring that the channel is free.
CHK	Routine which checks for beginning of tape test (BTT), end of tape test (ETT), end-of-file test (EOF), and transfer on redundancy check (TRC) for the channel indicated.
WAT	Routine which hangs up the program until a channel is checked and then returns.
K TEST	Routine which updates the activity on all channels.
M TMDSP	Routine which activates all I/O transmission macros.
WRT	Routine which prints BCD characters both on- and off-line depending on the desired output.
I CRDBCD	Routine which reads BCD cards from card reader.
I CDOPTN	Routine which reads BCD cards prestored on tape.
I INP	Synonymous with RETAK. This routine reads cards from channel a card reader and gives special returns for end-of-group and end-of-block.

NOTE: The Test Control Program (JTCPZ) is also in the permanent core configuration along with the communication registers and the routines noted above. For technical data on JTCPZ, refer to FN-LO-200.

Sense Indicators

Bit	Name	Coding
6	JOVIAL cards	Ø = no revisions to JOVIAL cards. 1 = revisions to JOVIAL cards.
8	JSTRZ data cards	Ø = no revisions to JSTRZ data input cards. 1 = revisions to JSTRZ data input cards.
10	JSTRZ date on tape	Ø = no additional initial table data on tape. 1 = additional initial table data on tape.
12	JOVIAL error	Ø = no errors in JOVIAL input. 1 = errors in JOVIAL input.
13	JSTRZ data error	Ø = no errors in JSTRZ data inputs. 1 = errors in JSTRZ data inputs.
14	Expected Table Data	Ø = no expected results. 1 = expected results exist on tape.

The contents of the sense indicator register is stored in location TSSI by JTCPZ prior to the operation of the First and Second Passes of the Interpreter. The sense indicator register is restored after the operation of these programs.

Sense Switches

Sense Switch 1 set to the down position indicates that all input data to JIS is being introduced through the card reader.

Sense Switch 3 set to the down position indicates that printing, which normally would be only off-line, is also on-line.

Sense Switch 5 is set to the down position by the computer operator when it becomes obvious that the Second Pass of the Interpreter is in a loop. This causes JTCPZ to bring in JDSYZ which will process all data in a normal manner.

A listing of the symbolic cards for permanent core (JCORZ) will be issued as the first supplement to this document (FN-LO-199, S1).

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