IBM

Application Program

H20-0184-0

1620 Drafting System (1620-CX-04X)

Operator's Manual

This program can be used by any industry to produce a drawing as computer output. The program is designed particularly to produce mechanical detail drawings from language statement input.

This manual explains the physical operation of the system, including program setup, console operations, halts and messages, storage maps, restart procedures, and macro library operations.

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CONTENTS

Program Setup 1
Disk Packs 1
The 1627 Plotter 1
The 1620 Monitor 1
Console Operating Instructions 1
Program Deck Organization 1
Execution 3
Halts and Message Listing 4
Message Format 4
Halts 4
Message Listing 5
Storage Maps 7
Compiler 7
Part Processor 8
Drawing Processor 9
Restart Procedures 10
Macro Library Procedures 10
Initializing the Macro Library 10
Adding Macros to the Library 11
Deleting Macros 11
Console Switch Summary 11

PROGRAM SETUP

This drafting system is designed for minimal operating procedures. The general procedure for running the system is to mount the proper disk pack(s), ready the 1627 Plotter, load the source deck behind the appropriate control cards, start the processing, and, when processing is complete, remove the completed drawing.

DISK PACKS

1. Disk storage areas are needed for the following:
   a. 1620 Monitor
   b. Monitor's Work Cylinders
   c. 1620 Drafting System Programs
2. 1620 Drafting System macros, if macros are being defined or used during this run.

All of the above may be stored on one or more disk packs.

THE 1627 PLOTTER

Set the pen at the right-hand edge of the plotting surface. This setting corresponds to minimum-Y on the 1627. For detailed information on the operation of the plotter see reference manual IBM 1627 Plotter (A26-5710-0).

THE 1620 MONITOR

Because the drafting system operates with the 1620 Monitor, the monitor must be in core and ready to read a JOB control card.

Specific details about the 1620 Monitor can be found in IBM 1620 Monitor I System Reference Manual (C26-5739-2). The reader, in using the manual, should have an understanding of the 1620 Monitor.

CONSOLE OPERATING INSTRUCTIONS

PROGRAM DECK ORGANIZATION

Typically, a program deck is divided in three parts:
Monitor control cards
1620 Drafting System control cards
1620 Drafting System source statements

Two control cards are needed for the monitor — a JOB card and an XEQ card for dim number 0810. Their format is shown below:

	Cols. 1-5	Cols. 13-16
First control card	†† JOB	
Second control card	†† XEQ	0810

A list of valid control cards for the 1620 Drafting System follows. Use of the control cards is optional, but when used they all must precede the source statements. Blanks in the control cards are ignored; otherwise, the cards must appear exactly as shown below:

Statement in Columns 1-72	Purpose of the Statement
*LIST TYPEWRITER	Source statements are listed on the typewriter.
*LIST PRINTER	Source statements are listed on the printer.
*ERROR STOP	When an error is detected during compilation, the computer indicates the error statement and awaits entry of a corrected statement from the typewriter. Without this control card, the system, after typing out the statement in error, continues compilation.
*SEQUENCE CHECK	The sequence number in columns 73-76 of the source statements is checked for ascending sequence. A card out of sequence causes an error message. If this control card is not used, sequence numbers on the input cards are ignored, and the system generates its own sequence numbers for the statements.
*EDIT ANSWERS digit	This control statement causes the outputting of the results of equivalence statements. The output device used depends upon the digit. One of the following digits must be used: 1 for typewritten output 4 for card output 9 for printer output
*BEGIN TYPEWRITER INPUT	If the source statements are to be entered from the typewriter instead of from cards, this control card is used. After this card is read, the computer activates the typewriter for all succeeding statements during the job.

Statement in Columns 1-72	Purpose of the Statement
*REMOVE MACRO name	To remove a macro from the drafting system library, use this control statement. For example, to remove a macro named BORDER, prepare a control card with the statement *REMOVE MACRO BORDER (see the section of this manual titled "Macro Library Procedures" for further information).

Unless the control card *BEGIN TYPEWRITER INPUT has been used, the next set of cards, after the control cards, is the deck of source statements in the 1620 Drafting System language. The last card of the source statement deck must contain a FINI statement; otherwise, the computer attempts to read more cards, and processing is suspended.

EXECUTION

When the 1620 Monitor is ready to read a JOB card, place the deck of cards, as described above, into the card reader, and push reader start. As the source statements are read, they are compiled into an object program onto the disk. After the FINI card is read, the compiling phase is over, and the phase logs out on the typewriter. Phase two is then called in through the monitor. This is the part processor, and it contains geometric subroutines that are brought from the file as needed. The part processor executes the compiled program, producing two output files: a part model file and a set of drawing command records. After phase two logs out, phase three is executed. This is the drawing processor, which reads the drawing command records and operates upon the part model. As this phase executes, the plotter begins to produce the drawing. After the drawing is produced, control is returned to the 1620 Monitor.

If the system reads the control card *BEGIN TYPEWRITER INPUT, the typewriter carriage is returned, and the compiler awaits entry from the keyboard.

Type the desired statement; type a record mark; press the release-start key. After the statement is processed, the carriage is again returned, and the next statement is entered.

If a typing error is made, turn on switch four; press release-start; turn switch four off; reenter the statement correctly.

Only 72 characters of a statement can be entered at once. However, a statement can be continued by ending the first line of the statement properly with a single dollar sign.

HALTS AND MESSAGE LISTING

MESSAGE FORMAT

All messages are printed on the typewriter. Their format is a five-digit message code, followed by the sequence number of the input statement.

The first character of each message is always one of the following:
1. M — This is a message to indicate stage of processing.
2. E — An error has occurred that allows processing to continue.
3. P — An error has occurred that causes termination of this phase of the system.
4. J — An error has occurred that causes complete termination of this job.

The second digit of each message is either a zero or a two. Zero indicates that the drafting system allows no options after the message is typed. Two signifies that two options are available to the user.

The third digit of each message is the phase in which the message was typed. The fourth and fifth digits identify the message. A completely successful run causes the following three messages to be typed:

M0199
M0299
M0399

HALTS

There are two halt conditions — source statement correction of error and programmed pauses.

If an *ERROR STOP control card has been entered, the compiler, after logging the message in error, halts. The operator can then push START and can enter the correct statement from the typewriter. After the correct statement is entered, processing is resumed automatically. If the program cannot be corrected merely by changing the statement just found to be in error, it is possible to restart the compiler in this manner: (1) remove all cards from the reader; (2) make corrections to the card deck; (3) put the new deck back in the reader; (4) turn on switch two; (5) push READER START; and (6) depress computer START.

During the execution of the drawing processor, a halt can also occur if the halt has been programmed. This provision, among other uses, enables the operator to intervene and to change the size of the plotter's pen. Such a halt is preceded by the message M0304. Resume processing by depressing START.

MESSAGE LISTING

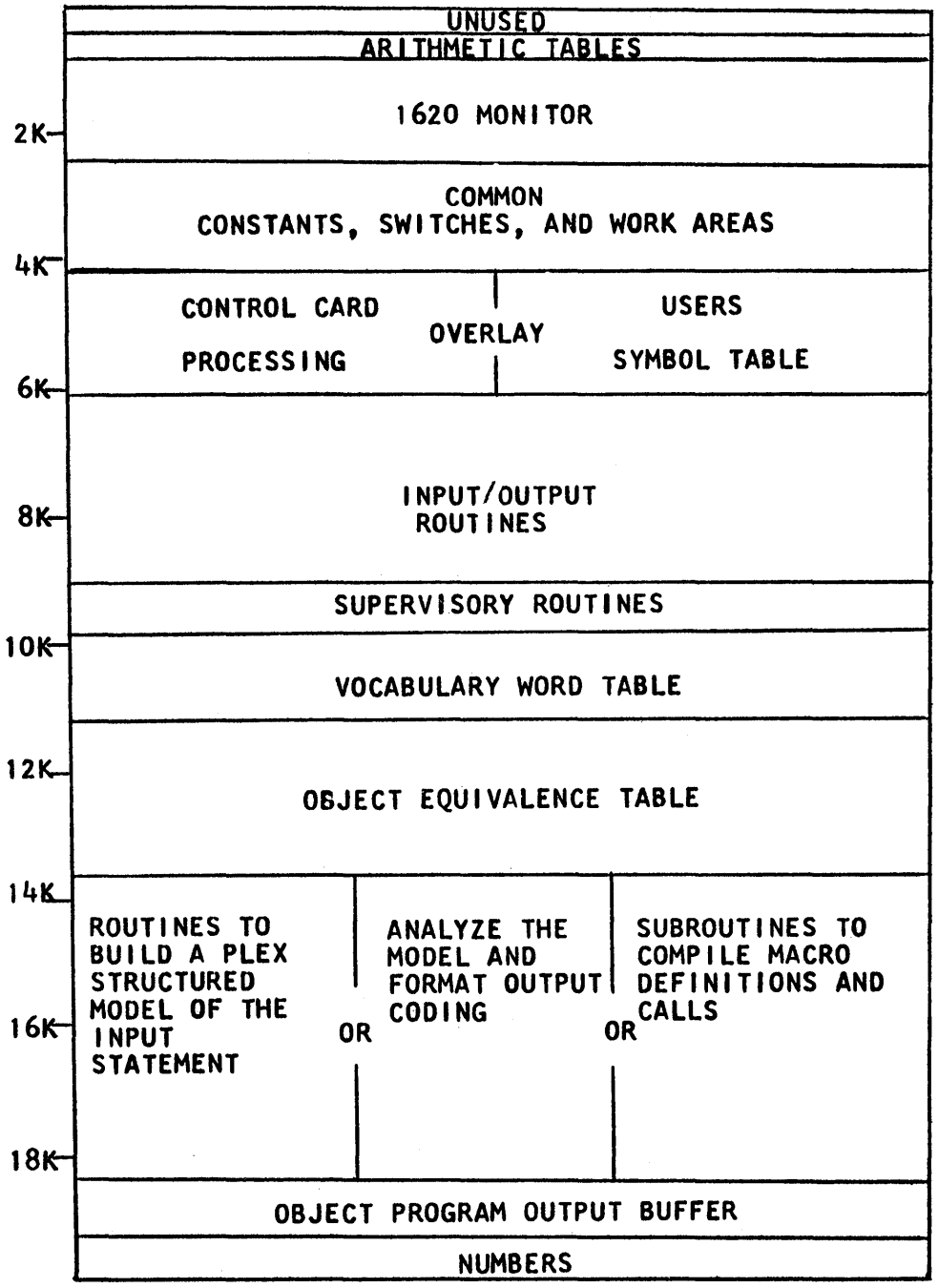
The following is a list of the last three digits in message codes and their definitions:

Code	Explanation
101	Undefined symbol
102	Syntax error, illegal context
103	Syntax error, unconnected phrases
104	Syntax error, more than one sentence
105	Revising the type classification of a previously defined symbol
106	Two symbols adjacent
107	Improper equivalence statement
110	Alphabetic string longer than six characters
111	Number greater than eight digits
112	Illegal input character
113	Decimal point used improperly
114	Literal greater than 48 characters
115	Statement too long
120	Statement number not in a loop
121	Statement number without a right parenthesis
122	IF statement not in a loop
130	Card sequence error
140	A macro defined within a macro
141	Improper name given to the macro
142	A number occurs in a parameter card
143	Illegal data in a parameter card
144	Too many parameters are being defined
145	A TERMAC statement without a macro definition
146	Not enough room in the library for the macro
147	The name of the macro is already in use
148	Not enough room for another macro name
149	Attempting to delete a macro incorrectly
150	A macro parameter of a type different from its definition is being called
151	A macro parameter that does not exist in the macro is being called
152	The macro name called is not in the library
153	A call is being attempted within a macro
154	Dim number 0815 has not been reserved for the macro library
155	Fewer than 50 sectors have been reserved for the macro library
180	Scalar table exceeded
181	Canonical file area exceeded
182	Literal disk area exceeded
183	Too many numbers in a program
184	Too many symbols in a program

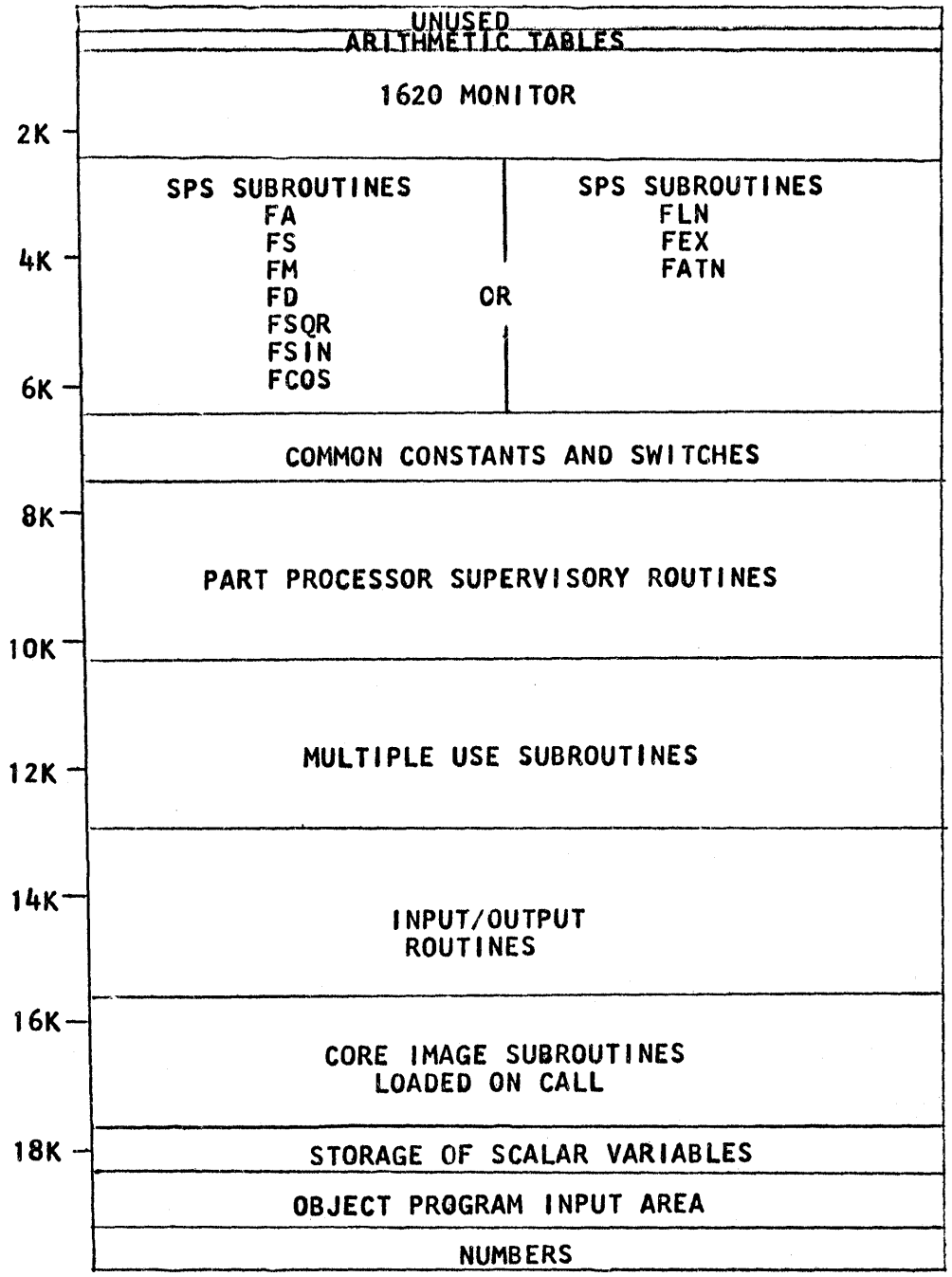
Code	Explanation
185	Too many numbers in a macro
190	Too many numbers in a loop
191	Object program too large
192	Loop too large
198	Error occurred during compilation
199	Successful compilation
201	Intersection of two lines does not exist
202	Line cannot be constructed from a point perpendicular to a given line
203	Intersection of a line and circle does not exist
204	The two given circles do not intersect
205	Arc cannot be constructed with given parameters
206	A line cannot be constructed from a given point tangent to a given circle
207	A circle cannot be constructed through the three given points
208	Improper filleting
209	A line cannot be constructed tangent to two given circles
210	A circle cannot be constructed tangent to two given lines
211	A point in a TILLX or TILLY statement cannot be constructed
287	File area for the part model has been exceeded
288	File area for the drawing commands has been exceeded
299	Phase two processing is finished
301	Stray record. Record identification is typed out. If switch 1 is on, program tries to read next record; if switch 1 is off, program goes to end of job
302	Conversion of floating-point number caused a number greater than 9999.9999; zero is substituted
303	Record caused plotting out of plotter Y direction; record is bypassed
304	Programmed halt
305	Dimensioning is out of limits on the drawing; dimension record bypassed
306	Crosshatch model is too large; if switch 1 is on, the area to be crosshatched is bypassed and the drawing continued; if switch 1 is off, the 1620 Monitor is called
399	End of job

STORAGE MAPS

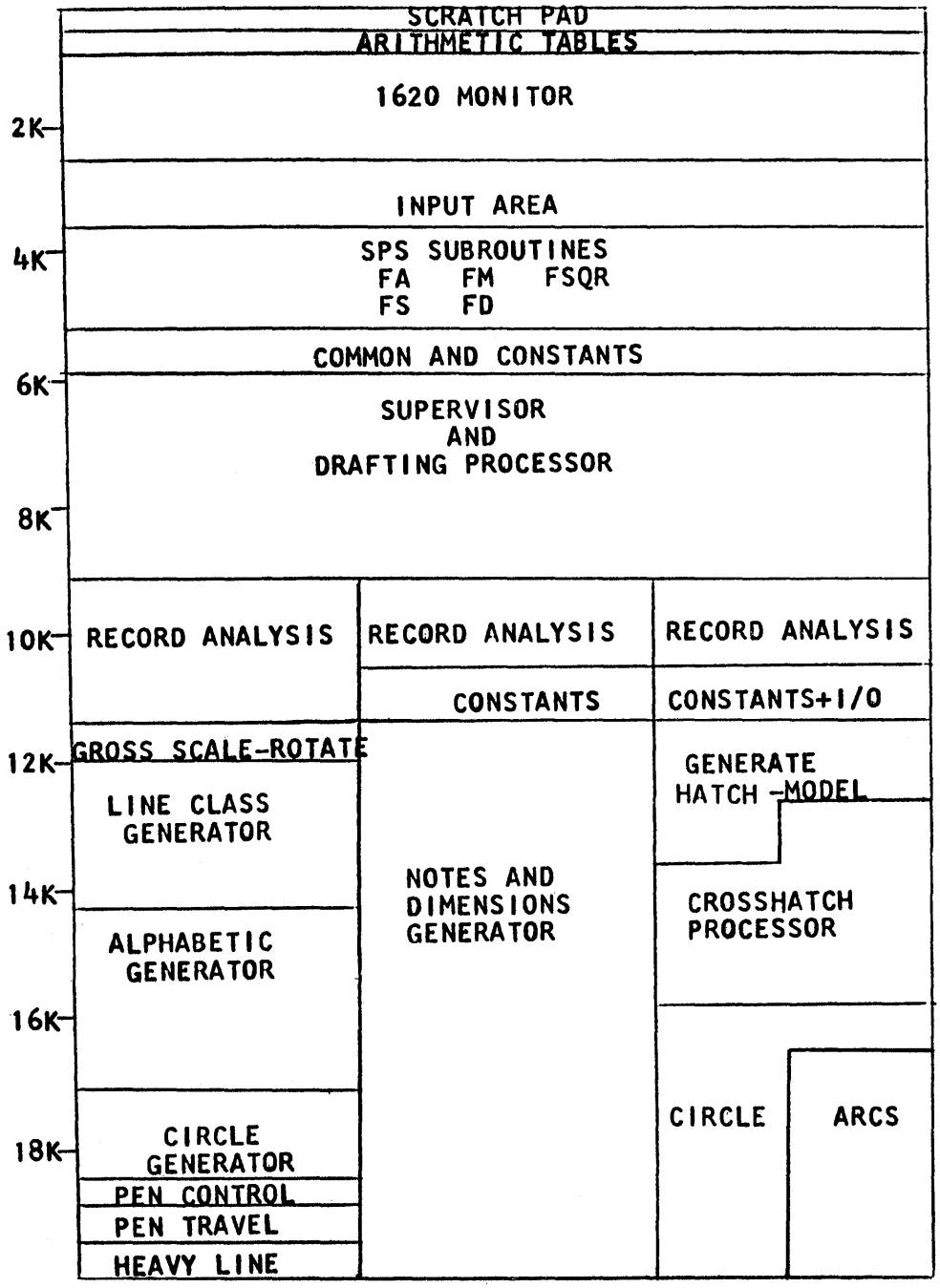
COMPILER



PART PROCESSOR



DRAWING PROCESSOR



RESTART PROCEDURES

1. The compiler can be restarted by a branch to core location 02402.
2. The part processor can be restarted by using a monitor XEQ card for dim number 0820.
3. A branch to 02402 restarts the drawing processor.

The operator can determine, from the typewriter log, the phase that is currently being executed. If M0199 has not yet been typed out, the compiler phase is in core. If the message M0199 has been typed, the part processor is in core. If the message M0299 has been typed, the drawing processor is in core.

MACRO LIBRARY PROCEDURES

INITIALIZING THE MACRO LIBRARY

The first step in setting up a library file is to reserve disk storage sectors for the macros. At least 50, but not more than 2997, sectors must be reserved. The sectors must all be consecutive, but can be on any module. Furthermore, they must be assigned "permanently" by the 1620 Monitor. One dim number can handle up to 999 sectors; therefore, three dim numbers have been set aside to provide a maximum of 2997 sectors. These dim numbers are 0815, 0816, and 0817. Control cards for the 1620 Monitor, which permanently assign sectors 113000 through 115996 to dim numbers 0815, 0816, and 0817, are shown below. Not all three dim numbers need be used, but 0815 must be used.

Purpose	Cols. 1-6	Cols. 17-50
New Job	††JOB	
Call DUP	††DUP	
Store 0815	*DLOAD	0815100000100998113000024020079 6DI
Call DUP	††DUP	
Store 0816	*DLOAD	0816100000100998113999024020079 6DI
Call DUP	††DUP	
Store 0817	*DLOAD	0817100000100998114998024020079 6DI
End of Job	††††	

After the library sectors have been reserved, the macro initialization program for the drafting system — dim number 0819 — must be executed; the purpose of the program is to initialize the name table for the macro library. Executing this initialization program is equivalent to deleting the entire library if one already exists. The program looks up the entries for dim numbers 0815, 0816, and 0817, and computes the sector allocations for the library. To execute this program, use the following 1620 Monitor control cards:

	Card Columns	
	Cols. 1-6	Cols. 13-17
Control card 1	††JOB	
Control card 2	††XEQ	0819
Control card 3	††††	

ADDING MACROS TO THE LIBRARY

Macros can be added to the library during a regular run by defining the macros in a source program. When a macro has been added to the file, a message — MACRO ADDED (and the name) — is typed, and the compiler resumes regular processing.

DELETING MACROS

A macro can be removed from the library by use of the control card *REMOVE MACRO (and the name). This capability is restricted to the deletion of the last macro on the file. A program that defines macros to be used only in that program should be followed by a second program that deletes them, so that the macros do not occupy permanent storage. Any number of *REMOVE MACRO (and the name) control cards can be used as long as each card references the last entry in the library. When a macro is deleted, the following message is typed:

MACRO REMOVED (and the name).

To delete the entire macro library, execute the initialization program, dim number 0819.

CONSOLE SWITCH SUMMARY

Switch 1 is normally off. This causes the drawing phase to go to end of job when a serious error is detected. With switch 1 turned on, the drawing processor will attempt to process in spite of errors.

Switch 2 is used by the compiler only when an error stop has occurred. If the switch is on, the entire compilation is restarted. If the switch is off, the operator may enter a corrected statement on the typewriter.

Switch 3 is normally off. It can be turned on during the part processor to trace on the typewriter the sector addresses of generated records.

Switch 4 has two uses: (1) Whenever a statement is being entered on the typewriter and a typing error is made, switch 4 is turned on to cause the Drafting System to ignore the statement. When switch 4 is off, the statements are processed. (2) An unedited trace is available by turning on switch 4 during the phases after compilation. The switch can be turned on and off as desired during execution.

Printed in U.S.A. H20-0184-0

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