

II. OPERATOR DUTIES

INTRODUCTION

The most important duty of the GE-225 System operator is the actual operation of the central processor and the system's peripheral equipment. His knowledge of the equipment and its operating procedures and his cautious application of this knowledge can make considerable difference in whether the equipment operates at 100 per cent or at some unreasonably low figure such as 60 per cent. To a certain extent, the operator shares equipment responsibility with the service engineers, and a congenial, cooperative relationship between operators and service engineers can go a long way toward improving actual system performance.

In addition to the equipment responsibilities, the operator is responsible for monitoring and logging operations, assisting programmers, correcting transitory errors, and caring for input and output media. Here again, the results obtained from system operation will depend largely upon the skill and understanding of the operator. This manual will attempt to include necessary information for operator performance in these areas.

Equipment and Operation Responsibility

At some sites, the service engineer turns on the equipment, cleans working parts, and does any necessary maintenance before turning the system over to the operator. Each day such items as cleaning read heads with alcohol, emptying the chip box on the paper tape punch, replacing worn ribbons on type-out machines may be done by maintenance personnel, but should be checked by the operator. In cases where there is heavy use of the equipment, it may be necessary for the operator to perform these duties at the beginning of each shift or even more often. There is a definite procedure for turning the equipment on and off; it is covered in Section III of this manual. The operator should know how to do this, even though it may be done by the service engineer. The operator will usually be responsible for shutting down the system at the end of the day.

During operation, the operator must service peripherals for individual runs; handle input and output; control the execution of the program; and, when the computer stops during an operation, locate the errors if possible and restart the program. From available instructions such as those in the run book or on the instruction card, the operator will load magnetic tape handlers, set switches, and make sure that the correct controller-selector plug is connected for each peripheral. He will load punched paper tape, load punched cards, including necessary loader cards and routines called for, and in general take care of and properly label all input output media. Setting up peripherals takes time, but extra care here is time well invested.

A good operator is more than a button pusher. Intelligence and ingenuity are needed if the computer is to be efficiently utilized. The operator should examine output and compare it to examples in the run book. If the output does not look right, the operator may need to call on the programmer for help in determining correct procedures for running the program. Until a program becomes routine, most programmers are anxiously watching the output as it is being printed.

ACTION UNDER EMERGENCY CONDITIONS

Because the computer is an extremely expensive piece of equipment and because the operator may be solely in charge of it during much of its operating time, he must be thoroughly familiar with the procedures for handling emergency conditions. Besides preventing unnecessary damage to equipment, the correct action on the operator's part may also prevent harm to personnel. All operators and service engineers in the computer area at the time of an emergency condition should share responsibility for action.

Exact procedures of shutting down the entire system will depend on the urgency of the situation; that is, whether the emergency is predicted, about to occur,

is occurring, or has already occurred. For instance, a flood may be predicted; a fire may be approaching the system room; a peripheral may be shorting out; or a main power supply may have failed. In each case, the operator should weigh the importance of saving data against the amount of time he feels he has before he must get main power off to the system. In each case of doubt, throw the main power switches and worry about saving or retrieving data after the emergency is over.

Fire

Most fires can be avoided if matches, cigarettes, ashes, etc., are not thrown into wastepaper baskets. If a fire starts in the computer room, regardless of its cause, take the following action:

1. Immediately shut power off with the master circuit breaker on the main power panel.
2. Release the fire alarm warning signal.
3. Evacuate personnel from the area as quickly as possible.
4. Notify plant guards of the location of the fire.
5. Notify service engineering personnel of the emergency condition.
6. Use carbon dioxide extinguishers on the electrical equipment. (Never use water or any other kind of extinguisher on an electrical fire.)

Flood

If water gets into the computer room or in a computer wiring area such as under a false floor, take the following steps:

1. Shut power off. If flooding appears to be slight and gradual, follow normal shutdown procedure. If flooding is extensive and fast, shut power off with the master circuit breaker on the main power panel.
2. Notify building maintenance personnel and plant guards.
3. Notify service engineering personnel.
4. Evacuate personnel as necessary.

Power Failure

If external power should fail, take the following steps:

1. Immediately shut power off at the master circuit breaker on the main power panel. (This is necessary to avoid damage to the equipment.)
2. Notify the service engineer of the power failure.

Air Conditioning Failure

When air conditioning fails from any cause, room temperature will rise to a point which endangers computer operation. Temperatures above 80 degrees Fahrenheit are considered dangerous. When air conditioning fails, take the following action:

1. Follow normal shutdown procedures to remove power from the central processor and peripheral equipment.
2. Notify service engineering personnel.
3. Notify building maintenance personnel.

Injury to Personnel

Emergency phone numbers of medical personnel should be posted at the control panel or in a conspicuous place in the computer area. If there is an injury to personnel, take the following action:

1. Do not move the injured person unless his position would cause further injury.
2. Notify the designated medical personnel.
3. If medical personnel are not on duty in the plant, contact any building security personnel who will assist with first aid and/or ambulance service.
4. If conditions indicate a delay in continued computer operations, follow normal shutdown procedures to remove power from the central processor and peripheral equipment.

Safety Considerations

To avoid serious injury, operating personnel

should adhere to basic safety practices. Operator functions have been specified with a view to permitting the operator to handle equipment only to the degree that it is safe, both for himself and for the equipment. The following list specifies safety considerations which are of importance to all operators.

1. Do not remove covers to any equipment unless specifically instructed to do so by this operating manual and confirmed by the Product Service Engineer.
2. Do not attempt to remove a jam from any machine while it is running.
3. Do not operate a machine with covers off.
4. Do not use power extension cords in the operating area.

GENERAL SITE OPERATING PROCEDURES

Each site must develop methods of scheduling machine time, of keeping logs of machine performance, of recording information about programs run, and of operating a tape and card library. There are, of course, numerous ways to do this, and some locations may have individual problems which make one method better than another. One or more methods will be suggested here, and the sample forms included may be used without change, or may be used as a basis for designing forms to better suit a particular operation.

Schedule of Computer Operation

A sample schedule of operation is shown in Figure II-1. Such a form is useful for precise scheduling. Although scheduling of computer time is a management problem, the operator should be aware of how scheduling is done. There are two methods of scheduling computer time, block scheduling and individual scheduling. In block scheduling, blocks of time are assigned to an organization or a customer to use as needed. In individual scheduling, the name of the person involved is entered on the scheduling form. In Figure II-1, a combination of the two methods has been used. The first two columns show block scheduling, and the third column shows individual scheduling.

If a programmer does not show up at the appointed time, his name can be shifted to the bottom of the block or used as a fill-in later in the day. The operator should encourage programmers to show up

early, in case the previous run is completed ahead of schedule. It is important that computer time be scheduled so the system is never idle; the time is too valuable to ever be wasted.

Instructions to the Operator

There are numerous ways in which the operator can be given the specific instructions needed to run a program. These may vary from verbal instructions to a whole book on the operation of a single program. Of course, the more standardized instructions become, the easier it is for all concerned. Completed production programs have Programmer's Run Books which should contain all the information an operator would ever need to run a program. At many locations, operations are so standardized that there are run books for every program and the same programs are used day in and day out. Where a program has not reached its final stage of completion, the programmer has probably not finished writing the run book. In such cases, the programmer will either be on hand to direct the running (usually debugging) of the program or provide written operating instructions for each particular operation. Several instruction forms will be described and illustrated.

Programmer's Run Book. This book is actually a procedures manual; its purpose is to provide a written record of everything pertinent to a run. It is identified by the title of the run and usually gives the name of the programmer. Some of the information is written specifically for the operator. Even portions of the manual which are not directed to the operator will be of interest to him, for they will assist him in understanding what the program is about.

Under the section heading of 'Operator Instructions,' the following types of information are found:

1. Error procedures, rerun and restart instructions, and average run time. A list of program halts, their meaning, and specified operator action.
2. Initial setup for tape input and output, including tape labels and controller plug numbers; disposition of tapes.
3. Printer controller plug number, paper form number, setup of print position, VFU tape name, line number, punch number, and length.
4. Card description for use with card punch, including form number of card and color code, if any.
5. Document handler controller plug number, description of or number of plugboard, if used.

Schedule of Operation

225 Machine No. 1
Date 4-12-62

6 AM	AM	PM	PM	PM
6:05	9:05 ENGR'G	12:05 SYSTEMS	3:05 SMALL	6:05 PR+D
6:10	9:10	12:10 DEVEL.	3:10	6:10
6:15	9:15	12:15	3:15	6:15
6:20	9:20	12:20	3:20	6:20
6:25	9:25	12:25	3:25 PRODUCT	6:25
6:30	9:30	12:30	3:30 RESEARCH	6:30
6:35 PR+D	9:35	12:35 RICHARDS	3:35	6:35
6:40	9:40	12:40	3:40	6:40
6:45	9:45	12:45	3:45	6:45
6:50	9:50	12:50 SAMUELS	3:50	6:50
6:55	9:55	12:55	3:55	6:55
7:AM	10 AM	1 PM	4 PM	7 PM
7:05	10:05 /ST. NAT'L.	1:05	4:05	7:05
7:10	10:10 BANK	1:10	4:10	7:10
7:15	10:15	1:15	4:15	7:15
7:20	10:20	1:20 WHITE	4:20	7:20
7:25	10:25	1:25	4:25	7:25
7:30	10:30	1:30	4:30	7:30
7:35	10:35	1:35	4:35	7:35
7:40	10:40	1:40 PAULSON	4:40	7:40
7:45	10:45	1:45	4:45	7:45
7:50	10:50	1:50	4:50	7:50
7:55	10:55	1:55	4:55	7:55
8 AM	11 AM	2 PM	5 PM	8 PM
8:05	11:05	2:05	5:05	8:05
8:10	11:10	2:10 DAVIDSON	5:10	8:10
8:15	11:15	2:15	5:15	8:15
8:20	11:20 NATURAL	2:20	5:20	8:20
8:25	11:25 GAS CO.	2:25	5:25	8:25
8:30	11:30	2:30	5:30	8:30
8:35 ACCOUNTING	11:35	2:35 SMITH	5:35 SPECIAL	8:35
8:40	11:40	2:40	5:40 SYSTEMS	8:40
8:45	11:45	2:45	5:45	8:45
8:50	11:50	2:50	5:50	8:50
8:55	11:55	2:55	5:55	8:55
9 AM	12 NOON	3 PM	6 PM	9 PM

Figure II-1. Sample Schedule of Operation

6. Typewriter tab settings, if non-standard. Description of typeouts which could include a dictionary of informative typeouts and corresponding operator action.
7. Order of card placement in card reader, including program cards, data cards, loader cards, transfer cards, blank cards, and any others used.
8. All instructions for setup of the control console, such as option switch settings.
9. Memory dump requirements and instructions for the dumps.
10. Take-down procedure, which covers information such as disassembly of the program and data decks of cards, labeling of punched cards, identification of reports from the printer, rewinding and labeling of all tapes. It specifies disposition of all cards, tapes and reports.

Areas of information in a run book which are not written directly for the operator, but which should nevertheless be of interest and assistance to him are:

1. General run description. This is a narrative description of the scope and purpose of the program. It usually states the system components required for the program's operation.
2. A general (top level) flow chart. This usually shows the source and disposition of all input/output. It indicates the input/output tapes, paper tape, cards, printer etc., and specifies tape unit numbers, plugs, and labels.
3. Input and output specifications. This covers card and tape formats and descriptions of each field. Printer formats and field descriptions are also given.
4. Detailed flow charts. These indicate all of the major programming steps.
5. Memory allocation chart. This lists the areas of the program in memory and shows locations of input, output, constants, working storage, and available memory. It also shows locations of major subroutines.

Operator Instruction Sheet. This form, illustrated in Figure II-2, was developed for use in run books, but it has been found useful in giving instructions for nonproductive types of runs and during debugging

stages of runs which would later have their own run books.

Operator Instruction Cards. Cards can be used to provide a compact form of instructions to the operator, as illustrated in Figure II-3. Here, all necessary information is written on a card the size of a tab card. It should be noted that on each of these cards there is a space for the operator to write his initials, the date, the running time of the program, as well as any special remarks about the operation of the run.

Operator Manual. Frequently, a site will make up a manual consisting of excerpts of the operating portions of run books and other pertinent operating instructions, such as those for utility routines, assembly, and compiler manuals. Depending on the scope of the instructions and the familiarity of the operator with the various programs, the manual may be used instead of the more lengthy run books or other manuals on specific programs.

Error and Operator Corrective Action

Specific errors and operator corrective action are described in the individual sections on each peripheral and in the section on the console. However, a few generalized remarks on these procedures can be made here.

When a program stops, the operator must determine whether the error condition was an operator error, program error, or an equipment error. This determination is often a matter of judgement on the operator's part. The more simple of each of these types of errors can often be corrected on the spot and the program can be continued. Often a second pass at the program will be successful. If the error is found to be caused by the operator or by the program, the operator should make a note of it in the operator's log book for future use.

Operator errors. It is obvious that for this type of error, the operator either made a mistake in the order of procedure or, for example, in the actual setting of switches, placing of tapes on tape handlers, or method of feeding input cards or paper tape. The solution is to review the instructions for the particular operation, then check everything that was done to see if an error was made. In checking peripheral equipment, the operator will soon learn which are the most common mistakes. Each peripheral in use will have to be examined to be sure it is properly set up and in a ready condition.

GE-225

GE 225 OPERATOR INSTRUCTION SHEET

CK 64

RUN _____
SYSTEM _____

PROGRAMMER John James
DATE 6/20/62

TAPE UNIT	PLUG NBR	TAPE REEL	DATA IDENTIFICATION	DATE CREATED	DISPOSITION
0					
1	1	234	Old Master File	6/12/62	Save
2	1	361	New Master Pay file	6/20/62	Save
3	1	Blank			
4	1	Blank			
5					
6					
7					

OTHER PERIPHERAL UNITS USED	DATA IDENTIFICATION
CARD READER	Changes to master file
CARD PUNCH	
HIGH SPEED PRINTER	Listing of New Master Pay file
MRAF	

WHEN THIS OCCURS:	DO THIS:
Halt at 2164	Restart the program
Halt at 2168	Toggle Switch # 3

RERUN INSTRUCTIONS:

SET SWITCHES	
#	FUNCTION
3	Reject pay card

SYSTEM <u>225</u>	<u>20 min.</u> TIME ESTIMATE	NAME <u>Core Jones</u>	JOB NO. <u>364</u>	EXT. <u>2177</u>									
INSTRUCTIONS TO OPERATOR:		INPUT			OUTPUT								
<u>Dump tapes 3 and 4 in</u> <u>octal and BCD</u> <u>Take memory dump at</u> <u>end of run.</u>		PAPER TAPE	CARDS	MAG TAPE	CARDS	MAG TAPE	PRINTER						
		YES	NO	YES	NO	TU REEL #	YES	NO	TU REEL #	FORMAT	No. Copies	Save	
				<input checked="" type="radio"/>									
						1 720							
						2 341							
OPERATOR COMMENTS:				3 Blank			3			2	✓		
<u>Ruv. O. K.</u>				4 Blank			4			2	✓		
OPERATOR INITIAL													
DATE & TIME COMPLETED													
<u>APX 6/30/62 1034</u>		TIME USED	<u>14 min</u>										

NAME <u>George Hobbs</u>	JOB # <u>421</u>	EST. TIME <u>30 min.</u>	CALL <input checked="" type="checkbox"/>	EXT. <u>3101</u>	SYSTEM <u>2</u>											
DEBUG <input checked="" type="checkbox"/>	PRODUCTION	SWITCHES 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19														
PRIORITY PLUGS IF NON STANDARD		TAPES	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	5	6	7	8	9	0				
AAU	HSP	SORT.	ADP	TAPE CTRL.	1	2	REEL # (INPUT) <u>133</u>									
GECOM <input type="checkbox"/>	GAP 412 <input type="checkbox"/>	RING OUT	<input checked="" type="checkbox"/>													
GAP <input type="checkbox"/>	WIZ <input type="checkbox"/>	SAVE	<input checked="" type="checkbox"/>													
CPM <input type="checkbox"/>	L.P. <input type="checkbox"/>	PRINTER X #	PARTS <u>2</u>	LOOP	<u>Stand.</u>	FORM										
SPECIAL INST:		NORMAL STOP IS <u>2040</u>														
<u>Save and return typewriter</u> <u>messages.</u>		DUMP CORE <input checked="" type="checkbox"/>														
		DUMP TAPES <u>4</u>														
		DATE IN <u>8-15-62</u>														
		DATE RUN <u>8-15-62</u>														
		RUNNING TIME <u>28 min.</u>														
		OPERATOR <u>J.L.L.</u>														
		SYSTEM USED <u>2</u>														
DATE OUT <u>8-16-62</u>																

Figure II-3. Two Types of Operator Instruction Cards

Program Errors. The operator will want to make sure his equipment and operating procedures are in order before blaming the program for the halt. A persistent repetition of halts in the same area of the program is apt to be an indication of a program error or, if there has been a series of halts known to be due to programming errors, the operator may save time by checking first for another program error. During the running of a program in the debugging stage, and when the programmer is not present, the operator must have a definite understanding about whether he is to make any program changes or corrections on his own. When a program is past the debugging stage, the operator should consult the run book for any applicable instructions, but in no case should he make changes in the program.

A review of the section of this manual on console operations will explain procedures of program changing. The first thing for the operator to notice is the information in the I Register which tells him what instruction is not yet executed, and the information in the P Register which is the location of the I Register's instruction. The information in the A Register is only meaningful to one who has a knowledge of the program at that point.

Equipment Errors. If an error condition cannot be pinpointed at the time as an operator or a programming error, the operator should call the service engineer for help. Until the service engineer arrives, the operator can save valuable time by making a careful record of all console indicators, switch settings, and peripheral indicators so he can give it to the engineer the moment he arrives.

Another type of error is that related to input/output media. The trouble can be a bad card, a bad spot on the magnetic tape, or a worn or torn portion of paper tape. Most card jams can be cleared by the operator. Magnetic and paper tape flaws can usually be seen upon inspection. Procedures to follow in correcting or replacing faulty input/output media are described in the sections of this manual which apply to individual peripherals.

Reporting forms for Equipment Failure. At some locations it has been found helpful to use a special form for reporting equipment difficulties and corrective action by service engineering personnel. Figure II-4 is an example of such a form.

Computer Utilization Logs

It is necessary that complete and accurate logs be kept of all machine time. The operator can see how important these logs are when he realizes that each minute of time is a vital cost consideration, and it is mainly from his logs that the time utilization breakdown is made. Charge numbers may be required by the accounting office for each type of time. The information

is used by management in scheduling computer time and in determining whether the system is being used effectively. The programming supervisor can use the information to determine how much time is used for certain approaches to programming and in determining the efficiency of his programmers (that is, the amount of time required for debugging). The log is also used by maintenance personnel in learning the details of difficulties experienced during operation and in determining the efficiency of maintenance procedures.

The exact form of the log should depend upon the cost accounting of the particular site. However, there is enough similarity between activities to make the following two examples of logs quite typical of the kind of log an operator would use. The log must account for all time during which the computer is turned on. Besides designating the time used as good production time and debugging time, the log must account for scheduled and nonscheduled maintenance time. Because both the operators and service engineering personnel are responsible for computer time, they usually use the same log. Here again, the operator must build a cooperative working arrangement with service engineers to avoid misunderstandings over the use of the log.

Figure II-5 is a daily computer log used by one site. Figure II-6 is a more general type of log which by means of a code, gives the user a choice of 16 types of time classifications. The log must be kept at the control console for use at the time of actual operation.

Systems which have a time clock supplement and verify the information on their logs by use of a time card (Figure II-7). The card is a regular tabulator card designed for use with key punch equipment. It should be noticed that there is a space to indicate unused time, so a record can be kept of all the time during which the computer is on. The user fills out the card, and gives it to the operator to put into the time clock. The time clock is made especially for installation under the edge of the console desk where it can be easily reached by the operator. When the time card is pushed into the clock, it prints the start time. When the card is pushed in a second time, it prints the stop time. Time is recorded in hours (24 hours to the day) and in hundredths of hours.

Although the operator is not usually responsible for scheduling of computer time, he can do much to insure efficient use of the time. He can make known (through his supervisor) any irregularities in use of computer time. He can also make it a custom to see that miscellaneous but necessary programs are always available to run when computer time unexpectedly becomes available.

INFORMATION PROCESSING CENTER
RECORD OF PRODUCT SERVICE

DATE: 5-17-62 TIME: 0200 TROUBLE <i>Two lights are burned out on the console. They are A→I and light "0" in the I register.</i> OPERATOR: <i>R. James</i>	DATE: 5-17-62 TIME: 1950 P.S. ACTION <i>Replaced A→I and Io.</i> PRODUCT SERVICE: <i>J. Funder</i>
DATE: 5-18-62 TIME: 1430 TROUBLE <i>Printer slewing extra pages.</i> OPERATOR: <i>M. L. Johnson</i>	DATE: 5-18-62 TIME: 2000 P.S. ACTION <i>Examined vertical slew tape and recommended installing a new one -- the one now in use is scotch taped and bumpy and probably causes the extra slews.</i> PRODUCT SERVICE: <i>Dave Feeney</i>
DATE: 5-20-62 TIME: 1000 TROUBLE <i>Read errors on Tape handler "C".</i> OPERATOR: <i>M. L. Johnson</i>	DATE: 5-20-62 TIME: 1040 P.S. ACTION <i>Adjusted read preamps on this and all other handlers. Cleared many problems.</i> PRODUCT SERVICE: <i>Dave Feeney</i>

INSTRUCTION: OPERATOR RECORD DATE, TIME AND DIAGNOSED TROUBLE THEN SIGN.

PRODUCT SERVICE RECORD DATE, TIME AND ACTION THEN SIGN.

Figure II-4. Sample Reporting Form for Equipment Repair

GE-225

GE-225

DAILY COMPUTER LOG

Shift *First*

Date *Aug. 20, 1962*

Operator *G. Harris*

- 1. Record all times
- 2. Fill out Hang-up sheet and Dump memory at all abnormal stops.
- 3. Explain all error time in remarks.

RUN DESCRIPTION	Programmer	Run Number	TIME RECORD			UTILIZATION			RERUN				MAINTENANCE			Remarks (Explain all Errors and Reruns)		
			Start	Stop	Elapsed	Production	Debug	Idle	Program Error	Operator Error	Machine Error	Misc. Error	Scheduled	Unsched.	Facility Failure			
				8:03	3			3										
<i>Posting</i>	<i>Roach</i>	<i>2010</i>	<i>8:03</i>	<i>8:33</i>	<i>30</i>	<i>30</i>												
			<i>8:33</i>	<i>9:03</i>	<i>30</i>					<i>30</i>							<i>Switch 3 was down</i>	
			TOTALS	<i>63</i>		<i>30</i>		<i>3</i>		<i>30</i>								
						TOTAL RERUN		<i>30</i>						TOTAL MAINT.				

Figure II-5.

Sample Daily Computer Log

JOB NO.	REQ. NO.	TAPES	MACHINE	CODE	DATE	CHECK ONE		
0					0	1	<input type="checkbox"/> EQUIPMENT ERROR	John Carlson PROGRAMMERS NAME
1					1	2	<input type="checkbox"/> OPERATION ERROR	
2					2	3	<input type="checkbox"/> INPUT ERROR	DEY01 JOB NUMBER
3					3	4	<input type="checkbox"/> DEBUGGING	
4					4	5	<input type="checkbox"/> PRODUCTION	REQUISITION NUMBER
5					5	A	<input type="checkbox"/> OVERHEAD	
6					6	B	<input type="checkbox"/> TRAINING	PROGRAM NAME
7					7	C	<input type="checkbox"/> UTILITY FAILURE	
8					8	D	<input checked="" type="checkbox"/> DEMONSTRATION	MACHINE TYPE 225
9					9	E	<input type="checkbox"/> UNUSED TIME	
						F	<input type="checkbox"/> PROGRAM ERROR	OPERATOR LJK
						G	<input type="checkbox"/> SCHED. MAINT.	
						H	<input type="checkbox"/> UNSCHED. MAINT.	
						I	<input type="checkbox"/> SYSTEM CHECK OUT	
						J	<input type="checkbox"/> POWER ON TIME	

TH 14.9.2
TH 15.4.4
START
STOP

THIS END OUT

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Figure II-7. Sample Time Card

Log Terminology. It is important that there be complete understanding of log terminology by both those who make the logs and those who use them. If there is any doubt about the meaning of any of the terms, the operator should insist that each term be defined in writing. The following partial list of terms may or may not provide the exact meaning necessary to understand the log terminology of a particular site, but it should provide some familiarity with the terms.

Machine Error. Lost time caused by machine malfunction.

Operator Error. Lost time caused from operator error.

Input Error. Time lost because of faulty input data.

Debugging. Applies to all work in program checkout stage.

Production. This code is used for all work that is checked out and known to be working properly.

Overhead. Time charged to computer operations, such as tape edit and tape cleaning.

Training. Time when a training group is using the computer, such as product service training, computer operations training, and other internal groups.

Utility Failure. Time lost through power failure.

Unused. Time when the machine is idle.

Facility Failure. Time when failure is caused by air conditioning, humidity control, etc.

Scheduled Maintenance. This is used when service engineering personnel are on the machine during the normal maintenance time.

Unscheduled Maintenance. This is used when it is necessary for service engineering personnel to work on the machine during normal center operation; but it does not necessarily halt operations on equipment other than that being repaired.

System Checkout. This category will be used if operator is having machine trouble and decides to run some diagnostics to determine trouble areas.

Power-on-time. Time starting when power is turned on at the beginning of each day and ending when power is turned off at the end of the day.

Total available time. Includes all time that the equipment has power on, less preventative maintenance.

Library Storage and Reference Files

A regular library storage and handling procedure should be established for both tapes and cards. Some sites may be large enough to have a librarian to control the storage and use, while at other locations, the operators have this responsibility.

Magnetic Tapes. Either a librarian or the senior operator should establish procedures for storage, checkout, and use of master tapes, save tapes, and scratch tapes. Master tapes are those which contain a master file of permanent or semi-permanent information. The information on the tapes is updated

rather than replaced. Save tapes are those which contain information which must be saved for a short period of time. Scratch tapes are those which have information which is of no further use and may be destroyed.

Tapes should be identified by numbers painted on their reels. A tape control form such as the one illustrated in Figure II-8 can be used for record purposes.

the controller, and the manager of the computer center before a change may be made.

An example of tape library procedure is described in the following paragraphs. This example explains the procedure used by an activity which has a librarian and keeps a tabulator card record of the use and storage of every tape in its library. Like the other examples in this manual, it may either be copied or used as a basis for designing procedures to more

REEL NO.		OF
473		
PROGRAMMERS NAME		
Johnson		
JOB NO.	UNIT	
JJ601	E-1	
TITLE		
FROM JOB	STEP	
TO JOB	STEP	
SEQ. NO.	OPER.	
1 of 1	JP	
DATE SAVED		
7-30-62		

TAPE CONTROL FORM	
Customers Name	Johnson
Program Code	Name and Address Tape
Charge No.	JJ601
Tape Unit	E-1
COMMENTS:	
OPERATOR	JP

Figure II-8. Sample Tape Control Form.

The left portion of this form is made in triplicate, and the first copy has an adhesive back. The right portion of the form is in duplicate. When a programmer checks out a tape for use, he fills out the form and fastens the adhesive backed portion to the reel itself. He keeps one copy of the form, and gives one copy to the librarian (or operator). Activities which have a sizable and active tape library use the information from these forms to punch tabulator cards which can be sorted and used to give various print-outs of tape library information. A log of tape use may be kept on a form like the one in Figure II-9.

Because of the importance of master program tapes, special precautions are taken with these. A duplicate of a master tape is usually kept for use in case some of the information is destroyed and needs to be retrieved. As an added safety precaution, duplicates of master tapes are stored in a different location and often in a different building to eliminate loss of information; for example, in case of a fire. Duplicates can easily be made by use of the tape copy routine. At most locations, no change may be made in a master program tape without special authorization. Figure II-10 is an example of a form used by an activity which requires the signature of the assigned programmer,

aply fit a particular situation.

1. Two source logs of tapes are kept for each 24-hour period. One log is at the console where tape reels to be saved are listed. The other is in the tape library and lists save tapes released for use.
2. The release of save tapes (to become scratch tapes) is the responsibility of the programmer. Release may be made either by a retention schedule or by initialed entry of the library's tape log.
3. At the beginning of each working day the librarian performs the following functions:
 - a. Collects the tape logs.
 - b. Updates the tape file (of tab cards on each save-tape reel) as to retention schedule or entries from the logs.
 - c. Updates cards by key punching information about scratch tapes that have changed to save tapes.

TAPE RECORD LOG													TAPE HISTORY																																	
REEL NO.	RUN NAME OR NO.	FILE NO.	NO. OF REELS	REEL STATUS DATE	HANDLER NO.	TRANS. ACTION DATE	RESPONSIBLE PROGRAMMER	REMARKS	DATE CLEARED	DATE RECEIVED																																				
1	495	4	5	6 Posting	9	10	11	15	16	17	19	20	21	3 days	26	27	28	D	29	30	35	36	37	Mary Roach	49	50	51		66	67	68	73	74	75												

Figure II-9. Sample Log of Tape Use

- d. Removes cards that represent save tapes changed to scratch tapes, and places them in the history file.
 - e. Makes a new scratch-tape card for the tape released in step d.
 - f. Files newly made cards for save tapes by file number and date, with the latest date first in the files.
 - g. Files updated scratch cards behind remainder of scratch cards in the file to provide rotation of tapes.
 - h. Preselects all tapes for the console operator for all shifts and places these cards in an in-use section of the file. Scratch tapes to be used are taken to correspond to the first cards in the scratch file (this permits tape rotation).
 - i. Places cards corresponding to the scratch tapes used the previous day in the back of the scratch-tape file.
4. If the librarian is absent, the senior operator selects scratch-tape reels corresponding to the cards in the front of the scratch-tape card file and places the cards in the in-use section of the file.

- 5. After the card file is completely updated for the day, a complete listing is made of the cards including the in-use file.

The retention schedule mentioned in step 3b above is a schedule used with production-run tapes. The schedule lists data numbers which identify a reel as containing a certain kind of data. Depending on the kind of data, the reel must be kept a specified number of days after the save tape was originated.

See Section IX of this manual for additional information on tape handling and storage.

Cards. There should be a working card file and a duplicate card file of all frequently used routines such as sorts, loaders, and dumps. The duplicate file is necessary to permit reproduction of the card in case the card in the working file is damaged or lost. Each time cards are removed from the duplicate file, the cards must be reproduced and replaced so as to keep a complete file at all times.

See Section VI of this manual for additional information on card handling and storage.

MASTER PROGRAM TAPE CHANGE REQUEST

Date 8/2/62 Name or RUN # 435
Requestor Bill Mann

1. Problem Encountered:

2. Specifications of Change:

a) Does this change specifications of run No Yes How?

George Roe
Comptroller

3. Description of how change corrects problem:

Provides for punching of cards.

John Hebb 8/2/62
Assigned Programmer Date

Reviewed by: Bob Drake Date 8/3/62

Comments: (Include planned date of completion)

Must be completed 8/4/62

Reviewed by: Avon Harris Date 8/3/62
Mgr. Computer Center

Comments:

Return To Howard Johnson
Before this Date 8/5/62
Suspense Date

Change Made: Date 8/4/62
Old Master Inst. Tape Jan. 20, 1962 # 241
Date & Reel # of Old Master
New Master Inst. Tape Aug. 4, 1962 630
Date & Reel #

Senior Opr. on duty Doug Powell

Figure II-10. Sample Master Program Change Request

ASSISTANCE TO THE PROGRAMMER

The operator is an essential member of the team that uses and operates a GE-225 System. The programmer is also essential, and the wise operator will learn to cooperate and get along with each individual programmer. It helps if the programmer knows something about the operation of the computer. Since the programmer uses the GAP language or some other pseudo coding technique, he may or may not be completely familiar with the actual machine language. With a new system, programmers will all be anxious to try new programs as soon as possible and they will be interested in learning all they can about the computer. The programmer who devises a run will often be present when the program is debugged and during initial production runs.

Debugging

The term debugging refers to the process of determining the correctness of a computer routine, locating errors in it, and correcting them. The term is also used, mainly by service personnel, in reference to detecting and correcting malfunctions of the computer equipment. Each new program must go through a stage of debugging, for it is inconceivable that a program which contains, for example, 10,000 instructions, would not have errors in it. There are many ways in which crippling mistakes can be made in a program, and it is mandatory that each mistake be found. Console debugging such as stepping through a portion of a program on the computer, is frowned upon because it is a waste of time for all concerned as well as a waste of computer time. The best procedure (after operator and equipment errors have been ruled out) is to note the error indicator lights and the contents of the I, A, and Q registers and of the P counter; take a complete memory dump; and remove the program so that the next run can be started. Some installations use a form called a 'Hang-up Sheet' as illustrated in Figure II-11. This form permits the operator to quickly indicate the exact conditions at the time the program stopped.

Some installations use a 'Debug Instruction Sheet' such as the one illustrated in Figure II-12. This permits the programmer to designate specifically, without being present, what is to be done. The operator may or may not know when an error is encountered in the program. The program may 'hang up' when it comes upon an error which means it will stop unintentionally (at a place where it was not programmed to stop). The program may also 'hang in a loop' when it comes upon an error, which means it will repeat a loop indefinitely and never get out of it. The operator should be able to identify programmed loops by referring to the run book which specifies these loops. The operator, in some cases, may not recognize that the program is hung in a loop until he notices

that the time limit for the program has been exceeded. A rule is sometimes made that a program should be stopped when it has exceeded its known time length by ten per cent. However, when peripheral equipment has stopped all visible operation and the central processor continues to operate, the operator can very well suspect that the program is in a loop. If, after checking the run book, the operator is still uncertain of the computer's operation, he can set the AUTO/MANUAL switch on the console to MANUAL and step through the program to determine exactly what is going on. (See Section IV for directions on manually stepping through the program). In some cases, the program may continue with whatever processing it is supposed to be doing, but produce faulty results, for example, it may punch cards with incorrect information on them. In these cases, the operator will never identify an error condition, but it is still important that he provide the programmer with a memory dump and any other information so that the programmer can then analyze the program.

Relationship Between Operator & Service Engineer

The operator must learn to recognize when any malfunction needs the service engineer's assistance. He will learn that better cooperation is obtained from the engineers if he does not call them unnecessarily and; if when the engineer's services are necessary, he can provide him with a complete description of what went wrong, supplying all necessary information from panel indicators at the time of equipment stoppage. This manual tries to spell out in detail the division of authority and responsibility between operators and service personnel; but it must be remembered that there is leeway for operating sites to alter this relationship to best fit the schedules, equipment, and personnel of the individual location.

Operator Behavior and Appearance

The operator should maintain proper decorum and appearance in the operating room. Computer installations are always more or less show places where important visitors are brought by company executives. The operator, by his behavior and appearance, can add or detract from the favorable impression that should be made. As a skilled individual, the operator should seek to maintain status in that respect.

HANG-UP SHEET

NAME OR Posting Run RUN # _____ DATE 7/18/62
E. C. Jones PROGRAMMER TIME 1430

Caution: Be sure all information has been recorded before taking memory dump.

- ALERT HALT
- BRANCH HALT
- LOOP (Try to give the Branches)

Remarks:

TAPE CONTROLLER
(LIGHT ON)

<input type="checkbox"/> Ready	<input type="checkbox"/> End of File	<input checked="" type="checkbox"/> Alert
<input type="checkbox"/> N Reg	<input checked="" type="checkbox"/> Alert Last Record	<input type="checkbox"/> Memory Alert
<input checked="" type="checkbox"/> Lateral Parity	<input type="checkbox"/> Horizontal Parity	<input type="checkbox"/> MOD Alert

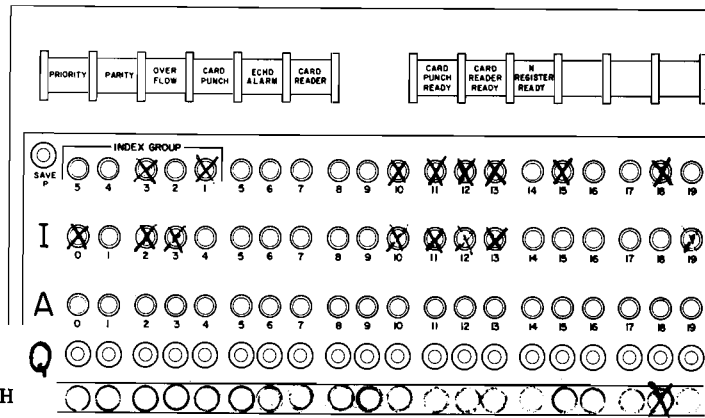
CONSOLE

BCD MODE
On Off

LIGHT ON

X For Switch Down

SENSE SWITCH



RUNNING TIME 30 min.

OPERATOR Dave Rogers

Figure II-11. Sample Hang-up Sheet

DEBUG INSTRUCTION SHEET

Program Name Posting Run Date 8/19/62
 Programmer Tom Smith Scheduled Time 2200

I. GAP

- Switch Options 18 Down (See General Instructions)
 Card Output Binary
 Octal (Binary Tape T.U. 6)
 Tapes Plug #1. Input - GAP Master T.U. 1
 Output - Blank Tapes on 3, 4 and 5, T.U. 6 optional

II. Debug

1. General Instructions (include console switch settings, special loading instructions, etc.)

2. Peripheral Card Reader Sorters (1, 2)
 Card Punch Printer (# Copies 1; Form # 14)

Tapes Plug # 1

	T.U.	0	1	2	3	4	5	6	7
IN									
OUT									
Print									

(Indicate Tapes to be Saved)

3. Normal Stops (include type-outs) Action to be Taken

<p><i>Reference GAP Operating Instructions Manual</i></p>	<p><i>*Fill out Hang-up Sheet and Dump Memory (octal)</i></p>
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4. Abnormal Stops

- a. Fill out Hang-Up Sheet
 b. Dump Memory
 c. Dump Tapes octal _____; BCD _____
 d. Save Tapes _____

Date Run 8/20/62
 Time Used 30 min.

Operator Dave Rogers

Figure II-12. Sample Debug Instruction Sheet