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**NATIONAL ASSOCIATION
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Vol. IV MAY 15, 1923 No. 17

**A Method of Collecting
Direct Labor Costs
and Statistics**

**BUSH TERMINAL BUILDING
130 WEST 42nd STREET, NEW YORK**

NATIONAL ASSOCIATION OF COST ACCOUNTANTS

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Vol. IV, No. 17

May 15, 1923

A Method of Collecting Direct Labor Costs and Statistics

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130 WEST 42nd STREET, NEW YORK CITY

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NATIONAL ASSOCIATION OF
COST ACCOUNTANTS

MAY 15, 1923

National Association of Cost Accountants

A METHOD OF COLLECTING DIRECT LABOR COSTS AND STATISTICS

(Compiling Job Costs)

The various procedures outlined in this article are applicable to a machine shop doing a wide variety of machine work. The shop is of medium size and has a wide range of machine tools, handling material varying in weight from 1 pound to 75 tons. The majority of the product is built to the customer's design, though generally the product consists of some parts that are duplicates of parts used on previous orders. A small portion of the product is standard machinery, but it is manufactured as required and not built for stock.

Machine rates are used in cost work. Machines carrying approximately the same rates are grouped and the group is rated at the average. These rates are based on normal production at current labor and material markets and they include the direct labor cost. Direct labor costs are not collected by operations or orders. The method of collecting Indirect Labor Costs is not covered by the procedure outlined, but the forms used are so arranged that the method can be easily extended to cover both these features.

The Engineering Department furnishes the shop with an itemized bill-of-material of each order with the blue prints.

PREPARATION OF TIME CARDS

Upon receipt of the blue prints and bill-of-material for a machine, the time setter prepares a time card for each operation on each item that requires machine work, showing the time allowed for the operation and the machine or group of machines on which it is to be performed. The time cards are of different colors, each color designating the nature of the operation. Brown is used for lathe work, pink for drill press work, etc. On the shop bill-of-material against each item is entered in code the classes of machines that are scheduled for performing the operation, in the order that the operations will probably be performed; *i.e.*, (P) Planer, (L) Lathe, etc.

FILING TIME CARDS IN SHOP OFFICE

After the time setter has completed his work, the prepared cards and the marked bills-of-material are delivered to the shop office, where the cards are filed to order in a wall rack for cards covering items for which material has not been received. The

bill-of-material is filed to order in a post binder. When material is received the time cards covering the operations to be performed on it are transferred to a wall rack with divisions for each machine tool or group of similar tools. If only a part of the material for an item is delivered, the circumstance in connection with the machining will govern the decision as to whether or not the time cards should be transferred.

ASSIGNING WORK TO OPERATOR

The foreman assigns the work to the operator of the machine scheduled by the time setter. If for any reason the foreman cannot or does not wish the operation performed on the machine scheduled, he must give his reasons to the time setter and, if it is then decided that the operation shall be performed on another machine, another time allowance must be set.

RECORDING ON TIME CARDS

When a foreman gives an operator a job, he enters the operator's number on the time card covering the operation and registers his starting time on a time recorder.

One side of the time card is for day turn and the reverse side for night turn, and each side is so labelled. The time of only one operator is registered on one side of a card. If more than one operator performs the operation, either on the same machine at a different time or on another machine, the foreman prepares a duplicate card. If the capacity of the card is not sufficient for recording all of the time spent by an operator on any one operation, the foreman prepares any additional cards required and attaches them to the original. The card is then placed in a small card holder in the shop. This holder has two compartments and bears the machine tool number. One of the compartments is for completed and current uncompleted operations, and one for other uncompleted operations. Each card covering an operation that has been started remains in the card holder until the operation has been completed.

Each time an operator stops work on a job before it has been completed (to go home or for any other reason excepting to start on another job), and when he returns to it, he records the time on the time recorder. When an operation has been completed, or when the operator is given another job before it has been completed, the foreman records the time, and if it has been completed he so notes on the card. At the same time he records the starting time on the card for the next job. As each operation is completed, it is so noted on the bill-of-material in the shop office.

Cards covering direct time on plant work are prepared by the foreman and the account to which the time is to be charged is entered in the order block. The time is recorded in the same manner as the time on machine work on orders. The fitting or erecting time is handled in about the same way as the time of

the machine tool operators. The foreman prepares a time card for each man he puts on the job, and each man records his time on a time recorder.

If, during the performance of an operation, the foreman finds that the operator will not complete it in the time allowed and believes that the time allowance is not sufficient, it is his duty to take the matter up with the time setter. If the foreman's reasons are sound, the time allowance is changed.

It is also the foreman's duty to note on the time card any time lost or extra time spent on operations, on account of defective castings, extra hard castings, excess stock, incorrect drawings, etc.

DAILY CHECK WITH PAYROLL RECORD

Each morning the time clerk circulates through the shop, checking the time recorded on the Operation Time Cards for the previous day and night with the "In and Out" records for the same periods. He enters the elapsed time on the Operation Time Cards and on a Monthly Time Sheet for each man records this time to order and item. At this time all cards on completed operations are lifted and totaled. All direct labor employees are grouped together on the payroll and are so charged unless the time clerk notes on the "In and Out" record that part of the time should be charged otherwise. This information he procures from Machine Tool Repair Cards and other Indirect Labor Cards in the card holders of the various operators.

ANALYSES OF THE RECORD OF EACH OPERATION

As time cards on completed operations are collected, they are given immediately to the time setter. The records of performance are carefully analyzed and each card covering operations on which the actual time over-ran the time allowed is promptly referred to the foreman for his comments. One-half of any time saved is credited to the operator as a premium and an attempt is made to set the allowed time so that the average operator can make a premium. Any notes in regard to lost or extra time are carefully investigated and the operator is not penalized for such time.

The record of the operation is then posted to Record Cards for future time setting. A Record Card is kept for each piece on which a machine operation has been performed, each card bearing the pattern number of the piece. On each card is the machine time record of every order on which such a piece was machined.

RECORDING OTHER NECESSARY ACCOUNTING INFORMATION

The time clerk then enters the premium time on the completed cards. If more than one operator worked on an operation, and a premium was made and split between the operators, the allowed time must also be split and proportioned to the time cards of the various operators.

The information required in the numbered blocks listed below is eventually punched on tabulating cards and is used for accounting and statistics. The time clerk must see that the information is recorded in all of these blocks, and, especially, that the operation and groups numbers are correct—

(1) Order, (2) Item, (3) Machine, (4) Group, (5) Operation, (6) Man Number, (7) Account (Direct Labor), (8) Estimated Hours, (9) Extra Hours, (10) Actual Hours, (11) Premium Hours, (12) Overtime Bonus Hours, (23) Year, (24) Month, (25) Periods, and (31) Grand Total Actual Hours.

PERIODIC CONTROL AND THE TIME CLERK'S PART IN THE PROCEDURE

Each month is divided into two periods to coincide with the pay periods, and the hours produced during each period are checked at the close of such period. To obtain this control and still permit all time cards on uncompleted operations to remain in the shop from one period to another, it is necessary that the production be subdivided as follows:

(1) Time on operations started and completed in the same period.

(2) Current time on completing operations which were partially completed at the end of the previous period.

(3) Current time on operations uncompleted at the close of the current period.

Time cards on operations started and completed in the same period are delivered daily to the Tabulating Department with an adding machine tape of the actual hours. After tabulating cards are punched from them, they are returned to the time clerk and filed to order number with all other cards on the same order.

Current time on cards covering operations which were started in a previous period and completed during the current period is abstracted daily on a columnar report which is delivered to the Tabulating Department to have tabulating cards punched from the information shown thereon. These time cards are then filed with all other cards on the same order.

This report has a column heading for each numbered block of the time card and also a column for day or night. It is known as "Report of Completing Operations which were Partially Completed at the End of the Previous Period." The information entered in columns 23, 24, 25 and 31 is the "Years, Months and Periods in which the operation was performed" and "The Total Time required to perform the complete operation."

At the close of each period the time clerk procures from the shop all uncompleted operation cards on which there is time for the current period. The time for the current period is abstracted on a "Report of Uncompleted Operations" and this report is delivered to the Tabulating Department to have tabulating cards punched from the information shown. These report sheets have the same column headings as those described in the preceding

paragraph, but no information is required in the following columns: (8) Estimated Hours, (9) Extra Hours, (11) Premium Hours, (23) Year, (24) Month, (25) Period, and (31) Grand Total Actual Hours.

DESCRIPTION AND PURPOSE OF TABULATING CARDS

The direct labor tabulating cards are arranged for the information contained in the numbered blocks on the time cards.

Green cards are used for Job Costing and are known as Cost Cards.

Manilla cards and blue cards are used for statistics, manilla for day turn and blue for night turn, and are known as Day or Night Statistic Cards.

Pink cards are used as Credit Cost Cards and are known as Credit Cards. They are used when the time on a piece is transferred in whole or in part from one order to another.

PUNCHING TABULATING CARDS

Cost and Statistic Tabulating Cards are punched from the information on the time cards and the two reports received from the time clerk, and are balanced against each other and against the adding machine tapes accompanying time cards and the totals of the Completing and the Uncompleted Operations Reports.

Cards punched from Uncompleted Operations Reports are punched "12" in the first column of the order block to signify an uncompleted operation on which more time will follow.

Cards punched from Completed Operations Reports are punched "11" in the first column of the order block to signify a completing operation on which there has been time in a previous period. On such cards the punch operator will enter with pencil the years, months and periods in which the operation was performed and also the actual time required to perform the complete operation. This information is shown on the Completing Operations Reports.

FILING TABULATING CARDS AFTER PUNCHING AND CHECKING

Cost cards are filed to order under current month. If for plant work, they are filed to account under current month.

Statistic cards are filed to period.

PERIODIC CONTROL—CHECKING PRODUCTION FOR THE PERIOD

After all time cards and reports for a period have been received from the time clerk and tabulating cards have been punched, checked and filed, the actual hours on the Statistic Cards are totaled and checked with the total of the actual time accumulated daily by the time clerk to man. If the totals do not check, the tabulating cards are sorted and totaled to man number and checked

with the time clerk's total to man. The cards for those men whose time does not check are then sorted to order and item and figures are furnished the time clerk to check against a similar abstract which he has made. When the clerk finds where the difference exists, he can readily procure the original time cards and rectify the error. If an error necessitates changing the tabulating cards, care must be taken to see that both the statistic and the cost cards are changed.

ACCOUNTING AND STATISTICAL REPORTS FROM ALL STATISTIC CARDS FOR PERIOD

Report of Actual Hours Produced During the Period—to Order, to Operation, to Group. The total of this report represents the machine shop hourly production for the period and, added to the total of a similar report for the other period of the month, represents the machine shop hourly production for the month or accounting period. The figures shown on the report, deducted from similar estimated figures compiled from time allowances made by the time setter for all the operations on each order, and adjusted by the difference between the estimated and actual figures on operations completed during the period, will show the amount of work ahead of the shop to group and machine for each order and for all orders.

Report of Actual Hours Produced by Each Machine and by Fitters During the Period, and Extra Time Paid for on Account of Overtime. This report, added to a similar report for the other period of the month, gives the monthly production of actual hours to machine. The monthly reports are used to compile reports of the yearly production of each machine tool and fitters, and also to check the machine rates as a whole by totaling the extensions of each machine by its rate and comparing the total with the actual cost of operating the machine shop. The extra time paid for on account of overtime is collected for general information only.

Accounting and Statistical Reports From All Statistic Cards on Operations Completed During the Current Period. Statistic cards for the current period are sorted into three lots; namely:

(a) Those covering operations which were started and completed during the current period.

(b) Those covering operations which were started during a previous period and completed during the current period.

(c) Those covering current time on uncompleted operations. The cards in lot (c) are then filed with other similar cards to order and item under "Uncompleted Operations."

Uncompleted Operations cards of previous periods covering operations that were completed during the current period are procured from the Uncompleted Operations file. The total of these previous period Uncompleted Operations cards and the Completing Operations cards of the current period is checked against the total of the time entered with pencil on the Completing Operations

cards to ascertain if all of the required Uncompleted Operations cards have been procured from the file.

All of the current cards in lots (a) and (b) and the (c) cards of previous periods are combined for the following reports of Estimated, Actual and Premium Hours.

To Man Number—To procure the amount of premium time to be paid each man and to show the efficiency of each man on the operations which he completed during the period.

To Operation, to Machine, to Man—To show the efficiency as a whole of each of the various classes of machines, such as Lathes, Planers, etc., and of each machine in each class and each man on each machine.

To Each Group of Machines Under the Supervision of Each Foreman, to Machine, to Man—To show the efficiency of his group as a whole, and of each machine and of each man on each machine.

To Order, to Operation, to Group—To ascertain the difference between the estimated and the actual time to adjust the records of work ahead of the shop to each order and to all orders.

MONTHLY REPORT FROM COST CARDS

At the close of each month, after all tabulating cards on current operations have been punched and filed, all cost cards on plant work are sorted and totaled to account and a journal entry is made.

COMPILING JOB COSTS

When an order is completed and invoiced and all cost cards have been punched and filed, the cost cards covering the order shipped are procured from the current and the previous months' cost card file and sorted to item. The actual, estimated, extra and premium time is then totaled to item and posted on the Job Cost Sheet against each item. The cards are then sorted to group and fitting and the total actual, estimated, extra and premium time of each group and fitting is posted on the cost summary and the actual time extended at the group machine rate. The total of these extensions is the Machine Shop Cost at the pre-determined rates.

OPERATION OF THE MACHINE SHOP ACCOUNT

The Machine Shop account is charged monthly with the actual hours produced and the actual cost of operating the Machine Shop. The direct time spent on plant work and on orders completed and billed is credited to the account at the average rate per hour as reflected by the account. The cost of orders completed and billed, resulting from calculating the hours applying to such orders at the average rate, is the total machine shop charge against sales. This total is compared monthly with the total cost at predetermined machine rates of all orders included in the charge.

GENERAL INSTRUCTIONS TO TIME SETTERS, TIME CLERKS, PUNCH CLERKS AND OTHERS.

TIME CARD "A"

(See page 13)

1. Columns 1—2—3—4—5—14—15—16—17—8—22 and sometimes 30 on the time cards are to be filled out before sending them into the shop.

2. If two turns (DAY AND NIGHT) are working on job, use one side of card for the DAY turn and one for the NIGHT turn.

3. If only one turn (DAY) works on a job, and the job requires more than eight periodograph registrations, both sides of the card can be used if the NIGHT space is marked out.

4. Column 26 is for holes that will be cut in the card by the periodograph and nothing should be written therein.

5. Column 27 is for periodograph registrations. If time is written in, 27-A is for date, 27-C is for STARTING TIME and 27-B is for STOPPING TIME.

6. Column 28 is for elapsed ACTUAL TIME and Column 29 is for the EXTRA TIME paid for overtime (overtime bonus hours).

7. Column 30 is for any kind of remarks by time setter or foreman; and for designating quantity and kind of material used by Bolt Cutters, Turret Lathes and Forge Shop.

8. When a man is given a job, the MAN'S NUMBER is to be entered in 6, (two places) and STARTING TIME recorded in Column 27 on the periodograph. If a man goes off the job to go home or for any other reason, when he goes back on the job, and when the job is finished, the time is recorded in Column 27 on the periodograph.

9. When a side of a card is filled with registrations and the job is not completed, Column 18 should be crossed out.

10. When the job is completed, Column 19 should be crossed out.

11. When a side of a card is filled with periodograph registrations or when a job is completed, the total of Column 28 on that side shall be entered in Column 10 and the total of Column 29 entered in Column 12.

At this time the total of Column 28 on both sides of card should be entered in 33 on DAY side, the total of Column 28 on all previous cards in Column 32, and the total of Column 33 and Column 32 in Column 31.

12. In Column 9 should be entered the extra time taken on account of Defective Castings, etc. The time in Column 9 is to be included in Column 10.

13. At this time Columns 20—21—13 are not being used.

14. Each month will be divided into two periods to coincide with pay periods.

15. As soon as operations are completed on jobs that were *started and completed in the same period*, the cards covering these operations should be sent to Tabulating Department with full information in Columns 1 to 12, inclusive, and Columns 23, 24 and 25, and an adding machine tape of Column 10. When such cards are returned to time clerk, they should be inspected to see that Tabulating Department "Punched Stamp" is on each side of each card on which there is any information.

TIME CARD "A" AND UNCOMPLETED OPERATION REPORT "B"

(See page 13)

16. At the close of each period, the Time Clerk shall report to the Tabulating Department the information for such period on PARTIALLY COMPLETED OPERATIONS, listing this information in the following columns of "B," 1, 2, 3, 4, 5, 6, 7, 10, 12, and designating DAY or NIGHT in first column. Columns 8, 9, 11 should be used only on report "C" which will be explained later, but, if for any reason information is entered in these columns, it must not be duplicated on Report "C." Columns 20, 21, 13 will not be used at this time.

17. When making out report "B" from cards covering partially completed operations, a colored line should be drawn above the last periodograph registration

in Column 27 on Time Card "A," and somewhere in Column 27 under and close to this line should be entered the total time in Column 28 and the total time in Column 29 for the period, which is the time entered on "B." At this time Columns 23, 24 and 25 should be recorded on Time Card "A."

TIME CARD "A" AND COMPLETING OPERATION REPORT "C"

(See pages 13 and 14)

18. Each day during each period, the Time Clerk shall report to the Tabulating Department, the information for such period on COMPLETING OPERATIONS WHICH WERE PARTIALLY COMPLETED AT THE END OF THE PREVIOUS PERIOD, listing this information in all of the columns of "C" excepting Columns 20, 21 and 13 which will not be used at this time. The information listed in Columns 23, 24 and 25 should cover all of the periods in which the operation was performed. If any information in Columns 8, 9 or 11 has been included on a "B" report, it should not be included on a "C" report. "C" is to be used for reporting COMPLETING INFORMATION on uncompleted operations that were previously reported on "B."

GENERAL

19. Cards and reports for different periods should be sent to Tabulating Department separately.

20. Total of Time Cards, "B" reports and "C" reports sent to Tabulating Department for a period, should equal total Actual Productive Hours for such periods.

21. Tabulating Department should be notified when all cards and reports for a period have been sent to them, together with the total actual time for the period.

PUNCHING TABULATING CARDS

The following tabulating cards are used:

- D—Green (For Costing Purposes)
- E—Manilla (For Statistics—Day)
- F—Blue (For Statistics—Night)
- G—Pink (For Credits)

1. From time cards "A" and reports "B" and "C," green cards "D" and Manilla Cards "E" or Blue Cards "F," (see page 14) will be punched and balanced against each other and with time cards and report totals.

2. Tabulating cards punched from "B" reports will be cut 12 in first column in 1, to signify an UNCOMPLETED OPERATION AND MORE TIME TO FOLLOW.

3. Tabulating cards punched from "C" reports will be cut 11 in first column in 1, to signify a COMPLETING OPERATION ON WHICH THERE HAS BEEN TIME IN A PREVIOUS PERIOD.

4. For tabulating cards punched from "B" and "C" reports, the YEAR, MONTH AND PERIOD punched should be taken from the upper right hand corner of the report.

5. From Columns 23, 24 and 25 on "C" reports should be entered with pencil on Tabulating Cards, the YEARS, MONTHS AND PERIODS in which the operation was performed, and from Column 31 should be entered with pencil the total Actual Hours.

6. Green cards "D" should then be separated to main account (Machine Shop, Fitting Shop, Forge Shop, or Pattern Shop) and filed to order and item in current file.

7. Manilla cards "E" and Blue cards "F" (see page 14) should then be separated to main account (Machine Shop, Fitting Shop, Forge Shop, or Pattern Shop) and filed to period.

8. When tabulating cards are punched from the time cards, the time cards should be stamped "Punched" on each side and returned to plant.

MACHINE SHOP—FITTING—FORGE AND PATTERN SHOP PRODUCTIVE TIME ON PLANT WORK, CHARGEABLE TO EXPENSE.

IMPROVEMENT OR CONSTRUCTION ACCOUNTS

Time Cards.

In ORDER block (1), enter account as shown in account book, and in ITEM block (2), enter the machine number or other sub account. Example: If time card covers a repair part for machine B11, enter in (1) 321a and in (2) B11.

Tabulating Cards.

In ORDER block (1), enter account as shown in account book, and in ITEM Use first three columns of (1) for Main Account (the number), and columns 4 and 5 of (1) for the first sub (the letter). Column (2) will have to be used only in connection with account 321a, and in this column will be cut the number of the machine. Use the first two columns for the letter, and the third and fourth for the number. 321a—B11 should be cut 32101 in (1) and 0211 in (2).

All cards covering work as described above must be stamped "PLANT WORK" above (1) and (2).

REPORTS FROM TABULATING CARDS.

At the end of each month, separate "PLANT WORK" cards to Machine, Forge and Pattern Shops, and for each shop compile a report of the total hours to each account as shown in cols. (1) and (2).

INFORMATION REQUIRED IN BLOCKS OR COLUMNS REFERRED TO IN INSTRUCTIONS

- | | |
|--------------------------------|---|
| 1. Order Number. | 19. Operation Not Finisher. |
| 2. Item Number. | 20. Paid Hours. |
| 3. Machine Tool Number. | 21. Rate Per Hour. |
| 4. Group Number. | 22. Name of Part. |
| 5. Operation Number. | 23. Years |
| 6. Man Number. | 24. Months } In which operation was |
| 7. Account Number. | 25. Periods } performed. |
| 8. Estimated Hours. | 26. Space for Holes Cut by Time Recorder. |
| 9. Extra Hours. | 27a. Dates |
| 10. Actual Hours. | 27b. Stopping Time } Time Record. |
| 11. Premium Hours. | 27c. Starting Time } |
| 12. Overtime Bonus Hours. | 28. Actual Hours for the Day. |
| 13. Direct Labor Cost. | 29. Overtime Bonus Hours for the Day. |
| 14. Pattern Number. | 30. Remarks. |
| 15. Drawing Number. | 31. Total Actual Time to Date. |
| 16. Number of Pieces Required. | 32. Total Actual Time Brought Forward. |
| 17. Kind of Material. | 33. Total Actual Time on Card. |
| 18. Operation Finished. | |

ORDER	1	2	3	4	5				
PATTERN	14				49				
DRAWING	15								
PIECE	16	MTR'L.							
OPER. V FINISHED	17	19							
YES	18	NO							
6-MAS. NO.	6								
7-ACCOUNT	7								
8-EST. HOURS	8								
9-EX. HOURS	9								
10-ACTUAL HRS.	10				60				
11-PRIN. HRS.	11				01				
12-M. T. BONUS HRS.	12								
20-PAID HOURS	20								
21-RATE PER HR.	21								
13-DIRECT LABOR COST	13	27A	27B	27C	29				
					28				
FR.	23	NO. 24	PER. 25	VE. 23	NO. 24	PER. 25	NO. DATE 31	PROF. FOND. 32	THIS CARD 33
REMARKS									
30									

9 'ON NIGHT MAN' PIPPLE

Form B, "Uncompleted Operations" Has the Same Columnar Arrangement as Form C.

COMPLETING OPERATIONS WHICH WERE PARTIALLY COMPLETED AT END OF PREVIOUS PERIOD.

SHEET _____

D. No.	Yr.	Mo.	Period	Grand Total	PLANT												YEAR		MONTH		PERIOD	
					Order	Item	Material	Operation	Man No.	Account	Est. Hrs.	Act. Hrs.	Prev. Hrs.	O.T. Hrs.	Paid Hrs.	Rate Per Hour	Direct Labor Cost					

C

Period	Plant	1 Order	2 Item	3 Machine	4 Gr.	5 Opm.	6 Man	7 Account	8 Est. Hrs.	9 Act. Hrs.	10 Acc. Hrs.	11 Prev. Hrs.	12 O.T. Hrs.	13 Direct Labor Cost
00	A	0	0	0	0	0	0	0	0	0	0	0	0	0
11	B	0	0	0	0	0	0	0	0	0	0	0	0	0
22	C	0	0	0	0	0	0	0	0	0	0	0	0	0
33	D	0	0	0	0	0	0	0	0	0	0	0	0	0
44	E	0	0	0	0	0	0	0	0	0	0	0	0	0
55	F	0	0	0	0	0	0	0	0	0	0	0	0	0
66	G	0	0	0	0	0	0	0	0	0	0	0	0	0
77	H	0	0	0	0	0	0	0	0	0	0	0	0	0
88	I	0	0	0	0	0	0	0	0	0	0	0	0	0
99	J	0	0	0	0	0	0	0	0	0	0	0	0	0
100	K	0	0	0	0	0	0	0	0	0	0	0	0	0

D-E-F-G

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