IMPROVING AN IBM TYPE 650 DIGITAL COMPUTER OPERATION BY PROGRAMMING THE INVERSE OF A PARTITIONED MATRIX AS USED IN THE ANALYSIS OF RECTANGULAR RIGID FRAMES

by

L. Carl Herring, Jr.

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Abstract

In order to solve a highly indeterminate rigid frame structure by the method of slope deflection a high order stiffness matrix needs to be inverted. Existing computer programs for the IBM Type 650 Computer are entirely too time consuming when the matrix coefficients and program instructions exceed the storage capacity of the computer drum. The method described in this paper involves the solution of the problem by the inversion of a partitioned matrix originally described by Duncan, Frazer, and Collar. Machine time was reduced by 91% using the new method. The program retains accuracy of six significant figures for a matrix normally twice as large as a machine can handle at one time, and four plus significant figures if the matrix is four times as large as the computer can handle in one storage operation. The method can be applied to digital computers of any size, thus increasing their apparent storage capacity or decreasing their operating time for a matrix inversion. The method is applicable to symmetrical as well as unsymmetrical matrices.

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II. LIST OF SYMBOLS

Symbol	Definitions
$[A]$	Square stiffness matrix
$[B]$	Inverse of $[A]$ equals $[A]^{-1}$
r	Order of a square submatrix
s	Order of a square submatrix
r, s	Order of a rectangular matrix, r columns s rows
θ_i	Rotation, in radians, of joint i
R_i	Lateral translation of joints i and i + 1
$[P]$	Load column matrix
$[\Psi]$	Redundant column matrix

III. INTRODUCTION

Since the analysis of a highly indeterminate structure requires the solution of a large number of simultaneous equations, conventional methods of solution become quite uneconomical because of the time required.

The equations employed in the solution of an indeterminate structural problem may be formed by the method of slope deflection equations, the method of three moments, or the method of moment distribution. Solution by slope deflection equations is the most commonly used method. Regardless of the method employed, the resulting simultaneous linear equations can be expressed in matrix form. Determining the solution of these matrix equations requires the inversion of matrices.

In the field of structures Benscoter,[1] in 1947, discussed the solution of continuous beams by matrix analysis and Chen [2] mentioned the use of matrix analysis in solving pin-connected structures. Murden, [3] in 1951, wrote his graduate thesis on the matrix analysis of rectangular rigid frames.

Regardless of the procedure used, matrix inversion is a time-consuming process when the conventional methods of solution are employed. More rapid routines for inversion are essential for matrix methods to be feasible.

In modern times matrix inversion has been facilitated by the use of high speed digital computers. These computers, most of which have a medium storage capacity, are immediately available in many areas. High speed digital computers having larger storage capacities are fewer in number and the rental rate is considerably higher than that for medium storage computers.

Matrix inversion programs have been written for both medium storage and large storage computers. Sweeney, [4] in 1955, wrote a small scale matrix inversion program for the type 650 IBM medium storage digital computer. Quite often, however, the matrix to be inverted is too large for the storage capacity of the digital computer and a procedure of reloading the computer numerous times, requiring much card-handling, is necessary. A program for inverting "large" matrices was written for the type 650 IBM

computer by Ayres[5]. In his program the inverse solution was obtained after reloading the machine "n" times where "n" is the order of the matrix to be inverted. This reloading procedure for "large" matrices is extremely time-consuming and is in no way proportional to the time required to solve smaller matrices. The author uses the adjective "large" to indicate a matrix too large to be completely stored in a computer as compared with smaller matrices which may be handled in one storage or loading operation.

The purpose of the present thesis is to present computer programs for the type 650 IBM digital computer which may be used to determine the inverse of "large" matrices and which will be considerably less time-consuming than present computer programs. Computing the inverse of the larger matrix was accomplished by partitioning the matrix into smaller matrices. The smaller matrices were operated upon to give the desired inverted matrix.

The problem used to illustrate the method was the analysis of the structural framing of the proposed William Penn Office Building to be erected in Pittsburgh, Pennsylvania. The framing was analyzed by means of the slope deflection equations expressed in matrix notation.

The author feels that not only structural engineers but also anyone else desiring the inverse of matrices previously too large to be solved economically, in terms of time, will benefit by the programs included in this thesis. To make use of this inversion program, it is only necessary to learn a few simple fundamentals of matrix algebra and the type 650 IBM digital computer operation. The programs were written for the type 650 IBM computer. The same principles would apply to other medium storage computers, however. The matrix algebra fundamentals are thoroughly discussed in such texts as that of Frazer, Duncan and Collar [6]. The computer operation is described in the IBM manual of operation for the 650 magnetic drum data processing machine[7].

IV. REVIEW OF LITERATURE

Both Benscoter[1] and Chen[2] discussed matrix analysis as a method of solving indeterminate structures. They used the classical method of inversion by determining the adjoint of the matrix and dividing by the determinate. Benscoter [1] and Chen[2] both concluded that matrix inversion was too time-consuming unless the number of loadings exceeded the number of redundants in the structural analysis.

Murden[3] investigated the feasibility and comparative usefulness of approximate as well as of direct methods of inversion in analyzing various plane rigid structures. In his discussion he correlated the inversion methods of Dwyer [8] and of Zurmuhl[9] with the method of partitioning developed by Frazer, Duncan and Collar [6] for frames of different construction and loadings to arrive at the most satisfactory combinations of inversion routines and structural problems in terms of solution time.

VI. THE INVESTIGATION

A. Object of the Investigation

When inverting a matrix on a type 650 IBM digital computer, a difficulty which may be encountered is that of having to invert a matrix whose order prevents storing all the elements of the matrix on the drum or memory unit of the computer because of its limited storage capacity.

The author had access to a type 650 IBM digital computer and an IBM computer program [4] for inverting any square matrix of order equal to or less than 42. A 42 x 42 matrix occupies 1764 of the 2000 possible drum storage locations. The remaining locations are used to store the inversion program instructions.

In writing the slope deflection equations for the frame analysis of the William Penn Insurance Building, the coefficients of the redundants formed a stiffness matrix of order 64. To solve this matrix in one loading on a digital computer would require 4096 storage locations which, of course, are not available. The large scale matrix inversion program written by Ayres [5] could have been used for inverting this matrix, but it would have required 64 separate machine loadings and a computer solution time of approximately 44 hours.

A partitioned matrix would reduce the order of the matrices to be operated on to a size which could be placed on the storage drum. This investigation was, therefore, centered on writing the necessary computer programswhich would enable the author to obtain the inversion of "large" matrices through matrix partitioning and thereby reduce the time for computer solution.

The usefulness of this inversion procedure was shown by inverting the aforementioned stiffness matrix of order 64 in less than one-tenth of the time required by previous methods [5].

B. Development of the Slope Deflection Equations in Matrix Form

Any text on statically indeterminate structures will contain the derivation of the scalar slope deflection equations. The present thesis will not include the development of these equations.

In the analysis of a rigid framed structure slope deflection equations for each structural joint combined with the equations of statics yield expressions containing the angular rotations, θ_i, and the story sidesways, R_i, of each of the joints as the redundants. The equations may be written in the matrix form $\left[A\right]\left[\Psi\right] = \left[P\right]$ where $\left[A\right]$ is termed the "stiffness matrix" and is equal to the coefficients of the redundants, $\left[\Psi\right]$. These coefficients depend entirely on the structural properties of the members comprising the rigid frame. The equations are equated to the applied loading which is present in the form of "Fixed End Moments". The structure to be analyzed appears in Figure 1 with the relative stiffnesses of each of the members shown and each joint numbered for the purpose of matrix correlation.

Table 1 of Appendix I, Section XI lists the equations obtained using the method of slope deflection combined with the equations of statics. In these equations the positive sign convention is a clockwise rotation, θ_i, of the joints and a similar relative story sidesway, R_i, to the right. On the right hand side of each of these equations two loadings are listed, one corresponding to a dead load plus live load, and the other corresponding to a wind load. Figure 2 shows the position of the elements of the stiffness matrix formed by the coefficients of the redundants. A frame whose members are symmetrical with respect to a vertical axis subjected to a symmetrical vertical loading will not sway. If, however, the loading on the frame is unsymmetrical with respect to any vertical axis, the frame will sway. Such is the case of the structure being analyzed as evidenced by the structural framing between the third and fourth floors. This condition introduces the sidesway redundants, R_i, into the matrix equations. In the matrix equation,

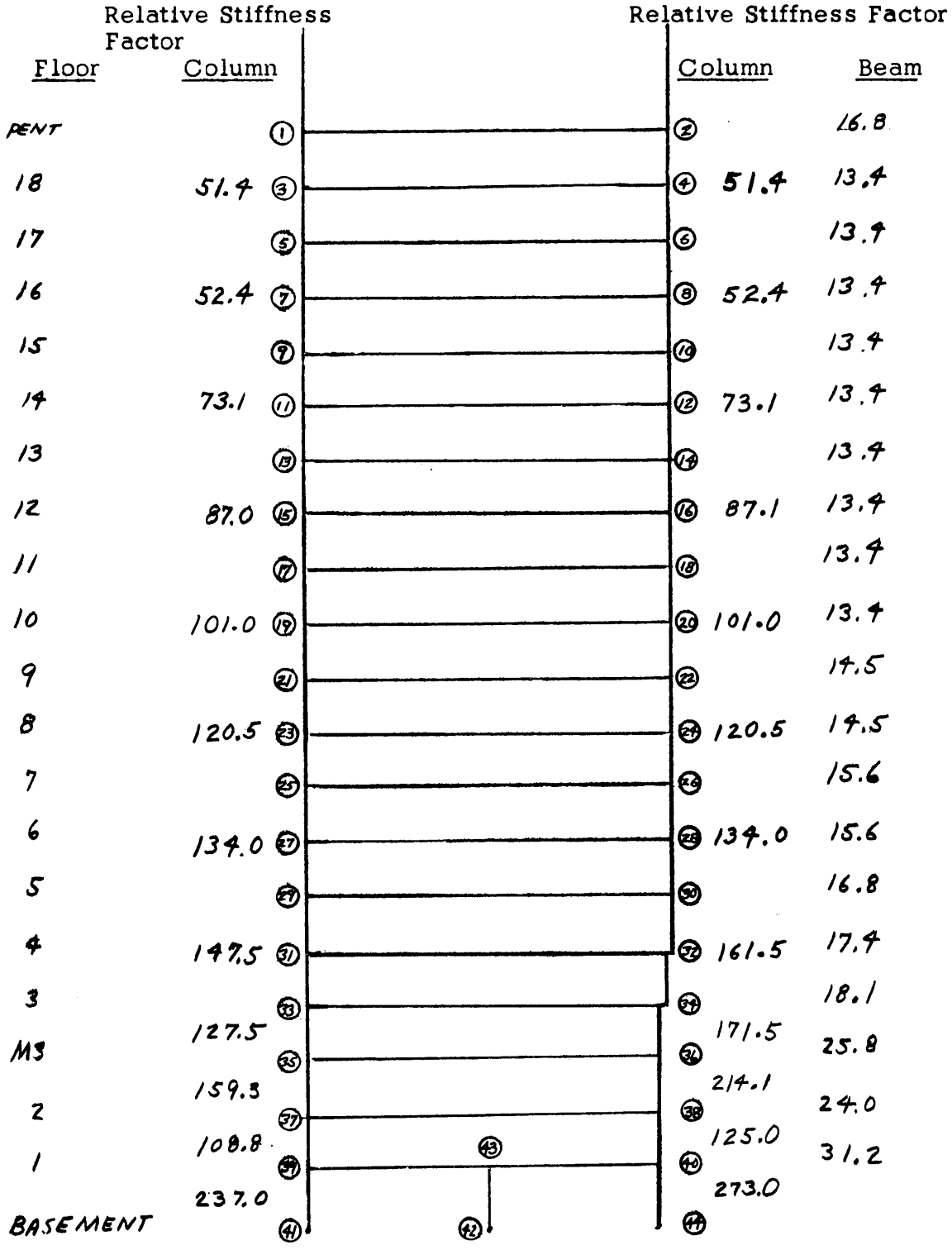

Figure 1

STRUCTURAL FRAMING OF THE WILLIAM PENN OFFICE BUILDING

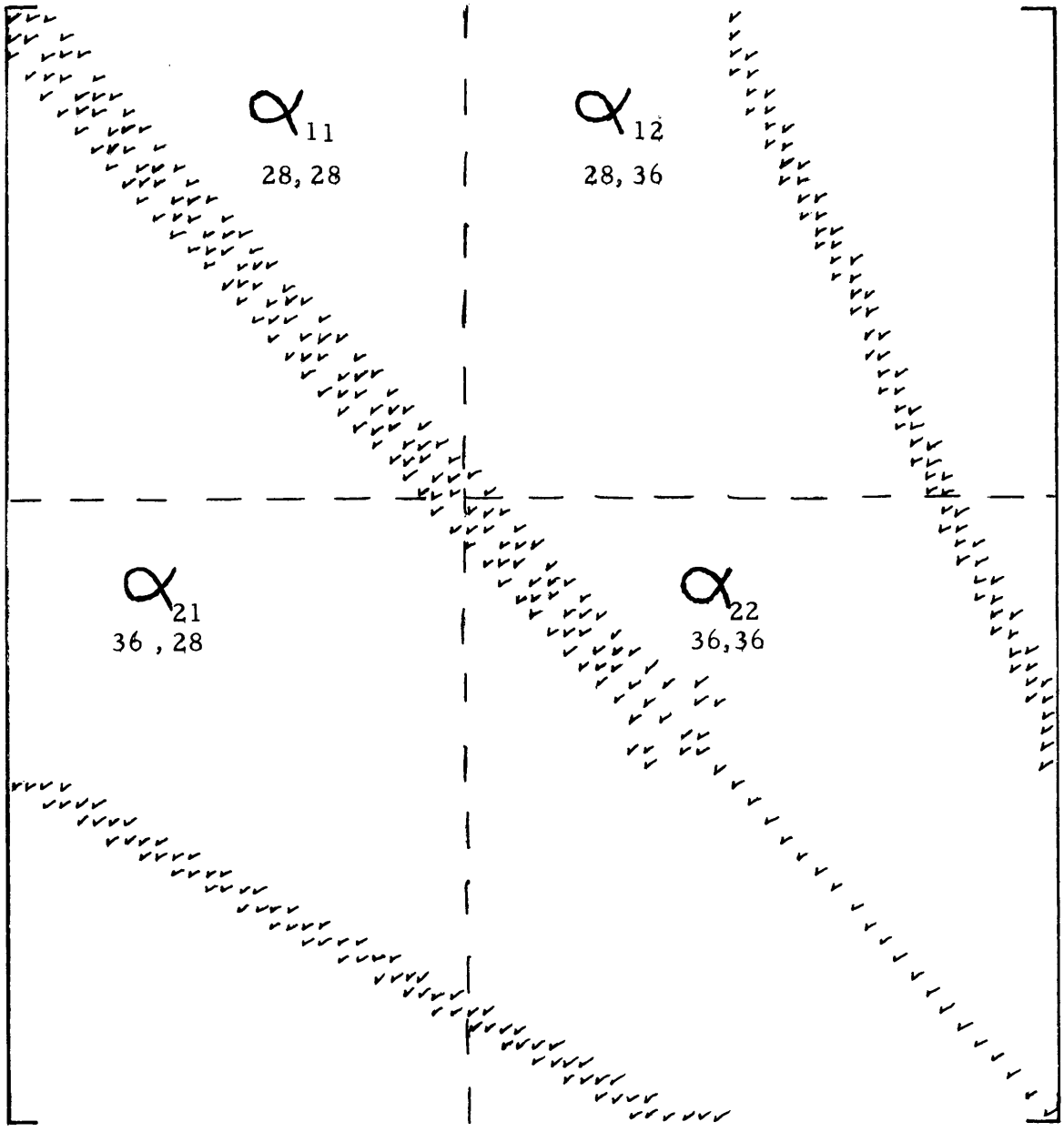

Figure 2

MATRIX OF THE ELEMENTS
(Partitioned)

$[A][\Psi] = [P]$, $[\Psi]$, the redundant matrix = $\begin{bmatrix} \theta_1 \\ \theta_2 \\ \vdots \\ \theta_{44} \\ R_1 \\ R_3 \\ \vdots \\ R_{39} \end{bmatrix}$ where θ_1, θ_2, --- --- θ_{44} represent the joint rotations and R_1, R_3, --- R_{39} represent the sidesways of each floor and of the joints 1 and 2, 3 and 4, --- 39 and 40, respectively, of the structural frame.

C. Inversion by Partitioning

Inversion of matrices as described by Frazer, Duncan and Collar [6] is accomplished by partitioning the given stiffness matrix A of order "n" as follows:

$$[A] = \left[\begin{array}{c|c} a_{11} & a_{12} \\ r,r & r,s \\ \hline a_{21} & a_{22} \\ s,r & s,s \end{array}\right] \quad \text{where } r + s = n \quad \ldots\ldots\ldots\ldots (1)$$

Similarly, partition $[B] = [A]^{-1}$

$$[B] = \left[\begin{array}{c|c} \beta_{11} & \beta_{12} \\ r,r & r,s \\ \hline \beta_{21} & \beta_{22} \\ s,r & s,s \end{array}\right] \quad \ldots\ldots\ldots\ldots (2)$$

Since $[B][A] = [I_n]$

$$[\beta_{11}][a_{11}] + [\beta_{12}][a_{21}] = [I_r] \quad \ldots\ldots\ldots\ldots (3)$$

$$[\beta_{11}][a_{12}] + [\beta_{12}][a_{22}] = [0] \quad \ldots\ldots\ldots\ldots (4)$$

$$[\beta_{21}][a_{11}] + [\beta_{22}][a_{21}] = [0] \quad \ldots\ldots\ldots\ldots (5)$$

$$[\beta_{21}][a_{12}] + [\beta_{22}][a_{22}] = [I_s] \quad \ldots\ldots\ldots\ldots (6)$$

Introduce $[X] = [a_{11}]^{-1}[a_{12}]$ $\ldots\ldots\ldots\ldots (7)$

$[Y] = [a_{21}][a_{11}]^{-1}$ $\ldots\ldots\ldots\ldots (8)$

$[\Phi] = [a_{22}] - [a_{21}][X]$ $\ldots\ldots\ldots\ldots (9)$

Then $[\beta_{11}] = [a_{11}]^{-1} + [X][\Phi]^{-1}[Y]$ ..... (10)

$[\beta_{12}] = -[X][\Phi]^{-1}$ ..... (11)

$[\beta_{21}] = -[\Phi]^{-1}[Y]$ ..... (12)

$[\beta_{22}] = [\Phi]^{-1}$ ..... (13)

"Thus $[B]$ is completely determined if $[a_{11}]^{-1}$ and $[\Phi]^{-1}$ exist. These will exist if the matrix $[A]$ is non-singular, and if $[A]$ has no zero elements in the principal diagonal. The stiffness matrix always meets these requirements". (3)

D. Type 650 IBM Computer Programs Discussed

To obtain the desired inverted stiffness matrix by partitioning the original matrix, the basic operations of matrix addition, matrix subtraction, matrix multiplication and matrix inversion were performed. During this procedure, whether the operation to be performed was the addition, subtraction, or multiplication of two matrices, one of the matrices was a "pre" matrix and the other a "post" matrix.

To perform any operation the matrices had to be introduced into the computer in a "pre" or "post" input form to comply with the operation. The "pre" and "post" loading forms are the same for all operations.

For each of the operations of addition, subtraction and multiplication of matrices, two computer programs were available, one of the programs left the operation answer (output) in post-input form and the other left the operation answer (output) in pre-input form. The input form needed to initiate the next operation governed the choice of program.

For example, to find the value of $[A] \times [B] \times [C]$, matrix $[A]$, a prematrix, when multiplied by matrix $[B]$, a postmatrix in the operation $[A] \times [B] = [K]$, must use the multiplication program which leaves the answer $[K]$ in preload form since it is a prematrix in the operation $[K] \times [C] = [A] \times [B] \times [C]$.

To invert a matrix the input had to be in post-input form. The output (the inverted matrix) of this operation was also in post-input form.

Since the inverted matrix was needed in pre-input form for some operations, a converter program was used which changed post-input answers into pre-input form.

In order that the inverse of a large matrix could be programmed by means of a partitioned matrix, the author wrote three programs and modified three programs. The programs written were for small scale matrix addition, small scale matrix subtraction and a converter program (mentioned previously) for converting the post-input answers to pre-input answers.

With the exception of the converter program, all operation answers were in post-input form. Therefore, the addition, subtraction, and multiplication programs were all modified to give three additional programs whose operations left their answers in pre-input form.

To use the above programs to find the inverse of a partitioned matrix, the order of any submatrix must not exceed 41. This requirement restricts the order of a matrix which may be partitioned once to 82. The inversion procedure is accomplished in less time if the submatrices of the partitioned matrix are of equal order.

E. The Stiffness Matrix Inverted and Checked

The inversion of the stiffness matrix to be used in the analysis of the framing of the William Penn Insurance Building requires that the matrix be partitioned into submatrices, where $[A] = \left[\begin{array}{c|c} a_{11} & a_{12} \\ \hline a_{21} & a_{22} \end{array}\right]$

The submatrices chosen for this analysis are illustrated in Figure 2.

Matrix equations (7), (8), and (9) are the first steps involving the four submatrices. To perform these operations, submatrices $[a_{11}]$ and $[a_{12}]$ were punched on IBM loading cards in post-input form as shown in Tables 2 and 3 of Appendix I. $[a_{21}]$ and $[a_{22}]$ were punched on loading cards in pre-input form as shown in Tables 4 and 5 of Appendix I. $[a_{11}]^{-1}$, $[X]$, $[Y]$, and $[\Psi]$ are shown in Tables 6, 7, 8, and 9 of Appendix I, respectively. The

submatrices $[\beta_{11}]$, $[\beta_{12}]$, $[\beta_{21}]$, and $[\beta_{22}]$ obtained from equations (10), (11), (12), and (13), respectively, which comprise the inverse of the original stiffness matrix $[A]$ are listed in Tables 10, 11, 12, and 13 of Appendix I, respectively. The programs used in this inversion routine are found in the Appendices in Tables A through H.

To insure that the inverse, $[A]^{-1}$, of the original stiffness matrix, $[A]$, had been obtained, the matrix equations (5) and (6) of $[B][A] = [I_n]$ were solved and the results appear in Tables 14 and 15 of Appendix I, respectively. Equations (3) and (4) were not used because satisfactory results of equations (5) and (6) insured that all steps in the procedure had been operated upon correctly.

F. Solving for Redundants

Having solved for the inverted stiffness matrix, $[A]^{-1}$, the equation $[\Psi] = [A]^{-1}[P] = [B][P]$ was used to determine the redundants θ_1 and R_i.

Since the inverted matrix $[A]^{-1} = [B]$ was previously determined in partitioned form where $[B] = \left[\begin{array}{c|c} \beta_{11} & \beta_{12} \\ \hline \beta_{21} & \beta_{22} \end{array}\right]$ the redundants, $[\Psi]$, could not be readily found by multiplying the loading matrix, $[P]$, by the matrix inverse $[A]^{-1} = [B]$ because of the unrelated nature of the input of each of the submatrices. To obtain the redundants, $[\Psi]$, the load matrix, $[P]$, listed in Table 16 of Appendix I was partitioned into $[P_1]$ and $[P_2]$ where $[P] = \begin{bmatrix} P_{1\,r,1} \\ P_{2\,s,1} \end{bmatrix}$ and multiplied by the already partitioned matrix inverse to give $[\beta_{11}][P_1] + [\beta_{12}][P_2] = [\Psi_1]$ and $[\beta_{22}][P_1] + [\beta_{22}][P_2] = [\Psi_2]$. In these equations,

$$\left[\Psi_1\right] = \begin{bmatrix} \theta_1 \\ \theta_2 \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \theta_{28} \end{bmatrix} \quad \text{and} \quad \left[\Psi_2\right] = \begin{bmatrix} \theta_{29} \\ \theta_{30} \\ \cdot \\ \cdot \\ \theta_{44} \\ R_1 \\ R_3 \\ \cdot \\ \cdot \\ R_{39} \end{bmatrix}.$$ $\left[\Psi_1\right]$ and $\left[\Psi_2\right]$ are listed in Table 17 of Appendix I.

The accuracy of these results was checked by multiplying the matrix, $\left[A\right]^{-1}\left[\Psi\right]$, by the original matrix, $\left[A\right]$, to obtain the loading matrix, $\left[P\right]$. These results were subtracted from the original load matrix. The absolute differences (errors) are listed with the original load matrix, $\left[P\right]$, in Table 16 of Appendix I.

VI. RESULTS

The inverted matrix $\left[A\right]^{-1} = \left[\begin{array}{c|c} \beta_{11} & \beta_{12} \\ \hline \beta_{21} & \beta_{22} \end{array}\right]$ is listed in partitioned form in Tables 10 through 13 of Appendix I. The redundants, $\left[\Psi\right]$, are listed in Table 17 of Appendix I.

The accuracy obtained in computing the inverse matrix was shown by the results of Equations (5) and (6). These results are listed in Tables 14 and 15 of Appendix I and show an accuracy of at least 6 significant figures.

The time required for the solution of each operation used in obtaining the inverse of the 64 x 64 stiffness matrix is presented below.

Program	Operation	Time in Minutes
Inversion	$\left[a_{11}\right]$ to $\left[a_{11}\right]^{-1}$	26
Converter	$\left[a_{11}\right]^{-1}_{post}$ to $\left[a_{11}\right]^{-1}_{pre}$	4
Multiplication	$\left[X\right] = \left[a_{11}\right]^{-1}\left[a_{12}\right]$	21
Multiplication	$\left[a_{21}\right]\left[X\right]$	23
Subtraction	$\left[\Phi\right] = \left[a_{22}\right] - \left[a_{21}\right]\left[X\right]$	6
Converter	$\left[X\right]_{post}$ to $\left[X\right]_{pre}$	5
Inversion	$\left[\Phi\right]$ to $\left[\Phi\right]^{-1}$	56
Converter	$\left[\Phi\right]^{-1}_{post}$ to $\left[\Phi\right]^{-1}_{pre}$	5
Multiplication	$\left[Y\right] = \left[a_{11}\right]^{-1}\left[a_{12}\right]$	19
Multiplication	$-\beta_{12} = \left[X\right]\left[\Phi\right]^{-1}$	28
Multiplication	$-\left[\beta_{21}\right] = \left[\Phi\right]^{-1}\left[Y\right]$	29
Multiplication	$\left[X\right]\left[\Phi\right]^{-1}\left[Y\right]$	24
Addition	$\left[\beta_{11}\right] = \left[a_{11}\right]^{-1} + \left[X\right]\left[\Phi\right]^{-1}\left[Y\right]$	4
	Total ...	250

Using the results of this investigation and the solution times indicated in the computer programs, the approximate times required to

invert matrices of order greater than 82 are listed below. This listing compares the solution times of theprograms described in this thesis with the solution times required by other large scale inversion programs[5].

Approximate Solution Times and Accuracy

Matrix Order	Ayres' Program Time in Hours	Author's Program Time in Hours	Accuracy in Significant Figures
82	92	5	6 +
164	735	35	4 +
328	5840	245	2 +

VII. DISCUSSION OF RESULTS AND CONCLUSIONS

The inversion of large order matrices by partitioning has heretofore been impractical because of the time required. Results of this investigation, however, indicate an accurate, time-saving procedure for inverting the 64 x 64 stiffness matrix. The computer running time was reduced from approximately 44 hours, using present matrix inversion programs [5], to slightly more than 4 hours using the inversion program described in this thesis.

Even though the partitioning program requires several operations, the results obtained were accurate to 6^+ significant figures.

It is evident from studying the data that beginning with a matrix of order 82, accuracy of no more than 2 significant figures will be lost each time the order of the matrix is doubled. Therefore, the inverse of a matrix whose order is 328 will be accurate to <u>at least</u> 2 significant figures.

In view of the accuracy of the solution and the relative speed with which it was obtained, it may be concluded that these methods will greatly extend the usefulness of the medium capacity computer for matrix solutions.

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XI. APPENDIX A

MATRIX INVERSION

D. W. Sweeney
IBM, Endicott

MATRIX INVERSION
IBM 650 PROGRAM

D. W. Sweeney

FUNCTION: This program will invert matrices of order less than or equal to 42.

GENERAL COMMENTS: The program is optimum coded, incorporating its own floating point routine, with eight place accuracy in the input, output and intermediate calculations. Matrix inversion alone is executed in approximately $.072n^3$ seconds, but this timing estimate does not include input and output.

The floating point routine cannot be used for any other calculations. The inversion program is destroyed after use and must be reloaded for each new inversion.

STORAGE: Locations 1764 to 1999 are used for instructions, constants and temporary storage. Also (n + b + 1) locations, directly following the last element of the input matrix, are used for erasable storage. (For example: A 42 x 42 matrix occupies locations 0000-1763. The erasable storage in this case consists of drum locations 1764-1805.)

INPUT: The matrix is punch row-wise seven elements per card, with drum location 0000 the loading address of the first element of the first row. The terms of the b column vectors of right hand sides (if any) corresponding to each row of the matrix are punched sequentially following each row, with their signs unchanged. The card format for the input is as follows:

Columns	1-2	00
	3-6	Drum Address
	7-9	000
	10	Word Count (1, 2 .... or 7)
	11-20	First Word
	21-30	Second Word
	.	
	.	
	.	
	71-80	Seventh Word

(Over-punch 12 in columns 1 and 10.)

Note: All unused fields, on cards with word counts less than 7, should be punched with zeros and signs.
The exponent is in the first two columns of each word, with a base 50 representing the exponent for X.XXXXXXX. The sign of each eight digit characteristic is punched over the units position of each word, 12 for plus, 11 for minus.

CONTROL CARDS:

The STARTING CONTROL CARD is punched as follows:

Columns	1-2	n (order of matrix)
	3-8	zeros
	9-10	n + b (where b is the number of right hand side column vectors)
	11-80	zeros

Over-punch a 12 in columns 10, 20, 30, 40, 50, 60, 70, 80

The PUNCH CONTROL CARD is punched as follows:

Columns	1-10	69 0000 8003
	11-12	69
	13-16	The location of the last element of the matrix
	17-20	8003

Over-punch a 12 in columns 1, 10 and 20.

DECK ARRANGEMENT:

1. 024 deck 00-36 (self-loading Inversion Program)
2. Matrix to be inverted.
3. Starting Control Card (See "Control Cards")
4. 024 deck 37-45 (Self-loading punching program)
5. Punch Control Card (See "Control Cards")
6. 024 deck 46-48 (Blank cards)

CONTROL PANEL:

The Control Panel for the type 533 is wired to read load cards specified by a 12 punch in column 1, to read columns 1-80 of the starting card, and to punch eight 10 digit words and signs from Storage exit words 1-8 to the 80 card columns. A 12 is wired to overpunch in column 1, and RSU, PSU, R + and P + are wired.

OPERATING NOTES:

1. Press computer reset.
2. Set console switches at 70 1951 XXXX, error stop and overflow stop.
3. Place deck in read hopper and blank cards in punch hopper and ready both.
4. Press start on console.

OUTPUT:

The output cards will be punched row-wise seven elements per card in the same card form as the input cards starting at location zero. The terms of the b column vectors of unknowns (if any) corresponding to each row of the inverse are punched sequentially preceding each inverse row.

MATRIX INVERSION PROGRAM

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Initial Set-Up		
1798	RAL	65	1951	1805
1805	SLT	35	0002	1772
1772	STU	21	1977	1780
1780	SLT	35	0002	1789
1789	LD	69	1907	1766
1766	STDA	22	1907	1769
1769	LD	69	1969	1776
1776	STDA	22	1992	1797
1797	LD	69	1908	1784
1784	STDA	22	1908	1796
1796	LD	69	1950	1966
1966	STDA	22	1950	1803
1803	STL	20	1959	1915
1915	AL	15	1766	1785
1785	STD	24	1983	1786
1786	STD	24	1994	1801
1801	LD	69	1962	1968
1968	STDA	22	1962	1800
1800	RAU	60	1959	1764
1764	MPY	19	1977	1781
1781	SL	16	1959	1790
1790	LD	69	1782	1791
1791	STDA	22	1954	1770
1770	AL	24	1959	1804
1804	LD	69	1965	1775
1775	STDA	22	1965	1787
1787	LD	69	1969	1793
1793	STDA	22	1996	1799
1799	STD	24	1969	1802

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1802	LD	69	1975	1795
1795	STDA	22	1975	1779
1779	AL	15	1983	1788
1788	LD	69	1961	1774
1774	STDA	22	1997	1794
1794	AL	15	1959	1900
1900	SL	16	1983	1765
1765	LD	69	1974	1771
1771	STDA	22	1974	1778
1778	STD	24	1989	1793
1792	LD	69	1975	1948
1948	STDA	22	1953	1806
1806	LD	69	1961	1916
1916	STDA	22	1961	1783
1783	LD	69	1841	1777
1777	STD	24	1980	1767
1767	LD	69	1970	1773
1773	STD	24	1985	1917
1917	RAU	60	1911	1964
1964	STDA	22	1978	1827
1827	LD	69	1836	1973
1973	STD	24	1999	1908
		Invert Matrix		
1908	LD	69	9999	1972
1972	STD	24	1999	1946
1946	LD	69	1949	1907
1907	STD	24	9999	1945
1945	RAL	65	0000	1940
1940	SLT	35	0002	1899
1899	STL	20	1955	1858
1858	STU	21	1966	1920
1920	RAL	65	1973	1912
1912	AU	10	1965	1929

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1929	AU	10	1983	1938
1938	AL	15	8001	1895
1895	STU	21	1900	1906
1906	STL	20	1911	8001
1911	RAL	65	9999	1918
1918	SLT	35	0002	1976
1976	STL	20	1988	1942
1942	RAABL	67	8003	1910
1910	SABL	18	1966	1925
1925	AL	15	1928	1909
1909	STL	20	1964	1867
1867	SL	16	1970	1875
1875	STL	20	1979	1933
1933	RAU	60	1988	1944
1944	SRT	30	0001	1902
1902	DIVRU	64	1955	1883
1883	SRD	31	0001	1890
1890	SLT	35	0002	1898
1898	BRNZU	44	1852	1924
1852	SRT	30	0001	1860
1860	LD	69	1964	1932
1924	LD	69	1979	1932
1932	BRMIN	46	1885	1936
1885	SU	11	8001	1943
1936	AU	10	8001	1943
1943	SRT	30	0002	1900
1900	STL	20	9999	1886
1886	RSU	61	1989	1896
1896	AU	10	1900	1857
1857	AL	15	1911	1865
1865	BRNZU	44	1870	1859
1870	AU	10	1974	1929
1859	RAL	65	1962	1868

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1868	LD	69	1971	1874
1874	STD	24	1927	1881
1881	STL	20	1836	1889
1889	RAU	60	1992	1947
1947	AL	15	1950	1856
1856	AU	10	1959	1963
1963	AL	15	8001	1871
1871	STU	21	1926	1879
1879	STL	20	1834	1887
1887	RSL	66	1990	1845
1845	SLT	35	0002	1807
1808	STL	20	1964	1825
1825	STU	21	1991	1926
1926	RAL	65	9999	1937
1937	STD	24	1990	1834
1834	STU	21	9999	1922
1922	RAL	65	1975	1829
1829	AL	15	1983	1837
1837	STL	20	1892	8001
1892	RAL	65	9999	1862
1862	SLT	35	0002	1919
1919	STL	20	1973	1830
1830	RAABL	67	8003	1838
1838	AABL	17	1991	1846
1846	SL	16	1999	1903
1903	STL	20	1958	1861
1861	RAU	60	1964	1869
1869	MPY	19	1973	1876
1876	STU	21	1981	1836
1836	RAL	65	9999	1812
1812	SLT	35	0002	1819
1819	STL	20	1973	1934
1934	STD	24	1988	1842

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1842	RAABL	67	8003	1849
1849	STL	20	1953	1855
1855	SL	16	1958	1813
1813	BRNZ	45	1816	1826
1826	RAL	65	1981	1935
1935	AL	15	1988	1843
1816	SLT	35	0002	1877
1877	LD	69	1980	1833
1833	STDA	22	1841	1844
1844	BRMIN	46	1847	1848
1847	SLT	35	0005	1809
1809	BRNZU	44	1822	1820
1822	RAL	65	1981	1843
1820	RAL	65	1973	1878
1878	LD	69	1981	1841
1848	LD	69	1952	1905
1905	STD	24	1958	1811
1811	SLT	35	0005	1823
1823	BRNZU	44	1882	1828
1882	RAL	65	1988	1843
1828	RAL	65	1981	1835
1835	LD	69	1988	1841
1841	SRT	30	0000	1863
1863	AL	15	8001	1843
1843	SRD	31	0002	1851
1851	BR NZ	45	1854	1927
1854	RAU	60	8002	1913
1913	SCT	36	0000	1884
1884	AL	15	8003	1891
1891	SU	11	8002	1850
1850	BRMIN	46	1853	1904
1853	AU	10	1958	1814
1814	AU	10	1967	1821
1904	SU	11	1958	1864
1864	SU	11	1967	1821
1821	SRT	30	0002	1927
1927	STL	20	9999	1824
1824	RAU	60	1927	1831
1831	AL	15	1836	1941
1941	AU	10	1994	1914
1914	AL	15	8001	1872
1872	STY	21	1927	1880
1880	STL	20	1836	1939
1939	RAL	65	1892	1897
1897	SL	16	1953	1810
1810	BRNZ	45	1818	1866
1818	AL	15	8001	1829
1866	RSU	61	1969	1873

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1873	AU	10	1926	1931
1931	AL	15	1834	1839
1839	BRNZU	44	1893	1894
1893	AU	10	1996	1856
1894	RAU	60	1997	1901
1901	AL	15	1954	8003
1808	SU	11	1961	1817
1817	BRNZU	44	1921	1923
1921	AU	10	8001	1930
1930	AU	10	1983	1888
1888	AL	15	8001	8003
1923	RAL	65	1977	1832
1832	SL	16	1985	1840
1840	BRNZ	45	1815	8000
1815	STL	20	1977	1908

7019013000	6919521951	6919541953	6919561955	6919581957	7019950000	6919561958	2419991999
6919521902	2419951903	6919531904	2419961905	6919541906	2419971907	6919551908	2419981957
2419881996	7019941798	2419941997	6519511979	2419791998	6919821986	2419861999	2219821989
2419891996	3500041981	2419811997	1580011990	2419901998	2219781984	2419841999	6519911992
2419921996	1019828002	2419771997	1019801985	2419851998	1580011993	2419931999	1119781983
2419831996	4419871988	2419871997	1080018002	2419821998	2400001977	2419911999	6919528003
2419801988	10000						
17640007	1919771781	6919741771	2219071769	6919701773	10000	6919691776	1519591804
17710007	2219741778	2119771780	2419851917	2219971794	2219651787	2219921797	2419801767
17780007	2419891792	1519831788	3500021789	1619591790	2400001808	6918411777	2219081796
17850007	2419831786	2419941801	6919691793	6919611774	6919071766	6917821791	2219541770
17920007	6919751948	2219961799	1519591900	2219751779	6919501966	6919081784	6519511805
17990007	2419691802	6019591764	6919621968	6919751795	2019591915	6919651775	3500021772
18060007	6919611916	2019641825	1119611817	4418221820	4518181866	3500051823	3500021819
18130007	4518161826	1019671821	2019771908	3500041877	4419211923	1580011829	2019731934
18200007	6519731878	3000021927	6519811843	4418821828	6019271831	2119911926	6519811935
18270007	6918361973	6519811835	1519831837	6780031838	1518361941	1619851840	2218411844
18340007	2199991922	6919881841	49	2018928001	1719911846	4418931894	4518158000
18410007	3000001863	6780031849	3100021851	4618471848	3500021807	1619991903	3500051809
18480007	6919521905	2019521855	4618531904	4518541927	3000011860	1019581814	6080021913
18550007	1619581813	1019591963	1519111865	2119661920	6519621868	6919641932	6019641869
18620007	3500021919	1580011843	1119671821	4418701859	6119691873	1619701875	6919711874
18690007	1919731876	1019741929	2119261879	2119271880	1019261931	2419271881	2019791933
18760007	2119811836	6919801833	6919811841	2018341887	2018361939	2018361889	6519881843
18830007	3100011890	1580031891	1180011943	6119891896	6619901845	1580018003	6019921947
18900007	3500021898	1180021850	6599991862	1019961856	6019971901	2119001906	1019001857
18970007	1619531810	4418521924	2019551858	1619831765	1519548003	6419551883	2019581861
19040007	1119581864	2419581811	2019118001	2499991945	6999991972	2019641867	1819661925
19110007	6599991918	1019651929	3600001884	1580011872	1517681785	2219611783	6019111964
19180007	3500021976	2019731830	6519781912	1080011930	6519751829	6519771832	6919791932

19250007	1519281909	6599991937	2099991824	50	1019831938	1019831888	1518341839
19320007	4618851936	6019881944	2419881842	1519881843	1080011943	2419901834	1580011895
19390007	6518921897	3500021899	1019941914	6780031910	3000021900	3000011902	6500001940
19460005	6919491907	1519501856	2219531806	5010000000	2199991922	3000011902	6500001940
19610007	6999998002	6599991812	1580011871	2219781827	2099991886	2219501803	2
19680007	2219621800	6599991937	1	2000001824	2419901946	2419991908	2099991886
19750002	6599991862	2019881942	1	2000001824	2419901946	2419991908	2099991886
7019013000	6919521951	6919541953	6919561955	6919581957	7019950000	6919561958	2419991999
6919521902	2419951903	6919531904	2419961905	6919541906	2419971907	6919551908	2419981957
2419651996	2419851962	2419701997	4419731976	2419731998	1080018002	2419761999	7119771961
2419501996	7019908000	2419901997	6519511961	2419611998	1019641969	2419641999	2419781962
2419691996	6919721975	2419721997	7	2419751998	2219778002	2419621999	1019891994
2419891996	10000	2419941997	1619521963	2419631998	1180031971	2419711999	4519741986
2419861996	6580011992	2419921997	1619651987	2419871998	3000041966	2419661999	1519771967
2419741996	1080011985	2419851997	1519891993	2419931998	1519521991	2419911999	1119651970
2419671996	2019771968	2419681950	7119771950	2400001998		2400001999	

MATRIX INVERSION (continued)

XI. APPENDIX B

MATRIX MULTIPLICATION

L. W. Ayres
IBM WASHINGTON

SMALL SCALE MATRIX MULTIPLICATION
IBM 650 PROGRAM

L. W. Ayres

PURPOSE: This program will multiply an mxn matrix by an nxk matrix to produce an mxk matrix.

RESTRICTIONS: Let

m = the number of rows in the premultiplier

n = the number of columns in the premultiplier and the number of rows in the post-multiplier

k = the number of columns in the post-multiplier

Then

n must be less than or equal to 41

nk must be less than or equal to 1681

There is no restriction on the size of m.

INPUT CARD FORM:

The data must be in 8 digit floating decimal form, that is, as an integer and seven decimals with a modulo 50 exponent in the two high order positions.

The post-multiplier is punched row-wise in seven-per-card form to read consecutively into storage units 0000 to nk-1.

Each row of the premultiplier is punched in seven-per-card form on a separate set of cards to read consecutively into the same set of storage units, 1764 to 1764 + n-1.

OUTPUT CARD FORM:

The resulting matrix will be punched out in seven-per-card form, the output data being "2 and 8" floating decimal numbers. It will be in row order and carry the same storage unit identification as the "post" matrix.

TIMING: The time estimate is .061 mnk seconds (calculation).

CONTROL CARD FORM:

A. First row control card. Non-load.

Columns

1 - 10	65 1952 1921
11 - 14	zeros
15 - 16	k
17 - 24	zeros
25 - 26	n
27 - 30	zeros

Overpunch 12's in columns 10, 20, and 30.

B. "2nd to nth row" control card. Non-load.

Columns

1 - 6	zeros
7 - 10	1736

Overpunch a 12 in column 10.

OPERATING NOTES:

A. Card Order

1. Seven-per-card loader (No. 101) modified so that a non-load card transfers to 1951 (Read order of 101 must be 70 1994 1951 in location 1988).
2. Program.
3. "Post" matrix.
4. First row of "pre" matrix.
5. First row control card.
6. Second row of "pre" matrix.
7. "2nd to nth row" control card..
8. Repeat parts 6 and 7 using third to nth row "pre" matrix in order.

B. Console Settings:

1. Set 70 1951 3000 on Storage Entry Switch.
2. Set Error Sense Switch to STOP.
3. Set Overflow Switch to STOP.
4. Set Programmed Switch to RUN.
5. Set Control Switch to RUN.

C. Procedure:

1. Ready the read feed with the decks shown above.
2. Then ready punch feed with blanks.
3. Press Computer Reset and Program Start.
4. When deck has been read, press End of File Key.

D. Error Restart:

1. Run out the cards in the punch feed and throw away.
2. Ready the read feed with the entire "pre"-matrix (Steps 4 to 8 in the card order).
3. Set 00 0000 1988 on the Storage Entry Switches.
4. Press Computer Reset and Program Start.

CONTROL PANEL:

The 650 Utility Board may be used without modification. If a special board is desired, it needs only these features:

1. Read load cards specified by a 12 punch in column 1.
2. Read columns 1 - 30 into words 1 - 3 for a non-load card.
3. Punch eight 10 digit words and signs from storage exits words 1 - 8 to the 80 card columns.

MATRIX MULTIPLICATION PROGRAM

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Initial Set-Up		
1951	RAL	65	1952	1921
1921	LD	69	1907	1710
1710	STDA	22	1870	1923
1923	SLT	35	0006	1699
1699	MPY	19	1953	1922
1922	LD	69	1907	1711
1711	STDA	22	1868	1729
1729	SL	16	1735	1945
1945	LD	69	1907	1715
1715	STDA	22	1907	1730
1730	AL	15	1735	1944
1944	SL	16	1952	1712
1712	LD	69	1868	1943
1943	STDA	22	1850	1726
1726	LD	69	1738	1695
1695	STD	24	1927	1736
1951	NOOP	00	0000	1736
1736	LD	69	1805	1713
1713	STD	24	1811	1714
1714	LD	69	1725	1737
1737	STD	24	1893	1811
		Multiply - Add Subroutine		
1811	RAL	65	1764	1809
1809	SLT	35	0002	1816
1816	STU	21	1820	1823

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Multiply - Add Subroutine		
1823	STL	20	1827	1893
1893	RAL	65	0000	1851
1851	SLT	35	0002	1808
1808	STU	21	1812	1815
1815	RAU	60	8002	1824
1824	MPY	19	1827	1849
1849	BRNZ	45	1852	1840
1852	STU	21	1806	1859
1859	RAABL	67	1812	1817
1817	AABL	17	1820	1825
1825	STL	20	1829	1832
1832	SABL	18	1837	1741
1741	BRNZ	45	1841	1745
1745	RAL	65	1806	1819
1841	SLT	35	0004	1901
1901	BRMIN	46	1854	1855
1854	LD	69	1857	1810
1810	STDA	22	1813	1818
1818	AL	15	1874	1887
1887	BRMIN	46	1840	1848
1848	RAL	65	1806	1813
1813	SRD	31	9999	1819
1819	AL	15	1822	1877
1877	BRNZ	45	1830	1866
1830	BRNZU	44	1838	1834
1838	SRD	31	0001	1847
1847	STL	20	1822	1875
1875	RAABL	67	1837	1845
1845	AL	15	1909	1883
1883	STL	20	1837	1840

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Multiply - Add Subroutine		
1834	RAU	60	8002	1843
1843	SCT	36	0000	1814
1814	STU	21	1822	1925
1925	RSABL	68	8002	1833
1833	AABL	17	1812	1883
1866	STL	20	1822	1883
1855	LD	69	1858	1861
1861	STDA	22	1828	1836
1836	SL	16	1839	1844
1844	BRMIN	46	1897	1898
1897	RAL	65	1827	1828
1828	SRD	31	9999	1853
1853	AL	15	1806	1911
1911	BRNZ	45	1864	1866
1864	BRNZU	44	1867	1869
1867	SRD	31	0001	1846
1846	STL	20	1822	1826
1826	RAABL	67	1829	1845
1869	RAU	60	8002	1879
1879	SCT	36	0000	1899
1899	STU	21	1822	1876
1876	RSABL	68	8002	1865
1865	AABL	17	1829	1883
1898	LD	69	1806	1918
1918	STD	21	1822	1926
1926	RAL	65	1829	1883
1840	RAU	60	1893	1947
1947	SU	11	1850	1905
1905	BRMIN	46	1908	1860

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Multiplication Modification		
1908	AL	15	1811	1915
1915	AU	10	1868	1873
1873	AL	15	1831	1835
1835	STU	21	1893	1856
1856	STL	20	1811	8002
1860	RAL	65	1822	1910
1910	BRNZ	45	1727	1749
1727	SLT	35	0001	1733
1733	BRNZU	44	1743	1744
1743	SRT	30	0001	1949
1949	BRMIN	46	1702	1703
1702	AU	10	1906	1882
1703	SU	11	1906	1881
1744	BRMIN	46	1747	1948
1747	AU	10	1916	1882
1882	SU	11	1837	1892
1948	SU	11	1916	1881
1881	AU	10	1837	1892
1892	SRT	30	0002	1749
1749	STL	20	1928	1888
1888	RAL	65	1749	1903
1903	SL	16	1807	1862
1862	STU	21	1822	1878
1878	STU	21	1837	1890
1890	BRNZ	45	1894	1895
1895	PCH	71	1948	1701
1701	RAL	65	1927	1880
1880	LD	69	1884	1891
1891	STD	24	1749	1904
1904	AL	15	1863	1821

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Multiplication Modification		
1821	STL	20	1927	1902
1894	AL	15	1748	1842
1842	STL	20	1749	1902
1902	RSL	66	1907	1917
1917	AL	15	1893	1697
1697	BRMIN	46	1900	1886
1900	LD	69	1805	1708
1708	STD	24	1811	1914
1914	AL	15	1870	1885
1885	STL	20	1893	1811
1886	RAL	65	1749	1871
1871	SL	16	1884	1740
1740	BRNZ	45	1896	1988
1896	STL	20	1700	1704
1704	AL	15	1707	8002
8002	STU	21	1929	1739
1739	SL	16	1742	1698
1698	BRNZ	45	1705	1706
1705	AL	15	1709	8002
1706	RAL	65	1700	1919
1919	LD	69	1927	1732
1732	SRT	30	0004	1872
1872	STIA	23	1927	1731
1731	PCH	71	1934	1746
1746	RAU	60	8002	1912
1912	SLT	35	0004	1924
1924	AU	10	1927	1734
1734	AL	15	1738	1946
1946	STU	21	1700	1920
1920	STIA	23	1927	1728
1728	LD	69	1884	1696
1696	STD	24	1749	1988

16950007	2419271736	2417491988	4619001886	4517051706	1919531922		6519271880
17020007	1019061882	1119061881	1517078002	1517098002	6517001919	2119281739	2418111914
17090007	2119351739	2218701923	2218681729	6918681943	2418111714	6917251737	2219071730
17250007	6500001851	6917381695	3500011733	6918841696	1617351945	1517351944	7119341746
17320007	3000041872	4417431744	1517381946	10000	6918051713	2418931811	7
17390007	1617421698	4518961988	4518411745	2119341739	3000011949	4617471948	6518061819
17460007	6080021912	1019161882	2019351888	2019281888			
18050007	6517641809		2019341888	2118121815	3500021816	2218131818	6519511809
18120007		3100001819	2118221925	6080021824	2118201823	1718201825	1518741887
18190007	1518221877		2019271902		2018271893	1918271849	2018291832
18260007	6718291845		3100001853		4418381834	10000	1818371741
18330007	1718371883	6080021843	2118931856	1618391844		3100011847	100000
18400007	6018931947	3500041901	2017491902	3600001814	4618971898	1519091883	2018221826
18470007	2018221875	6518061813	4518521840	6599991851	3500021808	2118061859	1518061911
18540007	6918571810	6918581861	2018118002	3199991819	3199991853	6718121817	6518221910
18610007	2218281836	2118221878	70000	4418671869	1718291883	2018221883	3100011846
18680007	6599991851	6080021879	6599991851	1618841740	2319271731	1518311835	90000
18750007	6718371845	6880021865	4518301866	2118371890	3600001899	6918841891	1018371892
18820007	1118371892	2018371840	2019281888	2018931811	6517491871	4618401848	6517491903
18890007	4417431744	4518941895	2417491904	3000021749	6519521851	1517481842	7119481701
18960007	2017001704	6518221828	6918061918	2118221876	6918051708	4618541855	6619071917
19030007	1618071862	1518631821	4619081860	49	6599991851	1518111915	1
19100007	4517271749	4518641866	3500041924	70000	1518701885	1018681873	50
19170007	1518931697	2418221926	6919271732	2319271728	6919071710	6919071711	3500061699
19240007	1019271734	6880021833	6518291883				
19370001	3000011744						
19430007	2218501726	1619521712	6919071715	2117001920	1118501905	1119161881	4617021703

MATRIX MULTIPLICATION

XI. APPENDIX C

MATRIX MULTIPLICATION

L. W. Ayres
IBM, Washington

Modified by
L. Carl Herring, Jr.

SMALL SCALE MATRIX MULTIPLICATION
IBM 650 PROGRAM

L. W. Ayres

PURPOSE: This program will multiply an mxn matrix by an nxk matrix to produce an mxk matrix.

RESTRICTIONS: Let

m = the number of rows in the premultiplier

n = the number of columns in the premultiplier and the number of rows in the post-multiplier

k = the number of columns in the post-multiplier

Then

n must be less than or equal to 41

nk must be less than or equal to 1681

There is no restriction on the size of m.

INPUT CARD FORM:

The data must be in 8 digit floating decimal form, that is, as an integer and seven decimals with a modulo 50 exponent in the two high order positions.

The post-multiplier is punched row-wise in seven-per-card form to read consecutively into storage units 0000 to nk-1.

Each row of the premultiplier is punched in seven-per-card form on a separate set of cards to read consecutively into the same set of storage units, 1764 to 1764 + n-1.

OUTPUT CARD FORM: (Modified)

The resulting matrix will be punched out in seven-per-card form, the output data being "2 and 8" floating decimal numbers. It will be in row order and carry the same storage unit identification as the "pre" matrix.

TIMING: The time estimate is .061 mnk seconds (calculation).

CONTROL CARD FORM:

A. First row control card. Non-load.

Columns

1 - 10	65 1952 1921
11 - 14	zeros
15 - 16	k
17 - 24	zeros
25 - 26	n
27 - 30	zeros

Overpunch 12's in columns 10, 20, and 30.

B. "2nd to nth row" control card. Non-load.

Columns

1 - 6	zeros
7 - 10	1736

Overpunch a 12 in column 10.

OPERATING NOTES:

A. Card Order

1. Seven-per-card loader (No. 101) modified so that a non-load card transfers to 1951 (Read order of 101 must be 70 1994 1951 in location 1988).
2. Program.
3. "P ost" matrix.
4. First row of "pre" matrix.
5. First row control card.
6. Second row of "pre" matrix.
7. "2nd to nth row" control card..
8. Repeat parts 6 and 7 using third to nth row "pre" matrix in order.

B. Console Settings:

1. Set 70 1951 3000 on Storage Entry Switch.
2. Set Error Sense Switch to STOP.
3. Set Overflow Switch to STOP.
4. Set Programmed Switch to RUN.
5. Set Control Switch to RUN.

C. Procedure:

1. Ready the read feed with the decks shown above.
2. Then ready punch feed with blanks.
3. Press Computer Reset and Program Start.
4. When deck has been read, press End of File Key.

D. Error Restart:

1. Run out the cards in the punch feed and throw away.
2. Ready the read feed with the entire "pre"-matrix (Steps 4 to 8 in the card order).
3. Set 00 0000 1988 on the Storage Entry Switches.
4. Press Computer Reset and Program Start.

CONTROL PANEL:

The 650 Utility Board may be used without modification. If a special board is desired, it needs only these features:

1. Read load cards specified by a 12 punch in column 1.
2. Read columns 1 - 30 into words 1 - 3 for a non-load card.
3. Punch eight 10 digit words and signs from storage exits words 1 - 8 to the 80 card columns.

MATRIX MULTIPLICATION PROGRAM

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Initial Set-Up		
1951	RAL	65	1952	1921
1921	LD	69	1907	1710
1710	STDA	22	1870	1923
1923	SLT	35	0006	1699
1699	MPY	19	1953	1922
1922	LD	69	1907	1711
1711	STDA	22	1868	1729
1729	SL	16	1735	1945
1945	LD	69	1907	1715
1715	STDA	22	1907	1730
1730	AL	15	1735	1944
1944	SL	16	1952	1712
1712	LD	69	1868	1943
1943	STDA	22	1850	1726
1726	LD	69	1738	1695
1695	STD	24	1927	1736
1951	NOOP	00	0000	1736
1736	LD	69	1805	1713
1713	STD	24	1811	1714
1714	LD	69	1725	1737
1737	STD	24	1893	1811
		Multiply - Add Subroutine		
1811	RAL	65	1764	1809
1809	SLT	35	0002	1816
1816	STU	21	1820	1823

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Multiply - Add Subroutine		
1823	STL	20	1827	1893
1893	RAL	65	0000	1851
1851	SLT	35	0002	1808
1808	STU	21	1812	1815
1815	RAU	60	8002	1824
1824	MPY	19	1827	1849
1849	BRNZ	45	1852	1840
1852	STU	21	1806	1859
1859	RAABL	67	1812	1817
1817	AABL	17	1820	1825
1825	STL	20	1829	1832
1832	SABL	18	1837	1741
1741	BRNZ	45	1841	1745
1745	RAL	65	1806	1819
1841	SLT	35	0004	1901
1901	BRMIN	46	1854	1855
1854	LD	69	1857	1810
1810	STDA	22	1813	1818
1818	AL	15	1874	1887
1887	BRMIN	46	1840	1848
1848	RAL	65	1806	1813
1813	SRD	31	9999	1819
1819	AL	15	1822	1877
1877	BRNZ	45	1830	1866
1830	BRNZU	44	1838	1834
1838	SRD	31	0001	1847
1847	STL	20	1822	1875
1875	RAABL	67	1837	1845
1845	AL	15	1909	1883
1883	STL	20	1837	1840

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Multiply - Add Subroutine		
1834	RAU	60	8002	1843
1843	SCT	36	0000	1814
1814	STU	21	1822	1925
1925	RSABL	68	8002	1833
1833	AABL	17	1812	1883
1866	STL	20	1822	1883
1855	LD	69	1858	1861
1861	STDA	22	1828	1836
1836	SL	16	1839	1844
1844	BRMIN	46	1897	1898
1897	RAL	65	1827	1828
1828	SRD	31	9999	1853
1853	AL	15	1806	1911
1911	BRNZ	45	1864	1866
1864	BRNZU	44	1867	1869
1867	SRD	31	0001	1846
1846	STL	20	1822	1826
1826	RAABL	67	1829	1845
1869	RAU	60	8002	1879
1879	SCT	36	0000	1899
1899	STU	21	1822	1876
1876	RSABL	68	8002	1865
1865	AABL	17	1829	1883
1898	LD	69	1806	1918
1918	STD	21	1822	1926
1926	RAL	65	1829	1883
1840	RAU	60	1893	1947
1947	SU	11	1850	1905
1905	BRMIN	46	1908	1860

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Multiplication Modification		
1908	AL	15	1811	1915
1915	AU	10	1868	1873
1873	AL	15	1831	1835
1835	STU	21	1893	1856
1856	STL	20	1811	8002
1860	RAL	65	1822	1910
1910	BRNZ	45	1727	1749
1727	SLT	35	0001	1733
1733	BRNZU	44	1743	1744
1743	SRT	30	0001	1949
1949	BRMIN	46	1702	1703
1702	AU	10	1906	1882
1703	SU	11	1906	1881
1744	BRMIN	46	1747	1948
1747	AU	10	1916	1882
1882	SU	11	1837	1892
1948	SU	11	1916	1881
1881	AU	10	1837	1892
1892	SRT	30	0002	1749
1749	STL	20	1928	1888
1888	RAL	65	1749	1903
1903	SL	16	1807	1862
1862	STU	21	1822	1878
1878	STU	21	1837	1890
1890	BRNZ	45	1894	1895
1895	PCH	71	1948	1701
1701	RAL	65	1927	1880
1880	LD	69	1884	1891
1891	STD	24	1749	1904
1904	AL	15	1863	1821

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Multiplication Modification		
1821	STL	20	1927	1902
1894	AL	15	1748	1842
1842	STL	20	1749	1902
1902	RSL	66	1907	1917
1917	AL	15	1893	1697
1697	BRMIN	46	1900	1886
1900	LD	69	1805	1708
1708	STD	24	1811	1914
1914	AL	15	1870	1885
1885	STL	20	1893	1811
1886	RAL	65	1749	1871
1871	SL	16	1884	1740
1740	BRNZ	45	1896	1924
1896	STL	20	1700	1704
1704	AL	15	1707	8002
8002	STU	21	1929	1739
1739	SL	16	1742	1698
1698	BRNZ	45	1705	1706
1705	AL	15	1709	8002
1706	RAL	65	1700	1919
1919	LD	69	1927	1732
1732	SRT	30	0004	1872
1872	STIA	23	1927	1731
1731	PCH	71	1934	1746
1746	LD	69	1884	1912
1912	STD	24	1749	1924
1924	LD	69	1738	1734
1734	STD	24	1927	1988

16950007	2419271736		4619001886	4517051706	1919531922		6519271880
17020007	1019061882	1119061881	1517078002	1517098002	6517001919	2119281739	2418111914
17090007	2119351739	2218701923	2218681729	6918681943	2418111714	6917251737	2219071730
17250007	6500001851	6917381695	3500011733		1617351945	1517351944	7119341746
17320007	3000041872	4417431744	2419271988	10000	6918051713	2418931811	17640007
17390007	1617421698	4518961924	4518411745	2119341739	3000011949	4617471948	6518061819
17460007	6918841912	1019161882	2019351888	2019281888			
18050007	6517641809		2019341888	2118121815	3500021816	2218131818	6519511809
18120007		3100001819	2118221925	6080021824	2118201823	1718201825	1518741887
18190007	1518221877		2019271902		2018271893	1918271849	2018291832
18260007	6718291845		3100001853		4418381834	10000	1818371741
18330007	1718371883	6080021843	2118931856	1618391844		3100011847	100000
18400007	6018931947	3500041901	2017491902	3600001814	4618971898	1519091883	2018221826
18470007	2018221875	6518061813	4518521840	6599991851	3500021808	2118061859	1518061911
18540007	6918571810	6918581861	2018118002	3199991819	3199991853	6718121817	6518221910
18610007	2218281836	2118221878	70000	4418671869	1718291883	2018221883	3100011846
18680007	6599991851	6080021879	6599991851	1618841740	2319271731	1518311835	90000
18750007	6718371845	6880021865	4518301866	2118371890	3600001899	6918841891	1018371892
18820007	1118371892	2018371840	2019281888	2018931811	6517491871	4618401848	6517491903
18890007	4417431744	4518941895	2417491904	3000021749	6519521851	1517481842	7119481701
18960007	2017001704	6518221828	6918061918	2118221876	6918051708	4618541855	6619071917
19030007	1618071862	1518631821	4619081860	49	6599991851	1518111915	1
19100007	4517271749	4518641866	2417491924	70000	1518701885	1018681873	50
19170007	1518931697	2418221926	6919271732		6919071710	6919071711	3500061699
19240007	6917381734	6880021833	6518291883				
19370001	3000011744						
19430007	2218501726	1619521712	6919071715		1118501905	1119161881	4617021703

MATRIX MULTIPLICATION
MODIFIED

XI. APPENDIX D

MATRIX ADDITION

L. Carl Herring, Jr.

SMALL SCALE MATRIX ADDITION
IBM 650 PROGRAM

L. Carl Herring, Jr.

PURPOSE: This program will add matrices of equal order.

RESTRICTIONS: Let

n = number of rows of each matrix.

k = number of columns of each matrix.

Then

n must be less than or equal to 41.

nk must be less than or equal to 1681.

INPUT CARD FORM:

The data must be in 8 digit floating decimal form, that is, as an integer and seven decimals with a modulo 50 exponent in the two high order positions.

The "post" matrix is punched row-wise in seven-per-card form to read consecutively into storage units 0000 to nk-1.

Each row of the "pre" matrix is punched in seven-per-card form on a separate set of cards to read consecutively into the same set of storage units, 1764 to 1764 + n-1.

OUTPUT CARD FORM:

The resulting matrix will be punched out in seven-per-card form, the output data being "2 and 8" floating decimal numbers. It will be in row order and carry the same storage unit identification as the "post" matrix.

TIMING: The time estimate is .005 nk minutes (calculation including input and output).

CONTROL CARD FORM:

A. First row control card. Non-load.

Columns

1 - 10	65 1952 1921
11 - 14	zeros
15 - 16	k
17 - 24	zeros
25 - 26	n
27 - 30	zeros

Overpunch 12's in columns 10, 20, and 30.

B. "2nd to nth row" control card. Non-load.

Columns

1 - 6	zeros
7 - 10	1736

Overpunch a 12 in column 10.

OPERATING NOTES:

A. Card Order

1. Seven-per-card loader (No. 101) modified so that a non-load card transfers to 1951 (Read order of 101 must be 70 1994 1951 in location 1988).
2. Program.
3. "P ost" matrix.
4. First row of "pre" matrix.
5. First row control card.
6. Second row of "pre" matrix.
7. "2nd to nth row" control card..
8. Repeat parts 6 and 7 using third to nth row "pre" matrix in order.

B. Console Settings:

1. Set 70 1951 3000 on Storage Entry Switch.
2. Set Error Sense Switch to STOP.
3. Set Overflow Switch to STOP.
4. Set Programmed Switch to RUN.
5. Set Control Switch to RUN.

C. Procedure:

1. Ready the read feed with the decks shown above.
2. Then ready punch feed with blanks.
3. Press Computer Reset and Program Start.
4. When deck has been read, press End of File Key.

D. Error Restart:

1. Run out the cards in the punch feed and throw away.
2. Ready the read feed with the entire "pre"-matrix (Steps 4 to 8 in the card order).
3. Set 00 0000 1988 on the Storage Entry Switches.
4. Press Computer Reset and Program Start.

CONTROL PANEL:

The 650 Utility Board may be used without modification. If a special board is desired, it needs only these features:

1. Read load cards specified by a 12 punch in column 1.
2. Read columns 1 - 30 into words 1 - 3 for a non-load card.
3. Punch eight 10 digit words and signs from storage exits words 1 - 8 to the 80 card columns.

MATRIX ADDITION PROGRAM

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Initial Set-Up		
1951	RAL	65	1952	1921
1921	STL	22	1725	1726
1726	LD	69	1738	1695
1695	STD	24	1927	1736
1951	NOOP	00	0000	1736
1736	LD	69	1805	1713
1713	STD	24	1811	1714
1714	RAL	65	1907	1737
1737	AL	15	1725	1710
1710	STL	20	1907	1923
1923	AL	15	1735	1699
1699	STL	20	1868	1922
1922	RAL	65	1893	1711
1711	AL	15	1735	1729
1729	STL	20	1893	1811
		Matrix Addition Subroutine		
1811	RAL	65	1764	1815
1815	STL	20	1829	1809
1809	STL	35	0002	1816
1816	STU	21	1820	1823
1823	STL	20	1827	1893
1893	RAL	65	0000	1712
1712	STL	20	1806	1851
1851	SLT	35	0002	1808
1808	STU	21	1812	1883
1851	SLT	35	0002	1808
1808	STU	21	1812	1883
1883	STL	20	1837	1899
1899	RAABL	67	8003	1876
1876	SABL	18	1820	1865
1865	BRMIN	46	1926	1918
1926	LD	69	1820	1947
1947	STD	24	1870	1741
1918	LD	69	1812	1947
1947	STD	24	1870	1741
1741	BRNT	45	1841	1745
1841	SLT	35	0004	1901
1901	BRMIN	46	1854	1855
1855	LD	69	1858	1861
1861	STDA	22	1828	1836

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1836	SL	16	1839	1844
1844	BRMIN	46	1897	1898
1898	RAL	65	1806	1749
1749	STL	20	1928	1888
1897	RAL	65	1827	1828
1828	SRD	31	9999	1853
1853	AL	15	1837	1877
1745	RAL	65	1837	1819
1819	AL	15	1827	1877
1877	BRNZ	45	1824	1866
1866	RAL	65	1730	1749
1749	STL	20	1928	1888
1824	BRMIN	46	1830	1849
1830	BRNZU	44	1838	1834
1838	SRT	30	0001	1847
1847	STL	20	1822	1875
1875	RSABRL	68	1870	1845
1845	SL	16	1909	1832
1832	RAU	60	8002	1864
1864	AL	15	1822	1892
1892	SRT	30	0002	1749
1749	STL	20	1928	1888
1834	RAU	60	8002	1843
1843	SCT	36	0000	1814
1814	STU	21	1822	1925
1925	RRABL	67	8002	1833
1833	SABL	18	1870	1832
1832	RAU	60	8002	1864
1849	BRNZU	44	1852	1867
1852	SRT	30	0001	1859
1859	STL	20	1822	1817
1817	RRABL	67	1870	1825
1825	AL	15	1909	1832
1867	RAU	60	8002	1846
1846	SCT	36	0000	1826
1826	STU	21	1822	1869
1849	RSABL	68	8002	1879
1879	AABL	17	1812	1832
1832	RAU	60	8002	1864
1854	LD	69	1857	1810
1810	STDA	22	1813	1818
1818	AL	15	1874	1887
1887	BRMIN	46	1840	1848
1840	RAL	65	1829	1749
1848	RAL	65	1837	1813
1813	SRD	31	9999	1819

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
	Matrix	Addition	Modification	
1888	RAL	65	1749	1903
1903	SL	16	1807	1890
1862	STU	21	1822	1878
1878	STU	21	1837	1890
1890	BRNZ	45	1894	1895
1895	PCH	71	1948	1701
1701	RAL	65	1927	1880
1880	LD	69	1884	1891
1891	STD	24	1749	1904
1904	AL	15	1863	1821
1821	STL	20	1927	1902
1902	RSL	66	1907	1917
1917	AL	15	1893	1697
1697	BRMIN	46	1900	1886
1900	LD	69	1805	1708
1708	STD	24	1811	1914
1914	AL	15	1831	1885
1885	STL	20	1893	1811
1886	RAL	65	1749	1871
1871	SL	16	1884	1740
1740	BRNZ	45	1896	1988
1896	STL	20	1700	1704
1704	AL	15	1707	8002
8002	STU	21	1929	1739
1739	SL	16	1742	1698
1698	BRNZ	45	1705	1706
1705	AL	15	1709	8002
1706	RAL	65	1700	1919
1919	LD	69	1927	1732
1732	SRT	30	0004	1872
1872	STIA	23	1927	1731
1731	PCH	71	1934	1746
1746	RAU	60	8002	1912
1912	SLT	35	0004	1924
1924	AU	10	1927	1734
1734	AL	15	1738	1946
1946	STU	21	1700	1920
1920	STIA	23	1927	1728
1728	LD	69	1884	1696
1696	STD	24	1749	1988

16950007	2419271736	2417491988	4619001886	4517051706	2018681922		6519271880
17020007			1517078002	1517098002	6517001919	2119281739	2018931914
17090007	2119351739	2019071923	1517351729	2018061851	2418111714	6519071737	
17250007		6917381695		6918841696	2018931811	5000000000	7119341746
17320007	3000041872		1517381946	10000	6918051713	1517251710	7
17390007	1617421698	4518961988	4518411745	2119341739			6518371819
17460007	6080021912		2019351888	2019281888			
18050007	6517641815		2019341888	2118121883	3500021816	2218131818	6517641815
18120007		3100001819	2118221925	2018291809	2118201823	6718701825	1518741887
18190007	1518271877		2019271902		2018271893	4618301849	1519091832
18260007	2118221869		3100001853		4418381834	10000	6080021864
18330007	1818701832	6080021843		1618391844		3100011847	90000
18400007	6518291749	3500041901	2017491902	3600001814	4618971898	1619091832	3600001826
18470007	2018221875	6518371813	4418521867		3500021808	3000011859	1518371877
18540007	6918571810	6918581861		3199991819	3199991853	2018221817	
18610007	2218281836		70000	1518221892	4619261918	6517301749	6080021846
18680007		6880021879		1618841740	2319271731		80000
18750007	6818701845	1818201865	4518241866	2018118002	1718701832	6918841891	
18820007		2018371899	2019281888	1518311878	6517491871	4618401848	6517491903
18890007		4518941895	2417491904	3000021749	6499991712	1517481842	7119481701
18960007	2017001704	6518271828	6518061749	6780031876	1518681708	4618541855	6619071917
19030007	1618071890	1518631821		49	6499991712		1
19100007			3500041924		6518111885		50
19170007	1518931697	6918121947	6919271732	2319271728	2217251726	6518931711	1517351699
19240007	1019271734	6780021833	6918201947				
19430007				2117001920	2418701741		

MATRIX ADDITION

XI. APPENDIX E

MATRIX ADDITION (MODIFIED)

L. Carl Herring, Jr.

SMALL SCALE MATRIX ADDITION
IBM 650 PROGRAM

L. Carl Herring, Jr.

PURPOSE: This program will add matrices of equal order.

RESTRICTIONS: Let

n = number of rows of each matrix.

k = number of columns of each matrix.

Then

n must be less than or equal to 41.

nk must be less than or equal to 1681.

INPUT CARD FORM:

The data must be in 8 digit floating decimal form, that is, as an integer and seven decimals with a modulo 50 exponent in the two high order positions.

The "post" matrix is punched row-wise in seven-per-card form to read consecutively into storage units 0000 to nk-1.

Each row of the "pre" matrix is punched in seven-per-card form on a separate set of cards to read consecutively into the same set of storage units, 1764 to 1764 + n-1.

OUTPUT CARD FORM: (Modified)

The resulting matrix will be punched out in seven-per-card form, the output data being "2 and 8" floating decimal numbers. It will be in row order and carry the same storage unit identification as the "pre" matrix.

TIMING: The time estimate is .005 nk minutes (calculation including input and output).

CONTROL CARD FORM:

A. First row control card. Non-load.

Columns

1 - 10	65 1952 1921
11 - 14	zeros
15 - 16	k
17 - 24	zeros
25 - 26	n
27 - 30	zeros

Overpunch 12's in columns 10, 20, and 30.

B. "2nd to nth row" control card. Non-load.

Columns

1 - 6	zeros
7 - 10	1736

Overpunch a 12 in column 10.

OPERATING NOTES:

A. Card Order

1. Seven-per-card loader (No. 101) modified so that a non-load card transfers to 1951 (Read order of 101 must be 70 1994 1951 in location 1988).
2. Program.
3. "P ost" matrix.
4. First row of "pre" matrix.
5. First row control card.
6. Second row of "pre" matrix.
7. "2nd to nth row" control card..
8. Repeat parts 6 and 7 using third to nth row "pre" matrix in order.

B. Console Settings:

1. Set 70 1951 3000 on Storage Entry Switch.
2. Set Error Sense Switch to STOP.
3. Set Overflow Switch to STOP.
4. Set Programmed Switch to RUN.
5. Set Control Switch to RUN.

C. Procedure:

1. Ready the read feed with the decks shown above.
2. Then ready punch feed with blanks.
3. Press Computer Reset and Program Start.
4. When deck has been read, press End of File Key.

D. Error Restart:

1. Run out the cards in the punch feed and throw away.
2. Ready the read feed with the entire "pre"-matrix (Steps 4 to 8 in the card order).
3. Set 00 0000 1988 on the Storage Entry Switches.
4. Press Computer Reset and Program Start.

CONTROL PANEL:

The 650 Utility Board may be used without modification. If a special board is desired, it needs only these features:

1. Read load cards specified by a 12 punch in column 1.
2. Read columns 1 - 30 into words 1 - 3 for a non-load card.
3. Punch eight 10 digit words and signs from storage exits words 1 - 8 to the 80 card columns.

MATRIX ADDITION PROGRAM

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Initial Set-Up		
1951	RAL	65	1952	1921
1921	STL	22	1725	1726
1726	LD	69	1738	1695
1695	STD	24	1927	1736
1951	NOOP	00	0000	1736
1736	LD	69	1805	1713
1713	STD	24	1811	1714
1714	RAL	65	1907	1737
1737	AL	15	1725	1710
1710	STL	20	1907	1923
1923	AL	15	1735	1699
1699	STL	20	1868	1922
1922	RAL	65	1893	1711
1711	AL	15	1735	1729
1729	STL	20	1893	1811
		Matrix Addition Subroutine		
1811	RAL	65	1764	1815
1815	STL	20	1829	1809
1809	STL	35	0002	1816
1816	STU	21	1820	1823
1823	STL	20	1827	1893
1893	RAL	65	0000	1712
1712	STL	20	1806	1851
1851	SLT	35	0002	1808
1808	STU	21	1812	1883
1851	SLT	35	0002	1808
1808	STU	21	1812	1883
1883	STL	20	1837	1899
1899	RAABL	67	8003	1876
1876	SABL	18	1820	1865
1865	BRMIN	46	1926	1918
1926	LD	69	1820	1947
1947	STD	24	1870	1741
1918	LD	69	1812	1947
1947	STD	24	1870	1741
1741	BRNT	45	1841	1745
1841	SLT	35	0004	1901
1901	BRMIN	46	1854	1855
1855	LD	69	1858	1861
1861	STDA	22	1828	1836

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1836	SL	16	1839	1844
1844	BRMIN	46	1897	1898
1898	RAL	65	1806	1749
1749	STL	20	1928	1888
1897	RAL	65	1827	1828
1828	SRD	31	9999	1853
1853	AL	15	1837	1877
1745	RAL	65	1837	1819
1819	AL	15	1827	1877
1877	BRNZ	45	1824	1866
1866	RAL	65	1730	1749
1749	STL	20	1928	1888
1824	BRMIN	46	1830	1849
1830	BRNZU	44	1838	1834
1838	SRT	30	0001	1847
1847	STL	20	1822	1875
1875	RSABRL	68	1870	1845
1845	SL	16	1909	1832
1832	RAU	60	8002	1864
1864	AL	15	1822	1892
1892	SRT	30	0002	1749
1749	STL	20	1928	1888
1834	RAU	60	8002	1843
1843	SCT	36	0000	1814
1814	STU	21	1822	1925
1925	RRABL	67	8002	1833
1833	SABL	18	1870	1832
1832	RAU	60	8002	1864
1849	BRNZU	44	1852	1867
1852	SRT	30	0001	1859
1859	STL	20	1822	1817
1817	RRABL	67	1870	1825
1825	AL	15	1909	1832
1867	RAU	60	8002	1846
1846	SCT	36	0000	1826
1826	STU	21	1822	1869
1849	RSABL	68	8002	1879
1879	AABL	17	1812	1832
1832	RAU	60	8002	1864
1854	LD	69	1857	1810
1810	STDA	22	1813	1818
1818	AL	15	1874	1887
1887	BRMIN	46	1840	1848
1840	RAL	65	1829	1749
1848	RAL	65	1837	1813
1813	SRD	31	9999	1819

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
	Matrix	Addition	Modification	
1888	RAL	65	1749	1903
1903	SL	16	1807	1890
1862	STU	21	1822	1878
1878	STU	21	1837	1890
1890	BRNZ	45	1894	1895
1895	PCH	71	1948	1701
1701	RAL	65	1927	1880
1880	LD	69	1884	1891
1891	STD	24	1749	1904
1904	AL	15	1863	1821
1821	STL	20	1927	1902
1902	RSL	66	1907	1917
1917	AL	15	1893	1697
1697	BRMIN	46	1900	1886
1900	LD	69	1805	1708
1708	STD	24	1811	1914
1914	AL	15	1831	1885
1885	STL	20	1893	1811
1886	RAL	65	1749	1871
1871	SL	16	1884	1740
1740	BRNZ	45	1896	1924
1896	STL	20	1700	1704
1704	AL	15	1707	8002
8002	STU	21	1929	1739
1739	SL	16	1742	1698
1698	BRNZ	45	1705	1706
1705	AL	15	1709	8002
1706	RAL	65	1700	1919
1919	LD	69	1927	1732
1732	SRT	30	0004	1872
1872	STIA	23	1927	1731
1731	PCH	71	1934	1746
1746	LD	69	1884	1912
1912	STD	24	1749	1924
1924	LD	69	1738	1734
1734	STD	24	1927	1988

16950007 2419271736 4619001886 4517051706 2018681922 6519271880
17020007 1517078002 1517098002 6517001919 2119281739 2018931914
17090007 2119351739 2019071923 1517351729 2018061851 2418111714 6519071737
17250007 6917381695 2018931811 5000000000 7119341746
17320007 3000041872 2419271988 10000 6918051713 1517251710 17640007
17390007 1617421698 4518961924 4518411745 2119341739 6518371819
17460007 6918841912 2019351888 2019281888
18050007 6517641815 2019341888 2118121883 3500021816 2218131818 6517641815
18120007 3100001819 2118221925 2018291809 2118201823 6718701825 1518741887
18190007 1518271877 2019271902 2018271893 4618301849 1519091832
18260007 2118221869 3100001853 4418381834 10000 6080021864
18330007 1818701832 6080021843 1618391844 3100011847 90000
18400007 6518291749 3500041901 2017491902 3600001814 4618971898 1619091832 3600001826
18470007 2018221875 6518371813 4418521867 3500021808 3000011859 1518371877
18540007 6918571810 6918581861 3199991819 3199991853 2018221817
18610007 2218281836 70000 1518221892 4619261918 6517301749 6080021846
18680007 6880021879 1618841740 2319271731 80000
18750007 6818701845 1818201865 4518241866 2018118002 1718701832 6918841891
18820007 2018371899 2019281888 1518311878 6517491871 4618401848 6517491903
18890007 4518941895 2417491904 3000021749 6499991712 1517481842 7119481701
18960007 2017001704 6518271828 6518061749 6780031876 1518681708 4618541855 6619071917
19030007 1618071890 1518631821 49 6499991712 1
19100007 2417491924 6518111885 50
19170007 1518931697 6918121947 6919271732 2217251726 6518931711 1517351699
19240007 6917381734 6780021833 6918201947
19430007 2418701741

MATRIX ADDITION
MODIFIED

XI. APPENDIX F

MATRIX SUBTRACTION

L. Carl Herring, Jr.

SMALL SCALE MATRIX
IBM 650 PROGRAM

L. Carl Herring, Jr.

PURPOSE: This program will subtract matrices of equal order.

RESTRICTIONS: Let

n = number of rows of each matrix.

k = number of columns of each matrix.

Then

n must be less than or equal to 41.

nk must be less than or equal to 1681.

INPUT CARD FORM:

The data must be in 8 digit floating decimal form, that is, as an integer and seven decimals with a modulo 50 exponent in the two high order positions.

The "post" matrix is punched row-wise in seven-per-card form to read consecutively into storage units 0000 to nk-1.

Each row of the "pre" matrix is punched in seven-per-card form on a separate set of cards to read consecutively into the same set of storage units, 1764 to 1764 + n-1.

OUTPUT CARD FORM:

The resulting matrix will be punched out in seven-per-card form, the output data being "2 and 8" floating decimal numbers. It will be in row order and carry the same storage unit identification as the "post" matrix.

TIMING: The time estimate is .005 nk minutes (calculation including input and output).

CONTROL CARD FORM:

A. First row control card. Non-load.

Columns

1 - 10	65 1952 1921
11 - 14	zeros
15 - 16	k
17 - 24	zeros
25 - 26	n
27 - 30	zeros

Overpunch 12's in columns 10, 20, and 30.

B. "2nd to nth row" control card. Non-load.

Columns

1 - 6	zeros
7 - 10	1736

Overpunch a 12 in column 10.

OPERATING NOTES:

A. Card Order

1. Seven-per-card loader (No. 101) modified so that a non-load card transfers to 1951 (Read order of 101 must be 70 1994 1951 in location 1988).
2. Program.
3. "P ost" matrix.
4. First row of "pre" matrix.
5. First row control card.
6. Second row of "pre" matrix.
7. "2nd to nth row" control card..
8. Repeat parts 6 and 7 using third to nth row "pre" matrix in order.

B. Console Settings:

1. Set 70 1951 3000 on Storage Entry Switch.
2. Set Error Sense Switch to STOP.
3. Set Overflow Switch to STOP.
4. Set Programmed Switch to RUN.
5. Set Control Switch to RUN.

C. Procedure:

1. Ready the read feed with the decks shown above.
2. Then ready punch feed with blanks.
3. Press Computer Reset and Program Start.
4. When deck has been read, press End of File Key.

D. Error Restart:

1. Run out the cards in the punch feed and throw away.
2. Ready the read feed with the entire "pre"-matrix (Steps 4 to 8 in the card order).
3. Set 00 0000 1988 on the Storage Entry Switches.
4. Press Computer Reset and Program Start.

CONTROL PANEL:

The 650 Utility Board may be used without modification. If a special board is desired, it needs only these features:

1. Read load cards specified by a 12 punch in column 1.
2. Read columns 1 - 30 into words 1 - 3 for a non-load card.
3. Punch eight 10 digit words and signs from storage exits words 1 - 8 to the 80 card columns.

MATRIX SUBTRACTION PROGRAM

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Initial Set-Up		
1951	RAL	65	1952	1921
1921	STL	22	1725	1726
1726	LD	69	1738	1695
1695	STD	24	1927	1736
1951	NOOP	00	0000	1736
1736	LD	69	1805	1713
1713	STD	24	1811	1714
1714	RAL	65	1907	1737
1737	AL	15	1725	1710
1710	STL	20	1907	1923
1923	AL	15	1735	1699
1699	STL	20	1868	1922
1922	RAL	65	1893	1711
1711	AL	15	1735	1729
1729	STL	20	1893	1811
		Matrix Subtraction Subroutine		
1811	RAL	65	1764	1815
1815	STL	20	1829	1809
1809	STL	35	0002	1816
1816	STU	21	1820	1823
1823	STL	20	1827	1893
1893	RAL	65	0000	1712
1712	RAU	60	8002	1702
1702	MPY	19	1949	1733
1733	STL	20	1806	1851
1851	SLT	35	0002	1808
1808	STU	21	1812	1883
1883	STL	20	1837	1899
1899	RAABL	67	8003	1876
1876	SABL	18	1820	1865
1865	BRMIN	46	1926	1918
1926	LD	69	1820	1947
1947	STD	24	1870	1741
1918	LD	69	1812	1947
1947	STD	24	1870	1741
1741	BRNT	45	1841	1745
1841	SLT	35	0004	1901
1901	BRMIN	46	1854	1855
1855	LD	69	1858	1861
1861	STDA	22	1828	1836

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1836	SL	16	1839	1844
1844	BRMIN	46	1897	1898
1898	RAL	65	1806	1749
1749	STL	20	1928	1888
1897	RAL	65	1827	1828
1828	SRD	31	9999	1853
1853	AL	15	1837	1877
1745	RAL	65	1837	1819
1819	AL	15	1827	1877
1877	BRNZ	45	1824	1866
1866	RAL	65	1730	1749
1749	STL	20	1928	1888
1824	BRMIN	46	1830	1849
1830	BRNZU	44	1838	1834
1838	SRT	30	0001	1847
1847	STL	20	1822	1875
1875	RSABRL	68	1870	1845
1845	SL	16	1909	1832
1832	RAU	60	8002	1864
1864	AL	15	1822	1892
1892	SRT	30	0002	1749
1749	STL	20	1928	1888
1834	RAU	60	8002	1843
1843	SCT	36	0000	1814
1814	STU	21	1822	1925
1925	RRABL	67	8002	1833
1833	SABL	18	1870	1832
1832	RAU	60	8002	1864
1849	BRNZU	44	1852	1867
1852	SRT	30	0001	1859
1859	STL	20	1822	1817
1817	RRABL	67	1870	1825
1825	AL	15	1909	1832
1867	RAU	60	8002	1846
1846	SCT	36	0000	1826
1826	STU	21	1822	1869
1849	RSABL	68	8002	1879
1879	AABL	17	1812	1832
1832	RAU	60	8002	1864
1854	LD	69	1857	1810
1810	STDA	22	1813	1818
1818	AL	15	1874	1887
1887	BRMIN	46	1840	1848
1840	RAL	65	1829	1749
1848	RAL	65	1837	1813
1813	SRD	31	9999	1819

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
	Matrix	Subtraction	**Modification**	
1888	RAL	65	1749	1903
1903	SL	16	1807	1890
1862	STU	21	1822	1878
1878	STU	21	1837	1890
1890	BRNZ	45	1894	1895
1895	PCH	71	1948	1701
1701	RAL	65	1927	1880
1880	LD	69	1884	1891
1891	STD	24	1749	1904
1904	AL	15	1863	1821
1821	STL	20	1927	1902
1902	RSL	66	1907	1917
1917	AL	15	1893	1697
1697	BRMIN	46	1900	1886
1900	LD	69	1805	1708
1708	STD	24	1811	1914
1914	AL	15	1831	1885
1885	STL	20	1893	1811
1886	RAL	65	1749	1871
1871	SL	16	1884	1740
1740	BRNZ	45	1896	1988
1896	STL	20	1700	1704
1704	AL	15	1707	8002
8002	STU	21	1929	1739
1739	SL	16	1742	1698
1698	BRNZ	45	1705	1706
1705	AL	15	1709	8002
1706	RAL	65	1700	1919
1919	LD	69	1927	1732
1732	SRT	30	0004	1872
1872	STIA	23	1927	1731
1731	PCH	71	1934	1746
1746	RAU	60	8002	1912
1912	SLT	35	0004	1924
1924	AU	10	1927	1734
1734	AL	15	1738	1946
1946	STU	21	1700	1920
1920	STIA	23	1927	1728
1728	LD	69	1884	1696
1696	STD	24	1749	1988

16950007	2419271736	2417491988	4619001886	4517051706	2018681922		6519271880
17020007	1919491733	580031733	1517078002	1517098002	6517001919	2119281739	2018931914
17090007	2119351739	2019071923	1517351729	6080021702	2418111714	6519071737	
17250007		6917381695		6918841696	2018931811		7119341746
17320007	3000041872	2018061851	1517381946	10000	6918051713	1517251710	7
17390007	1617421698	4518961988	4518411745	2119341739			6518371819
17460007	6080021912		2019351888	2019281888			
18050007	6517641815		2019341888	2118121883	3500021816	2218131818	6517641815
18120007		3100001819	2118221925	2018291809	2118201823	6718701825	1518741887
18190007	1518271877		2019271902		2018271893	4618301849	1519091832
18260007	2118221869		3100001853		4418381834	10000	6080021864
18330007	1818701832	6080021843		1618391844		3100011847	90000
18400007	6518291749	3500041901	2017491902	3600001814	4618971898	1619091832	3600001826
18470007	2018221875	6518371813	4418521867		3500021808	3000011859	1518371877
18540007	6918571810	6918581861		3199991819	3199991853	2018221817	
18610007	2218281836		70000	1518221892	4619261918	6517301749	6080021846
18680007		6880021879		1618841740	2319271731		80000
18750007	6818701845	1818201865	4518241866	2018118002	1718701832	6918841891	
18820007		2018371899	2019281888	1518311878	6517491871	4618401848	6517491903
18890007		4518941895	2417491904	3000021749	6499991712	1517481842	7119481701
18960007	2017001704	6518271828	6518061749	6780031876	1518681708	4618541855	6619071917
19030007	1618071890	1518631821		49	6499991712		1
19100007			3500041924		6518111885		50
19170007	1518931697	6918121947	6919271732	2319271728	2217251726	6518931711	1517351699
19240007	1019271734	6780021833	6918201947				
19430007				2117001920	2418701741		1-

MATRIX SUBTRACTION

XI. APPENDIX G

MATRIX SUBTRACTION (MODIFIED)

L. Carl Herring, Jr.

SMALL SCALE MATRIX SUBTRACTION
IBM 650 PROGRAM

L. Carl Herring, Jr.

PURPOSE: This program will subtract matrices of equal order.

RESTRICTIONS: Let

n = number of rows of each matrix.

k = number of columns of each matrix.

Then

n must be less than or equal to 41.

nk must be less than or equal to 1681.

INPUT CARD FORM:

The data must be in 8 digit floating decimal form, that is, as an integer and seven decimals with a modulo 50 exponent in the two high order positions.

The "post" matrix is punched row-wise in seven-per-card form to read consecutively into storage units 0000 to nk-1.

Each row of the "pre" matrix is punched in seven-per-card form on a separate set of cards to read consecutively into the same set of storage units, 1764 to 1764 + n-1.

OUTPUT CARD FORM: (Modified)

The resulting matrix will be punched out in seven-per-card form, the output data being "2 and 8" floating decimal numbers. It will be in row order and carry the same storage unit identification as the "pre" matrix.

TIMING: The time estimate is .005 nk minutes (calculation including input and output).

CONTROL CARD FORM:

A. First row control card. Non-load.

Columns

1 - 10	65 1952 1921
11 - 14	zeros
15 - 16	k
17 - 24	zeros
25 - 26	n
27 - 30	zeros

Overpunch 12's in columns 10, 20, and 30.

B. "2nd to nth row" control card. Non-load.

Columns

1 - 6	zeros
7 - 10	1736

Overpunch a 12 in column 10.

OPERATING NOTES:

A. Card Order

1. Seven-per-card loader (No. 101) modified so that a non-load card transfers to 1951 (Read order of 101 must be 70 1994 1951 in location 1988).
2. Program.
3. "P ost" matrix.
4. First row of "pre" matrix.
5. First row control card.
6. Second row of "pre" matrix.
7. "2nd to nth row" control card. .
8. Repeat parts 6 and 7 using third to nth row "pre" matrix in order.

B. Console Settings:

1. Set 70 1951 3000 on Storage Entry Switch.
2. Set Error Sense Switch to STOP.
3. Set Overflow Switch to STOP.
4. Set Programmed Switch to RUN.
5. Set Control Switch to RUN.

C. Procedure:

1. Ready the read feed with the decks shown above.
2. Then ready punch feed with blanks.
3. Press Computer Reset and Program Start.
4. When deck has been read, press End of File Key.

D. Error Restart:

1. Run out the cards in the punch feed and throw away.
2. Ready the read feed with the entire "pre"-matrix (Steps 4 to 8 in the card order).
3. Set 00 0000 1988 on the Storage Entry Switches.
4. Press Computer Reset and Program Start.

CONTROL PANEL:

The 650 Utility Board may be used without modification. If a special board is desired, it needs only these features:

1. Read load cards specified by a 12 punch in column 1.
2. Read columns 1 - 30 into words 1 - 3 for a non-load card.
3. Punch eight 10 digit words and signs from storage exits words 1 - 8 to the 80 card columns.

MATRIX SUBTRACTION PROGRAM

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
		Initial Set-Up		
1951	RAL	65	1952	1921
1921	STL	22	1725	1726
1726	LD	69	1738	1695
1695	STD	24	1927	1736
1951	NOOP	00	0000	1736
1736	LD	69	1805	1713
1713	STD	24	1811	1714
1714	RAL	65	1907	1737
1737	AL	15	1725	1710
1710	STL	20	1907	1923
1923	AL	15	1735	1699
1699	STL	20	1868	1922
1922	RAL	65	1893	1711
1711	AL	15	1735	1729
1729	STL	20	1893	1811
		Matrix Subtraction Subroutine		
1811	RAL	65	1764	1815
1815	STL	20	1829	1809
1809	STL	35	0002	1816
1816	STU	21	1820	1823
1823	STL	20	1827	1893
1893	RAL	65	0000	1712
1712	RAU	60	8002	1702
1702	MPY	19	1949	1733
1733	STL	20	1806	1851
1851	SLT	35	0002	1808
1808	STU	21	1812	1883
1883	STL	20	1837	1899
1899	RAABL	67	8003	1876
1876	SABL	18	1820	1865
1865	BRMIN	46	1926	1918
1926	LD	69	1820	1947
1947	STD	24	1870	1741
1918	LD	69	1812	1947
1947	STD	24	1870	1741
1741	BRNT	45	1841	1745
1841	SLT	35	0004	1901
1901	BRMIN	46	1854	1855
1855	LD	69	1858	1861
1861	STDA	22	1828	1836

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1836	SL	16	1839	1844
1844	BRMIN	46	1897	1898
1898	RAL	65	1806	1749
1749	STL	20	1928	1888
1897	RAL	65	1827	1828
1828	SRD	31	9999	1853
1853	AL	15	1837	1877
1745	RAL	65	1837	1819
1819	AL	15	1827	1877
1877	BRNZ	45	1824	1866
1866	RAL	65	1730	1749
1749	STL	20	1928	1888
1824	BRMIN	46	1830	1849
1830	BRNZU	44	1838	1834
1838	SRT	30	0001	1847
1847	STL	20	1822	1875
1875	RSABRL	68	1870	1845
1845	SL	16	1909	1832
1832	RAU	60	8002	1864
1864	AL	15	1822	1892
1892	SRT	30	0002	1749
1749	STL	20	1928	1888
1834	RAU	60	8002	1843
1843	SCT	36	0000	1814
1814	STU	21	1822	1925
1925	RRABL	67	8002	1833
1833	SABL	18	1870	1832
1832	RAU	60	8002	1864
1849	BRNZU	44	1852	1867
1852	SRT	30	0001	1859
1859	STL	20	1822	1817
1817	RRABL	67	1870	1825
1825	AL	15	1909	1832
1867	RAU	60	8002	1846
1846	SCT	36	0000	1826
1826	STU	21	1822	1869
1849	RSABL	68	8002	1879
1879	AABL	17	1812	1832
1832	RAU	60	8002	1864
1854	LD	69	1857	1810
1810	STDA	22	1813	1818
1818	AL	15	1874	1887
1887	BRMIN	46	1840	1848
1840	RAL	65	1829	1749
1848	RAL	65	1837	1813
1813	SRD	31	9999	1819

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
	Matrix	Subtraction	Modification	
1888	RAL	65	1749	1903
1903	SL	16	1807	1890
1862	STU	21	1822	1878
1878	STU	21	1837	1890
1890	BRNZ	45	1894	1895
1895	PCH	71	1948	1701
1701	RAL	65	1927	1880
1880	LD	69	1884	1891
1891	STD	24	1749	1904
1904	AL	15	1863	1821
1821	STL	20	1927	1902
1902	RSL	66	1907	1917
1917	AL	15	1893	1697
1697	BRMIN	46	1900	1886
1900	LD	69	1805	1708
1708	STD	24	1811	1914
1914	AL	15	1831	1885
1885	STL	20	1893	1811
1886	RAL	65	1749	1871
1871	SL	16	1884	1740
1740	BRNZ	45	1896	1924
1896	STL	20	1700	1704
1704	AL	15	1707	8002
8002	STU	21	1929	1739
1739	SL	16	1742	1698
1698	BRNZ	45	1705	1706
1705	AL	15	1709	8002
1706	RAL	65	1700	1919
1919	LD	69	1927	1732
1732	SRT	30	0004	1872
1872	STIA	23	1927	1731
1731	PCH	71	1934	1746
1746	LD	69	1884	1912
1912	STD	24	1749	1924
1924	LD	69	1738	1734
1734	STD	24	1927	1988

16950007	2419271736		4619001886	4517051706	2018681922		6519271880
17020007	1919491733		1517078002	1517098002	6517001919	2119281739	2018931914
17090007	2119351739	2019071923	1517351729	6080021702	2418111714	6519071737	
17250007		6917381695			2018931811	5000000000	7119341746
17320007	3000041872	2018061851	2419271988	10000	6918051713	1517251710	17640007
17390007	1617421698	4518961924	4518411745	2119341739			6518371819
17460007	6918841912		2019351888	2019281888			
18050007	6517641815		2019341888	2118121883	3500021816	2218131818	6517641815
18120007		3100001819	2118221925	2018291809	2118201823	6718701825	1518741887
18190007	1518271877		2019271902		2018271893	4618301849	1519091832
18260007	2118221869		3100001853		4418381834	10000	6080021864
18330007	1818701832	6080021843		1618391844		3100011847	90000
18400007	6518291749	3500041901	2017491902	3600001814	4618971898	1619091832	3600001826
18470007	2018221875	6518371813	4418521867		3500021808	3000011859	1518371877
18540007	6918571810	6918581861		3199991819	3199991853	2018221817	
18610007	2218281836		70000	1518221892	4619261918	6517301749	6080021846
18680007		6880021879		1618841740	2319271731		80000
18750007	6818701845	1818201865	4518241866	2018118002	1718701832	6918841891	
18820007		2018371899	2019281888	1518311878	6517491871	4618401848	6517491903
18890007		4518941895	2417491904	3000021749	6499991712	1517481842	7119481701
18960007	2017001704	6518271828	6518061749	6780031876	1518681708	4618541855	6619071917
19030007	1618071890	1518631821		49	6499991712		1
19100007			2417491924		6518111885		50
19170007	1518931697	6918121947	6919271732		2217251726	6518931711	1517351699
19240007	6917381734	6780021833	6918201947				
19430007					2418701741		1-

MATRIX SUBTRACTION
MODIFIED

XI. APPENDIX H

MATRIX CONVERTER

L. Carl Herring, Jr.

MATRIX CONVERTER PROGRAM
IBM 650 PROGRAM

L. Carl Herring, Jr.

PURPOSE: This program will convert an n x k matrix from "post" input form (which reads a matrix into locations 0000 to nk-1) into "pre" input form (which reads each row of the matrix consecutively into the same storage locations 1764 to 1764 + k-1.

RESTRICTIONS: Let

n = number of rows of each matrix.

k = number of columns of each matrix.

Then

k must be less than or equal to 100

nk must be less than or equal to 1764.

INPUT CARD FORM:

The data must be in 8 digit floating decimal form, that is, as an integer and seven decimals with a modulo 50 exponent in the two high order positions.

The "post" matrix is punched row-wise in seven-per-card form to read consecutively into storage units 0000 to nk-1.

OUTPUT CARD FORM:

The resulting matrix will be punched out in seven-per-card form, the output data being "2 and 8" floating decimal numbers. It will be in row order and carry the storage unit identification of a "pre" matrix.

TIMING: The time estimate is .045 nk seconds. (Calculation including input and output.)

CONTROL CARD FORM:

Columns	
1-10	65 1952 1875
11-12	65
13-16	nk-1
17-20	1892

OPERATING NOTES:

A. Card Order
   1. Seven-per-card loader (No. 101) modified so that a non-load card transfers to 1951 (Read order of 101 must be 70 1994 1951 in location 1988).
   2. Program
   3. "Post" matrix
   4. Control card

B. Console Settings:
   1. Set 70 1951 3000 on Storage Entry Switch.
   2. Set Error Sense Switch to STOP.
   3. Set Overflow Switch to STOP.
   4. Set Programmed Switch to RUN.
   5. Set Control Switch to RUN.

C. Procedure:
   1. Ready the read feed with the decks shown above.
   2. Then ready punch feed with blanks.
   3. Press Computer Reset and Program Start.
   4. When deck has been read, press End of File Key.

CONTROL PANEL:

The 650 Utility Board may be used without modification. If a special board is desired, it needs only these features:

1. Read load cards specified by a 12 punch in column 1.
2. Read columns 1-30 into words 1-3 for a non-load card.
3. Punch eight 10 digit words and signs from storage exits words 1-8 to the 80 card columns.

MATRIX CONVERTER PROGRAM

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1951	RAL	65	1952	1875
1875	STL	22	1888	1876
1876	LD	69	1886	1877
1877	STD	24	1927	1878
1878	RAL	65	1890	1879
1879	AL	15	1888	1880
1880	STL	20	1890	1881
1881	AL	15	1887	1882
1882	STL	20	1889	1883
1883	RAL	65	1891	1884
1884	AL	15	1887	1885
1885	STL	20	1891	1891
1891	RAL	65	0000	1892
1892	STL	20	1928	1893
1893	RAL	65	1892	1894
1894	SL	16	1869	1895
1895	BRNZ	45	1896	1898
1896	AL	15	1868	1897
1897	STL	20	1892	1904
1898	PCH	71	1948	1899
1899	RAL	65	1927	1900
1900	LD	69	1872	1901
1901	STD	24	1892	1902
1902	AL	15	1867	1903
1903	STL	20	1927	1904
1904	RSL	66	1890	1905
1905	AL	15	1891	1906
1906	BRMIN	46	1907	1909
1907	AL	15	1889	1908
1908	STL	20	1891	8002
1909	RAL	65	1892	1910
1910	SL	16	1872	1911
1911	BRNZ	45	1912	1925
1912	STL	20	1874	1913
1913	AL	15	1873	8002
8002	STU	21	1928	1915
1915	SL	16	1871	1916
1916	BRNZ	45	1917	1918
1917	AL	15	1870	8002
1918	RAL	65	1874	1919

Location of Instruction	Operation Abbreviation	Operation Code	Data Address	Instruction Address
1919	LD	69	1927	1920
1920	SRT	30	0004	1921
1921	STIA	23	1927	1922
1922	PCH	71	1934	1923
1923	LD	69	1872	1924
1924	STD	24	1892	1925
1925	LD	69	1886	1926
1926	STD	24	1927	1866
1866	RSL	66	1891	1865
1865	AL	15	1953	1864
1864	BRNZ	45	1878	1988

18640003	4518781988	1519531864	6618911865				
18670007	70000	2019351893	2019341893	2119351915	2119341915	2019281893	2119281915
18740007		2218881876	6918861877	2419271878	6518901879	1518881880	2018901881
18810007	1518871882	2018891883	6518911884	1518871885	2018911891	17640007	10000
18880007			6499991892	6499991892	2019281893	6518921894	1618691895
18950007	4518961898	1518681897	2018921904	7119481899	6519271900	6918721901	2418921902
19020007	1518671903	2019271904	6618901905	1518911906	4619071909	1518891908	2018918002
19090007	6518921910	1618721911	4519121925	2018741913	1518738002		1618711916
19160007	4519171918	1518708002	6518741919	6919271920	3000041921	2319271922	7119341923
19230004	6918721924	2418921925	6918861926	2419271866			

XI. APPENDIX I

DATA TABLES

pages 94 to 185

INTERPRETATION OF THE APPENDIX MATRIX DATA

Each row of the Appendix matrix data tables represents the information punched on a computer load card. Each of the rows of data contains 80 numerals divided into 8 equal groups, with each group called a "word". To load information on the type 650 IBM computer, the first word of a load card serves as a storage instruction, the following seven words represent the information to be stored on the drum of the computer.

The matrices in the Appendix appear row wise seven elements per card with the last seven columns of each sheet being filled with matrix elements. The exponent of each matrix element is in the first two columns of each word, with a base 50 representing the exponent for X:XX-XXXXX. Column spaces which are void of typed numerals are to be interpretated as zeros.

EQUILIBRIUM SLOPE DEFLECTION EQUATIONS

						D. L. + L. L.	W. L.
$682\theta_1$	$84\theta_2$	$257\theta_3$	$771R_1$			-1.140	±.1775
$682\theta_2$	$84\theta_1$	$257\theta_4$	$771R_1$			+1.140	±.0443
$257\theta_1$	$1162\theta_3$	$67\theta_4$	$257\theta_5$	$771R_1$	$771R_3$	-.799	±.1070
$257\theta_2$	$67\theta_3$	$1162\theta_4$	$257\theta_6$	$771R_1$	$771R_3$	+.799	±.1070
$257\theta_3$	$1172\theta_5$	$67\theta_6$	$262\theta_7$	$771R_3$	$786R_5$	-.796	±.1437
$257\theta_4$	$67\theta_5$	$1172\theta_6$	$262\theta_8$	$771R_3$	$786R_5$	+.796	±.1437
$262\theta_5$	$1182\theta_7$	$67\theta_8$	$262\theta_9$	$786R_5$	$786R_7$	-.796	±.1804
$262\theta_6$	$67\theta_7$	$1182\theta_8$	$262\theta_{10}$	$786R_5$	$786R_7$	+.796	±.1804
$262\theta_7$	$1389\theta_9$	$67\theta_{10}$	$365.5\theta_{11}$	$786R_7$	$1096.5R_9$	-.794	±.2171
$262\theta_8$	$67\theta_9$	$1389\theta_{10}$	$365.5\theta_{12}$	$786R_7$	$1096.5R_9$	+.794	±.2171
$365.5\theta_9$	$1596\theta_{11}$	$67\theta_{12}$	$365.5\theta_{13}$	$1096.5R_9$	$1096.5R_{11}$	-.794	±.2538
$365.5\theta_{10}$	$67\theta_{11}$	$1596\theta_{12}$	$365.5\theta_{14}$	$1096.5R_9$	$1096.5R_{11}$	+.794	±.2538
$365.5\theta_{11}$	$1735\theta_{13}$	$67\theta_{14}$	$435\theta_{15}$	$1096.5R_{11}$	$1305.0R_{13}$	-.794	±.2905
$365.5\theta_{12}$	$67\theta_{13}$	$1735\theta_{14}$	$435\theta_{16}$	$1096.5R_{11}$	$1305.0R_{13}$	+.794	±.2905
$435\theta_{13}$	$1874\theta_{15}$	$67\theta_{16}$	$435\theta_{17}$	$1305R_{13}$	$1305.0R_{15}$	-.794	±.3273
$435\theta_{14}$	$67\theta_{15}$	$1874\theta_{16}$	$435\theta_{18}$	$1305R_{13}$	$1305.0R_{15}$	+.794	±.3273
$435\theta_{15}$	$2014\theta_{17}$	$67\theta_{18}$	$505\theta_{19}$	$1305R_{15}$	$1515.0R_{17}$	-.794	±.3640
$435\theta_{16}$	$67\theta_{17}$	$2014\theta_{18}$	$505\theta_{20}$	$1305R_{15}$	$1515.0R_{17}$	+.794	±.3640
$505\theta_{17}$	$2154\theta_{19}$	$67\theta_{20}$	$505\theta_{21}$	$1515R_{17}$	$1515.0R_{19}$	-.794	±.4007
$505\theta_{18}$	$67\theta_{19}$	$2154\theta_{20}$	$505\theta_{22}$	$1515R_{17}$	$1515.0R_{19}$	+.794	±.4007
$505\theta_{19}$	$2360\theta_{21}$	$72.5\theta_{22}$	$602.5\theta_{23}$	$1515R_{19}$	$1807.5R_{21}$	-.797	±.4374
$505\theta_{20}$	$72.5\theta_{21}$	$2360\theta_{22}$	$602.5\theta_{24}$	$1515R_{19}$	$1807.5R_{21}$	+.797	±.4374
$602.5\theta_{21}$	$2555\theta_{23}$	$72.5\theta_{24}$	$602.5\theta_{25}$	$1807.5R_{21}$	$1897.5R_{23}$	-.797	±.4741

TABLE 1

EQUILIBRIUM SLOPE DEFLECTION EQUATIONS						D. L. + L. L.	W. L.
$602.5\theta_{22}$	$72.5\theta_{23}$	$2555\theta_{24}$	$602.5\theta_{26}$	$1807.5R_{21}$	$1807.5R_{23}$	+.797	±.4741
$602.5\theta_{23}$	$2701\theta_{25}$	$78\theta_{26}$	$670.0\theta_{27}$	$1807.5R_{23}$	$2010.0R_{25}$	-.800	±.5108
$602.5\theta_{24}$	$78\theta_{25}$	$2701\theta_{26}$	$670.0\theta_{28}$	$1807.5R_{23}$	$2010.0R_{25}$	+.800	±.5108
$670.0\theta_{25}$	$2836\theta_{27}$	$78\theta_{28}$	$670.0\theta_{29}$	$2010R_{25}$	$2010.0R_{27}$	-.800	±.5475
$670.0\theta_{26}$	$78\theta_{27}$	$2836\theta_{28}$	$670.0\theta_{30}$	$2010R_{25}$	$2010.0R_{27}$	+.800	±.5480
$670.0\theta_{27}$	$2983\theta_{29}$	$84\theta_{30}$	$737.5\theta_{31}$	$2010R_{27}$	$2212.5R_{29}$	-.803	±.5723
$670.0\theta_{28}$	$84\theta_{29}$	$3123\theta_{30}$	$807.5\theta_{32}$	$2010R_{27}$	$2422.5R_{29}$	+.804	±.5963
$737.5\theta_{29}$	$3124\theta_{31}$	$87\theta_{32}$	$737.5\theta_{33}$	$2212.5R_{29}$	$2212.5R_{31}$	-.749	±.5961
$807.5\theta_{30}$	$87\theta_{31}$	$3404\theta_{32}$	$807.5\theta_{34}$	$2422.5R_{29}$	$2422.5R_{31}$	-1.858	±1.0228
$737.5\theta_{31}$	$2931\theta_{33}$	$90.5\theta_{34}$	$637.5\theta_{35}$	$2212.5R_{31}$	$1912.5R_{33}$	-2.191	±.7129
$807.5\theta_{32}$	$90.5\theta_{33}$	$3511\theta_{34}$	$857.5\theta_{36}$	$2422.5R_{31}$	$2572.5R_{33}$	-1.001	±1.2926
$637.5\theta_{33}$	$3126\theta_{35}$	$129\theta_{36}$	$796.5\theta_{37}$	$1912.5R_{33}$	$2389.5R_{35}$	-1.002	±.7527
$857.5\theta_{34}$	$129\theta_{35}$	$4114\theta_{36}$	$1070.5\theta_{38}$	$2572.5R_{33}$	$3211.5R_{35}$	+1.002	±.9973
$796.5\theta_{35}$	$2921\theta_{37}$	$120\theta_{38}$	$544.0\theta_{39}$	$2389.5R_{35}$	$1632.0R_{37}$	-.709	±1.0460
$1070.5\theta_{36}$	$120\theta_{37}$	$3631\theta_{38}$	$625.0\theta_{40}$	$3211.5R_{35}$	$1875.0R_{37}$	+.710	±1.2480
$544\theta_{37}$	$3770\theta_{39}$	$1185\theta_{41}$	$156\theta_{43}$	$1632.0R_{37}$	$3555.0R_{39}$	-.310	±1.0260
$625\theta_{38}$	$4292\theta_{40}$	$156\theta_{43}$	$1365\theta_{44}$	$1875.0R_{37}$	$4095.0R_{39}$	+.310	±1.1720
$1185\theta_{39}$	$2370\theta_{41}$				$3555R_{39}$	+.000	±.0000
$11.0\theta_{42}$	$5.5\theta_{43}$				$16.5R_{39}$	+.000	±.0000
$156\theta_{39}$	$156\theta_{40}$	$5.5\theta_{42}$	$635\theta_{43}$		$16.5R_{39}$	+.000	±.0000
$1365\theta_{40}$	$2730\theta_{44}$				$4095R_{39}$	+.000	±.0000
$771\theta_{1}$	$771\theta_{2}$	$771\theta_{3}$	$771\theta_{4}$	$3084R_{1}$		+.000	±.0000

TABLE 1 (continued)

EQUILIBRIUM SLOPE DEFLECTION EQUATIONS						D. L. + L. L.	W. L.
7710_3	7710_4	7710_5	7710_6	$3084R_3$		+.000	±.0000
7860_5	7860_6	7860_7	7860_8	$3144R_5$		+.000	±.0000
7860_7	7860_8	7860_9	7860_{10}	$3144R_7$		+.000	±.0000
1096.50_9	1096.50_{10}	1096.50_{11}	1096.50_{12}	$4386R_9$		+.000	±.0000
1096.50_{11}	1096.50_{12}	1096.50_{13}	1096.50_{14}	$4386R_{11}$		+.000	±.0000
$1305\theta_{13}$	$1305\theta_{14}$	$1305\theta_{15}$	$1305\theta_{16}$	$5220R_{13}$		+.000	±.0000
$1305\theta_{15}$	$1305\theta_{16}$	$1305\theta_{17}$	$1305\theta_{18}$	$5220R_{15}$		+.000	±.0000
$1515\theta_{17}$	$1515\theta_{18}$	$1515\theta_{19}$	$1515\theta_{20}$	$6060R_{17}$		+.000	±.0000
$1515\theta_{19}$	$1515\theta_{20}$	$1515\theta_{21}$	$1515\theta_{22}$	$6060R_{19}$		+.000	±.0000
1807.50_{21}	1807.50_{22}	1807.50_{23}	1807.50_{24}	$7230R_{21}$		+.000	±.0000
1807.50_{23}	1807.50_{24}	1807.50_{25}	1807.50_{26}	$7230R_{23}$		+.000	±.0000
$2010\theta_{25}$	$2010\theta_{26}$	$2010\theta_{27}$	$2010\theta_{28}$	$8040R_{25}$		+.000	±.0000
$2010\theta_{27}$	$2010\theta_{28}$	$2010\theta_{29}$	$2010\theta_{30}$	$8040R_{27}$		+.000	±.0000
2212.50_{29}	2422.50_{30}	2212.50_{31}	2422.50_{32}	$9270R_{29}$		+.000	±.0000
2212.50_{31}	2422.50_{32}	2212.50_{33}	2422.50_{34}	$9270R_{31}$		+.000	±.0000
1912.50_{33}	2572.50_{34}	1912.50_{35}	2572.50_{36}	$8970R_{33}$		+.000	±.0000
2389.50_{35}	3211.50_{36}	2389.50_{37}	3211.50_{38}	$11202R_{35}$		+.000	±.0000
$1632\theta_{37}$	$1875\theta_{38}$	$1632\theta_{39}$	$1875\theta_{40}$	$7014R_{37}$		+.000	±.0000
$3555\theta_{39}$	$4095\theta_{40}$	$3555\theta_{41}$	$16.5\theta_{42}$	$16.5\theta_{43}$	$15333R_{39}$	$-4095\theta_{44}$	
						+.000	±.0000

TABLE 1 (continued)

7	5268200000-	5184000000-	5225700000-	5000000000-	5000000000-	5000000000-	5000000000-
70007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
140007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
210007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
280007	5184000000-	5268200000-	5000000000-	5225700000-	5000000000-	5000000000-	5000000000-
350007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
420007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
490007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
560007	5225700000-	5000000000-	5311620000-	5167000000-	5225700000-	5000000000-	5000000000-
630007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
700007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
770007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
840007	5000000000-	5225700000-	5167000000-	5311620000-	5000000000-	5225700000-	5000000000-
910007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
980007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1050007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1120007	5000000000-	5000000000-	5225700000-	5000000000-	5311720000-	5167000000-	5226200000-
1190007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1260007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1330007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1400007	5000000000-	5000000000-	5000000000-	5225700000-	5167000000-	5311720000-	5000000000-
1470007	5226200000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1540007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1610007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1680007	5000000000-	5000000000-	5000000000-	5000000000-	5226200000-	5000000000-	5311820000-
1750007	5167000000-	5226200000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1820007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1890007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1960007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5226200000-	5167000000-
2030007	5311820000-	5000000000-	5226200000-	5000000000-	5000000000-	5000000000-	5000000000-

TABLE 2 $[a_{11}]$

2100007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2170007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2240007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5226200000-
2310007	5000000000-	5313890000-	5167000000-	5236550000-	5000000000-	5000000000-	5000000000-
2380007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2450007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2520007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2590007	5226200000-	5167000000-	5313890000-	5000000000-	5236550000-	5000000000-	5000000000-
2660007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2730007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2800007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2870007	5000000000-	5236550000-	5000000000-	5315960000-	5167000000-	5236550000-	5000000000-
2940007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3010007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3080007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3150007	5000000000-	5000000000-	5236550000-	5167000000-	5315960000-	5000000000-	5236550000-
3220007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3290007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3360007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3430007	5000000000-	5000000000-	5000000000-	5236550000-	5000000000-	5317350000-	5167000000-
3500007	5243500000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3570007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3710007	5000000000-	5000000000-	5000000000-	5000000000-	5236550000-	5167000000-	5317350000-
3780007	5000000000-	5243500000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3920007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3990007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5243500000-	5000000000-
4060007	5318740000-	5167000000-	5243500000-	5000000000-	5000000000-	5000000000-	5000000000-
4130007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-

TABLE 2 $[a_{ij}]$ (continued)

4200007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4270007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5243500000-
4340007	5167000000-	5318740000-	5000000000-	5243500000-	5000000000-	5000000000-	5000000000-
4410007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4480007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4550007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4620007	5243500000-	5000000000-	5320140000-	5167000000-	5250500000-	5000000000-	5000000000-
4690007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4760007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4830007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4900007	5000000000-	5243500000-	5167000000-	5320140000-	5000000000-	5250500000-	5000000000-
4970007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5040007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5110007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5180007	5000000000-	5000000000-	5250500000-	5000000000-	5321540000-	5167000000-	5250500000-
5250007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5320007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5390007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5460007	5000000000-	5000000000-	5000000000-	5250500000-	5167000000-	5321540000-	5000000000-
5530007	5250500000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5600007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5670007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5740007	5000000000-	5000000000-	5000000000-	5000000000-	5250500000-	5000000000-	5323600000-
5810007	5172500000-	5260250000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5880007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5950007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6020007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5250500000-	5172500000-
6090007	5323600000-	5000000000-	5260250000-	5000000000-	5000000000-	5000000000-	5000000000-
6160007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6230007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-

TABLE 2 $[a_{11}]$ (continued)

6300007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5260250000-
6370007	5000000000-	5325550000-	5172500000-	5260250000-	5000000000-	5000000000-	5000000000-
6440007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6510007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6580007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6650007	5260250000-	5172500000-	5325550000-	5000000000-	5260250000-	5000000000-	5000000000-
6720007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6790007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6860007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6930007	5000000000-	5260250000-	5000000000-	5327010000-	5178000000-	5267000000-	5000000000-
7000007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7070007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7140007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7210007	5000000000-	5000000000-	5260250000-	5178000000-	5327010000-	5000000000-	5267000000-
7280007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7350007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7420007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7490007	5000000000-	5000000000-	5000000000-	5267000000-	5000000000-	5328360000-	5178000000-
7560007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7630007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7700007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7770007	5000000000-	5000000000-	5000000000-	5000000000-	5267000000-	5178000000-	5328360000-

TABLE 2 $[\alpha_{11}]$ (continued)

7	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
70007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
140007	5000000000-	5000000000-	5277100000	5000000000	5000000000	5000000000	5000000000
210007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
280007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
350001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
360007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
430007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
500007	5000000000-	5000000000-	5277100000	5000000000	5000000000	5000000000	5000000000
570007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
640007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
710001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
720007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
790007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
860007	5000000000-	5000000000-	5277100000	5277100000	5000000000	5000000000	5000000000
930007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
1000007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
1070001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
1080007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1150007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1220007	5000000000-	5000000000-	5277100000	5277100000	5000000000	5000000000	5000000000
1290007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
1360007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
1430001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
1440007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1510007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1580007	5000000000-	5000000000-	5000000000	5277100000	5278600000	5000000000	5000000000
1650007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
1720007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
1790001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 3 $[a_{12}]$

1800007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1870007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1940007	5000000000-	5000000000-	5000000000	5277100000	5278600000	5000000000	5000000000
2010007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2080007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2150001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2160007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2230007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2300007	5000000000-	5000000000-	5000000000	5000000000	5278600000	5278600000	5000000000
2370007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2440007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2510001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2520007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2590007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2660007	5000000000-	5000000000-	5000000000	5000000000	5278600000	5278600000	5000000000
2730007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2800007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2870001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2880007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2950007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3020007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5278600000	5310965000
3090007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3160007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3230001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3240007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3310007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3380007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5278600000	5310965000
3450007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3520007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3590001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 3 $\left[\alpha_{12}\right]$ (continued)

3600007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3670007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3740007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5310965000
3810007	5310965000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3880007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3950001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3960007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4030007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4100007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5310965000
4170007	5310965000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4240007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4310001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4320007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4390007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4460007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
4530007	5310965000	5313050000	5000000000	5000000000	5000000000	5000000000	5000000000
4600007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4670001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4680007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4750007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4820007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
4890007	5310965000	5313050000	5000000000	5000000000	5000000000	5000000000	5000000000
4960007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5030001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5040007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5110007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5180007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
5250007	5000000000	5313050000	5313050000	5000000000	5000000000	5000000000	5000000000
5320007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5390001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 3 $\left[a_{12}\right]$ (continued)

5400007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5470007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5540007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
5610007	5000000000	5313050000	5313050000	5000000000	5000000000	5000000000	5000000000
5680007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5750001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5760007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5830007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5900007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
5970007	5000000000	5000000000	5313050000	5315150000	5000000000	5000000000	5000000000
6040007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
6110001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
6120007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6190007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6260007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
6330007	5000000000	5000000000	5313050000	5315150000	5000000000	5000000000	5000000000
6400007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
6470001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
6480007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6550007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6620007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
6690007	5000000000	5000000000	5000000000	5315150000	5315150000	5000000000	5000000000
6760007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
6830001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
6840007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6910007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6980007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
7050007	5000000000	5000000000	5000000000	5315150000	5315150000	5000000000	5000000000
7120007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
7190001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 3 $\left[a_{12}\right]$ (continued)

7200007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7270007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7340007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
7410007	5000000000	5000000000	5000000000	5000000000	5315150000	5318075000	5000000000
7480007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
7550001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
7560007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7630007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7700007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
7770007	5000000000	5000000000	5000000000	5000000000	5315150000	5318075000	5000000000
7840007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
7910001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
7920007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7990007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8060007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
8130007	5000000000	5000000000	5000000000	5000000000	5000000000	5318075000	5318075000
8200007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
8270001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
8280007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8350007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8420007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
8490007	5000000000	5000000000	5000000000	5000000000	5000000000	5318075000	5318075000
8560007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
8630001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
8640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
8850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5318075000
8920007	5320100000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
8990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 3 $\left[a_{12}\right]$ (continued)

9000007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9070007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9140007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
9210007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5318075000
9280007	5320100000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
9350001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
9360007	5267000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9430007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9500007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
9570007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
9640007	5320100000	5320100000	5000000000	5000000000	5000000000	5000000000	5000000000
9710001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
9720007	5000000000-	5267000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9790007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9860007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
9930007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
10000007	5320100000	5320100000	5000000000	5000000000	5000000000	5000000000	5000000000
10070001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 3 $[a_{12}]$(continued)

17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5267000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5267000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
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17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-

TABLE 4 $\left[a_{21}\right]$

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17780007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17850007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17640007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17710007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17780007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17850007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17640007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17710007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17780007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17850007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17640007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17710007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17780007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17850007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17640007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17710007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
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17850007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17640007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17710007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17780007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17850007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17640007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17710007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17780007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17850007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17640007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17710007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17780007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-
17850007	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-	500000000-

TABLE 4 $\left[a_{21}\right]$ Continued

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17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5277100000-	5277100000-	5277100000-	5277100000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5277100000-	5277100000-	5277100000-	5277100000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5278600000-	5278600000-	5278600000-
17710007	5278600000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5278600000-
17710007	5278600000-	5278600000-	5278600000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5310965000-	5310965000-	5310965000-	5310965000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5310965000-	5310965000-	5310965000-	5310965000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5313050000-	5313050000-

TABLE 4 $[a_{21}]$ Continued

17780007	5313050000-	5313050000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5313050000-	5313050000-	5313050000-	5313050000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5315150000-	5315150000-	5315150000-	5315150000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5315150000-	5315150000-	5315150000-
17850007	5315150000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5310875000-
17850007	5310875000-	5310875000-	5310875000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5310875000-	5310875000-	5310875000-	5310875000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5320100000-	5320100000-	5320100000-	5320100000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5320100000-	5320100000-

TABLE 4$[a_{21}]$ Continued

17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17850007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-

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TABLE 4 $\left[\bar{a}_{21}\right]$ Continued

17640007	5329830000-	5184000000-	5273750000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5320100000	5322125000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5184000000-	5331230000-	5000000000-	5280750000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5320100000	5324225000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5273750000-	5000000000-	5331240000-	5187000000-	5273750000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5322125000	5322125000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5280750000-	5187000000-	5334040000-	5000000000-	5280750000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5324225000	5324225000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5273750000-	5000000000-	5329310000-	5190500000-	5263750000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5322125000	5319125000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 5 $[a_{22}]$

17640007	5000000000-	5000000000-	5000000000-	5280750000-	5190500000-	5335110000-	5000000000-
17710007	5285750000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5324225000	5325725000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5263750000-	5000000000-	5331260000-
17710007	5212900000-	5279650000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5319125000	5323895000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5285750000-	5212900000-
17710007	5341140000-	5000000000-	5310705000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5325725000	5332115000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5279650000-
17710007	5000000000-	5329210000-	5212000000-	5254400000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5323895000	5316320000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5310705000-	5212000000-	5336310000-	5000000000-	5262500000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5332115000	5318750000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 5 $\left[a_{22}\right]$ (continued)

17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5254400000-	5000000000-	5337700000-	5000000000-	5311850000-	5000000000-
17780007	5215600000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5316320000
17990001	5335550000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5262500000-	5000000000-	5342920000-	5000000000-	5000000000-
17780007	5215600000-	5313650000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5318750000
17990001	5340950000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5311850000-	5000000000-	5323700000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5335550000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5111000000-
17780007	5055000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5116500000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5215600000-	5215600000-	5000000000-	5055000000-
17780007	5263500000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5116500000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 5 $\left[a_{22}\right]$(continued)

17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5313650000-	5000000000-	5000000000-
17780007	5000000000-	5327300000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5340950000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5330840000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5330840000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5331440000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5331440000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 5 $\begin{bmatrix} a \\ 22 \end{bmatrix}$ (continued)

17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5343860000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5343860000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5352200000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5352200000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5360600000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 5 $\left[a_{22}\right]$ (continued)

17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5360600000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5372300000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5372300000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5380400000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5320100000-	5320100000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5380400000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 5 $\left[a_{22} \right]$ (continued)

17640007	5322125000-	5324225000-	5322125000-	5324225000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5392700000	5000000000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5322125000-	5324225000-	5322125000-	5324225000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5392700000	5000000000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5319125000-	5325725000-	5319125000-
17710007	5325725000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5389700000	5000000000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5323895000-
17710007	5332115000-	5323895000-	5332115000-	5000000000-	5000000000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5411202000	5000000000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5316320000-	5318750000-	5316320000-	5318750000-	5000000000-	5000000000-
17780007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5370140000
17990001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 5 $\left[a_{22}\right]$ (continued)

17640007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
17710007	5000000000-	5000000000-	5000000000-	5335550000-	5340950000-	5335550000-	5116500000-
17780007	5116500000-	5340950000-	5000000000	5000000000	5000000000	5000000000	5000000000
17850007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17920007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
17990001	5415333000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000

TABLE 5 $\left[a_{22}\right]$ (continued)

7	4716409110-	4623185981	4638764595	4578956719-	4591207822-	4524075749	4521593488
70007	4469235613-	4444396022-	4416375559	4410927433	4344634437-	4325017361-	4311114951
140007	4262543723	4229756121-	4214684505-	4174080530	4137064033	4119644477-	4086395886-
210007	4047925611	4021985616	4012674089-	3953126249-	3931753671	3912766962	3878528850-
280007	4623185980	4716409108-	4578956723-	4638764594	4524075746	4591207833-	4469235608-
350007	4521593491	4416375560	4444396030-	4344634440-	4410927435	4311114951	4325017365-
420007	4229756127-	4262543733	4174080561	4214684502-	4119644482-	4137064026	4047925622
490007	4086395874-	4012674091-	4021985613	3931753676	3953126237-	3878528867-	3912766962
560007	4638764601	4578956728-	4710028877-	4582825785	4623416878	4534078608-	4555039614-
630007	4511315236	4511246126	4428945005-	4427539224-	4382730129	4362755590	4321318831-
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TABLE 6 $\left[a_{11}\right]^{-1}$

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TABLE 6 $\left[a_{11}\right]^{-1}$ Continued

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TABLE 6 $\left[a_{11}\right]^{-1}$ Continued

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TABLE 6 $\left[a_{11}^{-1}\right]$ Continued

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TABLE 7[X]

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2660007			4822400987-	4911618981	4953614666-	4955736791-	4914123185
2730007	4833241742-	4782838164	4719892379-	4650099895	4612286255-	4531491495	4477482226-
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2880007	4414236174-	4352942267					
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TABLE 7[X]Continued

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TABLE 7 [X] (continued)

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TABLE 7 [X] (continued)

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TABLE 7 [X] (continued)

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TABLE 7 [X] (continued)

7	4185538638-	4152614338	4220979672	4211166432-	4283392548-	4239757075	4334229231
70007	4314556572-	4414236170-	4352942265	4450677232	4416466415-	4520403358-	4457318698
140007	4576238027	4518335454-	4630520950-	4561515700	4711433797	4618904489-	4745466206-
210007	4659313029	4816779445	4716177426-	4866414701-	4742480692	4925215693	4779388032-
280007	4152614328	4185538645-	4211166430-	4220979673	4239757060	4283392555-	4314556570-
350007	4334229226	4352942258	4414236170-	4416466415-	4450677213	4457318696	4520403353-
420007	4518335453-	4576238020	4561515705	4630520943-	4618904488-	4711433797	4659313033
490007	4745466204-	4716177426-	4816779445	4742480688	4866414703-	4779388032-	4925215693
560007							
630007							
700007							
770007							
840007							
910007							
980007							
1050007							
1120007							
1190007							
1260007							
1330007							
1400007							
1470007							
1540007							
1610007							
1680007							
1750007							
1820007							
1890007							
1960007							
2030007							

TABLE 8 [Y]

2100007
2170007
2240007
2310007
2380007
2450007
2520007
2590007
2660007
2730007
2800007
2870007
2940007
3010007
3080007
3150007
3220007
3290007
3360007
3430007
3500007
3570007
3640007
3710007
3780007
3850007
3920007
3990007
4060007
4130007

TABLE 8 $\left[Y \right]$ (continued)

4200007							
4270007							
4340007							
4410007							
4480007	4984837903	4984837894	4947136834	4947136842	4910251069-	4910251069-	4822400983
4550007	4822400985	4742787257-	4742787257-	4698705121	4698705153	4621228982-	4621228984-
4620007	4550066676	4550066684	4511111144-	4511111143-	4426599664	4426599654	4358744108-
4690007	4358744085-	4314218703	4314218701	4232635925-	4232635914-	4175037973	4175037945
4760007	4918624059-	4918624052-	4955509821	4955509827	4953170411	4953170420	4911618977-
4830007	4911618981-	4822192959	4822192966	4751196538-	4751196538-	4711011083	4711011078
4900007	4625968666-	4625968653-	4557631458	4557631418	4513796757-	4513796749-	4430469491
4970007	4430469478	4373749792-	4373749759-	4316927652	4316927644	4238920821-	4238920808-
5040007	4841235258	4841235253	4912290351-	4912290351-	4954650180	4954650184	4953614669
5110007	4953614666	4910240731-	4910240733-	4823624149	4823624155	4750809578-	4750809601-
5180007	4711982990	4711982993	4626593479-	4626593490-	4563663781	4563663836	4514059848-
5250007	4514059861-	4434031122	4434031149	4378111008-	4378111071-	4317959637	4317959647
5320007	4793281563-	4793281563-	4827802984	4827802990	4912362852-	4912362857-	4955736791
5390007	4955736791	4946655778	4946655778	4910762933-	4910762934-	4823148354	4823148352
5460007	4754593348-	4754593355-	4712115731	4712115730	4629004609-	4629004608-	4564055350
5530007	4564055319	4515504258-	4515504251-	4435586627	4435586615	4381822390-	4381822363-
5600007	4723636681	4723636679	4770450172-	4770450179-	4831326314	4831326323	4914123183-
5670007	4914123185-	4964195071	4964195074	4954397396	4954397394	4911699508-	4911699507-
5740007	4827592252	4827592246	4761234631-	4761234618-	4714659343	4714659337	4632374481-
5810007	4632374466-	4578360720	4578360693	4517985988-	4517985982-	4441354193	4441354172
5880007	4655633659-	4655633654-	4716581852	4716581863	4773732773-	4773732779-	4833241736
5950007	4833241742	4915109593-	4915109594-	4957807483	4957807481	4952089497	4952089494
6020007	4912284848-	4912284848-	4827263387	4827263380	4765267530-	4765267517-	4714414027
6090007	4714414028	4634888403-	4634888397-	4580078702	4580078683	4518412056-	4518412049-
6160007	4613863864	4613863866	4641321850-	4641321871-	4718374143	4718374148	4782838153-
6230007	4782838162-	4837652985	4837652986	4914405579-	4914405581-	4961779102	4961779099

TABLE 8 [Y] (continued)

6300007	4956182290	4956182287	4912468361-	4912468358-	4829848795	4829848786	4765919672-
6370007	4765919660-	4715955506	4715955507	4636622377-	4636622377-	4584203794	4584203790
6440007	4533292048-	4533292056-	4599228418	4599228484	4644122838-	4644122853-	4719892381
6510007	4719892382	4790418195-	4790418200-	4834592909	4834592904	4914835356-	4914835355-
6580007	4958549286	4958549286	4953584409	4953584408	4912827907-	4912827909-	4828329840
6650007	4828329832	4768570889-	4768570873-	4715738946	4715738942	4636187695-	4636187687-
6720007	4483847609	4483847598	4524991152-	4524991153-	4611112548	4611112549	4650099906-
6790007	4650099901-	4722772248	4722772238	4787123885-	4787123865-	4837363544	4837363537
6860007	4914745913-	4914745910-	4962060934	4962060926	4956961727	4956961722	4912579728-
6930007	4912579731-	4830448577	4830448578	4769888050-	4769888046-	4716068975	4716068972
7000007	4420562372-	4420562372-	4461287076	4461287083	4527251870-	4527251867-	4612286254
7070007	4612286254	4655845535-	4655845526-	4721365832	4721365825	4791628514-	4791628500-
7140007	4836162158	4836162155	4915219517-	4915219520-	4959601515	4959601511	4953090892
7210007	4953090888	4912850369-	4912850369-	4829495213	4829495211	4767816727-	4767816710-
7280007	4331710131	4331710128	4394513462-	4394513445-	4442026296	4442026288	4518947167-
7350007	4518947163-	4586121838	4586121804	4632949185-	4632949169-	4714130429	4714130428
7420007	4755767235-	4755767233-	4823470682	4823470677	4891914067-	4891914077-	4938076930
7490007	4938076929	4934472252	4934472252	4879123506-	4879123509-	4818192435	4818192436
7560007	4278020158-	4278020145-	4323254263	4323254263	4410340223-	4410340223-	4446617950
7630007	4446617943	4521189570-	4521189564-	4581068760	4581068716	4634766764-	4634766759-
7700007	4713721068	4713721069	4757747684-	4757747674-	4822614703	4822614704	4893685147-
7770007	4893685139-	4935928415	4935928415	4933182769	4933182770	4876295311-	4876295313-
7840007	4233081564	4233081569	4298601097-	4298601077-	4343843896	4343843892	4419766619-
7910007	4419766615-	4489846537	4489846523	4534374211-	4534374195-	4614741564	4614741557
7980007	4658179126-	4658179122-	4724485769	4724485767	4795889296-	4795889299-	4839723726
8050007	4839723723	4915234117-	4915234117-	4962463548	4962463549	4954615451	4954615449
8120007	4198772930-	4198772921-	4229439726	4229439722	4313090646-	4313090643-	4359017983
8190007	4359017963	4426825834-	4426825830-	4510263245	4510263239	4544014466-	4544014452-
8260007	4617370772	4617370769	4673108138-	4673108120-	4728630047	4728630046	4811860471-
8330007	4811860470-	4845485107	4845485107	4918649989-	4918649990-	4973265440	4973265438

TABLE 8 [Y] (continued)

8400007
8470007
8540007
8610007
8680007
8750007
8820007
8890007
8960007
9030007
9100007
9170007
9240007
9310007
9380007
9450007
9520007
9590007
9660007
9730007
9800007
9870007
9940007
10010007

TABLE 8 [Y] (continued)

```
      7  5328140548- 5189318998- 5273750000- 5000000000- 5000000000- 5000000000- 5000000000-
  70007  5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000-
 140007  5000000000- 5000000000- 4450280000- 4526077000  4612033000- 4654821000  4727707320-
 210007  4812336070  4856416564- 4924245754  5010766211- 5045437205  5120258842- 5184961406
 280007  5236592351- 5315191215  5322125000  5000000000  5000000000  5000000000  5000000000
 350001  5000000000
 360007  5189318998- 5329540548- 5000000000- 5280750000- 5000000000- 5000000000- 5000000000-
 430007  5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000-
 500007  5000000000- 5000000000- 4450280000- 4526077000  4612033000- 4654821000  4727707300-
 570007  4812336068  4856416562- 4924245746  5010766213- 5045437200  5120258843- 5184961413
 640007  5236592350- 5315191215  5324225000  5000000000  5000000000  5000000000  5000000000
 710001  5000000000
 720007  5273750000- 5000000000- 5331240000- 5187000000- 5273750000- 5000000000- 5000000000-
 790007  5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000-
 860007  5000000000- 5000000000- 5000000000  5000000000  5000000000  5000000000  5000000000
 930007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000
1000007  5000000000  5000000000  5322125000  5322125000  5000000000  5000000000  5000000000
1070001  5000000000
1080007  5000000000- 5280750000- 5187000000- 5334040000- 5000000000- 5280750000- 5000000000-
1150007  5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000-
1220007  5000000000- 5000000000- 5000000000  5000000000  5000000000  5000000000  5000000000
1290007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000
1360007  5000000000  5000000000  5324225000  5324225000  5000000000  5000000000  5000000000
1430001  5000000000
1440007  5000000000- 5000000000- 5273750000- 5000000000- 5329310000- 5190500000- 5263750000-
1510007  5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000-
1580007  5000000000- 5000000000- 5000000000  5000000000  5000000000  5000000000  5000000000
1650007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000
1720007  5000000000  5000000000  5000000000  5322125000  5319125000  5000000000  5000000000
1790001  5000000000
```

TABLE 9 [Φ]

1800007	5000000000-	5000000000-	5000000000-	5280750000-	5190500000-	5335110000-	5000000000-
1870007	5285750000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
1940007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
2010007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2080007	5000000000	5000000000	5000000000	5324225000	5325725000	5000000000	5000000000
2150001	5000000000						
2160007	5000000000-	5000000000-	5000000000-	5000000000-	5263750000-	5000000000-	5331260000-
2230007	5212900000-	5279650000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
2300007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
2370007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2440007	5000000000	5000000000	5000000000	5000000000	5319125000	5323895000	5000000000
2510001	5000000000						
2520007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5285750000-	5212900000-
2590007	5341140000-	5000000000-	5310705000-	5000000000-	5000000000-	5000000000-	5000000000-
2660007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
2730007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
2800007	5000000000	5000000000	5000000000	5000000000	5325725000	5332115000	5000000000
2870001	5000000000						
2880007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5279650000-
2950007	5000000000-	5329210000-	5212000000-	5254400000-	5000000000-	5000000000-	5000000000-
3020007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
3090007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3160007	5000000000	5000000000	5000000000	5000000000	5000000000	5323895000	5316320000
3230001	5000000000						
3240007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3310007	5310705000-	5212000000-	5336310000-	5000000000-	5262500000-	5000000000-	5000000000-
3380007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
3450007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3520007	5000000000	5000000000	5000000000	5000000000	5000000000	5332115000	5318750000
3590001	5000000000						

TABLE 9[Φ] Continued

3600007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
3670007	5000000000-	5254400000-	5000000000-	5337700000-	5000000000-	5311850000-	5000000000-
3740007	5215600000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
3810007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
3880007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5316320000
3950001	5335550000						
3960007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4030007	5000000000-	5000000000-	5262500000-	5000000000-	5342920000-	5000000000-	5000000000-
4100007	5215600000-	5313650000-	5000000000	5000000000	5000000000	5000000000	5000000000
4170007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4240007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5318750000
4310001	5340950000						
4320007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4390007	5000000000-	5000000000-	5000000000-	5311850000-	5000000000-	5323700000-	5000000000-
4460007	5000000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
4530007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4600007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4670001	5335550000						
4680007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
4750007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5111000000-
4820007	5055000000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
4890007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
4960007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5030001	5116500000						
5040007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5110007	5000000000-	5000000000-	5000000000-	5215600000-	5215600000-	5000000000-	5055000000-
5180007	5263500000-	5000000000-	5000000000	5000000000	5000000000	5000000000	5000000000
5250007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5320007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5390001	5116500000						

TABLE 9[Φ] Continued

5400007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5470007	5000000000-	5000000000-	5000000000-	5000000000-	5313650000-	5000000000-	5000000000-
5540007	5000000000-	5327300000-	5000000000	5000000000	5000000000	5000000000	5000000000
5610007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5680007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
5750001	5340950000						
5760007	4450280000	4450280000	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5830007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
5900007	5000000000-	5000000000-	5310489496	5256877856-	5212593245	5128488190-	5072186417
5970007	5016990519-	4942340242	4910167394-	4825607070	4762797510-	4716095930	4639602700-
6040007	4610103100	4530165000-	5000000000	5000000000	5000000000	5000000000	5000000000
6110001	5000000000						
6120007	4526077000-	4526077000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6190007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6260007	5000000000-	5000000000-	5256877854-	5314081507	5265318858-	5214776301	5137441765-
6330007	5088126707	5021961100-	4952736396	4913281908-	4832571907	4783486650-	4720541200
6400007	4652403000-	4615646200	5000000000	5000000000	5000000000	5000000000	5000000000
6470001	5000000000						
6480007	4612033000	4612033000	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6550007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6620007	5000000000-	5000000000-	5212593245	5265318859-	5314420766	5268183826-	5217277148
6690007	5140665222-	5110133742	5024334708-	4961288125	4915029997-	4838524118	4794785410-
6760007	4724180860	4672197800-	5000000000	5000000000	5000000000	5000000000	5000000000
6830001	5000000000						
6840007	4654821000-	4654821000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6910007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
6980007	5000000000-	5000000000-	5128488188-	5214776300	5268183827-	5315343889	5278713007-
7050007	5218526679	5146168337-	5111086659	5027922267-	4968475198	4917551214-	4843183318
7120007	4811016562-	4732892590	5000000000	5000000000	5000000000	5000000000	5000000000
7190001	5000000000						

TABLE 9 $[\Phi]$ Continued

7200007	4727707310	4727707300	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7270007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7340007	5000000000-	5000000000-	5072186410	5137441764-	5217277147	5278713006-	5317852672
7410007	5293636469-	5223334136	5156033533-	5114112311	5034608334-	4988706328	4921825460-
7480007	4855679278	4816624380-	5000000000	5000000000	5000000000	5000000000	5000000000
7550001	5000000000						
7560007	4812336077-	4812336072-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7630007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7700007	5000000000-	5000000000-	5016990514-	5088126717	5140665220-	5218526680	5293636467-
7770007	5319759593	5310389012-	5224947710	5162831992-	5115408609	5039494553-	4997173119
7840007	4924789987-	4874016452	5000000000	5000000000	5000000000	5000000000	5000000000
7910001	5000000000						
7920007	4856416542	4856416539	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
7990007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8060007	5000000000-	5000000000-	4942340227	5021961100-	5110133742	5146168335-	5223334137
8130007	5310389012-	5321412078	5311409335-	5228734945	5170468176-	5118062043	5044440168-
8200007	5011337203	4933849922-	5000000000	5000000000	5000000000	5000000000	5000000000
8270001	5000000000						
8280007	4924245754-	4924245750-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8350007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8420007	5000000000-	5000000000-	4910167392-	4952736399	5024334712-	5111086658	5156033532-
8490007	5224947710	5311409335-	5322933106	5312349219-	5230284621	5177623983-	5119098745
8560007	5048723102-	5014547452	5000000000	5000000000	5000000000	5000000000	5000000000
8630001	5000000000						
8640007	5010766213	5010766210	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8710007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
8780007	5000000000-	5000000000-	4825607055	4913281914-	4961288120	5027922261-	5114112312
8850007	5162831977-	5228734944	5312349220-	5324536136	5313447744-	5234468562	5184807078-
8920007	5121635267	5064597275-	5000000000	5000000000	5000000000	5000000000	5000000000
8990001	5000000000						

TABLE 9 [Φ] (continued)

9000007	5045437207-	5045437197-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9070007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9140007	5000000000-	5000000000-	4762797500-	4832571912	4915029998-	4968475180	5034608337-
9210007	5115408605	5170468186-	5230284619	5313447744-	5326454202	5314546948-	5235791564
9280007	5191308429-	5127262318	5000000000	5000000000	5000000000	5000000000	5000000000
9350001	5000000000						
9360007	5112188931	5112188931	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9430007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
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9570007	5023762275-	5110867206	5146703224-	5220738347	5287523135-	5346073471	5296014044-
9640007	5224494289	5173133593-	5000000000	5000000000	5000000000	5000000000	5000000000
9710001	5000000000						
9720007	5151117858-	5151117860-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
9790007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
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9930007	4958465133	5026737863-	5111490945	5151025003-	5221534341	5296014042-	5347316307
10000007	5310272401-	5230670714	5000000000	5000000000	5000000000	5000000000	5000000000
10070001	5000000000						
10080007	5236592350	5236592350	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
10150007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
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10290007	4924789980-	5011337203	5048723102-	5121635269	5191308426-	5240711207	5317073439-
10360007	5333334243	5321955410-	5000000000	5000000000	5000000000	5000000000	5000000000
10430001	5000000000						
10440007	5315191215-	5315191215-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
10510007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
10580007	5000000000-	5000000000-	4530165000-	4615646200	4672197800-	4732892580	4816624384-
10650007	4874016416	4933849937-	5014547450	5064597275-	5127262321	5212155305-	5250976846
10720007	5321955410-	5350947294	5000000000	5000000000	5000000000	5000000000	5000000000
10790001	5000000000						

TABLE 9 $\left[\Phi\right]$ (continued)

```
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10940007  5000000000- 5000000000- 5000000000  5000000000  5000000000  5000000000  5000000000
11010007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000
11080007  5000000000  5000000000  5392700000  5000000000  5000000000  5000000000  5000000000
11150001  5000000000
11160007  5000000000- 5000000000- 5322125000- 5324225000- 5322125000- 5324225000- 5000000000-
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11370007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000
11440007  5000000000  5000000000  5000000000  5392700000  5000000000  5000000000  5000000000
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11730007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000
11800007  5000000000  5000000000  5000000000  5000000000  5389700000  5000000000  5000000000
11870001  5000000000
11880007  5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5323895000-
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12090007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000
12160007  5000000000  5000000000  5000000000  5000000000  5000000000  5411202000  5000000000
12230001  5000000000
12240007  5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000- 5000000000-
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12380007  5000000000- 5000000000- 5000000000  5000000000  5000000000  5000000000  5000000000
12450007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000
12520007  5000000000  5000000000  5000000000  5000000000  5000000000  5000000000  5370140000
12590001  5000000000
```

TABLE 9 $[\Phi]$ (continued)

12600007	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-	5000000000-
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12740007	5116500000-	5340950000-	5000000000	5000000000	5000000000	5000000000	5000000000
12810007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
12880007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
12950001	5415333000						

TABLE 9 $\left[\Phi\right]$ (continued)

7	4724023924-	4652962153-	4621662582-	4668322857-	4619526732-	4579983781-	4528191469-
70007	4556708505-	4515446212-	4493690541-	4437496508-	4452887387-	4417819224-	4414205988-
140007	4358316389-	4367546375-	4324998758-	4322789500-	4290051349-	4295722187-	4221445612-
210007	4220102359-	4096750361	4062080577	3985700395-	3743847200-	3878818610-	3929906534-
280007	4652962148-	4724023920-	4668322839-	4621662582-	4579983744-	4619526734-	4556708515-
350007	4528191451-	4493690520-	4515446212-	4452887383-	4437496506-	4414205990-	4417819219-
420007	4367546370-	4358316385-	4322789499-	4324998753-	4295722196-	4290051317-	4220102367-
490007	4221445598-	4062080802	4096750040	3743359900-	3985684852-	3929850783-	3878628530-
560007	4621662564-	4668322835-	4718751313-	4678941800-	4627339784-	4654164530-	4615887564-
630007	4592520764-	4529669793-	4543810420-	4515172355-	4511591132-	4443211067-	4451618491-
700007	4419708394-	4417560716-	4368182403-	4373323001-	4328164389-	4326844860-	4259950909-
770007	4263076399-	4119482154	4127549143	3928330400-	4022669409-	3981448719-	3930296656-
840007	4668322853-	4621662587-	4678941808-	4718751317-	4654164533-	4627339802-	4592520836-
910007	4615887565-	4543810434-	4529669807-	4511591136-	4515172361-	4451618528-	4443211068-
980007	4417560724-	4419708401-	4373323039-	4368182428-	4326844878-	4328164395-	4263076458-
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1120007	4619526730-	4579983743-	4627339785-	4654164530-	4718286839-	4680104588-	4627846364-
1190007	4653266466-	4614562755-	4591455739-	4536316370-	4550035805-	4516908763-	4513687924-
1260007	4456010433-	4464238038-	4423812968-	4421843635-	4386215948-	4391270926-	4320446028-
1330007	4319248650-	4191325551	4160420880	4079152466-	3931497140-	3982440490-	4027877697-
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1540007	4464238037-	4456010419-	4421843633-	4423812965-	4391270941-	4386215910-	4319248659-
1610007	4320446014-	4160421093	4191325254	3931456120-	4079138366-	4027827160-	3982279540-
1680007	4528191442-	4556708500-	4615887564-	4592520815-	4627846367-	4653266476-	4718058769-
1750007	4679885778-	4627336578-	4648796772-	4616582402-	4611147439-	4542747127-	4555506478-
1820007	4520937087-	4517677710-	4469406626-	4477208144-	4429499027-	4427496474-	4361363107-
1890007	4366106458-	4218243342	4230486067	4018411910	4128263769-	4096706970-	4019051686-
1960007	4556708487-	4528191441-	4592520745-	4615887563-	4653266467-	4627846355-	4679885780-
2030007	4718058769-	4648796773-	4627336574-	4611147440-	4616582401-	4555506485-	4542747116-

TABLE 10 $\left[\beta_{11}\right]$

2100007	4517677712-	4520937083-	4477208142-	4469406622-	4427496483-	4429499017-	4366106482-
2170007	4361363082-	4230486157	4218243278	4128268961-	4018391870	4019128308-	4096894209-
2240007	4515446206-	4493690490-	4529669790-	4543810426-	4614562756-	4591455737-	4627336581-
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2450007	4419591931-	4310303231	4254020520	4210285708-	4117673450	4031374220-	4134265051-
2520007	4493690471-	4515446207-	4543810417-	4529669801-	4591455757-	4614562755-	4648796775-
2590007	4627336575-	4679731129-	4716564265-	4655564787-	4633807022-	4613279333-	4618387282-
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2730007	4421490843-	4254020692	4310303202	4117682789	4210283759-	4134194443-	4031023690-
2800007	4437496485-	4452887369-	4515172349-	4511591130-	4536316357-	4550035790-	4616582401-
2870007	4611147437-	4633807021-	4655564783-	4715332813-	4678527034-	4632295658-	4649856298-
2940007	4618386266-	4613900407-	4555925328-	4566662517-	4525205641-	4522449544-	4450025922-
3010007	4456554182-	4311947060	4328796707	4196715950	4231762581-	4210181303-	4050935310
3080007	4452887376-	4437496505-	4511591128-	4515172356-	4550035794-	4536316359-	4611147439-
3150007	4616582399-	4655564780-	4633807021-	4678527037-	4715332812-	4649856299-	4632295656-
3220007	4613900407-	4618386264-	4566662516-	4555925325-	4522449551-	4525205633-	4456554204-
3290007	4450025897-	4328796784	4311947019	4231768851-	4196679630	4049580670	4210204072-
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3430007	4555506466-	4618387279-	4613279330-	4632295661-	4649856298-	4714567348-	4677319816-
3500007	4635089033-	4652549948-	4618727320-	4614547937-	4559313697-	4570041582-	4515735608-
3570007	4513194508-	4388090847	4322504277	4311064171-	4250646895	4176351050	4234008056-
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3920007	4358316357-	4367546353-	4419708365-	4417560694-	4456010397-	4464238009-	4520937073-
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4060007	4713916133-	4675976904-	4633280637-	4648404235-	4617818227-	4613936202-	4530911540-
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TABLE 10 $\left[\beta_{ij}\right]$(continued)

4200007	4367546341-	4358316367-	4417560687-	4419708371-	4464238006-	4456010395-	4517677698-
4270007	4520937070-	4568750820-	4555702583-	4613900407-	4618386263-	4652549947-	4635089028-
4340007	4675976907-	4713916133-	4648404238-	4633280642-	4613936208-	4617818224-	4540106793-
4410007	4530911526-	4425441204	4317079390	4336547005-	4321816790	4242926253	4310774992-
4480007	4324998767-	4322789513-	4368182270-	4373322903-	4423812957-	4421843624-	4469406572-
4550007	4477208087-	4525188169-	4522064989-	4555925318-	4566662497-	4618727316-	4614547933-
4620007	4633280643-	4648404242-	4713211352-	4673469119-	4632432825-	4647486031-	4610719678-
4690007	4571540557-	4480179076	4411850742-	4413169838-	4394616207	4321036711	4337386433-
4760007	4322789507-	4324998765-	4373322863-	4368182288-	4421843623-	4423812952-	4477208079-
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4900007	4648404236-	4633280643-	4673469117-	4713211350-	4647486030-	4632432810-	4571540570-
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5040007	4290051449-	4295722320-	4328164351-	4326844840-	4386215910-	4391270911-	4429499006-
5110007	4427496461-	4487838352-	4495855118-	4525205641-	4522449547-	4559313693-	4570041590-
5180007	4617818232-	4613936213-	4632432825-	4647486031-	4711985930-	4665166372-	4614212871-
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5320007	4295722288-	4290051443-	4326844823-	4328164357-	4391270898-	4386215889-	4427496457-
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5880007	4220102382-	4221445628-	4263076331-	4259950835-	4319248631-	4320445997-	4366106386-
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6090007	4673900728-	4545791992-	4583190099	4514846907	4516871263-	4445311009-	4436555540
6160007	4096750396	4062080862	4119482130	4127549212	4191325403	4160420957	4218243370
6230007	4230486186	4310303230	4254020706	4311947069	4328796799	4388090900	4322504433

TABLE 10 $\left[\beta_{ij}\right]$ (continued)

6300007	4317079640	4425441219	4480179102	4411850741-	4488090410-	4524628213	4583190269
6370007	4545791996-	4655690263-	4595224411-	4574456490	4539077714-	4468765160-	4522435589
6440007	4062080499	4096749988	4127549086	4119482028	4160420616	4191325005	4230486052
6510007	4218243260	4254020352	4310303187	4328796669	4311946986	4322504208	4388090520
6580007	4425441122	4317079210	4411850793-	4480178836	4524628146	4488090330-	4545791894-
6650007	4583190074	4595224413-	4655690159-	4539089293-	4574440920	4522378490	4469189400-
6720007	3985701677-	3743492100-	3928330640-	4022673339-	4079152212-	3931453880-	4018412970
6790007	4128268857-	4210285790-	4117681896	4196717560	4231768708-	4311064209-	4250662207
6860007	4321822841	4336547066-	4413169836-	4394641102	4436828312	4445407745-	4516875167-
6930007	4514846912	4574456502	4539089291-	4668058414-	4624445988-	4614654684-	4625929703-
7000007	3743965400-	3985686068-	4022669397-	3928338430-	3931493330-	4079138017-	4128263608-
7070007	4018393530	4117672865	4210283822-	4231762348-	4196681810	4250646692	4311061898-
7140007	4336539165-	4321816777	4394616342	4413166904-	4445397397-	4436818994	4514843237
7210007	4516871258-	4539077711-	4574440932	4624445988-	4668047988-	4625891399-	4614654762-
7280007	3878818550-	3929850792-	3981449117-	3930330809-	3982437200-	4027826829-	4096705443-
7350007	4019126807-	4031379620-	4134194971-	4210181257-	4049585550	4176353260	4233924598-
7420007	4310746346-	4242926210	4321036879	4337279358-	4412474259-	4387138102	4436420800
7490007	4445310945-	4468765010-	4522378501	4614654684-	4625891399-	4694994629-	4653634492-
7560007	3929906521-	3878628570-	3930297076-	3981589426-	4027877387-	3982276460-	4019050211-
7630007	4096892771-	4134265616-	4031029340-	4050938940	4210204034-	4234007860-	4176934920
7700007	4243151242	4310775008-	4337386285-	4321128324	4387480629	4412512086-	4445454185-
7770007	4436555611	4522435602	4469189260-	4625929704-	4614654761-	4653634492-	4695135331-

TABLE 10 $\left[\beta_{ij}\right]$ (continued)

7	3910616401	3852156238	3827153218	3841537772	3817115754	3813168286	3749530106
70007	3760392929	3728307248	3726123792	3714544685	3715064516	3714891261	3725720041
140007	3671129094-	3714631334	4695796708-	4629377639-	4590037771-	4527428811-	4484634135-
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280007	3930981989-	3913405102-	3856255257-	3824862007-	3810213838-	3741406979-	3720981246-
350001	3714775733-						
360007	3851951964	3910455526	3842077917	3828777704	3813440989	3816779038	3760684941
430007	3754678659	3726245641	3729203165	3715377394	3715015850	3715014499	3726354026
500007	3673016682-	3715195267	4695796692-	4629377634-	4590037765-	4527428809-	4484634129-
570007	4430602272-	4411152871-	4343412751-	4316591399-	4256830369-	4199899159-	4037554782
640007	3930958196-	3913341087-	3857237143-	3825156100-	3810539815-	3742591258-	3721505482-
710001	3715135476-						
720007	3917162278	3929362102	3912066646	3889936863	3841268639	3848872194	3817737036
790007	3816490209	3778932679	3786093557	3745588460	3744794707	3744735194	3778386190
860007	3721713512-	3745132088	4689110085-	4686989810-	4626660991-	4581219152-	4525060926-
930007	4490616117-	4433024668-	4412854912-	4349128659-	4316827992-	4229581046-	4111120259
1000007	3991692338-	3939567479-	3916994916-	3874924050-	3831325882-	3812662992-	3763962648-
1070001	3745019630-						
1080007	3929776604	3917169644	3885938952	3911962761	3849819265	3840470525	3815141475
1150007	3817819834	3783729734	3778928329	3743650875	3744907947	3744448440	3776911010
1220007	3721274301-	3743819905	4689110108-	4686989828-	4626660998-	4581219179-	4525060936-
1290007	4490616152-	4433024682-	4412854918-	4349128681-	4316827999-	4229581059-	4111120150
1360007	3991747719-	3939716436-	3916766447-	3874239744-	3830567385-	3812387429-	3762742833-
1430001	3744182566-						
1440007	3999951590	3951776881	3926728160	3939552583	3916357142	3912826090	3848151937
1510007	3857988063	3827203169	3825291735	3814048360	3814516280	3814355752	3824810918
1580007	3768619930-	3814121782	4627257356-	4686119322-	4686021453-	4626205289-	4580858865-
1650007	4529237219-	4510655383-	4441476270-	4415851320-	4354295392-	4295443026-	4135879046
1720007	4029606017-	4012823646-	3954100660-	3923971286-	3898556000-	3839949489-	3820239881-
1790001	3814253285-						

TABLE 11 $\left[\beta_{12}\right]$

1800007	3951626958	3998485406	3940032050	3928178260	3913081457	3916044718	3858095372
1870007	3852894371	3825365457	3828036694	3814790640	3814472903	3814465610	3825376056
1940007	3770302540-	3814624475	4627257361-	4686119336-	4686021462-	4626205289-	4580858865-
2010007	4529237218-	4510655381-	4441476265-	4415851318-	4354295385-	4295443016-	4135879480
2080007	4029584809-	4012766585-	3954975924-	3924233446-	3910146178-	3841005164-	3820707190-
2150001	3814573962-						
2160007	4014767981	4033380274	4013355842	3986236882	3940785786	3952737396	3919031180
2230007	3916797091	3880776969	3891074037	3847781128	3846466168	3846500173	3881711780
2300007	3822642045-	3847157694	4584074098-	4626563123-	4685396579-	4684151699-	4625965800-
2370007	4593888011-	4534217102-	4513319067-	4450902568-	4417435612-	4330649165-	4211521796
2440007	4094996362-	4040976769-	4017689070-	3977928963-	3932695366-	3913209154-	3866680172-
2510001	3846927180-						
2520007	4033911791	4014876643	3980854893	4013129623	3953762388	3939986739	3915092067
2590007	3918814944	3888057004	3880199788	3844840539	3846637967	3846064930	3879472908
2660007	3821975458-	3845166233	4584074075-	4626563116-	4685396573-	4684151697-	4625965799-
2730007	4593888009-	4534217100-	4513319067-	4450902566-	4417435612-	4330649164-	4211521623
2800007	4095080316-	4041202779-	4017342318-	3976890345-	3931544211-	3912790936-	3864828867-
2870001	3845656773-						
2880007	4111676631	4040729497	4024013752	4044080676	4017836826	4012394294	3947119561
2950007	3961440274	3928670854	3925431120	3914341033	3915041632	3914833278	3925532981
3020007	3870584044-	3914482961	4524573867-	4577640877-	4624960421-	4680376775-	4683686398-
3090007	4630259607-	4611027990-	4542926668-	4516405635-	4456194082-	4398780646-	4237133654
3160007	4130646367-	4113288026-	4055763733-	4024747048-	4010124245-	3941072014-	3920827177-
3230001	3914669186-						
3240007	4040127908	4111480494	4045112509	4026042053	4012641895	4017498747	3962888950
3310007	3953362162	3925756417	3929784381	3915518225	3914972843	3915007506	3926429246
3380007	3873252527-	3915280189	4524573868-	4577640881-	4624960421-	4680376776-	4683686401-
3450007	4630259607-	4611027990-	4542926666-	4516405634-	4456194078-	4398780640-	4237134345
3520007	4130612746-	4113197537-	4057151836-	4025162817-	4010585077-	3942746228-	3921568292-
3590001	3915177755-						

TABLE 11 $\left[\beta_{12}\right]$ (continued)

3600007	4071789961	4132909657	4112594930	4059962235	4030610315	4047555968	4016982542
3670007	4013504909	3965599532	3979115847	3940760691	3938820159	3939012563	3968952410
3740007	3919118947-	3939982881	4489504662-	4528278908-	4590912627-	4629275410-	4680306744-
3810007	4678501780-	4628609656-	4611136364-	4542560754-	4514578298-	4425626433-	4296336537
3880007	4179407381-	4134202093-	4114886652-	4065463949-	4027658920-	4011161747-	3956274575-
3950001	3939595305-						
3960007	4133526519	4074432058	4053413707	4112197717	4048469941	4030007304	4011561161
4030007	4016282069	3975619001	3964149671	3936713571	3939056602	3938413538	3965871057
4100007	3918201525-	3937242041	4489504683-	4528278910-	4590912630-	4629275409-	4680306742-
4170007	4678501779-	4628609656-	4611136364-	4542560753-	4514578297-	4425626432-	4296334149
4240007	4179522927-	4134513148-	4114409418-	4064034500-	4026074589-	4010586155-	3953726629-
4310001	3937846848-						
4320007	4210652255	4052028877	4110226611	4136762284	4114208693	4071116720	4028188812
4390007	4045832093	4021116356	4016531491	3997272885	4010615565	4010391810	4017698756
4460007	3948866436-	3999476484	4431713674-	4510019901-	4532212560-	4610372991-	4628454643-
4530007	4676286314-	4677658069-	4630228560-	4611552695-	4539571350-	4469560426-	4326148968
4600007	4221591990-	4193863783-	4138831564-	4117297513-	4069844326-	4028396288-	4014433641-
4670001	4010170287-						
4680007	4039664556	4210432938	4138460612	4112623342	4072569387	4113942368	4049291161
4750007	4035022142	4017216326	4022356963	4011302595	4010523522	4010624968	4018898137
4820007	3952437398-	4011014494	4431713667-	4510019900-	4532212553-	4610372989-	4628454637-
4890007	4676286305-	4677658060-	4630228555-	4611552693-	4539571341-	4469560416-	4326149887
4960007	4221547004-	4192652945-	4140689134-	4117853902-	4076011172-	4030636717-	4015425400-
5030001	4010850854-						
5040007	4149939414-	4231379263	4211084348	4116941924	4113769330	4138200906	4113328072
5110007	4079683137	4039993592	4058272220	4028662504	4025779834	4026218087	4047089498
5180007	4013080250-	4027659499	4412463835-	4439379358-	4512659904-	4540767038-	4611183002-
5250007	4629981410-	4675694301-	4674205778-	4628359822-	4597140654-	4517075850-	4364193609
5320007	4252868554-	4222674355-	4210096591-	4144152029-	4119018297-	4076511607-	4038443746-
5390001	4027032950-						

TABLE 11 $[\beta_{12}]$ (continued)

5400007	4232117226	4144908271-	4086754470	4210429164	4138925118	4113483246	4056919474
5470007	4111880035	4054106378	4037192111	4022962101	4026112933	4025374409	4042749449
5540007	4011788071-	4023799023	4412463834-	4439379356-	4512659903-	4540767037-	4611183002-
5610007	4629981411-	4675694302-	4674205780-	4628359825-	4597140663-	4517075850-	4364190245
5680007	4253031372-	4223112537-	4194244196-	4142138722-	4116786772-	4068404434-	4034854993-
5750001	4024570268-						
5760007	4310608465	4235709708-	4147683437-	4232191813	4211508415	4117116191	4091297891
5830007	4132561537	4114577929	4079262982	4053913101	4065948348	4063288919	4110463991
5900007	4028789289-	4057270967	4347323383-	4414951767-	4448067823-	4515478652-	4542460247-
5970007	4611383508-	4628740033-	4671816880-	4671375370-	4624448146-	4542976133-	4416155027
6040007	4313357983-	4258468099-	4223262171-	4210468559-	4140730819-	4116664532-	4085282147-
6110001	4060163434-						
6120007	4237820354-	4310338289	4234849120	4116795518-	4117538277	4211296333	4138740234
6190007	4117393184	4091054657	4116100495	4076017501	4064656782	4066560513	4112146936
6260007	4033799984-	4072240727	4347323376-	4414951765-	4448067816-	4515478649-	4542460241-
6330007	4611383506-	4628740030-	4671816874-	4671375361-	4624448141-	4542976123-	4416156325
6400007	4313294861-	4256769038-	4225868666-	4211249269-	4149384003-	4119808254-	4099198284-
6470001	4069712996-						
6480007	4318240249-	4333102164	4310679253	4226211518-	4123683710-	4232470089	4210920601
6550007	4130271839	4117474040	4142662771	4119056188	4114884121	4115625601	4129231535
6620007	4081555549-	4117711760	4318396650-	4358123983-	4418686039-	4460172226-	4516506134-
6690007	4544252619-	4611172492-	4627918324-	4666236130-	4656601598-	4599497014-	4437405515
6760007	4330738399-	4313031179-	4261608910-	4226558748-	4212003667-	4147931824-	4123883358-
6830001	4116769208-						
6840007	4334044846	4317434420-	4237149778-	4296853539	4233073045	4123540910-	4016222750
6910007	4185383165	4137357202	4112963443	4111025001	4115353403	4114436947	4123116908
6980007	4063350240-	4112272803	4318396646-	4358123971-	4418686035-	4460172215-	4516506131-
7050007	4544252612-	4611172490-	4627918320-	4666236123-	4656601593-	4599496981-	4437400786
7120007	4330967801-	4313648513-	4252138775-	4223722219-	4188597116-	4136509767-	4118827222-
7190001	4113299576-						

TABLE 11 $\left[\beta_{12}\right]$ (continued)

7200007	4411952510	4378951045-	4319530290-	4332086054	4310465128	4231567490-	4176493700-
7270007	4224300463	4210316341	4084723900	4120068180	4136647680	4133243190	4150085740
7340007	4113617446-	4124952940	4241143833-	4312999338-	4341791029-	4413457424-	4436915715-
7410007	4498970303-	4524987114-	4562438904-	4614813609-	4634802275-	4623522134-	4488416084
7480007	4373382323-	4332727360-	4311619025-	4253964070-	4218597752-	4177784530-	4140734770-
7550001	4128851220-						
7560007	4382161577-	4411599096	4335994650	4315385557-	4232061830-	4310276487	4233850472
7630007	4130416260	4126465440	4212303603	4151048120	4134837560	4137828460	4173672740
7700007	4120640087-	4145933490	4241143814-	4312999332-	4341791010-	4413457418-	4436915698-
7770007	4498970253-	4524987101-	4562438877-	4614813605-	4634802270-	4623522140-	4488434357
7840007	4372497507-	4330346113-	4315272113-	4264905990-	4230725451-	4212184475-	4160238680-
7910001	4142235230-						
7920007	4468670914-	4325957040	4344169698-	4423056152-	4387753753-	4338031308-	4315415894-
7990007	4327642593-	4312674131-	4294149879-	4256456974-	4262647351-	4261142167-	4310367559-
8060007	4228610100	4258046789-	4115728618	4149694417	4215976051	4251445623	4314112297
8130007	4337834788	4395521796	4423869387	4456630014	4513304357	4615368219-	4615418707-
8200007	4512734464	4455416494	4422790990	4410167716	4340831454	4316615910	4284541527
8270001	4259580337						
8280007	4335206895	4467181687-	4424291521-	4360641903-	4338818729-	4386114113-	4330270309-
8350007	4320033209-	4299288042-	4313515665-	4267545885-	4261999406-	4262783386-	4311211825-
8420007	4231123765	4265556527-	4115728541	4149694175	4215975971	4251445364	4314112224
8490007	4337834583	4395521296	4423869273	4456629787	4513304319	4615368195-	4615419360-
8560007	4512702796	4454564132	4424098562	4410559365	4345172413	4318192989	4291522697
8630001	4264370969						
8640007	4599065884	4571063160	4533727252	4541346021	4517492561	4515311959	4456894294
8710007	4463810386	4430086641	4429200456	4416003752	4416313379	4416175095	4428058738
8780007	4377635434-	4416020275	3985299650-	4026950955-	4086643643-	4127900741-	4176536588-
8850007	4220519209-	4251805304-	4312945428-	4330712809-	4372155120-	4483347411	4622241921-
8920007	4633272196-	4614399322-	4561069694-	4527031050-	4511163969-	4445219181-	4422891071-
8990001	4416117978-						

TABLE 11 $\left[\beta_{12}\right]$ (continued)

9000007	4571337418	4597864345	4541360979	4534819487	4515612990	4517158799	4462599810
9070007	4460887659	4429032175	4430775510	4416429673	4416288492	4416238134	4428383018
9140007	4378600926-	4416308722	3985288972-	4026947612-	4086632805-	4127897252-	4176526951-
9210007	4220516614-	4251798815-	4312943829-	4330709096-	4372146694-	4483338014	4622239414-
9280007	4633260033-	4614366584-	4561571930-	4527181482-	4511330704-	4445824932-	4423159216-
9350001	4416301984-						
9360007	4626129079	4635894234	4615167396	4612758789	4557218063	4562912682	4522951423
9430007	4522317284	4510641474	4511282514	4460229156	4459708229	4459524315	4510404554
9500007	4428813325-	4459784773	3937373964-	4011812287-	4037975603-	4112228980-	4133546622-
9570007	4189937494-	4222706412-	4256740930-	4313461685-	4331626567-	4436532448	4597489701-
9640007	4647293801-	4652663106-	4622570700-	4599639846-	4541536039-	4516798426-	4484896340-
9710001	4459759273-						
9720007	4636335381	4626029246	4612357572	4615161077	4564136396	4556114830	4520851335
9790007	4523393083	4511029603	4510702769	4458661426	4459799832	4459292281	4510285193
9860007	4428457947-	4458723060	3937409975-	4011823541-	4038011945-	4112240655-	4133578634-
9930007	4190023352-	4222728079-	4256795034-	4313474491-	4331656580-	4436567032	4597581987-
10000007	4647338572-	4652783610-	4622385838-	4599086136-	4540922321-	4516575461-	4483909353-
10070001	4459081981-						

TABLE 11 β_{12} (continued)

7	3910616257	3851950603	3917162469	3929776793	3999949442	3951624842	4014767126
70007	4033910945	4111676792	4040129573	4071788475	4133526377	4210652119	4039650171
140007	4149939417-	4232117224	4310608366	4237821302-	4318240494-	4334044587	4411952471
210007	4382161979-	4468670986-	4335206094	4599065868	4571337399	4626129079	4636335380
280007	3852154983	3910455408	3929362197	3917169741	3951773968	3998482520	4033379332
350007	4014875708	4040730746	4111480622	4132909418	4074429710	4052012704	4210432763
420007	4231379176	4144909279-	4235710867-	4310338178	4333101883	4317434715-	4378951418-
490007	4411599058	4325956242	4467181771-	4571063149	4597864331	4635894232	4626029243
560007	3827152462	3842077203	3912066678	3885939261	3926726761	3940030670	4013355408
630007	3980850554	4024014087	4045112867	4112594817	4053412559	4110225600	4138459564
700007	4211084289	4086747490	4147689687-	4234848537	4310679133	4237151123-	4319530512-
770007	4335994455	4344169908-	4424291555-	4533727239	4541360970	4615167398	4612357572
840007	3841537079	3828777055	3889937626	3911962835	3939551205	3928176904	3986232745
910007	4013129210	4044081188	4026042598	4059961336	4112197626	4136761381	4112622418
980007	4116941515	4210429115	4232191234	4116800860-	4226212701-	4296852207	4332085849
1050007	4315385730-	4423056179-	4360642333-	4541346009	4534819479	4612758791	4615161078
1120007	3817115408	3813440666	3841269052	3849819657	3916356473	3913080802	3940784037
1190007	3953760626	4017837043	4012642132	4030609806	4048469403	4114208294	4072565382
1260007	4113768982	4138924699	4211508168	4117536108	4123690040-	4233072307	4310465081
1330007	4232062020-	4387754028-	4338819128-	4517492559	4515612992	4557218096	4564136411
1400007	3813168061	3816773834	3848872636	3840470951	3912825408	3916044047	3952735539
1470007	3939984873	4012394489	4017498958	4047555369	4030006682	4071112603	4113941949
1540007	4138200520	4113482791	4117113706	4211296112	4232469442	4123548300-	4231567900-
1610007	4310276471	4338031596-	4386114504-	4515311958	4517158800	4562912728	4556114860
1680007	3749528389	3760683320	3817737170	3815141600	3848149347	3858092839	3919030552
1750007	3915091429	3947120128	3962889600	4016982350	4011560952	4028187257	4049289609
1820007	4113327957	4056917956	4091287797	4138739369	4210920399	4016197560	4176496810-
1890007	4233850311	4315415928-	4330270402-	4456894243	4462599779	4522951428	4520851331
1960007	3760391211	3754677042	3816490374	3817819989	3857985432	3852891800	3916796455
2030007	3918814298	3961440949	3953362927	4013504719	4016281862	4045830527	4035020588

TABLE 12 $[\beta_{21}]$

2100007	4079681947	4111879881	4132560531	4117392325	4130269637	4185380446	4224300199
2170007	4130415160	4327642660-	4320033338-	4463810366	4460887659	4522317296	4523393086
2240007	3728306391	3726244830	3778933493	3783730500	3827201881	3825364196	3880774002
2310007	3888053996	3928671136	3925756741	3965598746	3975618139	4021115582	4017215555
2380007	4039993105	4054105728	4114577418	4091050221	4117473113	4137356038	4210316164
2450007	4126464380	4312674140-	4299288425-	4430086617	4429032159	4510641482	4511029607
2520007	3726122909	3729202329	3786094321	3778929046	3825290419	3828035406	3891070995
2590007	3880196705	3925431392	3929784693	3979115029	3964148777	4016530698	4022356171
2660007	4058271726	4037191449	4079257668	4116100032	4142661862	4112962298	4084704700
2730007	4212303480	4294149934-	4313515698-	4429200430	4430775492	4511282523	4510702773
2800007	3714544197	3715376944	3745588943	3743651303	3814047632	3814789938	3847779518
2870007	3844838862	3914341168	3915518400	3940760336	3936713112	3997268376	4011302169
2940007	4028662290	4022961709	4053910047	4076015158	4119055771	4111024332	4120066860
3010007	4151047670	4256456948-	4267546184-	4416003734	4416429666	4460229261	4458661484
3080007	3715064038	3715015407	3744795199	3744908393	3814515558	3814472203	3846464532
3150007	3846636278	3915041787	3914973032	3938819783	3939056142	4010615131	4010523105
3220007	4025779580	4026112531	4065945532	4064654568	4114883617	4115352686	4136646720
3290007	4134837300	4262647454-	4261999780-	4416313367	4416288490	4459708339	4459799903
3360007	3714890776	3715014055	3744735693	3744448877	3814355028	3814464915	3846498568
3430007	3846063248	3914833420	3915007692	3939012208	3938413066	4010391370	4010624558
3500007	4026217843	4025373969	4063286064	4066558443	4115625099	4114436166	4133242230
3570007	4137828460	4261142255-	4262783836-	4416175083	4416238135	4459524384	4459292298
3640007	3725719204	3726353253	3778387038	3776911766	3824809661	3825374844	3881708993
3710007	3879470010	3925533224	3926429556	3968951815	3965870291	4017697979	4018897401
3780007	4047089139	4042748792	4110463466	4112146530	4129230788	4123115740	4150083530
3850007	4173671960	4310367557-	4311211877-	4428058708	4428383007	4510404573	4510285205
3920007	3671126755-	3673014518-	3721713733-	3721274497-	3766616434-	3770299164-	3822641253-
3990007	3821974637-	3870584738-	3873253403-	3919118759-	3918201292-	3948864332-	3952435396-
4060007	4013080115-	4011787856-	4028787949-	4033798961-	4081553006-	4063346569-	4113617017-
4130007	4120640037-	4228610155	4231123965	4377635361-	4378600902-	4428813362-	4428457963-

TABLE 12 $\left[\beta_{21}\right]$ (continued)

4200007	3714630864	3715194837	3745132571	3743820327	3814121073	3814623795	3847156056
4270007	3845164518	3914483122	3915280395	3939982481	3937241523	3999472327	4011014108
4340007	4027659191	4023798517	4057268407	4072238952	4117711154	4112271920	4124952440
4410007	4145933960	4258047072-	4265557172-	4416020272	4416308732	4459784868	4458723102
4480007	4695796701	4695796694	4689110093	4689110106	4627257358	4627257363	4584074121
4550007	4584074095	4524573874	4524573875	4489504700	4489504705	4431713699	4431713690
4620007	4412463847	4412463847	4347323417	4347323413	4318396652	4318396648	4241143833
4690007	4241143812	4115728624-	4115728570-	3985298334	3985287877	3937373821	3937409831
4760007	4629377631	4629377634	4686989812	4686989824	4686119323	4686119335	4626563123
4830007	4626563117	4577640882	4577640880	4528278919	4528278920	4510019913	4510019910
4900007	4439379403	4439379400	4414951789	4414951788	4358124050	4358124035	4312999356
4970007	4312999349	4149694499-	4149694331-	4026951098	4026947834	4011812349	4011823592
5040007	4590037735	4590037752	4626660990	4626660995	4686021454	4686021462	4685396579
5110007	4685396573	4624960421	4624960420	4590912650	4590912647	4532212577	4532212572
5180007	4512659911	4512659909	4448067843	4448067842	4418686047	4418686041	4341791070
5250007	4341791050	4215976055-	4215976004-	4086644178	4086633700	4037976572	4038012864
5320007	4527428794	4527428798	4581219140	4581219161	4626205291	4626205289	4684151701
5390007	4684151697	4680376775	4680376776	4629275413	4629275411	4610372994	4610372993
5460007	4540767068	4540767062	4515478665	4515478665	4460172268	4460172249	4413457436
5530007	4413457431	4251445573-	4251445421-	4127900574	4127897237	4112228964	4112240622
5600007	4484634098	4484634110	4525060924	4525060931	4580858865	4580858858	4625965801
5670007	4625965798	4683686397	4683686400	4680306747	4680306743	4628454645	4628454644
5740007	4611183006	4611183005	4542460265	4542460265	4516506138	4516506133	4436915733
5810007	4436915717	4314112296-	4314112255-	4176536097	4176526968	4133546132	4133578075
5880007	4430602268	4430602272	4490616050	4490616084	4529237205	4529237204	4593887995
5950007	4593887987	4630259603	4630259604	4678501781	4678501776	4676286312	4676286308
6020007	4629981412	4629981410	4611383509	4611383509	4544252618	4544252605	4498970328
6090007	4498970283	4337834742-	4337834631-	4220519318	4220516866	4189939363	4190024990
6160007	4411152865	4411152867	4433024623	4433024636	4510655375	4510655375	4534217082
6230007	4534217079	4611027986	4611027986	4628609656	4628609653	4677658067	4677658063

TABLE 12 $\left[\beta_{21}\right]$ (continued)

6300007	4675694304	4675694301	4628740033	4628740033	4611172491	4611172488	4524987114
6370007	4524987102	4395521705-	4395521437-	4251804569	4251798416	4222706588	4222728190
6440007	4343412749	4343412755	4412854890	4412854895	4441476249	4441476248	4513319058
6510007	4513319057	4542926640	4542926640	4611136363	4611136361	4630228556	4630228554
6580007	4674205779	4674205779	4671816875	4671816871	4627918320	4627918315	4562438915
6650007	4562438885	4423869365-	4423869307-	4312945414	4312943893	4256741361	4256795311
6720007	4316591411	4316591413	4349128574	4349128595	4415851313	4415851312	4450902528
6790007	4450902525	4516405624	4516405623	4542560750	4542560742	4611552693	4611552692
6860007	4628359828	4628359830	4671375372	4671375364	4666236131	4666236124	4614813613
6930007	4614813608	4456629995-	4456629888-	4330712812	4330709260	4313461987	4313474783
7000007	4256830439	4256830447	4316827972	4316827979	4354295355	4354295353	4417435599
7070007	4417435598	4456194052	4456194049	4514578296	4514578294	4539571348	4539571345
7140007	4597140678	4597140686	4624448144	4624448139	4656601596	4656601591	4634802275
7210007	4634802270	4513304364-	4513304342-	4372155313	4372147009	4331626982	4331657033
7280007	4160105374	4160105383	4217797704	4217797712	4257424179	4257424178	4318440343
7350007	4318440342	4359432294	4359432291	4415418386	4415418383	4441851694	4441851693
7420007	4510273852	4510273852	4525856998	4525856993	4559863345	4559863325	4614152322
7490007	4614152325	4592464388	4592464241	4450146721-	4450141073-	4421980052-	4422000856-
7560007	4022594757-	4022595055-	4066906004-	4066905346-	4121586927-	4121587189-	4169322103-
7630007	4169321057-	4222341743-	4222342158-	4257961967-	4257960525-	4315732732-	4315733289-
7700007	4338622662-	4338620642-	4397198246-	4397206049-	4422505362-	4422502517-	4453196411-
7770007	4453207369-	4592768152	4592772080	4613382067	4613380559	4558655622	4558711148
7840007	3930982457	3930958685	3991692823	3991748207	4029605716	4029584515	4094994811
7910007	4095078787	4130647164	4130613548	4179406558	4179522112	4221591960	4221546945
7980007	4252868884	4253031714	4313357872	4313294754	4330738258	4330967621	4373381661
8050007	4372496908	4512734470-	4512702801-	4633272197	4633260034	4647293800	4647338571
8120007	3913405010	3913341007	3939567719	3939716677	4012823321	4012766264	4040975489
8190007	4041201514	4113288346	4113197862	4134201708	4134512775	4193861863	4192650850
8260007	4222674391	4223112567	4258466715	4256767721	4313030809	4313648128	4332726911
8330007	4330345620	4455416640-	4454564278-	4614399322	4614366583	4652663106	4652783610

TABLE 12 $\left[\beta_{21}\right]$ (continued)

8400007	3856254116	3857236064	3916995012	3916766542	3954098664	3954973954	4017688407
8470007	4017341659	4055764627	4057152766	4114886516	4114409283	4138830203	4140687710
8540007	4210096543	4194243612	4223261305	4225867850	4261606943	4252136654	4311618731
8610007	4315271835	4422791041-	4424098627-	4561069682	4561571919	4622570702	4622385837
8680007	3824861424	3825155551	3874924568	3874240239	3923970225	3924232403	3977925923
8750007	3976887299	4024747385	4025163177	4065463144	4064033670	4117296832	4117853205
8820007	4144151525	4142138130	4210468144	4211248891	4226557774	4223721117	4253963010
8890007	4264905230	4410167750-	4410559413-	4527031043	4527181479	4599639867	4599086137
8960007	3810213552	3810539547	3831326135	3830567620	3898551272	3910145715	3932694163
9030007	3931542992	4010124367	4010585215	4027658546	4026074187	4069841462	4076008313
9100007	4119018058	4116786471	4140729028	4149382473	4212003252	4188592077	4218597327
9170007	4230725293	4340831595-	4345172663-	4511163965	4511330703	4541536063	4540922330
9240007	3741405658	3742590010	3812663104	3812387534	3839947520	3841003238	3913208687
9310007	3912790462	3941072453	3942746731	4011161609	4010586005	4028395113	4030635547
9380007	4076510738	4068403308	4116663768	4119807597	4147930262	4136507834	4177782340
9450007	4212184365	4316615944-	4318193069-	4445219147	4445824913	4516798434	4516575463
9520007	3720980564	3721504844	3763963293	3762743427	3820238864	3820706200	3866677844
9590007	3864826485	3920827390	3921568545	3956273992	3953725957	4014433030	4015424802
9660007	4038443368	4034854444	4085278136	4099194972	4123882646	4118826265	4140733370
9730007	4160238050	4284541622-	4291523098-	4422891049	4423159204	4484896443	4483909412
9800007	3714775250	3715135020	3745020109	3744183016	3814252565	3814573259	3846925558
9870007	3845655122	3914669337	3915177930	3939594928	3937846421	4010169857	4010850428
9940007	4027032673	4024569890	4060160680	4069710661	4116768688	4113298909	4128850320
10010007	4142234770	4259580452-	4264371263-	4416117966	4416301979	4459759365	4459082047

TABLE 12 $\left[\beta_{21}\right]$ (continued)

7	4695380553-	4656139992-	4627982249-	4638480811-	4616048488-	4613129506-	4549089218-
70007	4557508092-	4527029997-	4525550469-	4514118330-	4514512210-	4514366120-	4524864210-
140007	4468778580	4514169180-	3915677599	3949631388	4015958582	4051393391	4114098661
210007	4137798336	4195428536	4223846650	4256575447	4313291742	4415353519-	4540972050
280007	4619876195	4653496248	4654170343	4623996120	4598830184	4540049051	4520283946
350007	4514283520	4656139987-	4694068282-	4638785286-	4629244637-	4613388569-	4615743101-
420007	4557163502-	4553371924-	4525537743-	4527779438-	4514721080-	4514476990-	4514455330-
490007	4525323120-	4470144910	4514577380-	3915539961	3949201347	4015819736	4050947407
560007	4113976439	4137470767	4194601704	4223640018	4256085303	4313176607	4415220547-
630007	4540617208	4619704055	4653032933	4654881088	4624209005	4610118976	4540906290
700007	4520663415	4514543920	4627982247-	4638785292-	4691951834-	4654594327-	4626323974-
770007	4635821576-	4612886840-	4611042120-	4553247860-	4561188354-	4531934900-	4530872890-
840007	4530932180-	4554444160-	4515089078	4531463180-	3868824687	3921864449	3970280711
910007	4022640787	4062120968	4116655533	4142050160	4210507938	4224929785	4258569920
980007	4367655299-	4518054333	4587584472	4623573127	4653027649	4651857367	4621800174
1050007	4588045962	4544430152	4531266420	4638480806-	4629244641-	4654594323-	4689826255-
1120007	4636732441-	4627119184-	4610243367-	4612832393-	4560038308-	4554523955-	4530513100-
1190007	4531765220-	4531369500-	4554106450-	4514960818	4530743440-	3869856727	3922177011
1260007	3971307600	4022968325	4063014766	4116894616	4142653550	4210658715	4225287483
1330007	4259410265	4368625948-	4518313357	4588841036	4623911329	4653330957	4652358234
1400007	4621473432	4587077563	4544136314	4531084030	4616048483-	4613388571-	4626323969-
1470007	4636732441-	4690652484-	4651471131-	4620048531-	4629928111-	4613852759-	4611370141-
1540007	4565807210-	4570745420-	4569445400-	4611875017-	4532802367	4566976290-	3830360407
1610007	3896393643	3930992731	3999830607	4027389345	4073432747	4118539438	4146328168
1680007	4210991246	4225822818	4329828456-	4479599490	4538615014	4610393126	4623211135
1750007	4650969105	4646947076	4619071280	4596850909	4568232670	4613129503-	4615743104-
1820007	4635821574-	4627119185-	4651471136-	4685614655-	4630468115-	4623344808-	4611382946-
1890007	4614065706-	4572010020-	4568071480-	4568513260-	4612134535-	4533654199	4570482530-
1960007	3829766939	3894548321	3930393631	3997909436	4026863522	4072024415	4118183936
2030007	4145439851	4210780495	4225327679	4329256501-	4478073188	4537874583	4610193842

TABLE 13 $[\beta_{22}]$

2100007	4622884377	4650294811	4648718736	4619652471	4599038500	4569678840	4549089176-
2170007	4557163494-	4612886836-	4610243364-	4620048527-	4630468108-	4680078237-	4643033479-
2240007	4621914226-	4634308460-	4616608750-	4614626460-	4614942660-	4626999370-	4575046820
2310007	4615933810-	3810954643	3834794187	3911185171	3936031399	3998859347	4026505388
2380007	4066917831	4116722109	4139672804	4193207173	4310766540-	4428731332	4513938038
2450007	4537513860	4584180682	4618499791	4642427569	4643929177	4622044835	4615498020
2520007	4557508063-	4553371930-	4611042120-	4612832393-	4629928115-	4623344807-	4643033488-
2590007	4673478571-	4633769902-	4625746844-	4615293790-	4616831330-	4616451390-	4627956710-
2660007	4577168510	4615682620-	3811434494	3836308789	3911673454	3937602264	4010316629
2730007	4027659777	4069832178	4117450369	4141400570	4197266382	4311235426-	4429982589
2800007	4514545044	4539147598	4587562198	4619232571	4643324106	4644829862	4622798120
2870007	4616065530	4527029979-	4525537741-	4553247854-	4560038295-	4613852758-	4611382944-
2940007	4621914229-	4633769896-	4687156680-	4648221012-	4632548890-	4639603570-	4638040160-
3010007	4662979730-	4617330261	4634512810-	3754209386	3817213857	3855342884	3917827004
3080007	3948910630	4013113379	4033107110	4082731447	4119627826	4146113559	4253266649-
3150007	4414214611	4468957407	4518559704	4541523467	4591207962	4620575257	4646771896
3220007	4651330281	4636209730	4525550451-	4527779436-	4561188357-	4554523954-	4611370142-
3290007	4614065706-	4634308464-	4625746838-	4648221014-	4681833931-	4638954400-	4633519010-
3360007	4634417510-	4662601250-	4617413101	4637135200-	3754987114	3817463655	3856141850
3430007	3918084979	3949619322	4013303491	4033587117	4083930961	4119912410	4146782154
3500007	4254038951-	4414420705	4469957205	4518828798	4542210298	4592747547	4621156981
3570007	4648446693	4651120192	4635929800	4514118318-	4514721086-	4531934909-	4530513110-
3640007	4565807216-	4572010016-	4616608756-	4615293783-	4632548897-	4638954402-	4712946241-
3710007	4697812670-	4710350993-	4719554803-	4654613828	4711933479-	3729736922	3794438539
3780007	3830360574	3897799647	3926832913	3971941850	4018163037	4045387669	4110768110
3850007	4125298559	4229222845-	4377983381	4437831024	4510182122	4522812568	4550120476
3920007	4611395507	4626038237	4674257302	4711216076	4514512198-	4514476993-	4530872909-
3990007	4531765229-	4570745443-	4568071496-	4614626470-	4616831330-	4639603582-	4633519020-
4060007	4697812680-	4712750453-	4712111166-	4719707562-	4654115288	4710626574-	3729892785
4130007	3794928673	3830518852	3898308457	3926972359	3972315536	4018257375	4045623408

TABLE 13 $[\beta_{22}]$ (continued)

4200007	4110824038	4125429956	4229374624-	4378388418	4438027514	4510235006	4522916531
4270007	4550343595	4611406150	4626002762	4675018888	4711334533	4514366110-	4514455340-
4340007	4530932200-	4531369510-	4569445410-	4568513270-	4614942670-	4616451390-	4638040160-
4410007	4634417510-	4710350990-	4712111160-	4721799690-	4725427930-	4653443100	4716700190-
4480007	3729719540	3794379450	3830342140	3897739440	3926816270	3971897090	4018151730
4550007	4045359410	4110761400	4125282810	4229204650-	4377934840	4437807470	4510175780
4620007	4522786740	4550059500	4611349560	4625885380	4674511960	4715170520	4524864190-
4690007	4525323130-	4554444190-	4554106470-	4611875020-	4612134537-	4626999390-	4627956710-
4760007	4662979740-	4662601260-	4719554800-	4719707560-	4725427930-	4895294101-	4717289523
4830007	4725351550-	3751750510	3816434485	3852835060	3917019509	3946695630	4012519571
4900007	4031607940	4078985180	4118739030	4144025420	4250854600-	4413570937	4465834850
4970007	4517719280	4539685850	4587187140	4619786180	4645155530	4712957106	4723470220
5040007	4468778520	4470144930	4515089081	4514960819	4532802364	4533654196	4575046850
5110007	4577168480	4617330259	4617413101	4654613820	4654115280	4653443100	4717289521
5180007	4718429043-	4653692370	3714325029-	3745492273-	3814625253-	3847111660-	3912925808-
5250007	3934655400-	3987493880-	4021863875-	4051871490-	4112186669-	4214077054	4337565686-
5320007	4418223734-	4449048700-	4510985650-	4524134816-	4554777360-	4612502050-	4635860913-
5390007	4653833340-	4514169170-	4514577390-	4531463210-	4530743460-	4566976320-	4570482550-
5460007	4615933820-	4615682620-	4634512830-	4637135210-	4711933480-	4710626570-	4716700200-
5530007	4725351550-	4653692380	4721016650-	3729641620	3794134410	3830263010	3897485060
5600007	3926746560	3971710260	4018104570	4045241550	4110733440	4125217120	4229128770-
5670007	4377732340	4437709240	4510149340	4522734770	4549947950	4611344240	4625903130
5740007	4674131180	4715111290	3915677677-	3915540052-	3868825320-	3869857153-	3830360609-
5810007	3829767011-	3810954767-	3811434608-	3754209959-	3754987728-	3729737240-	3729893090-
5880007	3729719850-	3751751050-	3714325185	3729641920-	4712487882	4658183730	4617832386
5950007	4554323990	4516762172	4460609196	4422088771	4385980940	4332860029	4311255515
6020007	4219785483	4074378350-	3961342594	3926500356	3911264714	3849707502	3820625078
6090007	3783477458	3742223181	3729725650	3949631778-	3949202124-	3921864829-	3922177333-
6160007	3896395143-	3894549909-	3834794775-	3836309353-	3817214131-	3817463943-	3794440060-
6230007	3794930170-	3794380940-	3816434746-	3745493017	3794135880-	4658183727	4711897999

TABLE 13 $\left[\beta_{22}\right]$ (continued)

6300007	4656341226	4617163603	4552959901	4519149417	4469789256	4427165595	4410382095
6370007	4335561695	4262512039	4123499725-	4019383702	3983798375	3935714645	3915785618
6440007	3865500161	3826510285	3813408951	3794400650	4015959159-	4015820430-	3970283980-
6510007	3971310803-	3930994204-	3930395153-	3911185726-	3911674019-	3855345603-	3856144627-
6580007	3830362090-	3830520370-	3830343650-	3852837680-	3814625986	3830264510-	4617832383
6650007	4656341225	4711751563	4655178495	4617025843	4561562615	4522436241	4487333469
6720007	4433376940	4411432575	4320096730	4175548226-	4062316980	4026942264	4011484279
6790007	3950750910	3921058215	3885230402	3843109757	3830349800	4051393707-	4050947902-
6860007	4022641090-	4022968539-	3999831423-	3997910459-	3936031747-	3937602578-	3917827155-
6930007	3918085141-	3897800500-	3898309280-	3897740270-	3917019654-	3847112079	3897485880-
7000007	4554323972	4617163602	4655178496	4711407084	4654826097	4619824203	4572248501
7070007	4528122864	4510747945	4436814843	4364714906	4224327826-	4120066822	4086759466
7140007	4036986402	4016347485	3967831201	3927453754	3913886170	3897760340	4114098494-
7210007	4113976343-	4062120798-	4063014333-	4027389211-	4026863437-	3998859144-	4010316596-
7280007	3948910483-	3949619195-	3926832830-	3926972260-	3926816180-	3946695470-	3912925768
7350007	3926746460-	4516762168	4552959896	4617025842	4654826096	4710479639	4654380695
7420007	4619818824	4577145163	4529483197	4510098854	4417752249	4266734787-	4155046645
7490007	4123799789	4110146735	4044851121	4018610306	3975322724	3938098384	3926821730
7560007	4137799140-	4137471747-	4116656057-	4116895086-	4073434941-	4072026754-	4026506213-
7630007	4027660611-	4013113768-	4013303890-	3971943970-	3972317640-	3971899180-	4012519935-
7700007	3934656423	3971712340-	4460609171	4519149404	4561562595	4619824200	4654380692
7770007	4710019386	4653133859	4620682460	4579043843	4527074820	4447593424	4317891439-
7840007	4214758189	4163808882	4127204501	4112025443	4049897810	4020195449	4010214895
7910007	3971914100	4195429909-	4194603647-	4142051418-	4142654624-	4118539961-	4118184484-
7980007	4066919833-	4069834194-	4033108087-	4033588117-	4018163590-	4018257920-	4018152280-
8050007	4031608890-	3987496560	4018105110-	4422088750	4469789178	4522436228	4572248463
8120007	4619818820	4653133859	4695833269	4652217168	4619956259	4568356002	4512015947
8190007	4345170765-	4237259453	4216109542	4168682416	4130360450	4112597612	4050987095
8260007	4025789382	4018156050	4223846917-	4223640427-	4210508157-	4210658905-	4146329183-
8330007	4145440908-	4116722493-	4117450756-	4082733272-	4083932849-	4045388670-	4045624390-

TABLE 13 $\left[\beta_{22}\right]$ (continued)

8400007	4045360390-	4078986890-	4021864357	4045242530-	4385980863	4427165560	4487333430
8470007	4528122842	4577145134	4620682458	4652217165	4692168413	4649867591	4617081103
8540007	4530025984	4411287422-	4293107342	4240256046	4217162959	4175867194	4131479960
8610007	4112741086	4064444660	4045369820	4256577405-	4256087488-	4224930868-	4225288519-
8680007	4210991718-	4210780969-	4139674553-	4141402378-	4119628690-	4119913289-	4110768584-
8750007	4110824512-	4110761878-	4118739856-	4051873784	4110733913-	4332860012	4410382081
8820007	4433376925	4510747936	4529483186	4579043837	4619956259	4649867597	4685307394
8890007	4640524868	4571236564	4426779419-	4322089727	4295508311	4240719559	4217999683
8960007	4174687027	4130228566	4115289668	4110764113	4313292058-	4313176949-	4258571495-
9030007	4259411776-	4225823491-	4225328346-	4193209671-	4197268936-	4146114774-	4146783386-
9100007	4125299220-	4125430620-	4125283470-	4144026570-	4112186992	4125217770-	4311255515
9170007	4335561653	4411432568	4436814817	4510098851	4527074819	4568356010	4617081104
9240007	4640524864	4662203584	4616735918	4462914169-	4351896555	4322438320	4295664785
9310007	4242287695	4217546649	4171017656	4135920864	4125288720	4392375594	4391575560
9380007	4340705297	4341289299	4317946508	4317602389	4264777721	4267598777	4232048283
9450007	4232512941	4217582130	4217673450	4217571190	4230597030	4184695620-	4217525530
9520007	4211904129	4237610932	4312091381	4338936309	4410680808	4428635036	4472295106
9590007	4518065422	4542860161	4610069329	4625530636	4543724964	4436067186-	4415594001-
9660007	4366483985-	4329388592-	4312194357-	4249354988-	4224963834-	4217574840-	4524651239-
9730007	4524437744-	4510862568-	4511018413-	4447891835-	4446973520-	4417286501-	4418039326-
9800007	4385523657-	4386763641-	4346919500-	4347163190-	4346890290-	4381650930-	4322601785
9870007	4346768450-	4044750271-	4114138816-	4145454293-	4214637062-	4240151587-	4310764568-
9940007	4327177347-	4367911855-	4416112081-	4437852890-	4543724961	4625160422	4596248250
10010007	4541613936	4517741837	4478426050	4432541711	4413170811	4366618206	4346900030
10080007	4619876197-	4619704057-	4587584479-	4588841041-	4538615004-	4537874568-	4513938042-
10150007	4514545042-	4468957408-	4469957209-	4437831010-	4438027490-	4437807460-	4465834820-
10220007	4418223730	4437709210-	3961343227	4019383630	4062316076	4120066919	4155047318
10290007	4214758009	4237259620	4293107242	4322089546	4351896296	4459946220-	4615997126
10360007	4652726960	4633553155	4614305175	4563234629	4526238258	4510619575	4453714003
10430007	4437815310	4653496247-	4653032936-	4623573124-	4623911327-	4610393124-	4610193838-

TABLE 13 $\left[\beta_{22}\right]$ (continued)

10500007	4537513865-	4539147593-	4518559699-	4518828793-	4510182113-	4510234997-	4510175775-
10570007	4517719263-	4449048675	4510149333-	3926500347	3983797638	4026941406	4086759238
10640007	4123800069	4163807457	4216109373	4240255697	4295505516	4322437882	4425918387-
10710007	4569165224	4633553155	4665431782	4638501990	4617019429	4570619568	4528582302
10780007	4514456978	4510177888	4654170339-	4654881092-	4653027646-	4653330959-	4623211136-
10850007	4622884376-	4584180743-	4587562243-	4541523499-	4542210321-	4522812580-	4522916540-
10920007	4522786760-	4539685870-	4510985660	4522734780-	3911264634	3935714169	4011483794
10990007	4036986061	4110146816	4127203777	4168680837	4217162689	4240717939	4295662354
11060007	4411050140-	4529488150	4614305174	4638501991	4664651482	4638113268	4615817874
11130007	4564018467	4532379435	4522795370	4623996115-	4624209008-	4651857362-	4652358232-
11200007	4650969105-	4650294808-	4618499795-	4619232570-	4591207974-	4592747553-	4550120470-
11270007	4550343580-	4550059490-	4587187120-	4524134816	4549947930-	3849707102	3915785365
11340007	3950748494	4016347318	4044851342	4112025077	4130359578	4175865602	4217998914
11410007	4242286583	4348846067-	4513034944	4563234629	4617019430	4638113265	4662155403
11480007	4634751224	4614064514	4571135425	4550079820	4598830133-	4610118977-	4621800171-
11550007	4621473430-	4646947076-	4648718731-	4642427571-	4643324100-	4620575257-	4621156978-
11620007	4611395508-	4611406149-	4611349557-	4619786177-	4554777368	4611344236-	3820624881
11690007	3865499077	3921057185	3967830560	4018610360	4049896250	4112597238	4131479243
11760007	4174683751	4217546182	4320267940-	4454086534	4526238262	4570619580	4615817869
11830007	4634751224	4656600804	4631925214	4616143734	4611364874	4540049020-	4540906284-
11900007	4588045952-	4587077543-	4619071279-	4619652468-	4643929180-	4644829855-	4646771894-
11970007	4648446689-	4626038230-	4626002750-	4625885370-	4645155500-	4612502047	4625903110-
12040007	3783476532	3826509851	3885226209	3927453507	3975322908	4020194835	4050985583
12110007	4112740797	4130227229	4171015778	4282031683-	4421890778	4510619574	4528582303
12180007	4564018422	4614064512	4631925215	4655015877	4636843286	4625936320	4520283931-
12250007	4520663417-	4544430161-	4544136317-	4596850905-	4599038498-	4622044842-	4622798117-
12320007	4651330287-	4651120196-	4674257300-	4675018880-	4674511970-	4712957106-	4635860920
12390007	4674131170-	3742222726	3813408735	3843107615	3913886049	3938098501	4010214593
12460007	4025788611	4064443238	4115288996	4135919919	4241491778-	4411072395	4453714012
12530007	4514456986	4532379414	4571135433	4616143734	4636843295	4677198420	4674427080

TABLE 13 $\left[\beta_{22}\right]$ (continued)

12600007	4514283514-	4514543924-	4531266439-	4531084045-	4568232687-	4569678860-	4615498034-
12670007	4616065524-	4636209742-	4635929813-	4711216076-	4711334533-	4715170520-	4723470223-
12740007	4653833350	4715111291-	3729725335	3794399153	3830348290	3897759517	3926821822
12810007	3971912015	4018155501	4045368833	4110763641	4125288060	4229210720-	4377951026
12880007	4437815328	4510177897	4522795353	4550079831	4611364874	4625936337	4674427080
12950001	4713852372	4510177897	4522795353	4550079831	4611364874	4625936337	4674427080

TABLE 13 $\left[\beta_{22}\right]$ (continued)

7	3755980000	3756000000	3742600000	3740000000	3663000000-	3630000000-	3812700000-
70007	3813400000-	3816900000	3824000000	3914300000-	3912020000-	3914300000-	3913000000-
140007	3923000000	3915000000	3990000000	4012000000	4099000000-	4091000000-	4136000000
210007	4136000000	4213200000-	4214000000-	4233000000	4230000000	4260000000	4270000000
280007	3737400000	3737500000	3723900000	3721200000	3782000000	3783400000	3812900000-
350007	3813700000-	3825000000-	3816300000-	3886600000-	3859000000-	3932000000-	3926900000-
420007	3931000000	3932000000	3990000000	4012000000	4074000000-	4081000000-	4131000000
490007	4131000000	4212000000-	4211900000-	4210000000	4216000000	4260000000	4270000000
560007	3911260640	3911260130	3811481300-	3811493300-	3916448500	3916448700	3956133600
630007	3956130000	3965952000	3965888000	3939211000	3938968000	3856000000	3849000000
700007	3914200000-	3913440000-	3953600000	3949600000	4038930000-	4037110000-	4113796000
770007	4113163000	4146400000-	4146000000-	4216600000	4214600000	4221700000	4131000000
840007	3644360000-	3645280000-	3711521000-	3711121000-	3735730000	3734730000	3731560000-
910007	3726220000-	3813220000	3811770000	3772700000-	3722500000-	3756000000	3811400000-
980007	3919170000-	3911780000-	4012320000	3997300000	4056420000-	4046590000-	4121757000
1050007	4117586000	4174700000-	4160100000-	4222900000	4217300000	4020000000-	4122000000-
1120007	3527000000-	3535200000-	3578700000	3591200000	3624770000	3617100000	3517000000
1190007	3625800000	3769500000	3756800000	3749700000	3783400000	3824000000	3749600000
1260007	3847700000	3910590000	3930400000	3870600000	3730000000	3980120000	4011600000
1330007	4016050000-	4016400000-	4096100000	4138000000-	4210600000-	4210700000-	4118000000
1400007	3658200000-	3658790000-	3655470000-	3653980000-	3667720000	3664500000	3651800000-
1470007	3628300000-	3750300000	3738400000	3787500000-	3756600000-	3823190000	3810110000
1540007	3895400000-	3849600000-	3922850000	3861700000	4010810000-	3948300000-	4036280000
1610007	4012280000	4112210000-	4028500000-	4080000000-	4125000000-	4244500000-	4233900000-
1680007	3424700000	3414800000	3450000000-	3320000000-	3611380000	3584200000	3623100000
1750007	3629800000	3633400000	3567000000	3676000000	3716200000	3720100000-	3756100000-
1820007	3793400000	3821640000	3818600000-	3863700000-	3916600000	3934030000	3960860000-
1890007	4011480000-	4015900000	4038200000	4113300000-	4132400000-	4167000000	4212100000
1960007	3614054000-	3614309000-	3613540000-	3612820000-	3475000000	3530200000-	3490000000
2030007	3613500000	3685200000-	3713740000-	3713100000-	3616000000	3747200000-	3810800000-

TABLE 14 $[K_{21}]$

2100007	3815900000-	3790600000	3858000000-	3913880000-	3910340000	3945070000	3977110000-
2170007	4019670000-	4019700000	4059700000	4113500000-	4133000000-	4123000000-	4150000000
2240007	3422100000-	3415600000-	3431900000-	3432200000-	3513600000	3517800000	3532400000
2310007	3512500000	3558000000-	3450000000-	3620900000	3522000000-	3721200000-	3713900000-
2380007	3754800000	3730000000	3844110000-	3832970000-	3913540000	3898700000	3950800000-
2450007	3939140000-	4015990000	4012410000	4112000000-	4072000000-	4115900000	4023000000
2520007	3436400000-	3439300000-	3519270000-	3517440000-	3535300000-	3537600000-	3610450000-
2590007	3610370000-	3634400000-	3639000000-	3693000000-	3687700000-	3733700000-	3740700000-
2660007	3721400000-	3699000000	3852200000-	3858250000-	3896100000	3913080000	3945000000-
2730007	3960030000-	4012980000	4013230000	3980000000	3920000000-	4115400000-	4025000000
2800007	3327000000	3366000000	3377000000-	3374000000-	3469000000	3481000000	3474000000-
2870007	3467000000-	3611300000	3595000000	3460000000-	3570000000	3623000000	3530000000
2940007	3560000000	3649000000	3738500000	3711300000	3818500000	3819300000	3834700000-
3010007	3911300000-	3930500000-	3911900000-	4026000000	4051000000	4151000000	4149800000
3080007	3414800000-	3419000000-	3441200000-	3425200000-	3511400000-	3516500000-	3466000000-
3150007	3514500000	3618200000-	3627300000-	3533000000	3639000000	3722000000-	3732400000-
3220007	3727000000	3773200000	3823170000-	3840810000-	3892300000	3915020000	3946280000-
3290007	3972440000-	4015820000	4023880000	4112000000-	4115000000-	4110300000	4123100000
3360007	3312000000	3372000000	3324000000-	3410600000-	3483000000	3510700000	3523700000
3430007	3496000000	3536000000	3571000000	3638000000	3622500000	3679000000-	3611000000-
3500007	3751000000	3727300000	3815980000-	3772300000-	3911260000	3874600000	3942660000-
3570007	3933180000-	4012080000	3979400000	4023000000-	4012000000	4178300000	4172300000
3640007	3196000000	3132000000	3188000000-	3172000000	3290000000	3229000000	3332400000-
3710007	3293000000-	3420200000	3410100000	3447800000-	3414900000-	3525400000	3511900000
3780007	3579200000-	3531900000-	3636800000	3618960000	3711630000-	3652900000-	3750440000
3850007	3723490000	3820380000-	3811790000-	3910000000	3872000000	3818000000-	3825000000
3920007	3229500000	3181000000	3326020000-	3319160000-	3311500000	3265000000	3438930000-
3990007	3428870000-	3512210000	3498700000	3552580000-	3538540000-	3617370000	3612620000
4060007	3698660000-	3680450000-	3737880000	3729746000	3814621000-	3812241000-	3858170000
4130007	3846095000	3923538000-	3919989000-	4012180000	4010610000	4027180000-	4023650000-

TABLE 14 K Continued

$[K_{21}]$

4200007	3421800000-	3428600000-	3419100000-	3314000000	3512200000-	3521700000-	3541100000
4270007	3571000000	3627200000-	3643600000-	3653300000	3710240000	3734700000-	3750500000-
4340007	3777800000	3814330000	3841760000-	3866750000-	3918970000	3927440000	3987360000-
4410007	4012422000-	4033030000	4045730000	4117700000-	4123100000-	4127300000	4146500000
4480007			4310000000	4310000000	4270000000	4260000000	4210000000
4550007		4140000000	4150000000			4110000000-	4050000000-
4620007	4040000000-	4040000000-	4030000000-	4020000000-	4011000000-	4010000000-	3910000000-
4690007	3910000000-	3813000000	3814000000	3834000000-	3835600000-	3912680000-	3912100000-
4760007	4240000000	4250000000		4310000000-		4310000000-	4240000000
4830007	4230000000	4210000000		4190000000	4190000000	4130000000	4110000000
4900007	4110000000	4120000000	4090000000	4070000000	4040000000	4040000000	
4970007	3910000000	3830000000	3840000000	3747000000-	3719000000-	3821500000	3811900000
5040007	4220000000-	4210000000-	4230000000	4250000000	4310000000		4310000000
5110007		4230000000	4240000000	4210000000	4210000000	4210000000	4210000000
5180007	4110000000-	4130000000-			4090000000-	4090000000-	
5250007		3944000000-	3945000000-	3873000000	3871000000	3815000000-	3770000000-
5320007	4150000000-	4140000000-	4230000000-	4220000000-	4220000000-	4230000000-	4320000000-
5390007	4320000000-	4310000000-	4320000000-	4220000000-			4220000000-
5460007			4170000000-	4170000000-			4040000000-
5530007	4030000000-	4016000000	4016000000	3918500000	3917800000	3936400000	3937600000
5600007		4110000000	4220000000	4210000000	4210000000-		4310000000
5670007	4310000000	4320000000	4320000000	4310000000	4320000000	4310000000	
5740007	4240000000	4230000000	4230000000	4230000000	4140000000	4150000000	4120000000
5810007	4120000000	4044000000-	4044000000-	4027000000-	4026800000-	4025200000-	4025300000-
5880007	4110000000	4110000000	4120000000-	4110000000-	4210000000		4210000000
5950007	4240000000		4310000000	4310000000			4310000000-
6020007			4210000000-	4210000000-			4120000000-
6090007		4080000000	4070000000	4099000000	4098800000	4054600000	4055100000
6160007	4090000000-	4080000000-		4110000000-	4140000000-	4120000000-	4220000000-
6230007	4210000000-	4240000000-	4240000000-		4310000000-		4310000000-

TABLE 14 K Continued

$[K_{21}]$

6300007			4310000000	4310000000	4210000000	4220000000	
6370007	4210000000	4110000000-	4111000000-	4124800000-	4124600000-	4072000000-	4072000000-
6440007	4030000000	4030000000	4070000000-	4060000000-	4110000000	4120000000	4150000000-
6510007	4140000000-		4210000000	4210000000-	4230000000-		
6580007			4320000000-	4320000000-	4310000000-	4310000000-	4230000000-
6650007	4240000000-		4110000000-	4133800000	4133700000	4024000000	4027000000
6720007			4020000000-	4010000000-	4114000000-	4112000000-	4110000000-
6790007		4170000000-	4180000000-	4210000000-	4210000000-	4260000000-	4290000000-
6860007	4310000000-	4320000000-	4310000000-	4310000000-		4310000000-	4230000000-
6930007	4220000000-	4212000000	4190000000	4145000000-	4147000000-	4084000000-	4093000000-
7000007	3910000000				4030000000-	4040000000-	4120000000-
7070007	4110000000-	4110000000-	4110000000-	4214000000-	4212000000-		4210000000
7140007	4210000000-	4230000000-	4310000000-	4310000000-			
7210007		4130000000-	4150000000-	4129000000	4135000000	4116000000	4118000000
7280007	3840000000	3830000000	3910000000-		3920000000		
7350007	4010000000	4020000000-	4020000000-	4110000000		4110000000	
7420007	4160000000-	4160000000-		4210000000	4210000000	4210000000	
7490007	4310000000-	4210000000-		4160000000	4140000000	4130000000	4130000000
7560007	3863000000	3865000000	3814000000	3720000000	3820000000	3840000000	3961000000-
7630007	3961000000-	3980000000	4012000000	4039000000-	4026000000-	4030000000	4040000000
7700007	4146000000	4146000000	4135000000	4142000000	4212000000	4212000000	4130000000
7770007	4160000000	4210000000	4220000000	4310000000-	4290000000-	4311000000-	4310000000-
7840007	3724000000	3720000000	3798000000	3815600000	3842000000	3837000000	3897000000
7910007	3910600000	3880000000	3880000000-	4032900000	4028100000	4019000000-	4020000000-
7980007	4016000000	4020000000	4113000000	4090000000	4145000000	4144000000	4141000000-
8050007	4161000000-	4230000000	4220000000				
8120007	3718300000-	3717900000-	3640000000	3713000000-	3833000000-	3831200000-	3831000000-
8190007	3835000000-	3912100000-	3873000000-	3922000000-	3860000000-	3970000000-	3962000000-
8260007	4023000000	4021000000	3910000000	4013000000	4122900000-	4123700000-	4210100000
8330007	4210800000	4237000000-	4241000000-	4230000000-	4220000000-	4320000000-	4310000000-

TABLE 14 K Continued

$[K_{21}]$

8400007	3945287260-	3945288110-	3943038500-	3943036900-	3911715400-	3911721300-	3888780000-
8470007	3888580000-	3899190000	3898200000	3871900000	3869500000	3981360000-	3980420000-
8540007	3975600000-	3976180000-	4014580000-	4014130000-	4113733000-	4113463000-	4131490000
8610007	4130870000	4210740000-	4210970000-	4217800000	4218200000	4242000000	4120000000
8680007	3646340000-	3646840000-	3614190000-	3614630000-	3614400000-	3596000000-	3744580000-
8750007	3744110000-	3830640000	3829620000	3839430000-	3839630000-	3916870000	3915520000
8820007	3970960000-	3968450000-	4015670000	4014450000	4078590000-	4076080000-	4133094000
8890007	4131851000	4212400000-	4211720000-	4240700000	4238600000	4255100000	4238300000
8960007	3643670000-	3644160000-	3631180000-	3629570000-	3659390000	3647800000	3718630000
9030007	3721580000	3643000000-	3717300000-	3783100000	3812410000	3738600000-	3820320000-
9100007	3865900000	3912530000	3898000000-	3930440000-	4012400000	4020809000	4047490000-
9170007	4074440000-	4115720000	4126250000	4155000000-	4212300000-	4233900000	4252600000
9240007	3512300000-	3512200000-	3562000000-	3559000000-	3536000000-	3535000000-	3560000000-
9310007	3570000000-	3713000000-	3713300000-	3620000000	3610000000-	3815300000-	3815400000-
9380007	3710000000	3747000000	3917600000-	3917600000-	3934800000	3937400000	4016430000-
9450007	4018000000-	4067000000	4066000000	4152000000-	4150000000-	4220000000-	4216000000-
9520007	3393000000-	3414200000-	3471800000	3496500000	3519900000-	3526600000-	3559800000-
9590007	3521400000-	3622800000	3610200000	3614300000-	3637800000	3714300000	3667000000-
9660007	3720100000-	3750800000	3818770000	3780200000-	3832600000-	3864000000	3921460000
9730007	3917020000-	4013140000-	3826000000-	4044000000-	4077000000-	4169700000	4176800000
9800007	3452000000-	3444000000-	3478000000-	3479000000-	3523000000-	3525000000-	3559000000
9870007	3551000000	3652000000-	3660000000-	3712100000	3713400000	3781000000-	3778000000-
9940007	3818600000	3819100000	3910190000-	3910450000-	3946700000	3945100000	4021170000-
10010007	4022510000-	4076000000	4077900000	4144000000-	4141000000-	4211800000	4212300000

TABLE 14 K Continued

$[K_{21}]$

```
      7  5010000000  4240000000                4140000000- 4229000000  4225000000  4170000000
  70007  4229000000- 4070000000- 4181000000  4210900000  4187000000  4218700000- 4163000000-
 140007  4110000000  4221200000- 3768900000  3715400000  3745000000- 3786000000- 3815000000-
 210007  3921200000- 3880000000- 3954000000  4020300000- 3960000000  4010000000- 4190000000-
 280007  4270000000              4210000000- 4225000000- 4214000000- 4150000000- 4140000000-
 350001  4225500000
 360007              4999999998  4256000000- 4240000000- 4224000000  4225000000  4225000000-
 430007  4258000000- 4212500000- 4134000000- 4158000000- 4172000000  4230100000- 4136000000-
 500007  4166000000  4222200000- 3744300000  3732300000  3768000000  3830700000- 3833000000-
 570007  3917500000- 3926000000- 3985000000  4017600000- 4011000000  4010000000- 4216000000-
 640007  4240000000  4240000000  4290000000  4221000000  4255000000  4190000000  4210200000
 710001  4213900000
 720007  4243000000  4250000000  4999999991              4170000000  4224000000- 4233000000-
 790007  4227000000- 4216100000- 4233600000- 4219900000- 4230800000- 4255300000- 4268100000-
 860007  4216400000  4258000000- 3910804010  3833996000- 3947600900  3969049000  3964431000
 930007  3918490000  3821400000- 3754000000  3958200000- 3925600000- 4029800000  4122000000-
1000007  4218600000  4238000000- 4261000000- 4120000000  4226000000  4232000000  4218000000
1070001  4261100000
1080007  4224000000- 4254000000  4274000000- 4999999999  4271000000- 4257000000- 4263000000-
1150007  4287000000- 4212700000- 4248000000- 4221500000- 4080000000- 4226500000- 4231000000-
1220007  4211600000  4221200000- 3682250000- 3540000000  3741770000  3734400000- 3816590000
1290007  3821300000- 3847100000- 3917280000  3939000000- 3927500000- 4041700000  4144000000-
1360007  4222700000  4245000000- 4235000000  4245000000  4297000000  4232000000  4215800000
1430001  4252400000
1440007  4215300000- 4245000000  4170000000  4284000000  5010000000  4267000000  4234000000
1510007  4225000000  4213000000- 4226000000- 4220000000- 4236000000- 4241000000- 4284000000-
1580007  4211300000  4110000000  3445000000- 3618870000  3620200000  3722200000  3791500000
1650007  3774100000  3840300000  3914250000  3930070000  3930100000  4011700000  4126800000-
1720007  4210500000- 4213300000- 4291000000- 4271000000- 4281000000- 4214000000- 4219000000-
1790001  4264000000
```

TABLE [15] K

1800007	4121000000-	4243000000		4267000000	4231000000	4999999996	4210000000-
1870007	4212000000-	4222000000	4211000000-	4229000000	4190000000-	4262000000-	4241000000-
1940007	4162000000	4220000000-	3676450000-	3587500000-	3680700000	3628600000	3732600000
2010007	3774900000-	3731000000	3857600000-	3830600000-	3926800000-	3982000000	4118300000-
2080007	4213800000-	4257500000-	4292000000-	4216000000-	4213000000-	4217000000	4190000000-
2150001	4190000000						
2160007	4090000000-	4211400000	4226300000-	4221100000	4214000000-	4214000000	5010000000
2230007	4243000000	4224000000-	4261000000	4276000000-	4311500000-	4231000000-	4263000000-
2300007	4160000000-	4270000000	3414200000	3526800000	3622140000	3634900000	3662600000
2370007	3530000000-	3655000000	3794000000	3821900000	3831500000	3926500000-	3920000000-
2440007	4118000000	4210900000	4030000000	4150000000	4247000000-	4260000000-	4229000000-
2510001	4311600000						
2520007	4224100000-		4158000000-	4223300000-	4243000000-	4296000000-	4263000000-
2590007	4999999996	4226000000-	4259000000	4253000000	4315300000-	4323000000-	4230000000-
2660007	4160000000	4316200000-	3618345000-	3574000000-	3551200000	3622500000-	3712800000-
2730007	3724800000-	3793200000-	3829600000-	3820800000-	3862000000-	3950900000-	4059000000
2800007	4080000000-	4162000000	4148000000-	4285000000	4235000000	4272000000	4224000000
2870001	4316500000-						
2880007	4179000000	4154000000	4115000000-	4119000000	4212900000-	4219300000	
2950007	4254000000	4999999995	4277000000	4281000000-	4262000000-	4312500000	4332000000
3020007	4234000000-	4233000000-	3425200000-	3432000000	3528600000	3460000000	3512000000-
3090007	3632000000-	3632000000-	3753600000-	3741000000-	3815600000	3913500000-	4025000000-
3160007	4112500000-	4080000000-	4210200000-	4136000000	4228000000-	4264000000-	4240000000-
3230001	4275000000						
3240007	4181000000-	4152000000-	4117000000	4216600000-	4232800000-	4232700000-	4273000000-
3310007	4190000000-	4234000000-	4999999999	4272000000	4280000000-	4311000000-	4220000000
3380007	4239000000	4180000000-	3491800000-	3530300000-	3562500000-	3621900000-	3663200000-
3450007	3719100000-	3735500000-	3815680000-	3820300000-	3765000000	3929600000-	4034000000
3520007	4015000000-	4123000000	4194000000-	4221800000	4211000000	4238000000	4272000000
3590001	4314200000						

TABLE 15 $[K_{22}]$ Continued

3600007	4147000000-	4140000000-	4213400000-	4210500000-	4229300000-	4230100000-	4292000000-
3670007	4310600000-	4316400000-	4313500000-	4999999942	4390000000-	4336000000-	4333000000-
3740007	4320600000	4396000000-	3324000000	3415900000	3493000000	3513900000	3612200000
3810007	3553000000	3664000000	3710100000	3793000000	3782000000	3918700000-	4014400000
3880007	4119300000	4164000000	4210700000	4223800000	4221000000-	4315100000	4319200000
3950001	4210000000-						
3960007	4126000000-	4123000000	4214000000	4210700000	4236800000	4234000000	4247000000
4030007	4110000000	4318700000	4268000000	4320000000	4999999993	4356000000	4322000000-
4100007	4226000000-	4280000000	3428300000-	3470500000-	3512500000-	3563900000-	3619200000-
4170007	3642600000-	3713000000-	3726600000-	3640000000-	3812000000-	3790000000-	4035600000-
4240007	4112600000-	4130000000	4215200000-	4123000000-	4295000000-	4312100000-	4315400000-
4310001	4320000000						
4320007	4147000000-	4171000000-	4195000000-	4159000000-	4229600000-	4228500000-	4271000000-
4390007	4310700000-	4310700000-	4320200000-	4383000000-	4414200000-	4999999934	4371000000-
4460007	4326100000	4416600000-	3336000000	3423700000	3519000000	3528500000	3615400000
4530007	3617800000	3671000000	3711900000	3815400000	3712000000	3917800000-	4020200000
4600007	4123700000	4210700000	4213100000	4220200000	4259000000-	4316600000	4321400000
4670001							
4680007	3977000000-	3928000000-	3999000000-	3977000000-	4013500000-	4020000000-	4039000000-
4750007		4028000000-	4111000000-	4155000000-	4138000000-	4155000000-	5010000000
4820007	4111500000	4155000000-	3177000000	3217400000	3217000000	3317000000	3377000000
4890007	3413700000	3460000000	3477000000	3566000000	3550000000	3677000000-	3812900000
4960007	3899000000	3850000000	3949000000	4015900000	4011000000-	3950000000	4118000000
5030001	4155000000						
5040007	4047600000-	4027600000-	3923000000-	4033200000-	4041500000	4025000000-	4164100000-
5110007	4110100000-	4087000000	4128400000-	4124000000-	4218400000-	4125000000-	4119000000-
5180007	5010000000	4111000000-	3266300000-	3323660000-	3384500000-	3410900000-	3424700000-
5250007	3513730000-	3579400000-	3512600000-	3554000000-	3634000000-	3771000000-	3836900000
5320007	3940200000	4025000000-	4053600000-	4110310000	4130100000	4050000000	4111000000
5390001	4128000000						

TABLE 15 $\left[\begin{matrix} K \\ Z2 \end{matrix}\right]$ Continued

5400007	4155000000-	4114000000	4216300000	4219100000	4230000000	4221800000	4310900000
5470007	4227000000-	4321900000	4214000000		4382000000-	4381000000	4395000000-
5540007	4227000000	4999999914	3427300000-	3446400000-	3427000000-	3535500000-	3617800000-
5610007	3615000000-	3716400000-	3712300000-	3768000000	3821800000-	3854000000	4027300000-
5680007	4113700000-	4169000000	4216400000-	4127000000-	4310900000-	4315000000-	4310900000-
5750001	4341000000						
5760007	3930664000	3932912000	3941269000	3934799000	3915590400	3917116200	3862411000
5830007	3860731000	3828948000	3830680000	3816380200	3816241900	3816190500	3828301000
5900007	3778373000-	3816261400	5010000000	4310000000	4210000000	4210000000	
5970007	4120000000-	4070000000-	4040000000-	4020000000-	3940000000-	3850000000-	3818000000-
6040007	3876100000-	3922113000-	3939897000-	3927131000-	3911303500-	3845690000-	3823090000-
6110001	3816253100-						
6120007	3874700000-	3911160000-	3929733000-	3916994000-	3882250000-	3911475000-	3841080000-
6190007	3834650000-	3816698000-	3819394000-	3810093000-	3797300000-	3797530000-	3817185000-
6260007	3747640000	3799430000-		4999999980		4210000000	4210000000
6330007	4140000000	4130000000	4111000000	4060000000	4010000000		3827000000
6400007	3719000000-	3856100000	3915910000	3916469000	3869080000	3827806000	3814020000
6470001	3798640000						
6480007	3877900000	3911210000	3929550000	3916300000	3878260000	3911264000	3839880000
6550007	3833030000	3815870000	3818670000	3796740000	3793040000	3793260000	3816460000
6620007	3745640000-	3795450000	4210000000-	4310000000	5010000000		
6690007	4210000000	4120000000-		4110000000-	4020000000-	4010000000-	3915000000-
6760007	3833000000	3856800000-	3915170000-	3916030000-	3866780000-	3826680000-	3813430000-
6830001	3794320000-						
6840007	3866000000-	3820000000-	3925410000	3914810000	3876200000	3899900000	3837500000
6910007	3832700000	3816100000	3818230000	3796200000	3792500000	3793300000	3816340000
6980007	3745300000-	3793600000	4220000000-	4260000000-		4999999960	4310000000-
7050007	4230000000-		4190000000-	4110000000-	4110000000-	4010000000	3990000000
7120007	3939900000	3921200000	3910600000-	3914590000-	3862800000-	3826060000-	3813310000-
7190001	3794400000-						

TABLE 15 [K 22] Continued

7200007	4010540000	4010240000	3966600000	3952600000	3923400000	3928100000	3898300000
7270007	3891800000	3842500000	3846500000	3824100000	3824100000	3823700000	3841800000
7340007	3811590000-	3824500000	4130000000	4210000000	4210000000	4310000000	5010000000
7410007		4250000000	4240000000	4220000000	4150000000	4030000000	4051000000-
7480007	4031100000-	4018100000-	3975300000-	3942000000-	3917620000-	3869800000-	3834400000-
7550001	3823900000-						
7560007	4022300000-	4020400000-	3977300000-	3985300000-	3935000000-	3936700000-	3912900000-
7630007	3913500000-	3858900000-	3860800000-	3830500000-	3832100000-	3831100000-	3854800000-
7700007	3815200000	3833100000-		4140000000-	4210000000	4220000000	
7770007	4999999990	4310000000-	4230000000-	4220000000-		4110000000-	4118400000
7840007	4080100000	4039000000	4013600000	3956100000	3924500000	3897500000	3845900000
7910001	3831100000						
7920007	4028900000	4026600000	3962000000	3991000000	3930700000	3933400000	3910900000
7990007	3912300000	3840000000	3841000000	3816800000	3822700000	3820100000	3837000000
8060007	3810500000-	3829200000	4110000000-	4120000000-	4210000000-	4230000000-	
8130007		4999999990				4150000000	4146000000-
8200007	4114500000-	4051700000-	4014800000-	3948000000-	3922300000-	3887000000-	3833000000-
8270001	3820700000-						
8280007	4011000000-	4011000000-	3954000000	3840000000-	3919000000	3860000000	3892000000
8350007	3859000000	3910900000	3911300000	3869000000	3844000000	3848000000	3886000000
8420007	3822000000-	3813000000	4010000000	4110000000-	4120000000	4210000000-	4210000000
8490007			4999999980	4320000000-	4290000000-	4230000000-	4165000000
8560007	4113100000	4021000000	3916000000-	3933000000-	3860000000-	3860000000-	3869000000-
8630001	3848000000-						
8640007	4098000000	4110200000	3980000000	4031000000	3967000000	4011200000	3914000000
8710007	3932000000	3919000000-	3923000000-	3913200000-	3816000000-	3831000000-	3880000000-
8780007	3812000000	3912200000	4010000000-	4050000000-	4120000000-	4110000000-	4220000000-
8850007	4230000000-	4320000000-	4320000000-	4999999980			4130000000-
8920007	4121000000-	4112300000-	4044000000-	4010000000-	3976000000-	3918000000-	3875000000
8990001	3838000000						

TABLE 15 [K, 22] Continued

9000007	4117100000-	4120700000-	4057000000	4017000000-	4024000000	3910000000-	3994000000
9070007	3922000000	4015000000	4016600000	3992000000	3943000000	3948000000	3997000000
9140007	3921800000-	3913000000-	3910000000-	4020000000-	4080000000-	4120000000-	4130000000-
9210007	4210000000-	4210000000		4320000000-	5010000000		4210000000
9280007	4129000000	4117000000	4011000000	4037000000-	3920000000	3937000000-	3987000000-
9350001	3953000000-						
9360007	4131000000-	4136000000-	4155000000-	4130000000-	4122000000-	4116000000-	4083000000-
9430007	4067000000-	4070000000-	4074000000-	4042000000-	4028000000-	4029000000-	4054000000-
9500007	4013800000	4012000000-	3830000000	3910000000			4030000000-
9570007		4140000000-		4220000000	4210000000-	4999999992	4210000000-
9640007	4120000000	4170000000	4155000000	4136000000	4110600000	4053000000	4047000000
9710001	4030000000						
9720007	4250000000	4250000000	4236000000	4227000000	4214000000	4213000000	4160000000
9790007	4160000000	4139000000	4142000000	4120000000	4115000000	4117000000	4129000000
9860007	4080000000-	4090000000	3864000000	3810000000-	3911000000-	3940000000-	3930000000
9930007	4031000000-	4120000000	4164000000	4160000000	4213000000		5010000000
10000007	4312000000-	4280000000-	4240000000-	4224000000-	4170000000-	4142000000-	4126000000-
10070001	4117000000-						
10080007		4310000000	4210000000-	4210000000	4210000000-		
10150007	4210000000	4210000000-	4190000000-	4170000000-	4150000000-	4130000000-	4211000000-
10220007	4120000000	4120000000-	3770000000	3825000000	3862000000	3890000000	3996000000
10290007	4026000000	4026000000-	4087000000	4120000000	4144000000	4150000000	
10360007	499999999C	4310000000-				4140000000	4170000000
10430001	4150000000						
10440007	4320000000	4320000000	4314000000	4312000000	4314000000	4312000000	4236000000
10510007	4222000000	4242000000	4236000000	4232000000	4237000000	4219000000	4250000000
10580007	4212000000-	4223000000	3722000000-	3793000000-	3849000000-	3840000000-	3916000000-
10650007	3925000000-	3946000000-	4032000000	4089000000-	4060000000		4310000000-
10720007		4999999980	4318000000-	4315000000-	4270000000-	4240000000-	4237000000-
10790001	4227000000-						

TABLE 15 [K 22] Continued

```
10800007  4323400000  4323900000  4317100000- 4311400000- 4311900000- 4311300000- 4310960000-
10870007  4322860000- 4293700000- 4260400000- 4244300000- 4238500000- 4312590000- 4311300000-
10940007  4236300000  4312780000- 3959340200- 3928264900- 3877610000- 3869400000- 3918230000
11010007  3931260000- 4011087000- 3979500000- 4060520000- 4038840000- 4088000000  4215400000-
11080007  4229000000  4310200000- 5010000000  4318000000  4320500000  4289000000  4277200000
11150001  4312890000
11160007  4322500000- 4320100000- 4321200000- 4282000000- 4324900000- 4331000000- 4326300000-
11230007  4318600000- 4269900000- 4320630000- 4280500000- 4270100000- 4290600000- 4316240000-
11300007  4243800000  4271500000- 3651560000- 3567000000  3718300000- 3746600000  3822020000
11370007  3820000000- 3772000000- 3947820000- 3924900000- 3922400000  3850000000- 4152000000-
11440007  4261100000  4248000000  4310500000  5010000001  4329000000  4318100000  4255500000
11510001  4314240000
11520007  4250900000- 4160000000  4316500000- 4258000000- 4315200000- 4266000000- 4255000000
11590007  4260000000  4248000000  4316400000  4289000000  4256000000- 4319400000- 4314900000-
11660007  4121000000  4190000000  3653680000- 3580400000  3713580000  3718870000  3718400000
11730007  3795600000  3811400000  3864200000  3923050000  3910300000  3999000000- 4126600000
11800007  4180000000  4266000000  4213000000- 4325700000  4999999992  4260000000- 4272000000-
11870001  4190000000
11880007  4216000000  4220000000  4231000000  4231000000  4260000000  4250000000  4220000000
11950007  4330000000              4322000000  4290000000- 4332000000- 4270000000  4337000000
12020007  4270000000- 4311000000- 3530100000- 3575000000- 3516000000- 3650000000- 3713800000-
12090007  3738000000- 3816200000- 3840000000- 3872000000- 3817000000- 3915000000  4114000000-
12160007  4212000000- 4219000000- 4272000000- 4260000000- 4260000000- 4999999984  4310000000-
12230001  4315000000-
12240007  4146000000- 4131000000  4165000000- 4216500000- 4165000000  4192000000  4291000000-
12310007  4237000000- 4314000000- 4239000000  4313800000  4315700000  4318500000- 4320000000
12380007  4310400000  4318700000  3415000000  3438000000  3547900000- 3534000000  3622100000
12450007  3623000000  3715300000  3732200000  3810500000  3829200000  3923600000- 4045000000-
12520007  4112800000  4174000000  4136000000- 4225100000  4271000000- 4262000000  5010000000
12590001  4332100000
```

TABLE 15 $\begin{bmatrix} K \\ zz \end{bmatrix}$ Continued

12600007	4120000000-	4110000000-	4230000000	4238000000	4255000000	4244000000	4314000000
12670007	4260000000-	4347000000	4220000000	4320000000-	4422000000-	4418000000	
12740007	4240000000-	4420000000-	3470000000-	3513100000-	3450000000-	3611000000-	3625000000-
12810007	3656000000-	3731000000-	3754000000-	3821000000	3859000000-	3830000000	4069000000-
12880007	4113000000	4218000000	4224000000	4170000000	4337000000	4313000000	4355000000
12950001	4999999920						

TABLE 15 $[K_{ZZ}]$ Continued

7	5011400000-	5011400000	4979900000-	4979900000	4979600000-	4979600000	4979600000-
70007	4979600000	4979400000-	4979400000	4979400000-	4979400000	4979400000-	4979400000
140007	4979400000-	4979400000	4979400000-	4979400000	4979400000-	4979400000	4979700000-
210007	4979700000	4979700000-	4979700000	4980000000-	4980000000	4980000000-	4980000000

7	4980300000-	4980400000	4974900000-	5018580000-	5021910000-	5010010000-	5010020000-
70007	5010020000	4970900000-	4971000000	4930100000-	4930100000	5000000000-	5000000000-
140007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
210007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
280007	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000
350001	5000000000	5000000000	5000000000	5000000000	5000000000	5000000000	V000000000

ERRORS

431	433	433	4312	4316	424	431
4311	4314	4311	4312	4316	4316	4314
4318	429	425	427	427	429	422
429	423	425	423	423		
434	4325	4332	431	437	431	431
431	4318	4319	425	4332	43141	5
5	43641	4228	5	4224	4263	422
4232	43119	4254	4277	4233	4213	4314
431	437	4353	4397	4311	4321	43205
44132						

DEAD LOAD

TABLE 16 P

7	4917750000	4844300000	4910700000	4910700000	4914370000	4914370000	4918040000
70007	4918040000	4921710000	4921710000	4925380000	4925380000	4929050000	4929050000
140007	4932730000	4932730000	4936400000	4936400000	4940070000	4940070000	4943740000
210007	4943740000	4947410000	4947410000	4951080000	4951080000	4954750000	4954800000

7	4957230000	4959630000	4959610000	5010228000	4971290000	5012926000	4975270000
70007	4999730000	5010460000	5012480000	5010260000	5011720000		
140007							
210007							
280007							
350001							

ERRORS

423	423	4326	4316	431		
	432		432	432	433	436
432	434		434	432	432	434
431	432	433			431	434
428	4343	4312	433	4337	433	431
4346	432	434	4424	435	44321	42116
42362	4355	5	5	5	434	433
5	434	433	433	434	5	434
5	4412	44133	44115	423	431	4314
4423						

WIND LOAD

TABLE 16 P Continued

1	4718350400
10001	4718350398-
20001	4616593786
30001	4616593816-
40001	4656689659
50001	4656689664-
60001	4648447787
70001	4648447695-
80001	4640946967
90001	4640946682-
100001	4634405235
110001	4634404495-
120001	4632364558
130001	4632362574-
140001	4629525592
150001	4629520753-
160001	4627531288
170001	4627519121-
180001	4625688998
190001	4625660870-
200001	4623629615
210001	4623563167-
220001	4620594942
230001	4621753312-
240001	4636590159
250001	4562925110-
260001	4671951642
270001	4639109949

TABLE 17 Ψ

1	4716506810
10001	4710433492
20001	4725819927
30001	4731905150
40001	4733149767
50001	4727934267
60001	4713148048
70001	4696007014
80001	4670536387
90001	4639861273
100001	4635911488
110001	4623663367
120001	4625935978
130001	4651050482
140001	4614317552-
150001	4632060056
160001	3915631083-
170001	3985935341-
180001	4022508974
190001	4096244745
200001	4125578872
210001	4168174076
220001	4217080179
230001	4242525354
240001	4310075014
250001	4323644544
260001	4416424121-
270001	4543829807
280001	4635339809
290001	4695116144

TABLE 17 Ψ Continued

300001	4721166479
310001	4729712130
320001	4720635817
330001	4682044307
340001	4641749594
350001	4629261144

TABLE 17 Ψ Continued

1	4661033034-
10001	4636087721-
20001	4654380552-
30001	4660595715-
40001	4673838391-
50001	4672302822-
60001	4690587163-
70001	4690967007-
80001	4711009813-
90001	4711001719-
100001	4712612049-
110001	4712614100-
120001	4714205467-
130001	4714204980-
140001	4715314205-
150001	4715314341-
160001	4715527602-
170001	4715527518-
180001	4713655906-
190001	4713656104-
200001	4667862418-
210001	4667854990-
220001	4624774213-
230001	4624800706-
240001	4689423160-
250001	4689321436-
260001	4717989203-
270001	4718026645-

TABLE 17 Ψ (continued)

1	4723374805-
10001	4723238309-
20001	4727446307-
30001	4728462401-
40001	4729853202-
50001	4731251790-
60001	4728415647-
70001	4728935689-
80001	4731978281-
90001	4732345135-
100001	4737940127-
110001	4738228460-
120001	4737989561-
130001	4766108715-
140001	4718298175
150001	4737845406-
160001	4653024257-
170001	4665279370-
180001	4681923847-
190001	4710041736-
200001	4711809421-
210001	4713409149-
220001	4714759749-
230001	4715420916-
240001	4714591782-
250001	4710220937-
260001	4627870734-
270001	4634342660-
280001	4713472577-
290001	4720657239-

TABLE 17 Ψ (continued)

300001	4725640420-
310001	4729280777-
320001	4729684667-
330001	4730451228-
340001	4735134350-
350001	4737973092-

TABLE 17 Ψ (continued)