DOCUMENT RESUME

ED 104 698 SE 018 976

TITLE	METRO-APEX Volume 2.1: Computer Operator's Manual. Revised.
INSTITUTION	University of Southern California, Los Angeles. COMEX Research Project.
SPONS AGENCY	Environmental Protection Agency, Research Triangle Park, N.C. Control Programs Development Div.
PUB DATE	74
NOTE	267p.; Update to ED 064 531. Related documents used in METRO-APEX 1974 are SE 018 975 - 995. Best Copy Available; Occasional Marginal Legibility
AVAILABLE FROM	The computer tape described in this volume is available from COMEX Project, The John and Alice Tyler Building, 3601 South Flower Street, Los Angeles, CA 90007
EDRS PRICE	MF-$0.76 HC-$13.32 PLUS POSTAGE
DESCRIPTORS	City Problems; Computer Assisted Instruction; *Computer Programs; *Environmental Education; Environmental Influences; Games; *Higher Education; Management Games; Pollution; Professional Training; Role Playing; Simulated Environment; *Simulation; *Urban Environment
IDENTIFIERS	COMEX Project; *Environmental Management

ABSTRACT

The Computer Operator's Manual is one of a set of twenty-one manuals used in METRO-APEX 1974, a computerized college and professional level, computer-supported, role-play, simulation exercise of a community with "normal" problems. Stress is placed on environmental quality considerations. APEX 1974 is an expansion of APEX--Air Pollution Exercise (ED 064 530-550; ED 075 261; ED 081 619), and includes roles for an environmental quality agency, water quality manager, solid waste manager, and various pressure groups, in addition to the previously developed roles of city and county politicians, city and county planners, air pollution control office, developers, industrialists and newspaper. Two industries have been added, as have a number of program options. The participants may range in number from 17 to 100. Each run of the game should consist of at least three cycles (simulated years), the optimum being five cyceles. Each cycle should span at least a three-hour period. A cycle is composed of two major phases: the first is the game simulation; in the second phase, decisions emerging out of the game simulation are analyzed by a computerized system of integrated simulation models. The METRO-APEX computer program is in Fortran IV and runs on an IBM 360-50 or higher series computer. (BT)

METRO APEX

volume 2.1

Computer Operator's MANUAL

revised 1974

METRO-APEX

1974

A Computerized Gaming Simulation Exercise
For Training in Environmental Management
and Urban Systems

Developed by the
COMEX Project
University of Southern California

through a grant form the
Control Programs Development Division
Environmental Protection Agency

A revised version of the APEX Air Pollution Exercise
developed jointly by the
COMEX Project, University of Southern California
and
Environmental Simulation Laboratory, University of Michigan
June 1974

ACKNOWLEDGEMENTS

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PREFACE

PREFACE

METRO-APEX is the result of a long term research and development effort by a number of dedicated individuals. The inspiration, and much of the technical basis evolved from a similar exercise (M.E.T.R.O.) originally developed by the Environmental Simulation Laboratory, University of Michigan. In 1966, a grant from the Division of Air Pollution Control, U.S. Public Health Service was awarded to the COMEX Research Project, University of Southern California, to develop a dynamic teaching instrument, METRO-APEX. Working in close cooperation, the COMEX Research Project and the Environmental Simulation Laboratory successfully developed the initial version of the METRO-APEX exercise in 1971. This computer-based gaming simulation was designed to provide a laboratory urban community in which air pollution management trainees could apply and test the knowledge and skills gained through conventional educational methods.

METRO-APEX has proven to be highly adaptable to training programs dealing with the many aspects of air pollution control including law, management, air quality monitoring, land use planning, budget preparation, citizen participation programs, state and federal grant procedures, and political decision-making processes. As a result, METRO-APEX is in great demand as a valuable supplement to university training programs, and in many cases is being used as a central curriculum focus. Over 60 universities have been trained in the use of METRO-APEX. It has also been translated into French and Spanish and is being used in seven countries outside of the United States.

Based on the success of the initial METRO-APEX program, COMEX was awarded a grant from the Control Programs Development Division of the Environmental Protection Agency to substantially revise and broaden the simulation exercise to encompass the wide spectrum of environmental management issues. This current version, of which this manual is a part, was completed in June 1974 and greatly increases the utility and teaching potential of the exercise. In this version, the interrelationships among air, water and solid waste are demonstrated, the strategies and options available to players have been broadened, new roles have been added, the exercise materials have been updated to reflect the latest technology and nomenclature, and many of the operational problems associated with the earlier version have been rectified.

METRO-APEX is one of, if not the most complex gaming-simulations of an urban area in use today. Although it was designed to supplement standard teaching methods, APEX is far more than an educational tool. It is a communication channel of a new level--capable of providing both the language and the forum for information transfer between persons and groups with different educational and cultural backgrounds as well as different perspectives of the urban situation.

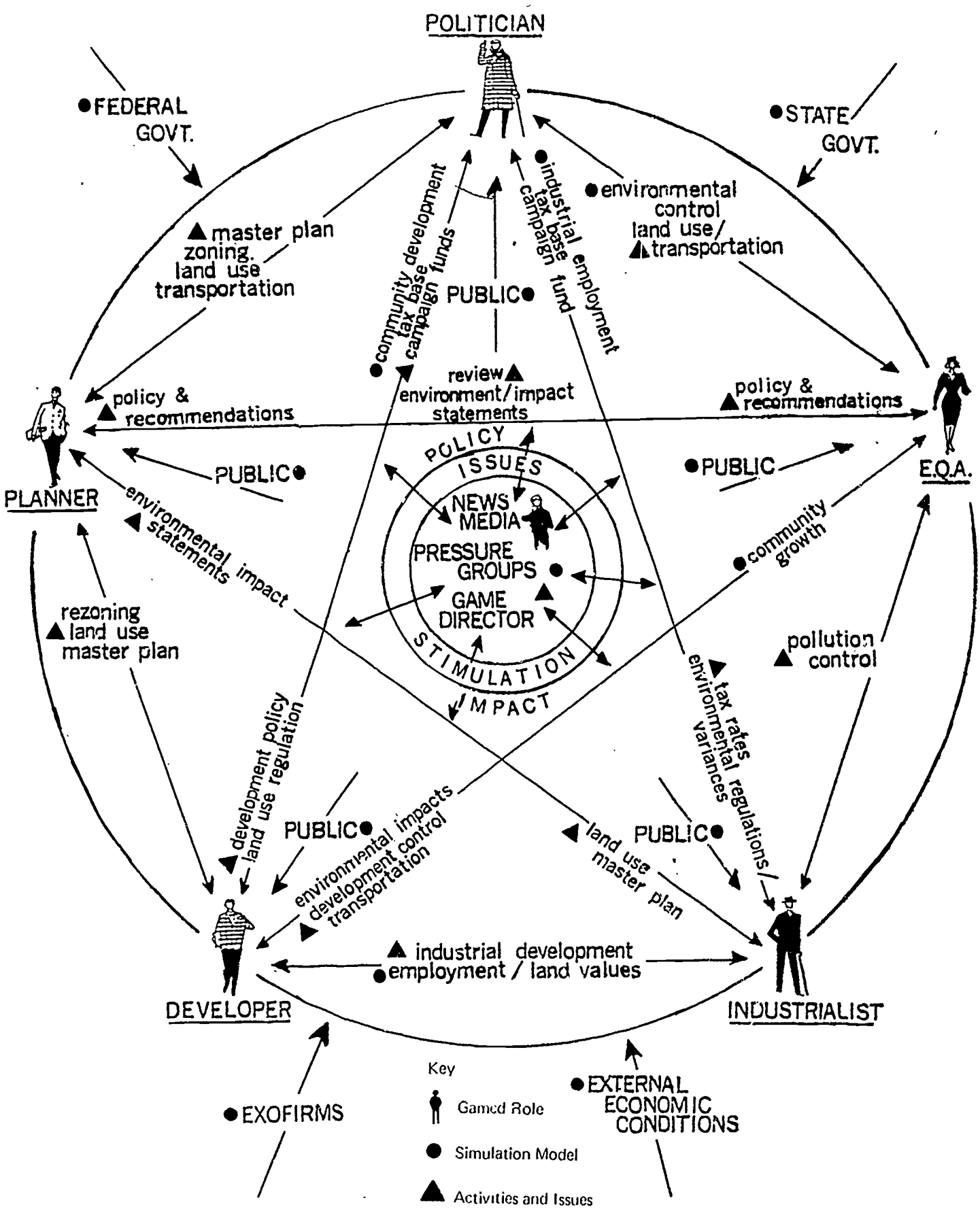
METRO-APEX is composed of two essential components: (1) a computerized system made up of a series of well-integrated simulation models linked to a (2) "gamed" environment encompassing a series of interactive roles. The computerized system predicts the changes that occur in several sectors of the urban system in response to the decisions made by participants in the "gamed" environment, decisions made by persons outside the "gamed" environment (other actors whose behavior is simulated in the computer), and external pressures on the metropolitan area (also simulated in the computer).

The County of APEX is run year by year by principle decision makers performing both the mundane and extraordinary functions of their office in the "gamed" environment. Each cycle or year is condensed in time to a three to eight hour session during which the decision makers formulate their yearly policy. The decisions that emerge out of the "competitive--cooperative" environment of the gaming-simulation are used as priming inputs to the computer simulation. The change in the status of the urban area is calculated by the computer and returned to the decision makers as the primary input to the next cycle of action. Included in the change picture generated by the computer are selected social, economic and physical indicators which show the magnitudes of change in key areas and a newspaper which serves as the focal point of local public opinion.

The key decision makers acting in the gamed environment include an Environmental Quality Agency with departments of Air Pollution, Water Pollution and Solid Wastes; Politicians, Planners and Administrative Officers from a Central City and a County; Land Developers and Industrialists from the private sector; and representatives from the News Media and Pressure Groups. The Politicians are responsible for the administration of their respective jurisdictions and for the formulation and implementation of various programs to upgrade the social status of their constituents. The Planners serve as aides to the Politicians and represent the major long range coordinating force in the community. The Environmental Control Officers are charged with the task of monitoring and alleviating the pollution problems. The private business sectors operate to foster their own interests and frequently those of the community. Pressure Groups and News Media advocate various positions on community issues. Generally, each decision maker finds it to his advantage to coordinate and/or compete with other players in his efforts to promote his strategies. The METRO-APEX General Interaction Diagram included here indicates possible linkages among the roles.

In general, people have great difficulty understanding the dynamics of a complex system through traditional means. Gaming-simulation offers participants the opportunity to study, work with, and discuss the structure of such a system and to experiment with intervention strategies designed to change that structure. When used as a teaching device, the strength of a gaming-simulation such as METRO-APEX lies in the opportunity afforded participants for involvement in the system. When compared with the passive observation of the system offered by traditional methods, this approach has had great success.

METRO-APEX INTERACTION DIAGRAM



CHAPTER 1

Chapter 1

INTRODUCTION

This volume contains the instructions and technical support material needed for processing the METRO-APEX game decisions on an IBM 360/370 computer.

The 360/370 series of IBM computers includes a wide range of sizes, speeds and variety of peripheral equipment (card readers, printers, tape drives, disk storage units and other off-line storage devices). Despite this complexity, no special skills in operating a computer or in computer programming are required to prepare METRO-APEX player decisions for submission to the computer. Because of variations in Operating System control cards and in system configuration from one installation to another, the basic sections of this manual are written on the assumption that the METRO-APEX programs have been installed and are correctly operating at your computer installation. Where certain instructions may be installation dependent, space has been provided for you to write in the correct procedure for your installation after consultation with a representative from that installation.

This volume takes the game operator from the worksheets filled out by players of the game through the complete card deck which must be submitted for computer input. It discusses the various program options and utility support features of the METRO-APEX system.

CHAPTER 2

Chapter 2

PREPARING THE COMPUTER INPUT

The first step in the computer processing is the preparation of the input cards. There are eleven possible sets of input cards. Figure 1 shows the final arrangement of these sets of cards in the order in which they should be arranged for submission of a complete run to the computer. Some of these sets of cards may be only a single card, but they are shown separately because they must be included in exactly the location shown. Not all of the eleven sets of cards will always be required for the program to operate correctly; the following discussion will indicate the circumstances in which they may be omitted.

There are two main sections of the METRO-APEX cycle processing program. The first section processes the main player decisions and produces the bulk of the computer output. The second section prints the METRO-APEX NEWS, the newspaper based on the factors calculated in the first section and on actions taken by players on issues raised in the newspaper the preceeding cycle. The second section also includes the Candidate Election Model.

Since the main player decision cards (input set #5) constitute the bulk of the program input, are the most time-consuming to prepare and the most frequent sources of error, they should be prepared first. They may then be submitted for running (along with input sets 1 through 6) independently of the newspaper and issue input sets (7 through 11). The program will check the player decision cards for many types of inconsistencies and other incorrect coding and, unless you instruct otherwise, will terminate processing if any errors are found. You may even instruct the program to stop after reading the main data cards even if no program detectable errors are found so that you may double-check the list of the cards printed by the computer.

A skilled operator can prepare the input sets for the newspaper and issue section of the program (sets 7 through 11) while the first section of the program is running on the computer and the newspaper can be printed in a seperate job, bypassing the first main section of the program. Figure 2 shows the basic flow of the program and how these two sections of the program interact.

The decision as to whether you wish to prepare and submit the complete program input deck (1-11) or submit the data in two sections will usually depend on the type of game you are

Figure 1

METRO-APEX JOB INPUT DECK

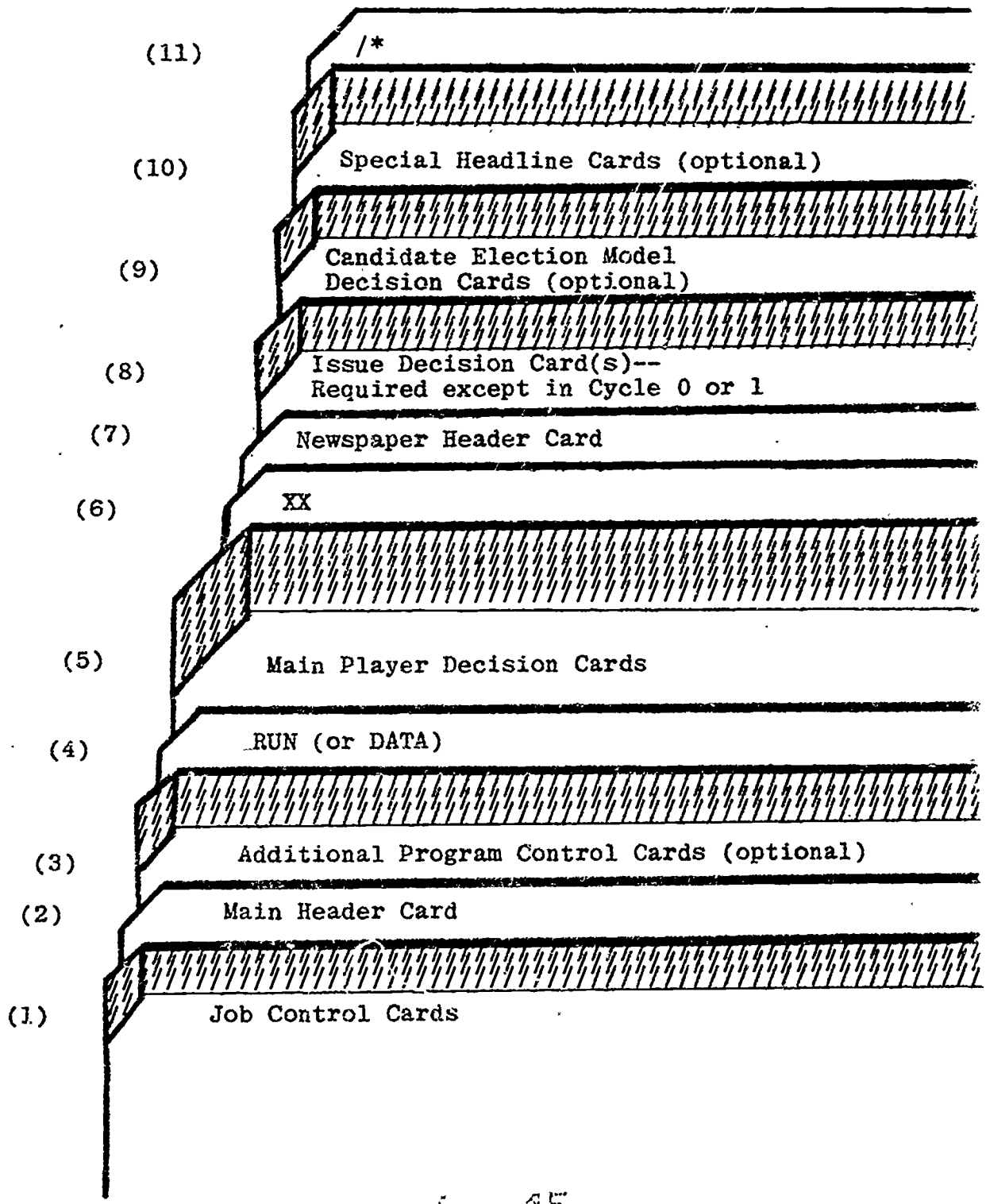
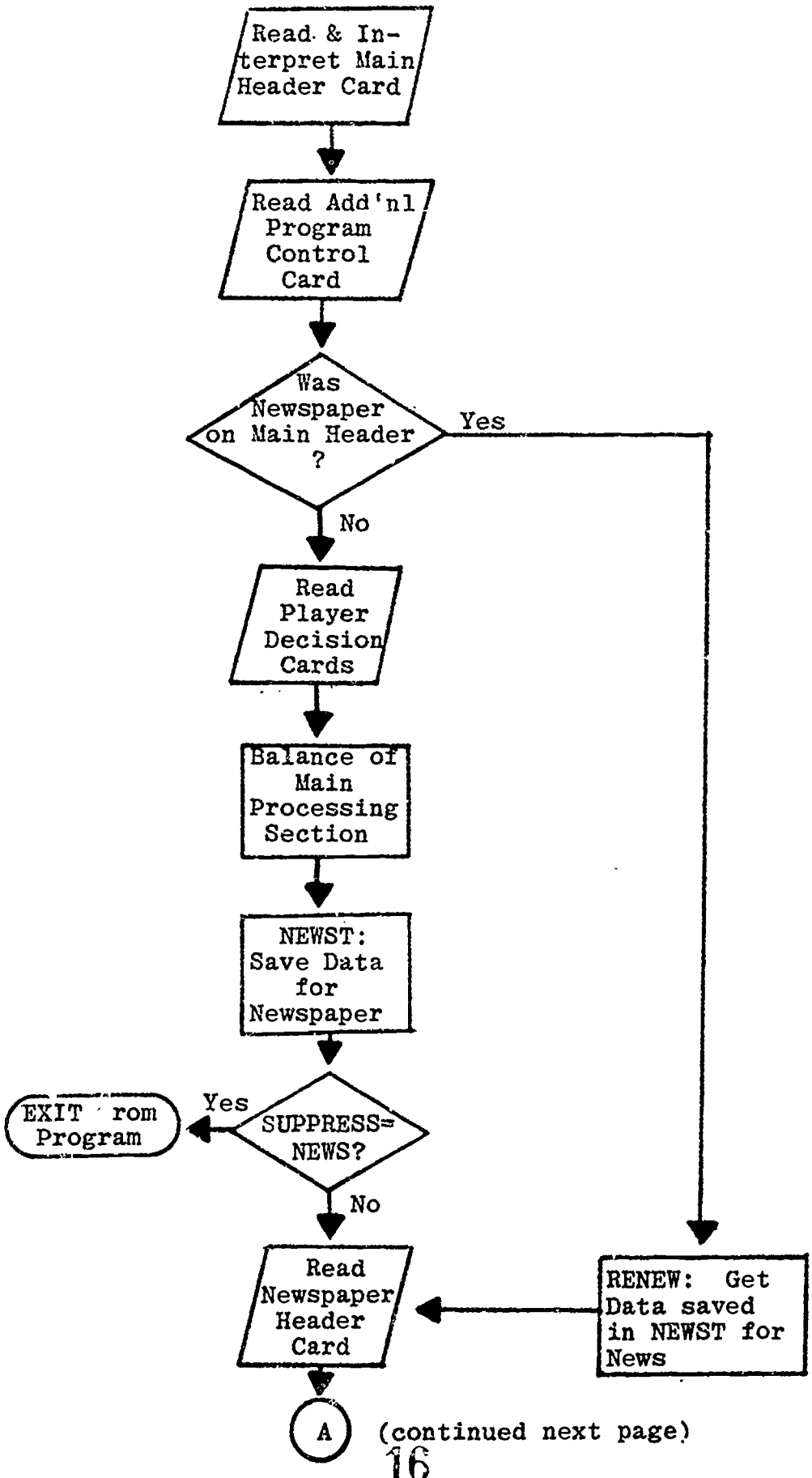


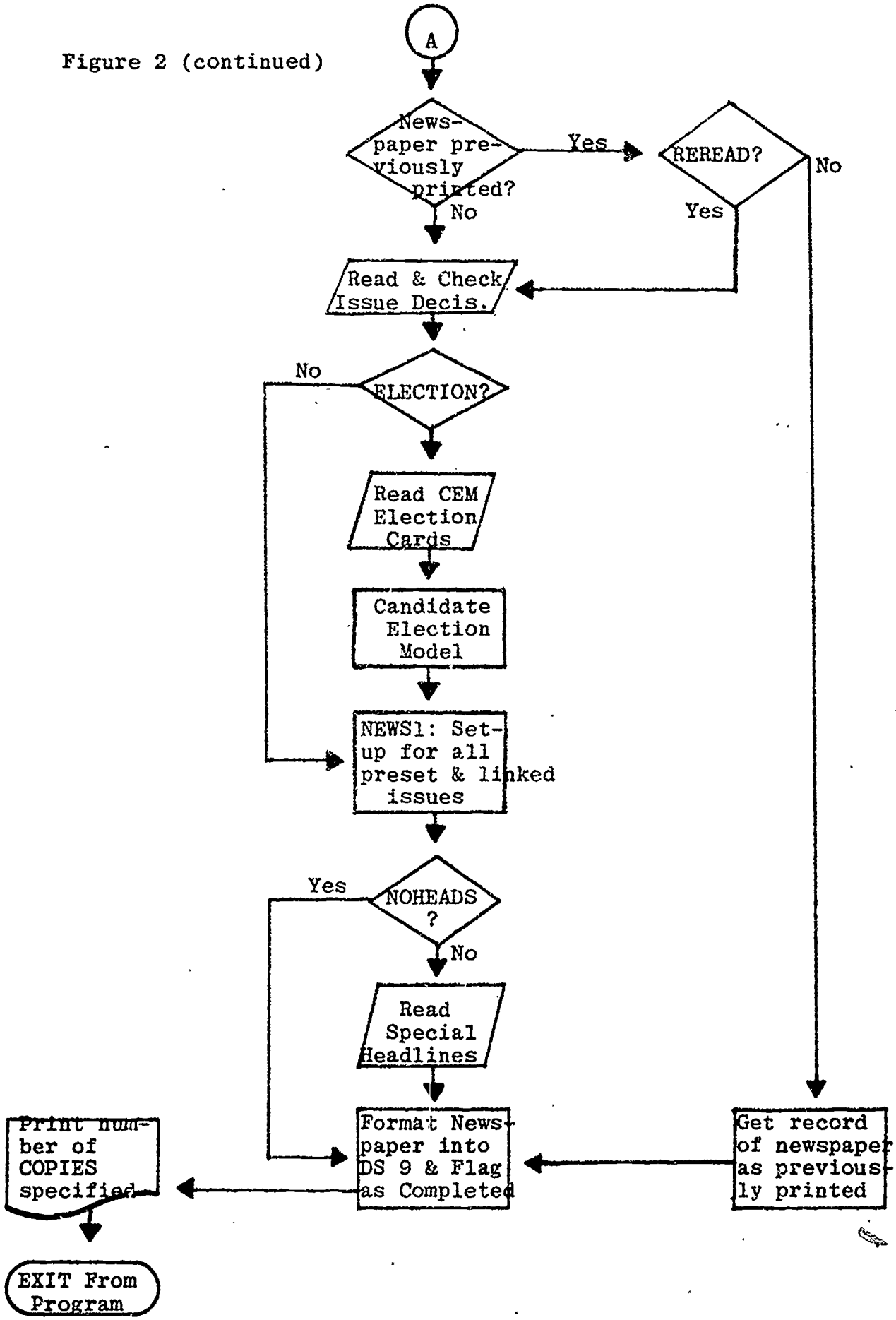
Figure 2

BASIC PROGRAM FLOW SHOWING NEWSPAPER REPEAT



(continued next page)

Figure 2 (continued)



conducting. If you are playing only one cycle a day (or less frequently) you may prepare all of the input cards and assemble the complete data deck for submission. This is recommended particularly for the first few times you run the game, since it involves fewer changes in the program option cards, less card shuffling and confusion and fewer chances of error in assembling the entire input deck.

However, if you are trying to play two or more cycles in a day and attempting to minimize the time between cycles, the two step procedure will probably be required to reduce turn-around time between submission of your job to the computer and getting back the results. You will be able to judge which method is faster as this is also dependent on your installation's turnaround time.

The rest of this chapter will discuss the input data card sets in detail in the order in which they are shown in Figure 1. Examples of two-step data decks are included at the end of this chapter.

Job Control Cards -- input card set #1

The METRO-APEX computer program and data bank are stored outside the main computer on a type of random access auxiliary storage known as a magnetic disk. Your computer installation will probably have many of these disks available to the computer. They are capable of storing not only the METRO-APEX programs and data but also many other programs and other data files. In order for any program to be executed by the computer it is necessary to transfer the program from its auxiliary storage into the main storage of the computer, tell the program where to find the data files it requires and finally instruct it to start operating. Depending on the model and size of IBM 360/370 you are running on, the METRO-APEX program may be sharing the main memory of the computer with one or more other programs, all running simultaneously. All of this activity is controlled by another program called the Operating System which resides permanently in the main memory of the computer and acts as "Big Brother" or traffic controller of the computer -- fetching programs from auxiliary storage, getting data for them and directing their output back to disk storage or to a printer.

This first set of cards in your input card deck is not part of the METRO-APEX program but is the information required by the Operating System to control the loading and execution of the METRO-APEX program (as well as information on how to charge you for the work done). It is written in a language all its own called "Job Control Language".

There are many elements of this Job Control Language which may be tailored to the requirements of a particular computer installation; therefore, as mentioned in the introduction to this manual, you should discuss this set of control cards with a systems analyst or another consultant at your particular installation before running METRO-APEX the first time. The examples given here will work in most installations, but there are many options available.

Figure 3 shows the basic Job Control Cards for inclusion in section #1 of the input deck. Several items on these cards have not been explicitly specified and you will need to substitute values specific to your installation. (If you expect to be running METRO-APEX frequently at the same computer installation, discuss with your installation representative the possibility of creating what is known as a "Catalogued Procedure" which would greatly reduce the number of Job Control Cards required. The following is a card-by-card discussion of each card in the Job Control set:

Line 1: The "JOB" card will most frequently vary from one installation to another. In some cases the installation will supply you with pre-printed, pre-punched JOB cards which will include accounting information and/or other installation-dependent information. Usually you will be able to add additional options to the card supplied. If you are required to punch your own JOB card you must ininclude the following:

a) Substitute "jobname" an actual name up to 8 characters long beginning with an alphabetic character, such as MAINPROG, or MYJOB007.

b) If accounting information is not required, you must punch a comma preceding your name to indicate the intentional omission of accounting information. It is recommended that you include in the name field, the name of the person submitting the job to the computer.

c) Do not include any blanks or other special characters in the name field unless you begin and end the field with apostrophes;, i.e., LASTNAME, or 'C. PRATT'.

d) The present 360/370 version of the METRO-APEX program requires a region size of 165k bytes of main storage. This must be indicated on the JOB card as shown.

Figure 3

BASIC JOB CONTROL CARDS REQUIRED FOR MAIN METRO-APEX PROGRAM
(assumes only one team and records of all preceding cycles not saved)

```
I    1-10    I    11-20    I    21-30    I    31-40    I    41-50    I    51-60    I    61-70    I
I 1234567890 I 1234567890 I 1234567890 I 1234567890 I 1234567890 I 1234567890 I 1234567890 I

 1 //jobname     JØB     accounting info.,name,etc.,REGIØN=165K,TIME=mm
 2 //=JØBLIB     DD      DSN=SWLIB,DISP=ØLD,UNIT=[2314 or 3330],VØL=SER=xxxxxx
 3 //             EXEC    PGM=METEQEX
 4 //FT02F001    DD      DDNAME=SYSIN
 5 //FT03F001    DD      SYSØUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
 6 //FT06F001    DD      SYSØUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
 7 //FT09F001    DD      UNIT=SYSDA,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330),
7b//     DISP=(NEW,DELETE),SPACE=(CYL,(2,1))
 8 //FT14F001    DD      DSN=SWFILE14,DISP=ØLD,UNIT=[2314 or 3330],VØL=SER=xxxxxx
 9 //FT17F001    DD      DSN=SWFILE17,DISP=ØLD,UNIT=[2314 or 3330],VØL=SER=xxxxxx
10 //FT18F001    DD      DSN=SWFILE18,DISP=ØLD,UNIT=[2314 or 3330],VØL=SER=xxxxxx
11 //FT19F001    DD      DSN=SWFILE19,DISP=ØLD,UNIT=[2314 or 3330],VØL=SER=xxxxxx
12 //FT15F001    DD      DSN=SWFILE15,DISP=ØLD,UNIT=[2314 or 3330],VØL=SER=xxxxxx
13 //FT16F001    DD      DSN=SWFILE16,DISP=ØLD,UNIT=[2314 or 3330],VØL=SER=xxxxxx
14 //FT20F001    DD      DSN=SWFILE20,DISP=ØLD,UNIT=[2314 or 3330],VØL=SER=xxxxxx
15 //SYSIN       DD      *
```

c) The maximum time that the program is allowed to use the central processing unit of the computer is usually set by the computer installation at between 30 seconds and 1 minute unless you specify otherwise on the JOB card. METRO-APEX will require more than this default time to process a complete cycle. Complete time estimates for all IBM 360/370 models is not available, however the time is approximately 8 minutes on a Model 50 and slightly less than 4 minutes on a Model 67. On IBM 370 systems the time has dropped to around 2 minutes per cycle. It is usually wise to specify a time limit slightly greater than you think will be required to make sure that your job is not abnormally terminated with only a little more time needed. We usually specify TIME=10 for a Model 50 and TIME=5 for a Model 67. NOTE: Since the priority a computing installation will assign to a job will usually decrease as time increases above the default time, if you are only running the player input decision cards through to check for errors, which will require relatively little time, you should omit the TIME parameter for data checking runs only. Don't forget to include it on your JOB card after you have corrected errors and expect the program to run to completion. There may be additional parameters, such as job class, etc., which will be required by your installation.

Line 2: (Optional) If your installation has allowed you to "Catalogue" the METRO-APEX main program, under the name METEQEX, in the System Library this card will not be required. The System Library is, however, usually reserved only for very frequently used programs and, in most cases, the program will not have been installed in this way. Therefore, the //JOBLIB card will be required to tell the system where to look to find the METEQEX program. Your installation will probably have either 2314 or 3330 magnetic disk. There may also be some installations who have 2311 disks. Be sure to specify the correct type. You will need to replace the XXXXXX following VOL=SER= with the identification serial number of the disk pack on which the partitioned data set SWLIB is located. Note here for further reference: VOL=SER=_____

Line 3: Punch as shown. Some installations may also require the region size and the TIME parameter on this card.

Line 4: The data set reference number for card input data throughout the METEQEX Program is 2. (This is different than normal IBM 360/370 FORTRAN). This card informs the system of this fact.

Line 5: The printed output data set number used throughout METEQEX is 3. (This is different than normal IBM 360/370 FORTRAN). The maximum line length throughout METEQEX is 133 characters (132 printed plus 1 carriage control). Check this DD card with your installation representative for possible local modifications. Point out to them that a complete cycle with all roles playing will produce from 120 to 150 pages of computer output. This may require an output class other than A.)

Line 6: Required for system error messages.

Line 7: This data set is used only for printing the newspaper. To save time in printing multiple copies of the newspaper, the first copy is written into this temporary sequential file which is then rewound and copied N times to SYSOUT parameter. Your installation may wish to modify this specification.

Lines 8-11: Data sets 14, 17, 18 and 19 contain the initial data base for METEQEX, constants used from cycle to cycle, and issue processing records. They are created by the FILEPRNT program (part of the METRO-APEX system in SWLIB) and are normally independent of the number of games being played. Normally all of these data sets will be stored on the same disk pack. Replace XXXXXX on each of these lines with the correct volume serial number on which they are stored at your installation. Your installation will probably have either 2314 or 3330 magnetic disks. Be sure to specity the correct type.

Lines 12-13: Data sets 15 and 16 are the basic files containing variable data reflecting the changes in role accounts from cycle to cycle as game play progresses. At the beginning of the main section of the program both of these data sets contain exactly the same information. During the run of the main section of the program data set 15 is continually updated, so that at the end of the main section data set 15 contains the "current" state of the game (the starting point for going on to the next cycle). At the same time, data set 16 contains the state of the game before the computer run; i.e. at the beginning of the cycle just played.

From the above, it follows that if the next run of the program specifies going on to the next cycle, data set 15 is copied to data set 16 before the main program section. However, if you choose to REPEAT a cycle, data set 16 is copied to data 15 before the first main section. (More details of this cycle updating and/or repetition method is given in a later section of this manual.)

For most game operations the two controls cards shown will be sufficient with the insertion of the correct VOL=SER= number for your installation. For those game operators who might be running more than one game at the same time or who wish to save a record of all cycles played, the DSName parameter will need to be changed to be unique for each team and/or each cycle. More details on this will be given later.

Line 14: Data set 20 is used in conjunction with running the Pressure Group routines. This card may be deleted if you do not plan on running those routines.

Line 15: This card informs the system that there will be no further Job Control cards required and completes section #1 of the input disk.

Main Program Header Card -- input card #2 (Required)

This card is the first card read by the METRO-APEX program and is always required. It identifies to the program the team number (required) and tells the program whether you are (1) starting a new game, (2) going on to a new cycle of play, (3) repeating the entire preceding cycle or (4) running only the issue and newspaper section of the program. You may also, on this card, specify a special team identification and/or special date to be printed on each page of the player output.

1. One, and only one*, of the following four keywords must be punched on the main header card:

   CYCLE=n,
   REPEAT=n,
   NEWGAME
   NEWSPAPER

   Explanation: CYCLE=is used to indicate that you are going on to a new cycle. The new cycle number must be punched following CYCLE= and it must be one greater than the preceding cycle.

   REPEAT=n indicates that you wish to repeat or restart a cycle. The value n which must be punched must be one greater than the cycle number stored in data set 16 (normally this is the same as the cycle you have just completed).

---

*There is one exception to the rule that only one of these keywords may be used. It will be explained later.

NEWGAME indicates that you are restarting from the cycle 0 history: i.e. you are about to run cycle 1 for a new game. (Note: NEWGAME is included for convenience. Actually NEWGAME, CYCLE=1 or REPEAT=1 all produce exactly the same result.)

NEWSPAPER is used if you wish to bypass the first main section of the program and skip directly to the issue and newspaper section.

2. The team number must be punched on the main header card as follows: TEAM=n. Usually the team number will be 1 (except for special cases discussed in the section on Running More Than One Game). The program checks the team number stored on the disk against this number to prevent errors.

3. You may specify the date to be printed on each page of player output: DATA=mm/dd/yy where mm=number of the month, dd=current day, and yy=current year, i.e. December 17, 1974 would be DATE=12/17/74. The date specification is optional. If not specified the date used for the preceding cycle (or the last time DATE was specified) will be used. Note: you should always specify a date at the beginning of a new game (when NEWGAME is used). The program will check the date given and, if correct, will convert it to an alphabetic month and day of week for printing in the newspaper masthead.

4. You may specify a game run identification of up to 40 characters which will be printed on each page of the output in addition to the date. Usually this is specified only when starting a new game run; i.e. when running cycle 1. Unless specified the identification ' ***METRO-APEX INITIAL CYCLE DATA ***' will be printed. Once a new team identification is specified, it will remain in effect for all following cycles until changed. The method of input is as follows: 'new team ident.' Any combination of letters, numbers, special characters and spaces may be used, preceding and followed by apostrophes (') except apostrophes. You need not count exactly 40 characters. If you punch fewer than 40 between apostrophes the program will fill the remaining spaces with blanks. However, if you punch more than 40 any additional characters will be ignored.

Rules for punching the main header card: All 80 columns of one card may be used. Punching may start in any column but may not be continued to a following card (you should never need more than 80 columns). Keywords must be separated by blanks, commas or, where indicated by = signs. The end of a numeric field must be indicated by a comma except for the DATE field where a slash (/) may be used to separate the month, day and year fields. The four possible fields on the main header card may appear in any order. All of the following examples are correct:

TEAM=1, CYCLE=3, 'EXAMPLE OF TEAM IDENT', DATE=2/1/72

CYCLE=1, DATE=8/31/71, TEAM=1, 'THIS IS A NEW GAME $¢*L@# TIME 8:45'

REPEAT=2, TEAM=1

NEWSPAPER CYCLE 0, TEAM=1, DATE=10/27/71, 'PRINT CYCLE 0 NEWSPAPER'*

Note: The last card above is one possible exception to the rule that only one of the first four keywords may be used on a card. If used, the words NEWSPAPER and CYCLE must appear in that order and the number must be zero; CYCLE 0 NEWSPAPER is incorrect.

Note: In the above examples that either a blank or an = may separate keywords and numbers. Blanks must never be used within keywords, although only the first four characters of any keyword need be punched.

*The cycle 0 newspaper is the newspaper that precedes the first preset cycle 1 decision sequence. It is used primarily to indicate linked issues in subsequent newspapers and may be printed for distribution to the players to give them the background information on issues appearing in the cycle 1 newspaper. This newspaper will be included in all of the gamed players manuals. Caution: This option should be exercised prior to the start of a new run only. Printing the cycle 0 newspaper destroys the record of the last cycle run for the designated team and resets the file for starting a new run. Normally, this option would not be used.

Additional Program Control Cards -- input card set #3 (optional)

Additional program control cards are used to inform the METRO-APEX program of non-playing roles, suppress printing of output, cause printing of some output not normally printed (usually for diagnostic purposes), and inform the program of some special newspaper options.

The additional program control cards consist of seven possible keywords followed by an equal sign followed by a string of options separated by commas. Each card must start with a keyword= and must not contain any embedded blank columns. The same keyword may be used on as many cards as necessary but the list of options may not continue from one card to another. Only one keyword may be used per card. Keyword cards may appear in any order. If contradictory options are included, the last one read remains in effect.

KEYWORD	OPTIONS	
NOPLAY=	ALLDEVELOPERS	
	ALLINDUSTRIALISTS	
	DEVELOPER (i)	(i can be 1 through 7)
	INDUSTRIALIST (i)	(i can be 1 through 7)
SUPPRESS=	DEVELOPER (i)	(i can be 1 through 7)
	INDUSTRIALIST (i)	(i can be 1 through 7)
	POLITICIAN (i)	(i can be 1 through 5)
	PLANNER (i)	(i can be 1 through 5)
	EQA	NOTE: POL AND PL (2), (3) and (4) are legal but unnecessary. The default is automatically SUPPRESS for these roles.
	APCO	
	SWM	
	WQN	
SUPPRESS=	ALLDEVELOPERS	
	ALLINDUSTRIALISTS	
	DISTRIBUTION	
	SUMMARY	
	DATA	
	ALL	
	NEWS	
PRINT=	POLITICIAN (i)	(i can be 1 through 5)
	PLANNER (i)	(i can be 1 through 5)
	TOMSTART	NOTE: POL AND PL (1) and (5) are legal but unnecessary. They are printed by default unless suppressed.
	TOMEND	
	WQUAL	
DIFFUS=	ALL	
	SPRING	
	SUMMER	
	FALL	Synonymous
	AUTUMN	
	WINTER	

KEYWORD	OPTIONS
ELECTION	none
BYPASS=	CYCLEONE LINKS NATIONAL LOCAL
CEM=	DIAGNOSTICS RESULTS

(Most of the above keywords and options may be abbreviated in keypunching. The minimum number of characters which must be used in each case is underlined.)

The effect of each of the above is as follows:

NOPLAY: All seven Developer roles and Industrialists are considered playing by default unless the program is explictly informed otherwise by use of a NOPLAY card(s). It is advisable to specify non-playing roles since their omission will save a small amount of computer time. If not played in any cycle, the status of the files for a particular role remains exactly as it was the last cycle played, including taxes and loan payments owed and property holdings. If a role is not indicated as nonplaying and no loan or tax payment decisions are input for that role, the program will assume it was an intentional non-payment and will assess delinquency payments and other penalties against that player's files which could create confusion if the player had merely missed a cycle and wished to resume play two cycles later. Notice the ALLDEV and ALLIND are available as a short-cut in the event you wish to suppress all of either or both types.

SUPPRESS: Output for all of the Developers and Industrialists will automatically be printed if that role is playing unless you specify otherwise with a SUPPRESS card(s). (Notice that you need not specify both NOPLAY=D(1) and SUPPRESS=D(1); the NOPLAY automatically assumes no output.)

Central City and County Politicians and Planners, (POL(1), POL(5), PL(1), and PL(5) respectively) Environmental Quality Agency, Air Pollution Control Officer, Water Quality Manager, and Solid Waste Manager's output will normally be printed unless suppressed. DISTRIBUTION refers to three tables in the output--a bar graph of land distribution and tables of developed and vacant property and prices. SUMMARY refers to several property and value tables, population and capital plant index summaries. Note that some tables usually given to the Planners are categorized and printed among the SUMMARY tables; suppressing SUMMARY would suppress all of these.

Normally all of the main player decision cards (input #5) are printed as they are read. The SUPPRESS=DATA option will suppress this complete listing. All cards with any errors will still be printed along with a diagnostic message indicating the type of error. Since it is usually a good idea to check the input card listing for unusual decimal values, even though no program detectable error was indicated, this option should normally not be used except to suppress the printing of preset cycle 1 data cards or input lists of cycles being repeated.

The SUPPRESS=ALL option will result in the suppression of all player output for the roles which preceded ALL in the list of options. It would normally be used only if you are repeating cycles with very minor changes for the purpose of file modification and no output was desired. Note that the ALL option does not suppress the newspaper section of the program.

SUPPRESS=NEWS is the mechanism for running only the first main section of the program as suggested at the beginning of this chapter. If this option is used only input card sets 1 through 6 need be included in the computer input deck. Even if this option is used, the data required by the issue and newspaper processing section from the first part of the program is saved in the newspaper files and need not be recalculated.

PRINT: Normally the output for simulated jurisdictions 2, 3, and 4 is not printed as it is infrequently used in the present version of the game. The printing indicated for Planners 2, 3, and 4 is only the recommended capital projects for simulated jurisdictions 2, 3, and 4. Since normally no projects are recommended for these jurisdictions (county financed projects in those areas are shown as Planners recommendations to the county) the output is not normally printed.

TOMMSTART causes the printing of initial distribution of population, employment and land use prior to the reallocation performed by the TOMM model. It is usually nothing more than a reiteration of summary data from the last cycle and not in a form which is

easily read by the players, hence is usually printed only for diagnostic purposes, which is rare. TOMMEND, like the start picture is for diagnostic purposes only and is not normally printed.

WQUAL will print out a detailed list of all the reaches and for all of the effluents values. This option was orginally incorporated in the program for diagnostic purposes. It is not in a form that is easily read by the players.

DIFFUS: Any of these options print a detailed table of the levels of all pollutants in all of the Analysis Areas. The option was originally incorporated in the program for diagnostic purposes. ALL prints this information for all four seasons, but you may obtain it for any one or more of the seasons by so specifying.

Note: All of the preceding options apply to the first main section of the program. The following options apply only to issues, candidate election model and newspaper processing but, if used, they must be included in input card set #3. They may be included even if the newspaper is being suppressed; they will simply be ignored.

ELECTION: This keyword card, which has no additional options, must be included to inform the program to process a candidate election. Unless this card is included, input card set #9 (Candidate Election Model decision cards) will not be read, even if included in the input deck.

CEM=DIAGNOSTICS will produce results unintelligible to anyone but the designer of the model. RESULTS prints a special analysis of the election result for each candidate; that is, for each election, the percent attained by the incumbent will be broken into parts reflecting EOP performance, past performance in office, party support and the random factor (see Vol. 1.1, Chapter 4) It is usually used only for diagnostic purposes. These results are printed preceding the newspaper. The omission of CEM=RESULTS does not prevent the election results from being printed in the newspaper; the final results will be printed in the newspaper if an election is held.

BYPASS: Normally this option will not be used. Preset decisions for the three issues in the "cycle 0" newspaper are stored in disk "file" 237 and are normally used when printing the newspaper at the end of cycle 1. Notice that when running cycle 1 the Issue Decision Card (input set #8) must not be included in the deck unless BYPASS=CYCLEONE is specified. If the Game Overall Director wishes to alter the contents of the first newspaper given to the players, he can specify BYPASS=CYCLEONE in whice case an Issue Decision Card with the decisions for the cycle 0 issues 1, 42 and 50 must be included in the cycle 1 data deck.

The three issues in the "cycle 0" newspaper are:

#42 -- (County) Runway expansion for airport, project 109. This is approved in the cycle 1 issue decision. The main preset decisions for cycle 1 include a CP card and BS card for bond number 111 to finance it. If this decision is changed the CP card and BS card should be removed from the cycle 1 data deck and new County Politician output (different than that in the player manuals) should be produced.

#1 -- (Central City) Build new City Hall, project 86. This is also approved in the cycle 1 preset decisions and a CP card for project 86 and BS card for bond #102 are included in the preset main cycle 1 decisions. As above, if this decision is altered the CP and BS card should be removed and new City Politician output run.

#50 -- Annexation of Maple Grove Area, part of Analysis Area 12. This area is assumed annexed to the Central City in cycle 1 and creates a demand in the cycle 1 newspaper for needed projects to service the area.

BYPASS=LINKS will allow issue decisions entered for issues to be printed in the newspaper but any issues which would be generated by linking from a decision on one of the preceding cycle issues will not be printed.

BYPASS=NATIONAL will suppress all preset state and national headlines for that cycle. (A list of the preset state and national headlines may be obtained by running the FILEPRNT utility program and printing file 204.) These headlines are preset to give an indication of the national and state economy and social problems. You could simulate your own national and/or state headlines by inputing them as special headlines with a code of 2 for national headlines and 3 for state headlines.

BYPASS=LOCAL will suppress all preset County and local issues. It will not suppress issues linked to preceding cycles, capital plant headlines, low percapita budget generated issues or business page issues.

As many additional program option cards as required may be included in the input deck. The following are some examples of correct Program Option decks:

```
ELECTION
SUPPRESS=DEV(4),APCO
NOP=I(2), I(5), D(5)
PR=POL(4)
RUN
```

The following set is exactly equivalent to the above:

```
SUP=D(4)
SUP=APCO
NOPLAY=DEVELOPER(5)
NOPLAY=IND(2)
NOPLAY=INDUSTRIALIST(5)
ELECTION
PRINT=POLITICIAN(4)
DATA
```

In the following example of contradictory options, Politician 5 would be printed since the last card read is the one in effect:

```
SUPPRESS=POL(5)
PRINT=POL(5)
RUN
```

The RUN (or DATA) Card - input card set #4

The card is actually an additional keyword, but is shown as a separate input card set because it must be included in the input deck whether or not you have used any other additional option cards. It indicates to the program the end of the Additional Option Card set and allows the program to continue on to the Player Decision Cards. You may use either RUN or DATA, not both.

From Worksheets to Cards -- input card set #5 (Main Player Decision Cards)

Prior to the actual punching of the main input cards, the operating team must transfer and translate the decisions on the player's worksheets to coding forms. The player decisions are sometimes expressed verbally rather than in number code and appear, along with assorted extraneous entries, on the worksheet. To facilitate keypunch operations, it is advisable for the operating team to translate the verbal decisions to numeric code and enter that code in the proper location on a keypunch form.

Copies and instructions of the keypunch forms for each role are included in Appendix B and Appendix C for reference. The starred items on the worksheet have to be entered on the keypunch form.

An example of the translation process will best demonstrate the procedure for filling in the coding form. (After a team of role advisors gains experience in filling in keypunch forms, the expected time duration for the transfer and translation process is about ten minutes per role.)

Once the decisions are entered correctly on the keypunch coding forms, the input cards must be punched. It is assumed that the reader is capable of using the keypunch -- if not, a short introduction should be all that the reader needs. (The key punch is little more than a high powered typewriter, one designed for putting holes on computer cards rather than printing letters on paper.)

Data is entered on cards to conform with an arrangement in accordance with program specifications. Two distinct arrangements, called formats, are used. The first and most common allows up to thirteen entries on a card. The first takes up two columns, the next six take up four columns apiece for a total of twenty-four, and the last six take up nine columns each, filling the remaining fifty-four. Each grouping of columns is called a field. The first two columns are reserved for an alphabetic code of two letters. Each card must have an alphabetic code. The next six fields are reserved for integer entries. These must be right justified; that is, the entries must appear as far to the right in each field as possible. For example, the number 12 would be entered in columns 5 and 6 on a card if it belonged in integer field 1. The remaining six fields are reserved for real number entries (numbers with decimal points). The entries may appear anywhere in the field but a decimal point must be punched in the appropriate location.

A Word of Caution: Occasionally a field will require punue.ng minus (-) sign. When punched, the sign must be the first non-blank character in the field. (Many keypunch operators prefer to fill in the left-hand sign of integer fields with zeros instead of blanks; e.g. BS00010025 instead of BS 1 25. This has a certain speed advantages when using a drum card, a discussion of which follows.) If you are punching leading zeros, the proper form for a negative number is, for example, -001 not 00-1. The latter form will result in the value zero being stored, not -1.

Each card corresponds to one line on the keypunch coding form. The two letter code adjacent to each table is the two letter code in the first field. The designation in parentheses of "I-*" indicates that the entry belongs in the *th integer number field. (For FORTRAN buffs the input format is (A2, 614, 6F9.0) with integers right justified.)

The second format is sometimes used. (Used for PI, EM, SS, ES, CD & SV cards) The two letter code is handled exactly as it is above. However, the remainder of the card is partitioned into 15 four column integer fields; that is, all entries are integers and all fields are four columns wide. Each entry goes in the field indicated by the I-* designation on the key punch form and each is right justified. (For FORTRAN buffs the input format is (A2, 1514) with integers right justified.)

The keypunch procedure is greatly simplified by the proper use of a drum card. A drum card is a high powered tab stop for a keypunch -- it not only jumps to the right column; it sets the numeric or alphabetic (upper or lower) case as well. Thus, by using a drum card, letters are placed automatically in the first field and numbers are punched in all other fields. Note, use the numeric decimal point in all cases. Also, use caution when using the skip key (the analogue to the tab). When the machine is resting in the first column of a field, depressing the skip key advances the field. (The keypunch shifts to the next field.)

A drum card for METRO-APEX is made by placing a 1 in column one on an IBM card followed by an A. The first column of each remaining field is blank with ampersands filling the balance. (See Figure 4.)

The XX Card -- input card set #6 (required)

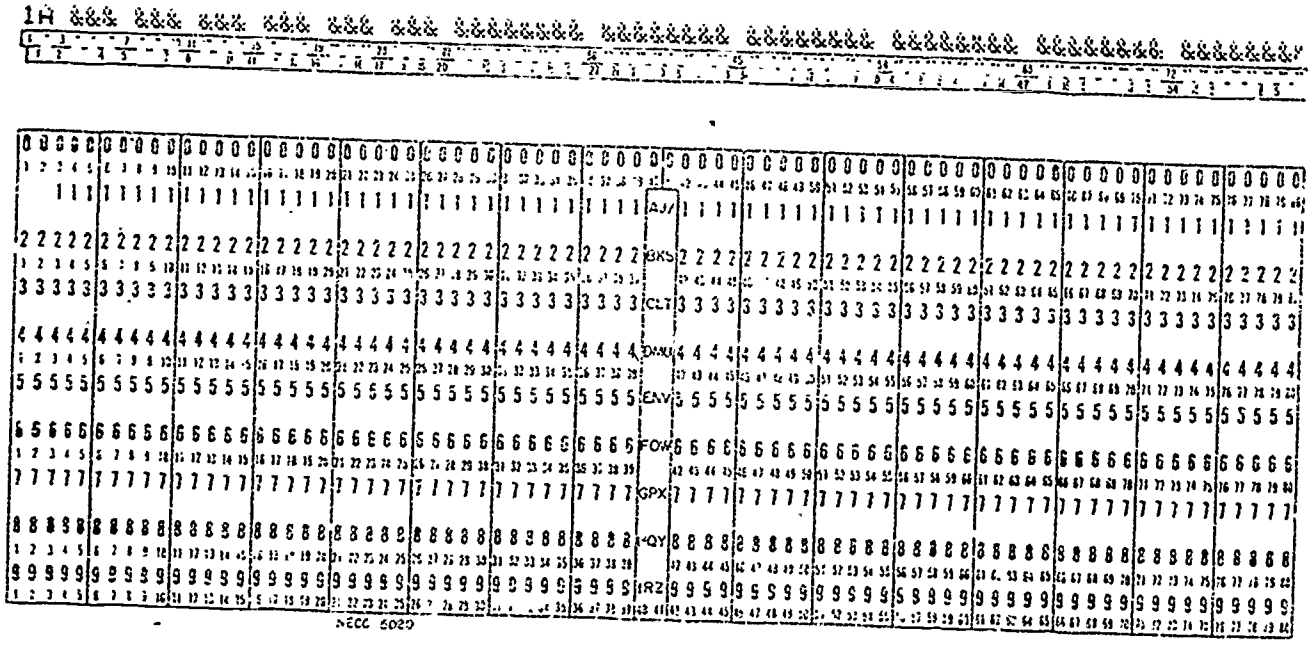
Once all of the main player decision cards are complete, an additional card with the letters XX punched in the first two columns must be added to the deck immediately following the last main player decision card. The XX card serves two purposes: (1) it signals the computer program that the last main player decision card has been read and (2) it informs the program what action to take after having read the player decisions. Normally the I-1 field (columns 3-6) is left blank in which case the program will continue with the normal processing sequence if there were no program detectable errors in the player decision cards but it will stop if the program did find errors in the player decisions.

You may alter this normal action in one of two ways:

(1) You may elect to have the program stop unconditionally after reading the player decision cards, in which case you must punch a negative number in the I-1 field (-1 in cols. 5 and 6.)
(2) In very rare cases you may elect to have the program continue on even though it did detect errors in the player decision cards (for example, if you were starting a new game without playing all of the Developers and/or Industrialists and not want to remove all of the preset decision cards for the nonplaying roles from the cycle 1 data deck). Other errors will usually cause the card in error to be ignored and may result in unforeseen errors in the final output. Therefore, this option is to be used with great care. If you do elect to continue on despite errors, punch a positive number in the I1 field of the XX card.

Figure 4

KEYPUNCH DRUM CARD FOR
MAIN PLAYER DECISION CARDS



For easy reference, the following is a chart of where each field begins on the card:

Field	Begins in column	Field	Begins in column
I-1	3	F-1	27
I-2	7	F-2	36
I-3	11	F-3	45
I-4	15	F-4	54
I-5	19	F-5	63
I-6	23	F-6	72

Note: The ampersand (&) is punched in what is frequently called the "12-row" of the card.

Newspaper Header Card -- input card set #7 (required)

The Newspaper Header Card is always required unless SUPPRESS=NEWS is specified in the additional program control cards (input card set #3). It is required even for cycle 0 and cycle 1 newspapers since it informs the program of the number of copies of the newspaper to be printed and some other possible options.

The following are the possible keyword options on the Newspaper Header Card:

COPY=n, [IGNORE] [NOHEADS] [REREAD] [CEMI] [NEWI]
COPIES=n,

At least the first four letters of each keyword must be punched. There must not be any blanks within a keyword, but each keyword must be separated either by a comma or a blank. The comma following the number of copies is required unless it is the only or last option on the card.

COPY= or COPIES=: Either form of this keyword may be used, followed by the number of copies of the newspaper you wish to have printed. If this keyword is ommitted the default is one copy.

IGNORE: Once the entries on the Issue Decision Card (input card set #8) are accepted as valid, the program verifies that the issue list is consistent with the linkage from the preceding cycle. (Each cycle, just prior to printing the first newspaper, the program prints a list of all issues that will link to other issues in the next cycle. This list is saved and the program checks that the issue decisions input for that next cycle include decisions for all those issues that required resolution to determine the nature of the linkage.) If some issue requiring resolution to direct the linkage to related issues is not included in the issue decision sequence, the following is printed:

**MISSING DECISION FOR ISSUE nn (Other error messages are listed in Chapter 4)

Normally if missing issue decisions are found, the program will stop, the errors must be corrected and the newspaper section of the program is restarted by specifying NEWSPAPER on the Main Header Card.

The use of the option IGNORE on the Newspaper Header Card will cause the program to continue on despite the missing decisions. Any further linking for those issues will be ignored.

NOHEADS: Since players almost always submit special headlines to be printed in the newspaper, the program assumes that Special Headline Cards (input card set #10) will be read unless NOHEADS is specified on the Newspaper Header Card. Notice, although you would not normally do so, special headlines can be read for both the cycle 0 and cycle 1 newspapers. Therefore IGNORE is ususally specified on the Newspaper Header Card when printing a cycle 0 newspaper and frequently when running the cycle 1 preset decisions.

REREAD: Once the program has printed one copy of the newspaper for any cycle it "remembers" what was printed. Any number of additional copies of the newspaper may then be printed without rerunning the main section of the program and without reading any of the newspaper and issue decision cards (input sets 8, 9, or 10) simply by specifying NEWSPAPER on the Main Header Card and the number of copies on the Newspaper Header Card.

Specifying the REREAD option on the Newspaper Header Card allows the operator to rerun the newspaper for a cycle with different alternatives for some of the issues, different candidate data (if ELECTION is specified), different special headlines, or any of the other options possible (e.g., bypassing state and national headlines). In other words, REREAD forces the program to read input card sets 8-10.

The ability to print additional exact copies of the newspaper, as mentioned above, may be useful if the operator wishes to check the printing of one copy before deciding whether to print many additional copies. For example, (for some fiendish reason known only to the Game Overall Director), he may want to be sure that some candidate wins or loses in the election. If, the first time through, the election result is not as desired, the operator can further bias the election results by changing the party support higher or lower and REREADing the decision cards. If the result was as desired, sufficient exact copies may be printed to pass out to players.

Notice that if one copy of the newspaper was not printed, due to a fatal error in one or more of the input card sets 8, 9 or 10, the program will assume that these cards are to be reread.

Issue Decision Card(s) -- input card set #8

An issue decision card contains one or more groups of numbers separated by commas. Each group of numbers gives the program information about one issue appearing in the newspaper that was printed at the end of the preceding cycle. The information is comprised of two required entries; the issue number and the alternative acted upon by the deciding agent (a Politician or the majority elite opinion poll). If the alternative action required that a project be funded by a general obligation bond or special millage, then the appropriate number associated with that project may be given.

The format for issue decisions is as follows: iiia(bbb), iiia, iiia(bbb), ...iiia*

Where iii is a 1 to 3 digit issue number
a is a single digit indicating the alternative chosen on that issue,
(bbb) is an optional 3 digit bond/mill number

The card is "free-format"; that is, punching may begin in any column, and blank columns are ignored and may be used for spacing to increase legibility. Each group of numbers for a single issue is separated by a comma. However, the last group must be terminated by an asterisk (*), not a comma. A maximum of 40 issue decisions may be entered in any single cycle. If one card is not sufficient for all issue decisions, decisions may be punched on any number of additional cards. The terminating asterisk appears only after the last decision on the last card of the series. The last character on any one card must be either a comma or an asterisk. Thus, a number group for any one issue must appear on only one card -- it will not be continued from one card to the next.

The following is an example of two issue decision cards:

/1692, 1 1,

/56 1 (103), 28 3*

This would be interpreted as follows:

Alternative 2 for issue 169, alternative 1 for issue 1, alternative 1 for issue 56 subject to the passage of bond 103 (otherwise, if bond 103 failed, the alternative would be changed to 2 by the program), and alternative 3 for issue 28. Note that all of the above could have been punched on one card; the two cards were used only for illustration.

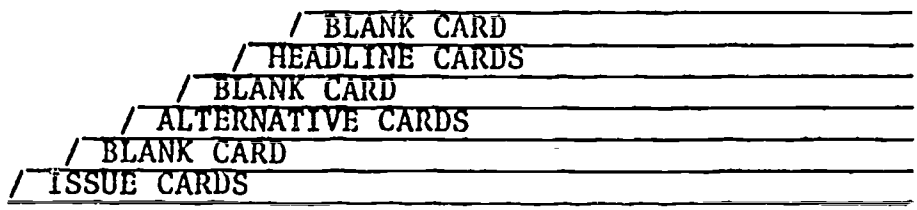
In each cycle, the alternative selected for every issue appearing in the preceding cycle's newspaper must be entered as part of the issue decision card set. Use of the elite opinion poll wall chart tally sheet described in Volume 1.1, in Chapter 3 of this kit is extremely useful in keeping tabs on issues and issue outcomes.

The CEMI option allows the game director to have any issue found in the data files to appear in the next cycle's newspaper. (To get a complete list of all of the issues and headlines stored use the FILEPRNT option and PRINT 201). The gamed format of the card is iii, iii, ... iii* where iii stands for the issue numbers you want to appear in the next cycle's newspaper and is separated by a comma. The last number must be terminated by an asterisk (*). This card should immediately follow the Issue Decision Card(s).

The NEWI option allows for new issues to be entered directly into the newspaper data files. These new issues will be treated in the same way as any other issues in the newspaper.

The issue addition card deck is comprised of three sections, one for issue cards, one for alternatives and one for headlines. Each section must be followed by a blank card. Even if there are no cards in a particular section, the blank card must be inserted in the card stream. Below is a graphic representation of the issue addition card deck.

Issue Additional Card Deck



Each sub-section of the issue addition deck has a distinct format. First, the issue cards are punched as follows:

Columns

1-2 Location of Issue. Each issue is assigned a section of the newspaper according to the location of the problem presented. Possible locations and their corresponding codes are:
- 36 = Central City
- 37 = Jurisdiction 2 (Suburb)
- 38 = Jurisdiction 3 (Township 1)
- 39 = Jurisdiction 4 (Township 2)
- 40 = County

3 Importance Level. Each issue is assigned an importance by the News Media or Game Overall Director. This is a measure of the impact of the issue on the Candidate Election Model. Allowable importance levels are:
- 0 = Least Important
- 1 = Average Importance
- 2 = Most Important

4 Issue Type. Issues decided by the school board are differentiated from issues decided by Council or the Board of Supervisors. (At present the school board option is not available). The codes are:
- 0 = Non-School
- 1 = School (Not used at present)

5-7 Issue Number. Each issue added to the issue file must have a number between 301 and 399. This number is also used to insure correspondence with alternatives and headlines during input.

8-37 Issue Description. A brief description of the issue is entered here. This entry is optional. It is included for the convenience of the players and operator. The description is not used by the program (or even read by it).

38. Skipped

39 Number of Headlines. The actual description of the issue in the Newspaper is given in a series of headlines. Each headline is comprised of from 1 to 4 records of 120 characters each. That is, the headline printed

for each issue takes up from 1 to 4 lines in the newspaper. The entry is the number of headlines used for this issue. Each headline number to be added should be a number between 1300 and 1498.

40-54 Skipped

55 How the outcome of the issue is determined. Each issue is "resolved" by an action by Politicians, Educators, Elite Opinion Poll or nobody (a dummy issue for the purpose of printing a noise headline in the newspaper). At present, the educator option is not available. Dummy issues have no alternatives. All budgetary issues offering the players alternatives are resolved by Politicians. Most others are resolved by the Elite Opinion Poll Majority. The coding is:

0 = Dummy Issue
1 = Politician's Ultimate decision
2 = Educator's ultimate decision (not used at present)
3 = Decided by EOP Majority

56-57 Skipped

58 Number of Alternatives for this Issue. Each issue may have from 0 to 5 alternatives. All dummy issues must have 0 alternatives and, in fact, all issues with 0 alternatives have no linking mechanisms with the balance of the program and are, therefore, dummy issues. The number of alternatives entered here is the number of alternative cards in the alternative sub-section of the issue addition card deck.

The format for alternative cards is as follows:

Columns

1-3 Issue Number. Each alternative is associated with some issue (presumably an issue included in the issue sub-section). The issue appearing in columns 5-7 on the corresponding issue card is entered here.

4 Alternative Number. Each issue may have several alternatives as specified in column 58 of the issue card. The particular alternative represented by this card should be entered here.

5-30 Title of Alternative. If it is possible to express the sense of the alternative in 26 characters or less, the expression that does so is entered here. For example, the common alternative POSTPONE AND RECONSIDER is fully stated in less than 26 characters. If an alternative requires more than 26 characters, up to four lines of text (each line is 120 characters) can be substituted for the short description by using headlines in place of the alternative title. In this case, the alternative title is redundant.

31 Skipped

32 Number of Headlines. If the number of characters needed to convey the sense of an alternative, up to four headlines can be printed in place of the alternative title. The number of headlines needed -- from 1 to 4 -- is entered here. A zero entry here forces the printing of the alternative title. Each headline number to be added should be between 1300 and 1498.

33-46 Skipped

47-49 Project Number. This entry is reserved for a project number corresponding to the project on the project list to be initiated if the alternative is chosen. At present, this forced initiation of the project is ignored; therefore, this entry should be skipped.

50-63 Skipped

64-66 Linked Issue. This is an optional entry. If the enactment of this particular alternative is linked to another issue, that issue number is entered here.

67-71 Interest Group Attitudes. The positions held by the Interest Groups with respect to this alternative are entered here. Each column represents the stand of a particular Interest Group. They are:

1 = Civil Rights Groups
2 = Effective Government Groups
3 = Business Community
4 = Labor Vote
5 = Right-Wing Conservatives.

Each entry is a number from 1 to 9 where one is a strong adverse posture and nine is a strong support posture. These numbers must be entered by the Game Overall Director -- the players do not make the decisions for the Interest Groups.

72-76 Household Type Attitudes. The positions held by the five household types with respect to this alternative are entered here. Each column represents the stand of a particular household type. These are:

1. H.H. Type 1 = Rich, Well-Educated, White-Collar
2. H.H. Type 2 = Less Wealthy, Moderately Educated, White-Collar
3. H.H. Type 3 = Rich, Blue Collar
4. H.H. Type 4 = Poor, Blue Collar
5. H.H. Type 5 = Unemployables, etc.

Each entry is a number from 1 to 9 where one is a strong adverse posture and nine is a strong supportive posture. These numbers must be entered by the Game Overall Director -- the players do not make decisions for Household Types.

The format for headline cards requires a bit more verbal description than either the issue cards or the alternative cards. Headlines are 120 characters in length. Unfortunately, the standard IBM card can record only 80 characters. Thus, two cards are needed to record each line of a headline. The format for both cards is the same.

Columns

1-3 Issue Number. Each headline is associated with some issue number. (The association may be to the issue itself or one of its alternatives.) That issue number is entered here.

4 Alternative Number. If the headline refers to an alternative associated with the issue entered in columns 1-3, the alternative is coded in column 4.

5 Sequence Number. Because two cards are required for each headline, a sequence number is entered here to specify whether the card is the first or second part of the given headline. In reading the input cards, the computer will expect both the first and second card of each headline to appear in sequence. If the second card for a particular headline is not needed, it may be omitted.

6 Line Within the Headline. Each headline (each unique issue number or alternative) can have up to four lines (eight cards). This entry specifies which line of the four lines is to be filled by the pair of cards sharing a common entry in column 6.

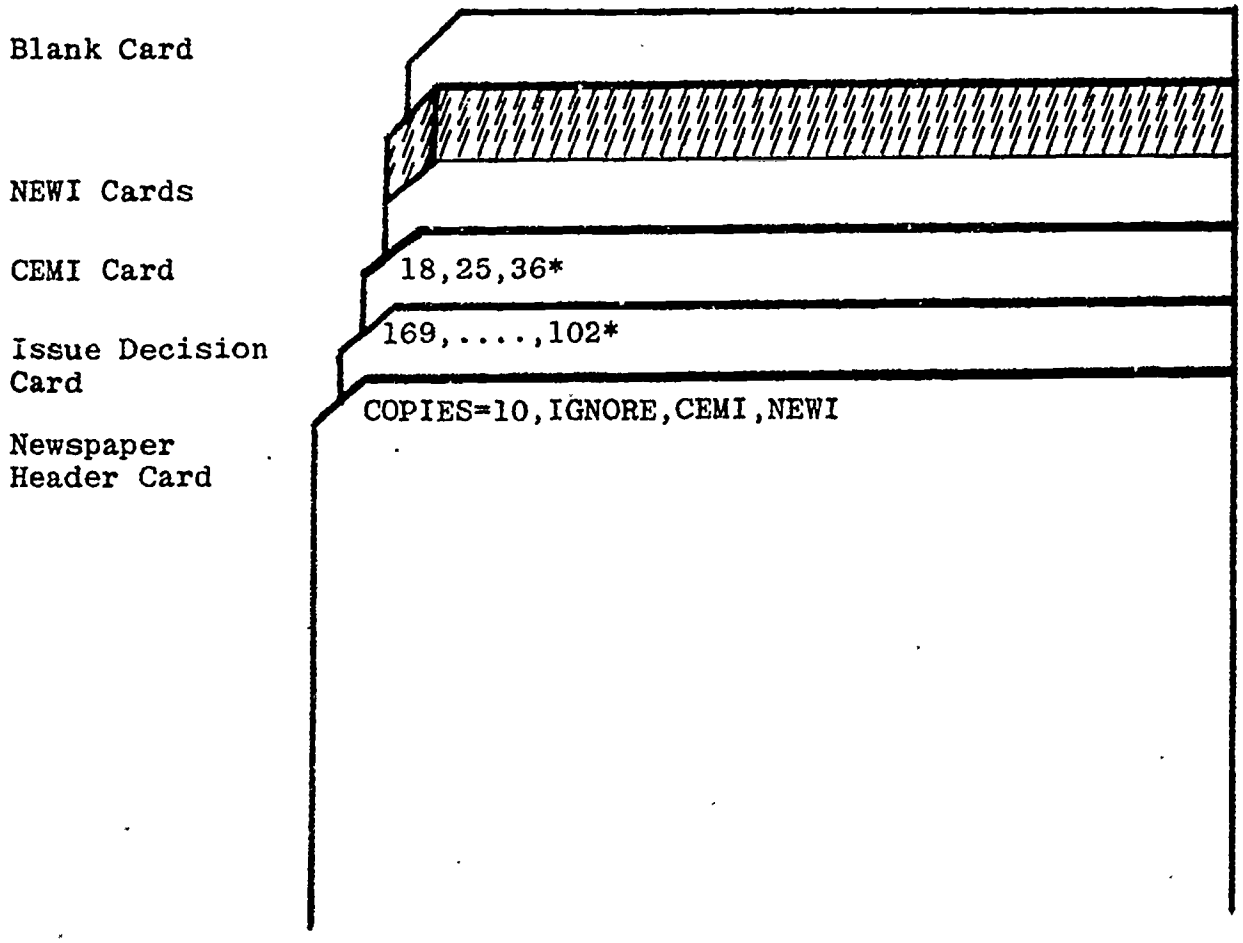
7-10 Skipped

11-70 Headline. The headline is recorded here as it will appear in the Newspaper. (The computer operator might check to see that each entry is spaced properly; that is, that each 120 character line is full and that no words are broken in between lines.)

Note: If the Newspaper Header Card specified the following:

/ COPIES=10, IGNORE, CEMI, NEWI

Then the cards would be placed in the following order:



Candidate Election Model Decision Cards -- input card set #9 (optional)

This input card set must be included, and may only be included, if you specified ELECTION in the Additional Program Control Card set (input card set #3).

There may be up to 16 candidate election data cards in an election. A card must be punched for each incumbent politician running for office. (Up to eight incumbents -- three Central City Politicians, one County Commission representing each outlying jurisdiction and two County Commissioners representing the City and the County -- can run each cycle.) For each incumbent running for office, a card must be punched for either his simulated or game opponent.

The following format is used for punching candidate election data cards.

Columns

1-2 Candidate Number. A candidate number must be entered on each card. Incumbents should be assigned numbers 1-8 according to the following schedule:

1 = Central City Politician, Ward 1
2 = Central City Politician, Ward 2
3 = Central City Politician, Ward 3
4 = Suburban County Commissioner
5 = Township 1 (jurisdiction 3) County Commissioner
6 = Township 2 (jurisdiction 4) County Commissioner
7 = Central City "At-Large" Representative on the County Board
8 = County "At-Large" Representative on the County Board

Corresponding numbers from 9-16 should be assigned to their opponents so that each matched pair are given numbers 8 apart; that is, opponent 12 runs against incumbent 4, etc. Do not punch cards for opponents if there is not a card for the corresponding incumbent.

Columns

3 a) For incumbents (01-08 in columns 1-2) this column indicates whether the opponent is real or simulated:
1 = gamed opponent (real)
2 = simulated opponent
b) For gamed opponents (09-16 in columns 1-2) this column should be blank. For simulated opponents this column designates the opponent type:

1 = Conservative
2 = Moderate Republican
3 = Labor Liberal
4 = New Left Liberal
5 = Working Class Conservative
6 = Ultra-Conservative
7 = Business Candidate
8 = Black Candidate
9 = Reform Candidate

Columns

4-8 Party support. This entry is included only for incumbents. It is the major discretionary variable under the control of the operator. Some number between 1 and 60 is entered designating the percentage of the vote, up to 60%, going automatically to the incumbent. The entry can be determined by apportioning the 60% in accordance to a hand vote of gamed players, operator's whim or any other suitable method. If the entry is left blank, the machine sets the appropriate variable to 30. A decimal point must be punched in this field.

9-28 Candidate Name. A name up to twenty characters long, is entered here to be printed with the election results in the Newspaper. Names should be entered for simulated as well as gamed opponents. For example, a conservative might be called Richmond L. Stuffshirt.

29-80 Issue Number, Candidate Stand on Issue, and Candidate Stress on Issue. The form follows that for issue decision cards -- iiia(ss) -- where iii is a 1 to 3 digit issue number, a is the alternative chosen and ss is the percent of campaign funds spent stressing the stand taken on that issue. These entries are free format and up to 40 issue decisions may be entered. Additional cards may be used as needed with the continuation card starting in column 1.

An asterisk is used to designate the end of the sequence for a given candidate. Entries should be made for only those issues for which the candidate casts a vote. Note that these columns should be left blank for simulated opponents. Also, for unstressed issues (issues which would have zero in parentheses) the parentheses may be ommitted. Stress percentages must be entered as whole numbers; decimal points may not be included within the parentheses.

One blank card must follow the last candiate to terminate this section of the input. The following is an example of a card for an incumbent candidate:

```
/ 01125.00ROY MILLER      1691(20),0012(5),0562,0423*
```

Incumbent from Ward 1 has a real opponent. The incumbent's name is Roy Miller. Twenty-five percent of the party allocation has been assigned to him. He has voted for alternative 1 on issue 169 and spent 20 percent of his campaign funds stressing that stand, etc.

Special Headline Cards -- input-card set #10

Special headline cards are assumed part of the newspaper input sequence unless NOHEADS is specified on the Newspaper Header Card (input card set #8).

This input section contains special headlines written by the operator, a newspaperman or players in the game for publication in the METRO-APEX NEWS. These cards, like the others, must be punched to conform to program specifications. Each line of a headline appears on two cards. The first column of the first card of each pair must have a code describing the type of headline. The possible codes are:

1 = Special Headline (lead article)
2 = National Headline
3 = State Headline
4 = Metropolitan and County Headline
5 = Central City Headline
6 = Suburb Headline
7 = Township 1 Headline
8 = Township 2 Headline
9 = Business Headline

The rest of the first card, columns 2-80 contain the first 79 characters of the line. The first 41 columns of the second card contain the last 41 characters of the same newspaper line. There can be a maximim of 118 lines in a given cycle of 120 characters each.

The cards must be ordered so that the codes in column 1 are in ascending order from 1 to 9. To skip a line between headlines in a single section (with the same code in column 1), one of the 118 lines must be left blank; that is, the appropriate code should be entered in column 1 of a card but the remainder of the card and a second card should be left blank. The program automatically handles the placement of each section; therefore, blank cards are not needed between sections (between headline cards with different codes in column 1).

Delimiter Card -- input card set #11

This card, which contains nothing but /* in columns 1 and 2 should always be included as the last card in the input deck. It serves two purposes; (1) it signifies the end of special headline cards, if present, and (2) signifies the end of the total input deck.

Summary

In summary, the data deck required to run a cycle from start to finish is pictured in Figure 1. It is not necessary, as noted at the beginning of this chapter, to run the entire program at one time. Therefore all of the input card sets shown in Figure 1 need not be included in every deck submitted to the computer. The following examples shown subsets of the complete deck which may be used for certain purposes.

Figure 5

INPUT DECK FOR ONLY MAIN SECTION OF PROGRAM

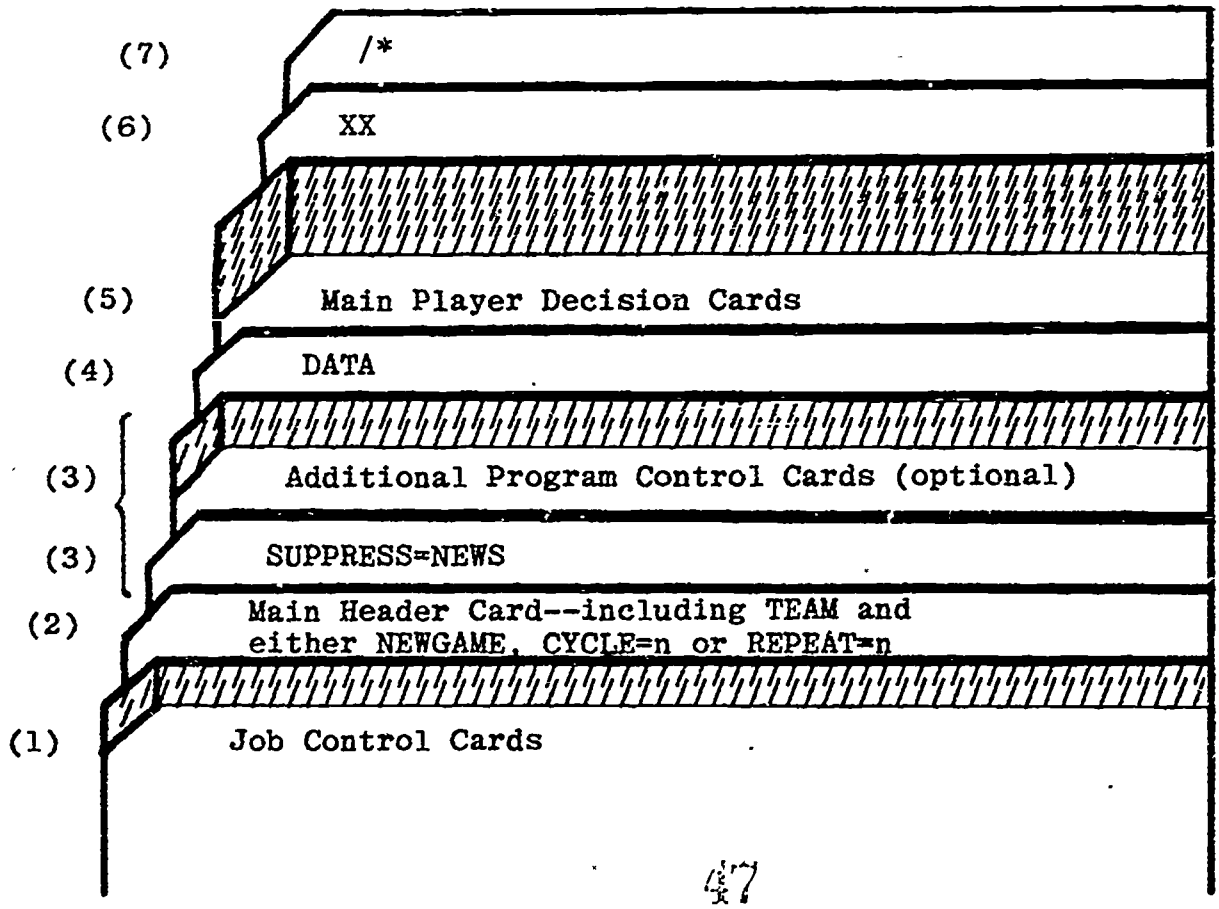


Figure 6

INPUT DECK FOR PRINTING NEWSPAPER
(if newspaper suppressed previously)

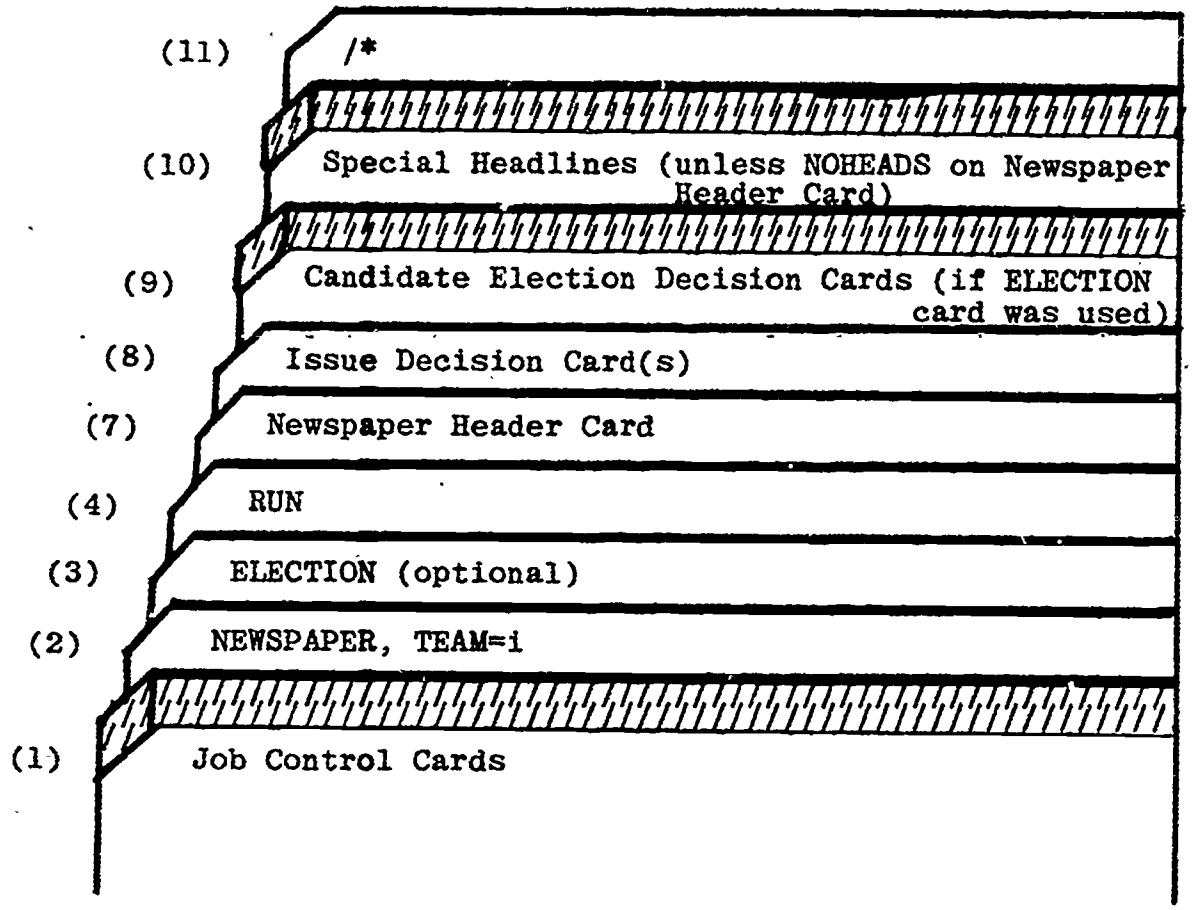
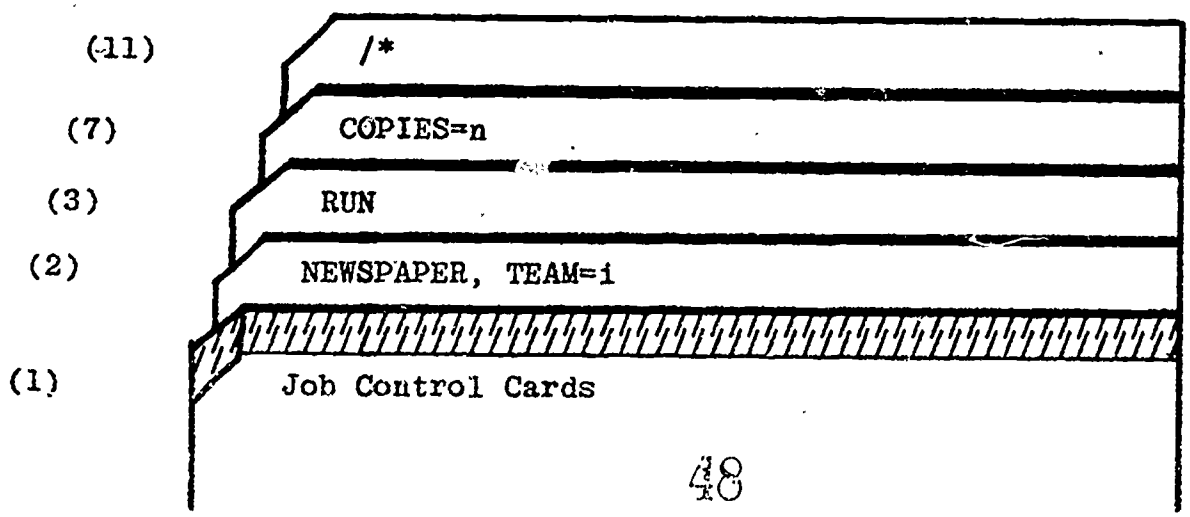


Figure 7

INPUT DECK FOR PRINTING ADDITIONAL EXACT COPIES OF NEWSPAPER
(assume at least one copy has already been printed)



CHAPTER 3

Chapter 3

ADDITIONAL GAME OVERALL DIRECTOR INPUTS

In addition to the operational controls and player decisions discussed in the preceding chapter, there are a number of additional options available to the Game Overall Director or operator for changing the values used in some of the game models and otherwise manipulating the outcome of the game for a particular cycle. The mechanism for introducing these options into the game is by means of cards which are prepared in the same format as and are included in the input deck with the main player decision cards (input card set #5). Since they are not usually player decisions, space for recording the values is not usually included in the player worksheets and standard keypunch coding forms. Instead they are recorded as part of the "Instructions to Computer Operator" form.

Change U.S. Exogenous Employment Growth Rate:

This value is the percent change in exogenous employment, both industrial and office (bureaucratic), except for the gamed industries, state government employees and the university employment in a cycle. It is preset at the actual values for the years 1957 through 1966 unless changed by the game director. A change in this value will have an effect on the growth of the entire gamed area. The precise change is not completely predictable, since growth is also affected by new industries entering the area (see Forcing Exofirms), additional exogenous employment in specific analysis areas (see Additional Exogenous Employment below) plus a small random factor. Changes in this value will also, obviously, have an effect on the METRO-APEX area unemployment rate -- the average unemployment changing in an inverse ratio to the employment growth.

The Employment Growth Rate may be changed by including in the Player Decision deck a card with EG punched in columns 1 and 2 and the new percentage value in columns 27-35 (F-1) (be sure to punch a decimal point).

Unless changed by use of the EG card the following are the preset U.S. Employment Growth Rates used by the program for each cycle:

Cycle	Percent	Cycle	Precent
1	-0.9	6	1.6
2	0.5	7	1.4
3	2.5	8	2.3
4	1.7	9	2.6
5	0.2	10	0.8

Forcing Exogenous Industries (Exofirms) into Specific Areas:

Each cycle the newspaper lists a small group (from 3 to 6) of exogenous industries that wish to locate in the METRO-APEX area. Each of these industries has a preferred location or locations (listed in order of preference) plus one or more conditions which must be satisfied by the Politicians, Industrialists, and/or Developers in order for them to locate in the community. These conditions may be construction of streets or sewers, rezoning of land for industrial use or investment of money.

The players are sometimes confused as to the specific actions they must take. As far as street and/or sewer construction is concerned, the program does not look for specific projects -- it simply checks to see whether the total dollar amount of all projects of the correct category (streets or sewers) being allocated to the desired Analysis Area is equal to or greater than the amount required by the exofirm (notice that they must be AA-wide projects; the program does not check for money spent in the Ward or Jurisdiction). Note that more than one Developer and/or Industrialist may invest in the same exofirm and that the amount invested may be more than required. The rezoning requirement will be met if the total number of acres rezoned to vacant industrial is equal to or greater than the number of acres required. The old land use type is immaterial and the total may be made up of several small parcels or one large one. The program considers all such parcels as contiguous. The game Developers should be advised that the exofirms which do enter will not purchase vacant land from them but only from the general market.

They should also be advised that they cannot rezone land to vacant industrial and sell that land to the market in the same cycle.

Sometime the players will form a scheme to create an industrial park in some location and request that the exofirms locate in that area. Other times the Game Overall Director will wish to force in an exofirm despite the fact that all player requirements have not been met, or he may wish to locate the exofirm in some area other than those listed in the Newspaper. The "Exofirm Force" card is the mechanism for accomplishing either of these goals. The format is:

Cols.	1-2		XF
Cols.	3-6	(I-1)	Exofirm number
Cols.	7-10	(I-2)	Analysis Area into which the firm is to be forced. If zero or blank, the firm's first choice will be used.

Notice that there must be one card for each exofirm to be forced.

Additional Exogenous Employment:

Another method the operator or Game Overall Director can use for changing the distribution or magnitude of employment in a specific area is by means of the EE (Exogenous Employment) card. By this card he can create larger growth than available with most preset exofirms. The format is as follows:

Cols. 1-2		EE
Cols. 3-6	(I-1)	Analysis Area in which to locate
Cols. 7-10	(I-2)	Type of employment 1 = Industrial (manufacturing) 2 = Office (bureaucratic)
Cols. 27-35	(F-1)	Number of employees
Cols. 36-44	(F-2)	Number of acres required
Cols. 45-53	(F-3)	Dollars of added tax base

Entering Background Pollution Levels for Each Season:

The Game Overall Director may wish to create an air pollution crisis by adding a fixed quantity of each contaminant throughout the region in one or more seasons. The mechanism is by means of the BP card, the format for which follows:

Columns

1-2		BP
3-6	(I-1)	Season code number: 1 = Winder 2 = Spring 3 = Summer 4 = Fall
27-35	(F-1)	Particulates (micrograms/cubic meter)
36-44	(F-2)	SO2 (micrograms/cubic meter)
45-53	(F-3)	CO (milligrams/cubic meter)
54-62	(F-4)	NO (micrograms/cubic meter)
63-71	(F-5)	Hydrocarbons (micrograms/cubic meter)

Additional Pollution Control Equipment:

Occasionally, it may become necessary to add an additional piece of air pollution control or water pollution control equipment on to an existing industry in the game. This option is available to both the gamed as well as the simulated Industries. If the Game Overall Director were to list File 53 he would have a list of all the air and water pollution control equipment available in the game. File 51 (for air) and File 58 (for water) would indicate if there was any room for additional equipment--i.e., a 0 for a control number. The format of the card is as follows:

Columns

1-2		AP
3-6	(I-1)	Industry Number
7-10	(I-2)	Type of equipment: 1 = air 2 = water
11-14	(I-3)	Process Number for air only (I-2 = 1) otherwise blank
15-18	(I-4)	Pollution Control Number found in File 53

Public Reaction to Smoke and Odor:

This option can be used by the Game Overall Director if he would like to increase the number of complaints in any one of the five categories of the APCO Complaint table, namely Putrid Odor, Acrid Odor, Sulfurous odors, Pungent Odor, or Smoke. The current values are 50., 50., 50., 60., and 30.

The format of the card is:

Columns

1-2		PR
27-35	(F-1)	Putrid Odor factor
36-44	(F-2)	Acric Odor factor
45-53	(F-3)	Sulfurous Odor factor
54-62	(F-4)	Pungent Odor factor
63-71	(F-5)	Smoke

Headwater Conditions:

This option is in many ways similar to the BP cards (Background Pollution) mentioned previously. The Game Overall Director may wish to create a water pollution crisis by adding a fixed quantity of each effluent throughout the region in one or more seasons. The format of the card is:

Columns

1-2		HW
3-6	(I-1)	River: 1 = Great River; 2 = Red Oak
7-10	(I-2)	Season: 1 = Winter, 2 = Spring, 3 = Summer, 4 = Fall
11-14	(I-3)	Flow (cubic feet/second)
27-35	(F-1)	Temperature (°Fahrenheit)
36-44	(F-2)	Dissolved Oxygen (mg/l)
45-53	(F-3)	Biological Oxygen Demand (mg/l)
54-62	(F-4)	Nutrients (mg/l)
63-71	(F-5)	Total Dissolved Solids (mg/l)
72-80	(F-6)	Coliform (most probable number/100ml)

Runoff Conditions:

This option is used if the Game Overall Director wants to directly affect a specific reach for potenti .1 water pollution for one or more seasons. He may use this option in conjunction with a new industry entering into the community. The Game Overall Director may wish to create a water pollution crisis by adding a fixed quantity of effluence throughout the reach. The format of the card is:

Columns

1-2		RO
3-6	(I-1)	Reach Number (1 to 16)
7-10	(I-2)	Season: 1 = Winter, 2 = Spring, 3 = Summer, 4 = Fall
11-14	(I-3)	Flow (cubic feet/second)
27-35	(F-1)	Temperature (°Fahrenheit)
36-44	(F-2)	Dissolved Oxygen (mg/1)
45-53	(F-3)	Biological Oxygen Demand (mg/1)
54-62	(F-4)	Nutrients (mg/1)
63-71	(F-5)	Total Dissolved Solids (mg/1)
72-80	(F-6)	Coliform (most probable number/100ml)

Solid Waste Generation Factors:

This card allows the Game Overall Director to change the amount of refuse generated in each of the six wards in the community. He can either increase or decrease the pounds of refuse per household per day. This change will remain in effect for all continuing cycles until either changed again or a new game is specified. Note that a change in any one of the factors requires a value for the other two. Otherwise the routine will assume a zero value. The initial values for each of the six wards are:

Type 1 = 2.3 Lbs/H.H. day
Type 2 = 17.5 Lbs/H.H. day
Type 3 = 10.9 Lbs/H.H. day

The format of the card is:

Columns

1-2		BG
3-6	(I-1)	Ward (1 to 6)
27-35	(F-1)	Hazardous Solid Waste - lbs/H.H./day (Type 1)
36-44	(F-2)	Household Refuse - lbs/H.H./day (Type 2)
45-53	(F-3)	Solid Fill - lbs/H.H./day (Type 3)

Fee Charged for Private Collection of Industrial Solid Wastes:

All industrial solid waste that is generated is picked up by private collectors and not by the city or county governments. The Game Overall Director may wish to act as representative of the private collectors and charge a higher fee than that listed on the Industrialist printout of cost factors. This card will only have an effect on the gamed industries. This fee will remain in effect until there is a new fee card encountered or until a new game is specified. The format for the card is:

Columns

1-2		FC
3-6	(I-1)	Industry Number (either 1-7 or 8-14)
7-10	(I-2)	1 = Solid Waste
27-35	(F-1)	Fee Charged - $/ton

Operate or Turn off Simulated Industry:

If an industry is forced to close down or not be in operation for a cycle or more, the Game Overall Director can manipulate the files by using this option. A gamed Industry (1-7) can be not played by using the NOPLAY option (input card set #3) mentioned in Chapter 2. However for a simulated industry we would need to use this card. This card can be used to shut down the open burning dumps (industries 9 and 10) and for any industry that has been given an injunction to shut down until his problems have been corrected. (Also, be sure and change the collection and disposal systems if you do close down the dumps) One additional feature of this card is that at the beginning of a game the Game Overall Director may want to move the simulated industries to form an industrial park in certain parts of the County. This option will not work with any of the gamed industries. The effects of this card will remain until a new card is entered or a new game is initiated. The format of the card is:

Columns

1-2		OI
3-6	(I-1)	Industry Number
7-10	(I-2)	Status: 0 or blank = turn off industry 1 = turn on industry
11-14	(I-3)	AA change (only for simulated industries)

Change State Equalization Factor for Property Tax Calculation:

This is a very rarely used option but one which may be employed by the Game Overall Director if he wishes to announce that the State Board of Property Equalization has discovered that a particular jurisdiction is not assessing property at the legally required rate. The equalization factor adjusts the actual assessment percentage to 50% before applying property tax millage. Note: only Jurisdictions 1 through 4 can be changed. County millage is applied against the taxable property value of each Jurisdiction. The method of entering this value is:

Columns

1-2		AC
3-6	(I-1)	Jurisdiction (only 1 thru 4 may be changed)
27-35	(F-1)	Assessment Factor. This must be entered as a proportion; i.e., a fraction less than 1.0.

CHAPTER 4

Chapter 4

ERROR MESSAGES

During the computer processing component of METRO-APEX, many opportunities exist for error. Frankly, it is a rare occasion when the processing of a set of decisions is free from error. The need for quick and accurate corrective action is most dramatically demonstrated during runs requiring rapid turn around because processing errors disrupt player strategies (ommission of a single card might result in the non-execution of a crucial activity in connection with some major plan) and upset the morale of the audience and the timing of the game.

Errors arise from many sources. Players make errors in specifying the exact nature of their decisions. Coders of key-punch forms make errors in transposition. Errors can be made by keypunchers and, finally, the operator communicates incorrectly with the program. The most difficult errors to correct are player mistakes--unless the role advisor is sufficiently close to the players to place the logic of player decisions correctly on the worksheets, the computer operator cannot correct these mistakes. (The MISMATCH OF SCALE error is the most common error of this type.) Other errors can and should be corrected; unfortunately however, the addition of a zero on a number, the minor miscoding of a single number, etc., often goes by undetected. One useful activity that often minimizes the occurance of such errors is to unconditionally stop after reading the Main Player Decision cards and visually check the listing for errors prior to advancing the program beyond that section. A second activity, if time is available, is the reading of the printout for glaring inconsistencies and errors and the rerunning of the cycle to correct the mistakes. As the operator gains experience with the game, his speed and ability to catch errors before the printout is returned to the players should go up markedly.

This chapter takes up most of the diagnostic error messages that may be printed during the normal run of METRO-APEX. Each type of error is considered in a separate section of this appendix.

VERY IMPORTANT WARNING! Methods of restarting after error termination.

First, some background information:

After reading the Main Header Card, the METRO-APEX program makes a decision about which files it needs to continue processing. After a normal termination of a cycle of the game, data set 15 contains a record of the final state of the variable player accounts for the cycle just concluded and data set 16 contains the status of the same accounts at the beginning of that cycle. In particular, at the end of the computer run for cycle 2, for example, the cycle number stored in data set 15 is 2 and the cycle number in data set 16 is 1.

The decision the program makes at the beginning of a run is as follows:

a. If CYCLE=n (n greater than 1) is specified on the Main Header Card, implying that you are going on to a new cycle, data set 15 is copied into data set 16 so that at the beginning of processing both data sets contain exactly the same information. When this copy operation has been successfully concluded the program prints the following message:

   STATUS AT END OF CYCLE n HAS BEEN COPIED FROM DATASET 15 TO DATASET 16 FOR START OF NEW CYCLE

   Once this message has been printed you must use REPEAT= on the Main Header Card to restart the cycle due to any errors which may occur after it (as well as to simply rerun the cycle with different decisions). If fatal errors have occured prior to printing this message (errors in JCL or on the Main Header Card itself) you should simply correct the error(s) and restart retaining the CYCLE= on the Main Header Card.

b. If you had specified REPEAT=n (n greater than 1) on the Main Header Card, the program copies data set 16 into data set 15. When this copy operation has been successfully completed the program prints this message:

   DATASET 16 HAS BEEN COPIED TO DATASET 15 FOR REPEAT OF CYCLE n

   Since the records in data set 16 are not changed during processing you can restart using REPEAT=n for any errors which may occur.

c. CYCLE=1, REPEAT=1, and NEWGAME are synonymous. They each result in data set 14 (the base team data, with cycle number 0) being copied into both data set 15 and data set 16. (This is the only time data set 14 is used.) Since this is the case, any errors in running cycle 1 can be corrected and restarted using any of the above options.

Notice that the above restart procedures apply only to errors which may occurr in input card sets 1 through 6. Assuming the first Main Section of the program runs correctly, any errors in input card sets 7 through 10 (issue and newspaper data) should be corrected and restarted using the NEWSPAPER option on the Main Header Card and removing input card sets #3 through #6 from the input deck. (See Chapter 3.)

A. Errors in Job Control Cards:

Errors which may occur in the Job Control Language at the beginning of your input deck could be many and varied and will not be dealt with at length in this volume. Any that do occur will probably be due to discrepancies between the requirements of your installation and the sample set of JCL shown in Chapter 3, Figure 3. Among the most probable sources of error are:

Punching the incorrect VOL=SER=code on the DD cards, particularly FT15F001 and FT16F001 if running multiple teams or saving all cycles. Punching the incorrect UNIT or DCB parameters on cards FT03F001 and FT09F001.

You should consult with a representative of your computer installation for diagnosis of JCL errors.

B. Errors on the Main Header Card:

As each program control card is read by the computer it is repeated on the printout for record purposes whether or not it contains any error. The program section which scans and interprets the Main Header Card will print a $ sign under the line on which the Main Header Card is printed in the position where an error is detected. The type of error will be indicated on the following line. All possible errors will be checked on the Main Header Card and up to 10 errors in Additional Program Control Cards will be detected before the program will terminate.

***ILLEGAL OR CONTRADICTORY KEYWORD ON HEADER--'_____'

Only the first four characters of the Main Header Card keywords are checked. The above message will be printed if the program does not find one of the following: NEWG, CYCL, REPE, NEWS, TEAM, DATE. The four characters which are considered illegal are printed following the message. One possible source of illegal keywords could be the use of the apostrophes (') within the team identification field. This string of characters starts with an apostrophe and is considered ended when the next apostrophe is detected. Therefore any additional characters following the second apostrophe is considered another keyword.

A keyword is considered contradictory if it appears more than once on the Main Header Card or, with one exception, if more than one of the keywords NEWGAME, CYCLE, REPEAT or NEWSPAPER.

*** ILLEGAL NUMBER --'____'

The following are considered illegal numeric values:

1. Any value less than 1 or greater than 10 following CYCLE or REPEAT.
2. Any value other than 0 following the combination NEWSPAPER CYCLE.
3. Any value less than 1 or greater than 5 following TEAM.
4. Any negative or zero value in any of the three DATE field. (Unfortunately, we will either have to modify the program or not play METRO-APEX in the year 2000.

*** DID NOT FIND 'CYCLE', 'REPEAT', OR 'NEWGAME' ON HEADER CARD

This message is printed if one of the keywords NEWG, CYCL, REPE or NEWS is not on the Main Header Card.

*** TEAM NUMBER NOT GIVEN ON HEADER CARD

Self-explanatory. The team number is required.

*** DATE NOT GIVEN, WILL USE DATE FROM PRECEDING CYCLE mm/dd/yy

The above is not a fatal factor, but only a warning. If the date is not specified, the date saved in bytes 3-8 of "file 16" will be used. If starting a newgame this date will be all zeros and will be found incorrect at a later point, therefore DATE should always be specified when starting a new game.

*** ILLEGAL CHARACTER IN EXPECTED NUMERIC FIELD

Only the ten numeric characters, 0 through 9, blanks (which are ignored), or the terminating character comma (or / for date fields) are legal following CYCLE, REPEAT, TEAM or DATE. Any other character will give the above message. The most usual causes are (1) failing to terminate the number with a comma or (2) failing to separate the number from the preceding keyword with a blank or equal sign. For example, both of the following would produce the above error message:

CYCLE3, TEAM 1

CYCLE 3 TEAM 1

$

*** SLASH ILLEGAL HERE

Slashes are only legal separators between parts of the DATE field. Any other occurrance following a number will produce the above error.

*** mm/dd/yy IS AN IMPOSSIBLE DATE

The program contains an algorithm which checks each field of the date for correctness. The month must be 1 through 12, the day must be greater than zero and less than or equal to the correct number of days in the corresponding month (a check for leap-years is included), and the year must not be equal to zero (as noted above).

*** TEAM NUMBER/FILE MIXUP

TEAM NUMBER IN DATASET SPECIFIED ON FT15F001 IS n
TEAM NUMBER ON HEADER CARD IS m

The team number (from 1 to 5) is stored in bytes 75-76 of record 71 of data sets 15 and 16 by utility program MAKETEAM (see Chapter 5) which must be run prior to the first time a game is run for any team. Each time NEWGAME, CYCLE 1 or REPEAT n is specified the team number in both files is compared with the team number on the Main Header Card. When any CYCLE other than 1 is specified the team number in data set 15 is compared with the team number on the Main Header Card. The above message is printed if the numbers are not the same to prevent inadvertant destruction of the wrong team files.

The error is caused by either (1) not having preset files for a new team with the MAKETEAM utility program, or (2) either the wrong data set DSNAME specified on the appropriate DD card or the wrong team number on the Main Header Card.

*** CYCLE NUMBER IN DATA SET 16 WAS n. SHOULD HAVE BEEN m.

CHECK NUMBER OF REPEAT CYCLE OR DSNAME ON FT16F001 CARD.

This message will only occur in conjunction with REPEAT on the Main Header Card. The cycle number in bytes 1 and 2 of record 71 of data set 16 must be one less than the cycle being repeated; in other words, the record at the end of the cycle preceding the one being repeated. If you are using the Basic Job Control in Chapter 3, this error could be caused by trying to repeat a cycle earlier than the last cycle completed. If running multiple teams or saving the records of all cycles it could be caused by the wrong DSNAME on the FT16F001 DD card.

*** CYCLE NUMBER IN DATASET 15 WAS n. SHOULD HAVE BEEN m.

CHECK CYCLE NUMBER ON HEADER CARD OR DSNAME ON FT15F001 CARD.

This message will only occur in conjunction with CYCLE on the Main Header Card if the cycle is greater than 1. It could be caused by attempting to run a new cycle when the preceding cycle had not run to completion or by attempting to repeat or start back at an earlier cycle without specifying REPEAT on the Main Header Card.

C. Errors in Additional Program Control Cards:

Each Additional Program Control Card (input card set #3) is printed on the output for record purposes as it is read. If any errors are detected on any of these cards, an appropriate message will be printed immediately following the card image. A maximum of 10 errors will be detected by the section of the program which reads the Additional Program Control Cards. If more than 10 errors are detected the program will print:

TOO MANY ERRORS. EXECUTION HALTED.

and the program execution will be terminated.

The following errors may be detected:

xxxx MAY NOT BE SUBSCRIPTED.

The parameter specified as xxxx has been subscripted and should not be;

e.g. NOPLAY=ALLDEV(1) is incorrect.

---

xxxx MUST BE SUBSCRIPTED.

The parameters DEVELOPER, INDUSTRIALIST, POLITICIAN, AND PLANNER or their abbreviations must be subscripted.

---

xxxx HAS AN OVERSIZE SUBSCRIPT.

The maximum subscript value for DEVELOPER and INDUSTRIALIST is (7) and for POLITICIAN and PLANNER the maximum subscript is (5).

---

xxxx IS UNDEFINED.

The keyword or parameter xxxx is not a valid word. Probably a misspelled or incorrectly abbreviated word. Check the list in Chapter 2.

UNEXPECTED END OF FILE or

UNEXPECTED EOP

These messages should only be printed if the program detects an "end-of-file" in the input deck before it finds a RUN or DATA card. An end-of-file card for the input deck is the card with /* in the first two columns and is found at the end of the input card deck. It might occur, for example, if you were running exact copies of the newspaper and had omitted the RUN card between the Main Header Card and the Newspaper Header Card.

Normally the METRO-APEX program terminates with one of the two following messages:

*** NORMAL METRO-APEX JOB TERMINATION

if no errors were detected in the entire program or

*** METRO-APEX ABNORMAL TERMINATION WITH nn ERRORS

Any occurance of the UNEXPECTED EOP message (and ABEND 0077) after either of the above messages should be disregarded.

D. Errors in Reading the Main Player Decision Cards:

As the Main Player Decision Cards are read by the program error diagnostics are written on the printer under the line containing the image of the incorrect card. If there are any errors, or if you have submitted the job only to get a listing of the input data deck and have found errors not detected by the program, the errors must be corrected and the job resubmitted specifying REPEAT on the Main Header Card.

Each error message is described briefly in the following paragraphs.

Several errors are associated with project and program input cards.

*** ILLEGAL PROJECT NUMBER [n] ***

If the number entered on a project or program card is not associated with any existing project or program, the above message is printed.

*** MISMATCH OF SCALE . . [n] ***

Assignment of a project or program to a location which is larger (more inclusive) than the scale indicated on the project list will cause this error message to appear; for example, coding 30 (Ward 1) for a project which must be assigned to a specific Analysis a Area.

*** MISASSIGNMENT OF AREA [n] ***

When Analysis Areas are coded incorrectly, most often when projects restricted to a particular area are assigned to another area, this message is printed.

*** PRICE (F-1) OUT OF RANGE ***

When prices on capital improvement projects are outside the range specified on the project lists, this error is printed.

Another message may appear after a capital improvement or program card.

*** FIELD 12 (LOC) CHANGED TO [n] ***

This message is not an error. Assignment of a project or program to a location which is smaller (less inclusive) than the scale indicated on the project list will activate a mechanism within the program to change that location automatically to the proper larger scale and write out this message. However, if a special program is County-wide, you must indicate the appropriate location, i.e., 40.

Errors in the balance of the input cards will trigger the following diagnostics.

*** NUMERICAL VALUE [n] IMPROPER ***

An entry on a card that is clearly impossible (for example, a zero entry for a player number) will trigger this message. The number [n] indicates which of the 12 possible numeric fields is in error.

*** NON-GAME LD OR IND ***

If a Developer or Industrialist number appears on a card but is the number of a non-playing Developer or Industrialist due to inclusion on a NOPLAY card, the above error is printed.

*** ALPHA CODE UNKNOWN ***

If the computer can not interpret the first two letters on a card, the above message is printed. The error sometimes occurs if a blank card has been inserted in this section of the input deck.

*** INCORRECT BOND/MILL NO. ***

This message is written in one of two cases. If the card requesting a bond or millage issue (BS card) is not read prior to the project or program request (CP or SP card) tied to that bond or mill or a campaign contribution to that bond/mill, this message will appear. Rearranging the input to place the BS card before the CP, SP or CC card(s) will rectify this error. The error is also caused if the first digit of the bond/mill number is not the same as the cycle number; i.e. in cycle 2 the bond/mill numbers must be 201, 202, 203, etc.

*** MORE THAN 20 BONDS/MILLS, ABOVE THE CARD IGNORED ***

If more than 20 requests for Bonds or Mills are processed in a cycle, the above message is printed. It may be corrected by either ommitting the card or cards over 20 (not a very desirable solution) or, preferably, by combining one or more bonds or mills of the same type for the same jurisdiction into a single larger bond issue or millage. If you do make corrections of either type, don't forget to check the CP, SP and CC cards for references to the BS cards which were eliminated.

An error message that is printed in response to problems on cards dealing with land transactions:

*** COMBO IMPROPER ***

This is caused by illegal combinations of land use and zoning. For example, if land use is vacant (code 0) the zoning must be 1-6. If developed (code 1), zoning must be 1-11.

One last message may appear on the output as a warning of a potential error.

*** MISSING APCO COUNTY BUDGET CARD ***

This is likely to be a serious error unless you are not playing the APCO role, since without a County budget allocation the APCO will have no money. You might also want to check if there is a UV 5 14 card--the County allocation to the EQA role.

The messages listed above are responses to errors in input found by the METRO-APEX program itself--the program checks the cards for mistakes and inconsistencies and reports out any errors. Sometimes, however, errors are made in preparing the input cards of a nature that prevents the computer from correctly reading the cards. These errors cause the computer itself to print diagnostic messages and take some action which is dependent on the Operating System at your installation. Probably the only error of this type which you are likely to encounter is the following:

IHC2151 CONVERT - ILLEGAL DECIMAL CHARACTER X

This error results from having punched some character other than a decimal digit 0 though 9, a single plus or minus sign, or blanks in an integer (I) field, or the above characters plus a single decimal point in a real (F) field.

The action taken depends on whether or not the Operating System at your installation has what is known as the "extended error handling facility." If extended error handling is not in effect the system will halt when the above error is encountered. You must correct the error and restart specifying REPEAT on the Main Header Card. If the system does have the extended error handling facility the problem is compounded. The system prints the diagnostic, performs what is known as the "standard fixup", which consists of setting the value of the field in error to zero, and continues execution. Since these errors are detected by the system prior to the checks by the METRO-APEX program it is possible that the zero field will be detected as an error by the main program and result in an error termination after reading all of the data cards. It is also possible, however, that the zero field will not be detected by the METRO-APEX program during card input, but that execution will continue with the incorrect value. If this does occur you should check the entire printout for possible errors as a result of this zero field and, if necessary, REPEAT the cycle, printing only the section of the printout effected.

E. Errors in Reading Newspaper Header Card

The Newspaper Header Card is scanned for legal keywords in the same manner as the Main Header Card (Section B.). Only the first four characters of each keyword are considered. The legal combinations are: COPI, COPY, IGNO, RERE, NOHE, CEMI, NEWI. (See Chapter 3 for complete keywords.) If some four-letter combination other than the above is detected, the incorrect column is flagged and the following message is printed:

*** NOT A LEGAL KEYWORD ON NEWSPAPER HEADER CARD

If a number followed by a comma is not detected following COPY= or COPIES= (probably due to a missing delimiter between the keyword and the number) the following message is printed:

*** ILLEGAL CHARACTER IN NUMERIC FIELD. COPIES SET EQUAL TO ONE.

Note that the number of copies is not required on the Newspaper Header Card. If not specified the number of copies is set by default to one.

If any errors are detected on the Newspaper Header Card the following message is printed and execution terminated:

*** EXECUTION TERMINATED DUE TO ABOVE ERRORS. CORRECT AND RERUN SPECIFYING 'NEWSPAPER' ON MAIN HEADER

F. Errors in Reading Issue Decisions

A subroutine, DECOD, is used to scan and interpret issue decisions (and CEM input cards) of the form iiia (bbb). DECOD searches for Syntax errors only. The only legal character which may appear on an issue decision card is:

blank 1 2 3 4 5 6 7 8 9 ( ) , *

If a character other than the above is found, this message is printed.

ILLEGAL PUNCH IN COL [n]

This message indicates the column containing the invalid character to assist the operator in making the needed corrections. Since the maximum number of digits in a single string on a card is four and the minimum is one, a check is made for

excessively long and short combinations. Strings of unacceptable length result in either of two messages.

MORE THAN 4 DIGIT NUMBER, COL [n]

LESS THAN 1 DIGIT NUMBER, COL [n]

If only one digit is found between two commas, it is assumed to be an alternative number with no preceding issue number and results in the following.

ZERO ISSUE NUMBER

Note, that no column number is given--the operator must scan the incorrect card for the error.

Whenever a right parenthesis ")" is encountered, the program checks that there was a preceding left parenthesis. The failure to pass such a check results in the following.

WRONG PARENTHESIS, COL [n]

WARNING -- NO TERMINATING CHAR. LAST NUMBER NOT STORED

The last character on each issue card must be either an asterisk or a comma. Any characters appearing on a card after the last comma (but not followed by an asterisk) will not be carried over to the continuation card but will trigger the message printed above. This is only a warning is as much as the incomplete issue entry triggering the message may be restarted on the continuation card without deleting the partial entry from the first card. If the incomplete entry is not repeated, it is, in fact, an error.

In the absence of warnings and/or syntax error messages, a series of messages may be printed indicating that the entry for a given issue is invalid. If the issue number is not within the 1-300 range, does not correspond to an initialized entry in the data file, or has an incorrect alternative number associated with it, one of the following messages is printed.

ILLEGAL ISSUE NO. [nnn]

or

ILLEGAL ALTERNATIVE (n). FOR ISSUE [nnn]

If any of the above messages are printed the program halts after printing:

CORRECT ERRORS AND RERUN SPECIFYING 'NEWSPAPER' ON MAIN HEADER CARD

If bond or millage numbers are entered on the issue cards the program compares the first digit of the bond or mill number to the cycle number. If they are not the same the following is printed:

ILLEGAL BOND NO. (nnn) FOR ISSUE m
IGNORED IN SUBSEQUENT PROCESSING

Note that the above does not terminate processing but is a warning only.

After all of the above checks, if no errors are detected, the program compares the list of issues read from the issue decision card with the list of issues from the preceding newspaper which had possible linkages to other issues. If the program does not find a decision for those issues the following is printed:

*MISSING DECISION FOR ISSUE n

for each such missing decision. If you had specified IGNORE on the Newspaper Header Card, processing will continue. If you had not specified IGNORE, the program will terminate after printing:

*** "IGNORE" NOT SPECIFIED. PROCESSING TERMINATED DUE TO MISSING DECISION(S).

One last message may appear after reading the issue decision cards. The program saves the record of the decisions from cycle to cycle for use in processing the candidate election model. A maximum of 40 issues can be saved from election cycle to election cycle. If that number is exceeded, the following is typed.

MORE THAN 40 ISSUE FOR CEM, nn IS IGNORED

This error is not disastrous. Because it is possible to input a special set of issue decisions for the Candidate Election Model, the issue list can be edited (to eliminate repetitions) when that mode is executed by the REREAD option.)

If there are no syntax errors on the Issue Decision Card(s), the program checks the content of the cards. The following warning message may be printed.

MORE THAN 40 SETS OF NUMBERS. STOPPED AT 40.

The maximum number of issues that can be stored at a single time is 40. Additional issues are ignored.

The entire set of issue decisions on a single card is checked for errors before execution is terminated. After scanning the entire card, if any errors were found, the following message is printed:

***** nn ERROR(S) ON ABOVE CARD *****

G. Errors in Reading the Issue Addition Card Deck

The computer program does some extensive checking of the issue addition card deck to insure internal consistency and legitimacy of most entires. The operator must remember to include the blank card for each sub-section of the program even if there are no cards from that section to be reread.

The error messages are as follows:

1. Error Messages for Issue Cards

** ISSUE NUMBER nnn TOO LARGE

The issue number in columns 5-7 is greater than 399.

** DUPLICATE ISSUE NUMBER nnn

The issue record corresponding to the number printed is already in files. A new issue number must be assigned. If the operator fails to remove these other alternatives and headlines, the alternatives and headlines associated with the issue already assigned to that number will be overprinted.

** NON-ZERO ALTS W/DUMMY ISSUE nnn

An issue card has a non-zero entry in column 58 and a zero entry in column 55. Either the number of alternative (column 58) should be zero or the resolver of the issue (column 55) must be specified.

*** ILLEGAL IWHO -- OUTCOME DETERMINED BY -- ISS nnn

Column 56 is not a 0, 1, 2, or 3

** BAD AA NUM, ISS nnn

The location is issue (columns 1-2) is not between 36 and 40.

** TOO MANY HEADLINES, ISS nnn

The number of headlines (column 39) is greater than 4.

** MORE THAN FIVE ALTERNATIVES, ISS nnn

The number of alternatives (column 58) is greater than 5.

** NO ALT RECORD AVAILABLE -- ISS, nnn, IGNORED

The alternative file is full. The issue is skipped. The operator has the option of clearing some issues (already printed) from the file and restarting input.

** NO HL RECORDS AVAILABLE -- ISS, nnn, IGNORED

The headline file is full and the issue is skipped. The operator has the option of clearing some issues (already printed) from the file and restarting input.

2. Error Messages for Alternatives

** ISSUE NUMBER GT 400, ALT nnn

The Issue number (columns 1-3) is greater than 399.

** ISSUE NUMBER LE 300, ALT nnn

The issue number (columns 1-3) is less than 301.

** ISSUE MISSING FOR ALT WITH ISS, nnn

The issue corresponds to the issue number on the alternative card has not been recorded properly. The alternative card is rejected because the issue card was wrong (it may or may not be correct itself). It must be reread after the issue card is inputted correctly during the correction phase.

** ALT NO nn GT NO OF ALTS ON ISSUE CARD n ISS nnn

The alternative number (column 4) is larger than the number of issues recorded on the issue card (column 58 on the issue card).

** ISS nnn ALT nn RECORD NOT RESERVED CORRECTLY

The file record number for each alternative is set when the issue card is read in. For some reason, the record was not reserved properly. The issue record should be blanked out and the entire issue reentered. (This should hardly ever occur.)

** DUPL ALTERNATIVE nn, n

The alternative record is already full. (This should hardly ever occur.)

** INCORRECT HEADLINE NUMBER nnnn,nnn

The number of headlines (column 32) is negative or greater than 4.

** ALT TOO HIGH, ISS. nnn ALT nn

This alternative pointer in the issue record is too high. (This should hardly ever occur.)

---

3. Error Messages for Headlines

** ISSUE INCORRECT FOR HL nnnn

The issue number as recorded in the issue file does not correspond to the issue record on the card. (This should hardly ever occur.)

** ALT TOO HIGH, ISS. nnn ALT nn

The specified alternative (column 4) is higher than the number of alternatives stated on the issue card (column 58, issue card).

** ISNO NOT BETWEEN 301 and 399 FOR HL -- ISS nnn

The issue number on the headline card is incorrect as specified.

** SEQ ERROR nnnn,nn

The sequence code (column 5) is out of sequence; that is, a card with sequence "2" appears without a card with sequence "1".

** ISSUE NUMBER nnn IN ISS FILE - NOT SAME AS nnn IN ALT FILE--ISS NO nnn

The issue number in the alternative file is not the same as the issue number in the issue file. (This should hardly ever occur.)

Upon encountering errors, the operator should correct miscoded cards and set up a new input stream. Most of the errors that "hardly every occur" are errors in the internal keying process of the program. The best procedure to follow if one of these errors occurs is to delete all of the issues being added when the delete option is offered. This clears all the keys. A complete reload of all issues added should clear up the problem. (Done through FILEPRNT routine--MAKE 201.)

H. Errors in Reading Candidate Election Model Input:

The input stream recording the candidate decisions on issues is scanned by the same DECOD routine that interprets issue decision cards (input card set #8). Therefore, any or all of the syntax errors described in connection with the issue decision cards may appear in response to errors in the candidate decision cards.

In addition, a series of straightforward error messages may be printed.

ILLEGAL PLAYER NUMBER nn

This is printed if the player number is less than 1 or greater than 16.

ILLEGAL OPPONENT TYPE FOR CANDIDATE nn

This is printed if the opponent type for incumbent cards (player number 1-8) is not 1 or 2. It also appears if the simulated opponent type on the opponent cards (player number 9-16) is not a digit between 1 and 9.

DUPLICATE PLAYER NUMBER nnn

This message signals that more than one set of cards was entered for player nnn.

NO MATCHING CANDIDATE FOR CAND. nnn

For every incumbent card read (candidate number 1-8) a corresponding opponent card (candidate number 9-16 with 1 paired

to 9, 2 to 10, etc.) must be read. A mismatch in pair triggers this last message.

If any of the above error messages are printed, the program terminates and the errors must be corrected and the program resubmitted, specifying NEWSPAPER on the Main Header Card.

In addition to the above "fatal" errors, the following errors may be detected. They are not considered "fatal" to execution because the indicated corrective action is taken, but they should be analyzed carefully for their effect on the Candidate Election and, if necessary, the cards should be corrected and the NEWSPAPER rerun.

PLAYER nn SPENT MORE THAN HE HAD (nnn PCT), CHANGED TO FF.fff FF.fff . . .

The designated player entered percentages totalling more than 100% in assigning his funds to stress the various issues. The program automatically adjusts this "oversight" by cutting the percentages back proportionally.

WRONG PARTY SUPPORT FOR CAND. nn. SET=30.0

This message appears if the value in columns 4-8 of the incumbent card is negative or greater than 60.0. (Warning only.)

PERCENT OVER 100 FOR ISSUE nnn CAND. nn. SET=100

This is printed if the percentage appearing in parenthesis for a given issue (designating stress) is greater than 100. (Warning only.)

ISSUE nnn FOR CANDIDATE nn NOT IN MASTER LIST -IGNORED

The program verifies that all issues entered for a given candidate were included on a previous issue decision card or input specially. If no record of an issue is found, the above diagnostic is printed. (Warning only.)

CHAPTER 5

Chapter 5

THE FILEPRNT UTILITY PROGRAM AND OTHER OPTIONS

A. The FILEPRNT Program--Creating and Printing METRO-APEX Files:

This utility program controls, by selective subroutine calls, all the necessary functions of initializing the "files" in data sets 14, 17, 18 and 19. Normally all of the required data cards for creating all of the files are in a single input stream on magnetic tape with the appropriate control cards for this program separating the individual decks. This initial input stream also causes a printout of all of the files (except issues and headlines) as they are created.

Once the files are created, this program is used to print any of the files, including those in data sets 15 and 16, either for diagnosis of program errors or for operator or player information. Of particular importance, since a number of copies will be needed for each game run, is the ability to print lists of capital projects and special programs (File 6). It is also useful for the operator to have a list of preset issues and headlines for each cycle and a complete listing of all issues and headlines (ISLST).

The program is executed using the same Job Control card set as indicated for the main METEQEX program in Figure 3 in Chapter 2 with the following exceptions:

1. Replace the word METEQEX on the EXEC card with the word FILEPRNT.
2. (Optional) The FT09F001 DD card is not necessary.
3. The REGION= size on the JOB card can probably be eliminated, depending on the default region size at your installation. The FILEPRNT will execute in a region size of 80K for file printing. A larger region size (120 will be required for initial creation from magnet tape.
4. (Optional) The 0F001 DD Card is not necessary.

The control cards for the FILEPRNT program are simple, involving a single keyword starting in column 1 on each card, in some cases followed by one or more decimal numbers. The following are the legal keywords and their meaning:

MAKE n: This card indicates that the program is make file n. This card is immediately followed by the data cards to be read by the program to make file n, if required. The only legal values for n are: 2, 3, 5, 6, 21, 25, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 53, 61, 62, 64, 65, 66, 68, 201, 203, 204, 206, 208, 209, 211, 237. File 5 and 209 are the same, the values are equivalent. File 35 36 and 208 require no data cards.

Note: the file creation routines for Files 6 and 28 also require control cards in addition to those required by the main program. They will be described in a following section.

The format for data cards required by the above file creation routines are found in the routines themselves.

PRINT n,m: Print the contents of file n. The legal values for n are:

1, 31, 41	4, 34, 44	7, 37, 47	8, 38, 48
15, 35, 45	16, 36, 46	19, 39, 49	20, 30, 40
22, 32, 42	23, 33, 43	51, 61, 71	52, 62, 72
54, 64, 74	55, 65, 75	56, 66, 76	58, 68, 78
511,531,541	512,532,542		

2, 3, 6, 11, 12, 21, 25, 28, 53, 513, 204, 206, 211, 201, 5, 209

PRINT 201 is the same as using the keyword ISLST. Both print the contents of files 201, 202, and 203--the so-called issue list.

PRINT 5 is the same as using PRINT 209, the values are equivalent.

File 6 is the only file that is usually printed with any regularity. The format of most of the other file prints is usually meaningful only to programmers.

File, 1, 31, 41 and 11 must be followed by at least one additional value, separated from n by a comma. This value designates the Analysis Area to be printed for File 1, 31 and 41 and the record from 1 to 50 to be printed for file 11. The reason is that a complete dump of either of these files is very lengthy and usually of little value. If m=99 for any of these files the complete file will be printed. For example: PRINT 1,23 would print only File 1 for Analysis Area 23.

As many PRINT cards as desired may be included in the input stream.

ISLST n,m: Print the issues, alternatives and headlines in files 201, 202 and 203.

The parameters n and m are optional. If omitted the entire list of issues will be printed. If specified n is the first issue to be printed and m is the last. For example:

ISLST 1, 10 will result in printing only the first 10 issues.

ISLST 101 would print all of the issues from 101 to the end.

Note: The issue file (#201) contains a maximum of 300 preset issues. At the present time only about 200 are used, allowing for future additions. Only those actually in the file will be printed. There is room in the headline file (#203) for 1498 headlines. Many of these headlines are printed as part of issues. When all issue related headlines have been printed, the program will continue with the balance of the "one-liners" which have not already been printed as part of issues or alternatives. At the end, the program will list the numbers of issue records and headline records which have not yet been used and are available for expansion.

BKVIN: This calls a special routine which does a final initialization of File 30 and 34. There are no data cards for this routine. It must be run following the original creation of Files 30, 31, 32, 34, and 64 from cards. All of the mentioned files must already have been created when BKVIN is run. It should not be used except in very special cases.

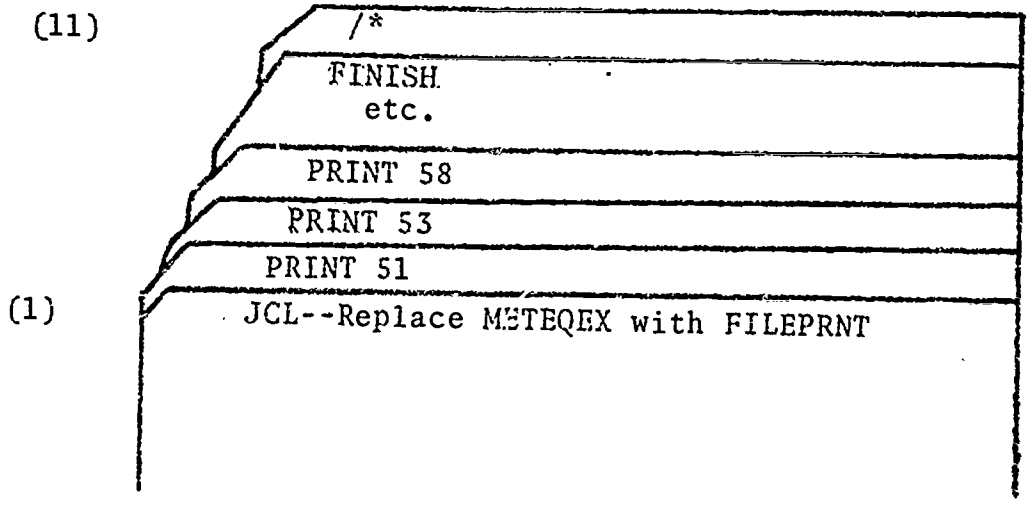
NOPRINT: The main FILEPRNT program is set to automatically call the print routine corresponding to a particular file following the use of a MAKE control. There may be circumstances when you may not wish to get a complete dump of all files created. The NORPRINT keyword card turns off this automatic print feature. It may be used preceding any MAKE card and remains in effect until:

PRON: This keyword, an abbreviation for PRintON, turns automatic printing back on following the use of NOPRINT.

FINISH: As many of the above control cards as desired may be included in a single run of FILEPRNT. The last card in the input deck must be FINISH to indicate the end of the input deck to the program.

Figure 8

Printing Different METRO-APEX Files



A. Control Cards for Creating and/or Printing File 6--Capital Projects:

A special section of the FILEPRNT program facilitates the addition of or changes to the file of capital projects and special programs. It also allows deletion of projects and/or programs when they are no longer needed. Once added, a new project or program should remain in the file for the balance of the game; however, all new projects should be deleted from the file prior to the inititation of a new game run.

Note that since the FILEPRNT program is entirely separate from the main METEQEX program it must therefore be executed before running METEQEX for any cycle in which there is to be a reference to a new project or program. The input to this special program is made from cards punched with the following format.

Project Card*

Columns	Format	Item and Code
1-3	I-3	Three digit integer project number (1-140)
4-5	I-2	Location: 01-29 for Specific Analysis Area; 30 for any AA., 31 for any Ward; 32 for any Jurisdiction
6	I-1	Type: 1=streets, 2=sewers, 3=water, 4=parks and recreation, 5=miscellaneous
7	I-1	Capital Plant Index Impact: 0=A.A., 1=Ward, 2=Jurisdiction, 3=County
8	I-1	Years to Construct
9	I-1	0 if Revenue Bond Financing is not allowed, 1 if it is
10-14	F5.0	Acres required (real number with decimal) If a negative number, then the number of acres will have to be coded on the F-2 field of the CP Card.
15-23	F9.0	Total Minimum Cos
		decimal)
24-32	F9.0	Total Maximum Cost (real number with de
33-77	45A1	Project Title

program Card*

Columns	Format	Item and Code
1-3	I-3	Three digit integer program number (001-060)
4-5	I-2	Number of years program is to run

Columns	Format	Item and Code
6-7	I-2	Location: 1-29 for a Specific Analysis Area; 30 for any Analysis Area; 31 for any Ward; 32 for any Jurisdiction; 33 for County-Wide
8-10	I-3	Required project number (leave blank if none is required)
11-20	F10.0	Cost per year
21-68	48A1	48-Character Title
69-70	2X	Blank
71-73		Number of issues to be printed during the last year of the program (usually blank for additions)

All integer fields (I Formats) must be right justified.

The control of the program for inserting or deleting or printing projects is by means of keyword control cards which are in addition to those required by the main section of the FILEPRNT program They are:

INITIAL: This should only be used when you wish to completely wipe out all projects and programs in the file and completely reload the file. It does not result in reading any cards, it simply clears the file. It must be followed by additional control cards to read new data.

PROJECTS: This indicates that the cards which follow are capital project cards punched according to the preceding format. The last card in the deck of project cards must be blank to indicate the end of the project card deck.

PROGRAMS: This control card indicates that the cards which follow it are special program cards punched according to the preceding format. The last card in the special program deck must be blank.

DELETE n,m,i ... r: This card contains a list of projects and/or programs which you wish to delete from the file. Each number must be separated from the next by a comma. Note that special programs must be numbers from 141 to 200. (140 + special program number.)

REPLACE: Normally when adding projects and/or programs the program will indicate an error if a record with that number already exists in the file, assuming that you do not wish to destroy a record that already exists. The above control card may be used preceding a PROJECTS or PROGRAMS control card to allow replacement of records which already exist.

LIST n: This control card will result in the printing of n copies of the project/program list. The default if n is not specified is one.

STOP: This card must be used to indicate the end of all controls cards related to File 6 and causes a return to the main FILEPRNT program.

Figure 9

Card Setup for Printing Project Lists

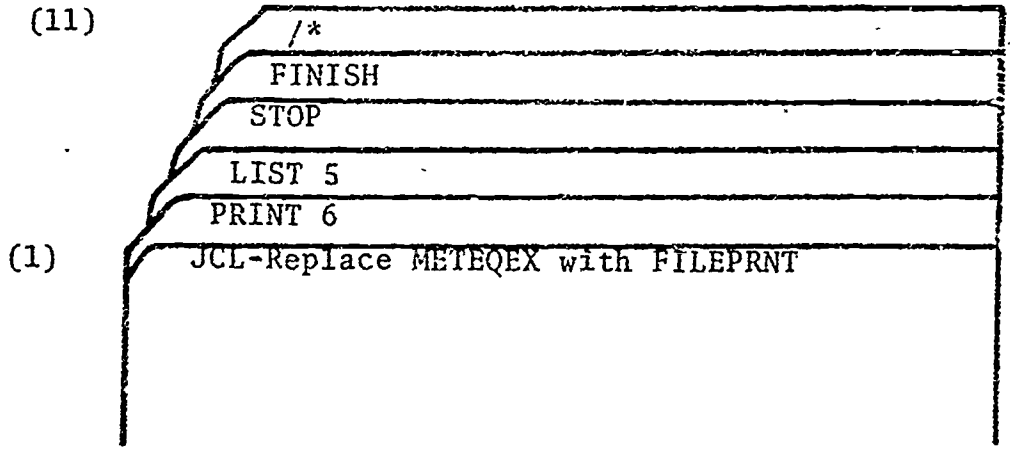
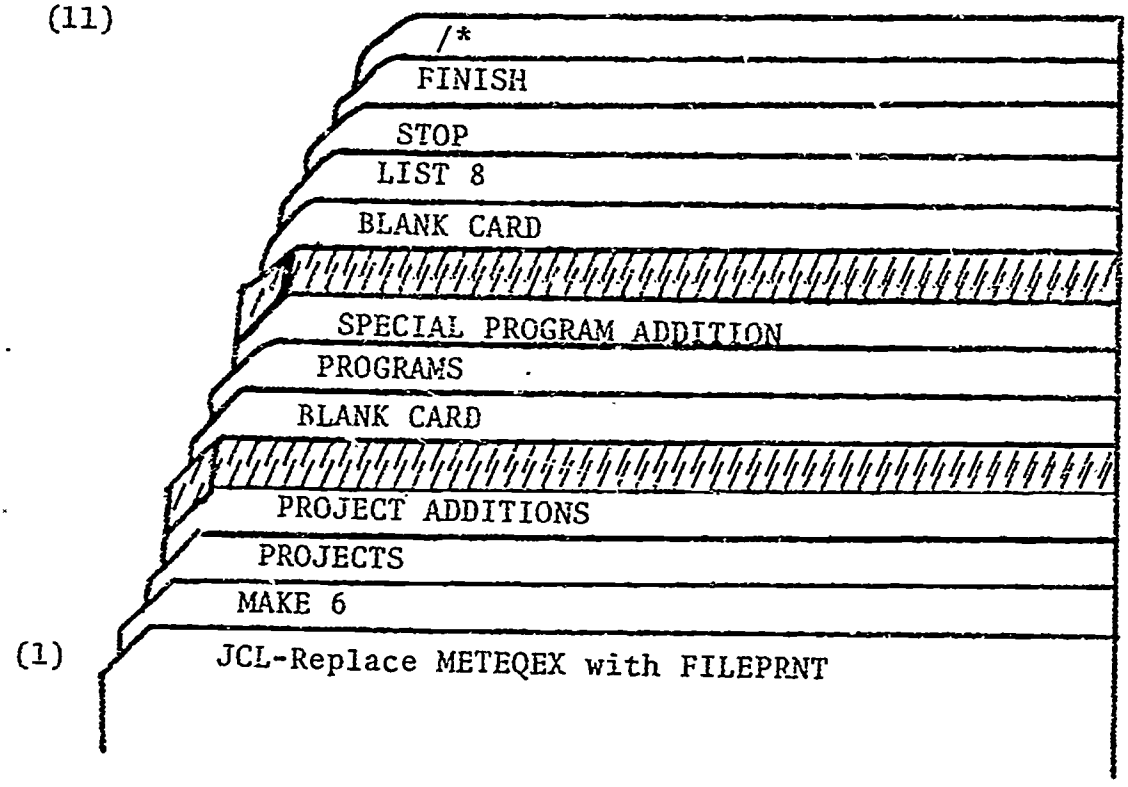


Figure 10

Card Setup for Making Changes in the Project Lists



B. Running More Than One Game:

Some organizations using METRO-APEX may need to be able to process more than one run of the game at the same computer installation concurrently. The reasons for this can be many--short demonstration runs overlapping long-term runs, more than one course using the game during the same semester, training sessions for operating staffs each of which is advising a different team, or running for very large groups where the group is divided into two or more teams.

The IBM 360/370 computer program for METRO-APEX can be used to run as many teams as necessary, although we recommend that no more than five game runs be in progress at any one time since the file handling becomes rather cumbersome for more than five teams and can lead to unintentional errors. The

procedure for up to five teams is extremely simple, since it only involves keeping three additional data files for each extra team.

Chapter 6, METRO-APEX Data File Organization and Description, discusses in detail the six "permanent" data sets used by the METRO-APEX 360/370 program. It was noted that data sets 14, 17 and 19 contain files which are "read-only" within the main program (the data may be changed for special purposes by the FILEPRNT program) and are shared by all teams. Data set 18 contains variable records of issue and newspaper decisions, however it is set up to handle records for up to five game runs automatically and no modification to the standard Job Control set is required for running from one to five teams.

Data sets 15, 16, and 20 are the critical data sets from the standpoint of multiple teams. Each team must have its own set of data sets 15, 16, and 20. Before running the game for any team for the first time, data sets 15 and 16 must have been "preformatted" by running a special job which creates the two data sets by reserving space on a disk volume for them, names them and runs a program which writes the team number into a specific place in each of the two data sets. An example of this job is shown in Figure 11. When the main program is executed, the team number specified on the Main Header Card is compared with the team number stored in one or both of these data sets and, as noted in Chapter 4 on Error Messages, execution will be terminated if the team numbers do not agree. Another copy of data set 20 is needed also, but will have a different name.

The following changes should be made prior to the creation of data sets 15 and 16 for a different team:

1. Changes in JCL

   a. on the EXEC card replace METROEX with MAKETEAM
   b. Replace the FT02 DD card with the following:
      //FT05F001 DD DDNAME=SYSIN
   * c. Replace the FT15 DD Card with the following:
      //FT15001 DD UNIT=[2314 or 3330],DISP=(NEW,KEEP),
      // SPACE=(640,(360)),DCB=(RECFM=F,LRECL=640,BLKSIZE=640),
      // VOL=SER=XXXXXX,DSN=SWFILE15.TEAM2
   * d. Replace the FT16 DD card with the following:
      //FT16F001 DD UNIT=[2314 or 3330],DISP=(NEW,KEEP),
      // SPACE=(640,(270)),DCB=(RECFM=F,LRECL=640,BLKSIZE=640),
      // VOL=SER=XXXXXX,DSN=SWFILE16.TEAM2

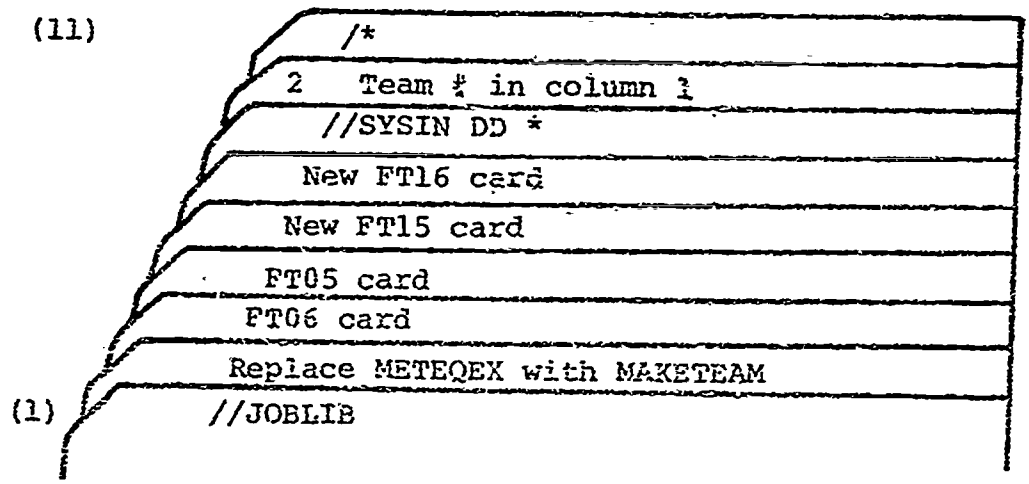
e. The following cards may be deleted (Optional): FT03, FT09, FT14, FT17, FT18, FT19, FT20

f. Immediately following the //SYSIN DD * have another card with the team number in column 1. This number should not be less than 1 nor greater than 5. (You may wish to change the FT15 and FT16 cards to correspond with your new team number, i.e., DSN parameter)

* Be sure and put in the appropriate unit number and replace the XXXXXX with appropriate identification serial number of the disk pack on which the data set will be located.

Figure 11

To Create Additional Files 15 & 16 For Running More Than 1 Team at the Same Time



Data Set Numbers vs. Data Set Names:

A number of references have been made above and elsewhere in this volume to data sets by number; for example, data set 15, etc. The following definitions will help to avoid confusion in the discussion which follows:

Data Set: An organized collection of related data residing on some storage medium; for the METRO-APEX program it is normally stored on a direct access volume, usually a disk pack.

Data Set Name: Each data set is assigned a name at the time it is created and that name is used thereafter to refer to that particular data set. The name is specified

to the Operating System on a DD card by means of the parameter DSNAME= or its abbreviation DSN=. Each data set on the same disk volume must have a unique name. An unqualified name consists of from 1 to 8 characters, the first of which must be an alphabetic character. A name may be qualified by appending to it a period followed by a qualifying name of from 1 to 8 characters, the first of which must be alphabetic. For example:

SWFILE15 is an unqualified name.

SWFILE15.TEAM1 is a qualified data set name.

SWFILE15.TEAM2 is a qualifitx

Additional qualifications may be appended, subject to the same rules, up to a maximum of 44 characters. For example:

SWFILE15.TEAM1.CYCLE4 is a legal data set name.

Notice that there may be no embedded blanks in a data set name.

Data Set Reference Number: Within the computer program there is no reference to any specific named data set for reading or writing data. Instead the program refers to a data set reference number -- it is this data set reference number (abbreviated DSRN) that is frequently used in this volume to refer to data sets. The actual named data set to which any number refers is not known to the program until it attempts to read from or write into the data set. Then the Operating System supplies the program with the actual location of the data set which it obtains from the DD cards supplied to it as part of the Job Control Cards. The connection between the data set reference number in the program and the data set reference number on the DD card is coded within the DDNAME, that is, the FTnnF001 in columns 3-10 of each DD card, where the nn (the third and fourth digits) is the data set reference number.

From the preceding definitions, it follows that it is the job of the person preparing the input data deck for a cycle of METRO-APEX to keep track of and specify the correct combination of team number on the Main Header Card and data set names (DSN=) for that team for data sets 15, 16 and 20 on the corresponding DD cards. For this purpose it is recommended that the naming convention used in creating data sets for new teams follow some easily remembered and coded pattern, such as SWFILE15.TEAM2 as used in the preceding examples.

As previously noted, any number of teams can be run concurrently. However, the team numbers must be from 1 to 5 since five teams are the maximum that can be accomodated by data set 18.

It is extremely unlikely that any organization using METRO-APEX will have any need for more than five teams, but in the rare event that it should become necessary the following notes are included:

For each additional set of five teams one additional data set "18" will be required. You will then need to become more sophisticated in data set naming. It is suggested that you use the convention of adding a letter to the data set names for the additional 15, 16, and 18 required:

SWFILE18A and SWFILE18B

SWFILE15.TEAM1A and SWFILE15.TEAM1B...SWFILE15.TEAM5B, etc.

Remember that the team number on the Main Header Card must still be only a digit from 1 to 5; no alphabetics are allowed. It becomes extremely important to keep good records and to carefully check the DD cards in the Job Control set for proper correspondence between data set names and team number. There is no protection in the main program to prevent using the files for TEAM1A when TEAM1B was intended, and vice versa.

C. Use of SYMAP Routines--MAPEX:

For years both players and advisors have felt that other means were needed to present much of the planners information. Some earlier attempts were made to bar graph the Property Distribution Data and these were met with approval by those who used those charts.

It was decided to use a SYMAP (Synagraphic Computer Mapping Program) technique on many of the tables generated in the game. SYMAP is a method of generating pictures of an area showing relative shades of darkness and are produced by a computer printer. Since almost all of the Planners data was given by Analysis Area, it would be quite easy to map this data.

We have tried to stress as much flexibility and user ease as possible. We have currently programmed 215 maps plus as many additional maps as the player can provide data for. Most of the data files used in METRO-APEX, especially in the Planners role, consist of three unique files. We store a "cycle zero file"--

our initial starting conditions. We have a "cycle N file"--the current cycle we are playing. We also have a "cycle N-1 file"--a history of last cycle's decisions. To date, 70 separate maps have been programmed. Since the player has an option of selecting any of the 70 maps including the selection of the cycle, this gives him 210 maps to choose from. Five additional maps have been provided which will give the results of the winter season diffusion data for the APCO role for each of the 5 air pollutants. An additional map has also been programmed to allow the player to apply the SYMAP program with other data that he has generated.

Description of Data Cards for Maps (1-76)

The players control cards will consist of Job Control Language cards which will execute the program MAPEX. Replace the word METEQEX with MAPEX on the EXEC card. The card format for maps (1-76) is the following:

COLUMNS	DESCRIPTION
1- 2	The number of the map. (I2)
3	Cycle to be printed. (I1) If column 3 is blank or zero, it will print this cycle's data. If column 3 = 1, it will print last cycle's data. If column 3 = 2, it will print cycle zero data.
4-10	1st Range These are optional for the player.
11-17	2nd Range If the 1st range is blank or zero.
18-24	3rd Range The program will use preset ranges
25-31	4th Range stored in the different subroutines.
32-38	5th Range A player can indicate his own ranges.
39-45	6th Range of values up to a total of 10 ranges.
46-52	7th Range (10F7.0)
53-59	8th Range
60-66	9th Range
67-73	10th Range
74-80	Blank-currently not being used.

If the player is going to supply his own data, additional cards must be supplied. The first card is exactly as above except columns 1 and 2 contain the number 71 respectively and column 3 is left blank. The player must indicate his own ranges.

The second card uses columns 1-80 for a description of the map. The player can use any valid alphanumeric symbol that can be printed by the computer. The third card is used to indicate the first 11 values. The format of the card is the following:

COLUMNS	DESCRIPTION
1-7	1st value corresponding to A.A. 1
8-14	2nd value corresponding to A.A. 2
15-21	3rd value corresponding to A.A. 3
22-28	4th value corresponding to A.A. 4
29-35	5th value corresponding to A.A. 5
36-42	6th value corresponding to A.A. 6
43-49	7th value corresponding to A.A. 7
50-56	8th value corresponding to A.A. 8
57-63	9th value corresponding to A.A. 9
64-70	10th value corresponding to A.A. 10
71-77	11th value corresponding to A.A. 11
78-80	Blank-currently not being used.

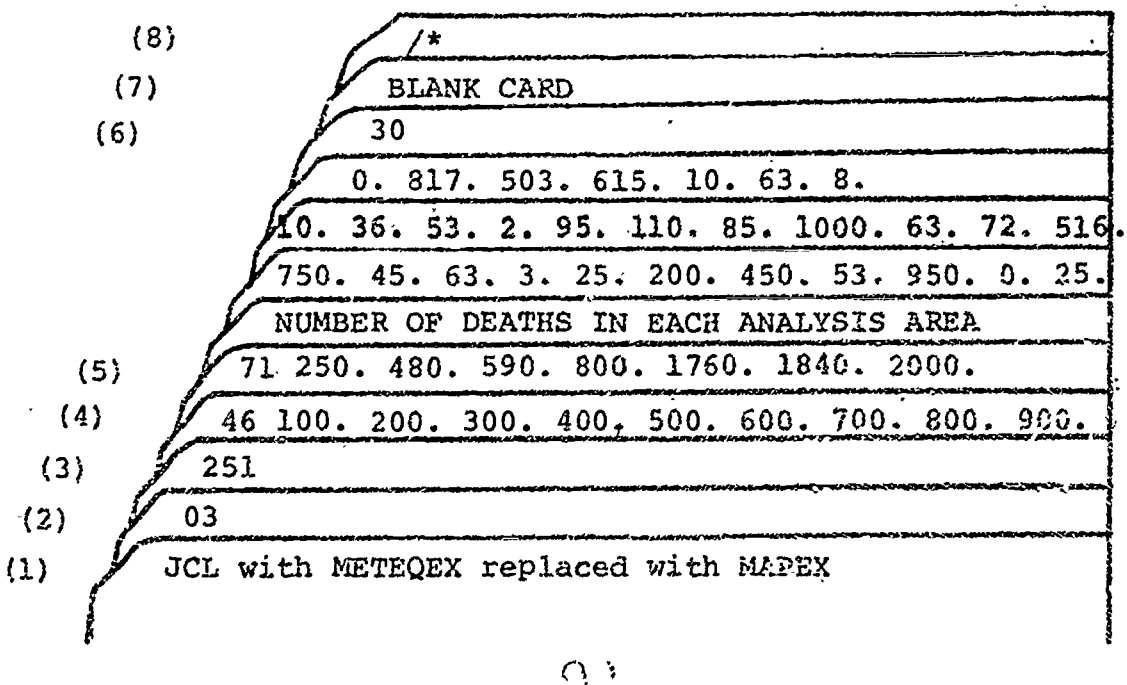
The fourth card is the same format as above but corresponds to Analysis Area 12-22. The fifth card is the same format except that columns 1-49 are the only ones used. This corresponds to A.A. 23-29. Columns 50-80 are left blank on the fifth card.

These last four cards must be in the specific order as specified.

When a player is using the mapping routines, he can submit any of the maps in any order, i.e. Map 5 doesn't have to be printed before Map 15. The next to the last card in the deck must be a blank card. This tells the program that there are no other maps to be printed. Finally there should be a /* card in columns 1 and 2 to tell the system you are finished.

Figure 12

Sample Deck Layout for MAPEX



Description of Deck Layout

(1) Job control language cards needed for execution of mapping routines. Replace METEQEX with MAPEX on EXEC card.

(2) Print MAP 3-% unemployed in APEX County. Use the ranges found in the program. (From 2% to 5.6%.)

(3) Print MAP 25--Sales price of developed commercial regional property from last cycle and use the preset ranges of $160,000 to $304,000.

(4) Print MAP 6-Appraised value of developed agricultural property and use the ranges indicated on the card.

(5) Print MAP 71-The first card indicates the ranges. The second card is a description of the map-"Number of deaths in each Analysis Area". The third, fourth, and fifth cards are the values for each Analysis Area.

(6) Print MAP 30-Appraised value of developed R-1 property and use the preset ranges of $20,000 - $47,000.

(7) Blank card - necessary

(8) /* - necessary

List of Maps

Map #	Maps	Pre-Set Ranges
01	Population	2,000-20,000
02	Unemployed	50-500
03	% Unemployed	2-5.6
04	% of Low income	2-20
05	% of Deteriorating Buildings	1.2-3
06	% of Nonwhite Population	10-100
07	$ Streets	1,000,000-5,500,000
08	$ Sewers	500,000-2,750,000
09	$ Water	250,000-2,500,000
10	$ Parks/Recreation	20,000-200,000
11	$ Miscellaneous	20,000-2,000,000
12	TOTAL $ Spent	
13	Type (1) Housing	100-1,000
14	Type (2) Housing	100-1,000
15	Type (3) Housing	100-1,000
16	Type (4) Housing	100-1,000
17	Type (5) Housing	100-1,000
18	TOTAL of Types (1-5)	500-5,000
19	Sales Price of Dev. R-1	40,000-85,000
20	Sales Price of Dev. R-2	20,000-38,000
21	Sales Price of Dev. R-3	15,000,28,500
22	Sales Price of Dev. M-1	25,000-47,500
23	Sales Price of Dev. M-2	11,000-20,000
24	Sales Price of Dev. Comm-Local	120,000-255,000
25	Sales Price of Dev. Comm-Regional	160,000-304,000
26	Sales Price of Dev. Ind-Local	105,000-150,000
27	Sales Price of Dev. Ind-Exog.	150,000-240,000
28	Sales Price of Dev. Office	80,000-143,000
29	Sales Price of Dev. Agri.	1,100-6,500
30	Appraised Value of Dev. R-1	20,000-47,000
31	Appraised Value of Dev. R-2	10,000-23,500
32	Appraised Value of Dev. R-3	7,000-16,000
33	Appraised Value of Dev. M-1	15,000-33,000
34	Appraised Value of Dev. M-2	9,000-14,400
35	Appraised Value of Dev. Comm-Local	120,000-300,000
36	Appraised Value of Dev. Comm-Reg.	150,000-285,000
37	Appraised Value of Dev. Ind-Local	100,000-145,000
38	Appraised Value of Dev. Ind-Exog.	15,000-222,000
39	Appraised Value of Dev. Office	80,000-143,000
40	Appraised Value of Dev. Agri.	500-5,900
41	Appraised Value of VAC. Single-Residential	2,000-18,200
42	Appraised Value of VAC. Multiple-Residential	10,000-64,000

Map #	Maps	Pre-Set Ranges
43	Appraised Value of VAC. Commercial	20,000-92,000
44	Appraised Value of VAC. Ind.	10,000-48,000
45	Appraised Value of VAC. Office	20,000-92,000
46	Appraised Value of VAC. Agri.	500-5,000
47	TOTAL # of Market R-1 units	100-1,000
48	TOTAL # of Market R-2 units	100-1,000
49	TOTAL # of Market R-3 units	100-1,000
50	TOTAL # of Market M-1 units	100-1,000
51	TOTAL # of Market M-2 units	100-1,000
52	TOTAL # of Market Single Res. units	300-3,000
53	TOTAL # of Market Multiple Res. units	200-2,000
54	TOTAL # of Market Residential units	500-5,000
55	TOTAL # of Market Dev. Comm-Local acres	10-100
56	TOTAL # of Market Dev. Comm-Reg. acres	10-100
57	TOTAL # of Market Dev. Ind.-Local acres	10-100
58	TOTAL # of Market Dev. Ind-Exog. acres	10-100
59	TOTAL # of Market Dev. Office acres	10-100
60	TOTAL # of Market Dev. Agri. acres	500-14,000
61	TOTAL # of Market Dev. Non-Res. acres	500-14,000
62	TOTAL # of Market VAC. Single-Res. acres	50-1,850
63	TOTAL # of Market VAC. Multi-Res. acres	50-1,850
64	TOTAL # of Market VAC. Comm acres	50-1,850
65	TOTAL # of Market VAC. Ind. acres	50-1,850
66	TOTAL # of Market VAC. Office acres	50-1,850
67	TOTAL # of Market VAC. Agri. acres	50-1,850
68	TOTAL # of Market VAC. acres	50-1,850
69	Density-Population/acres	1-37
70	Density-Dwelling Units/acres	1-10
71	Players Optional Map	Players must indicate ranges.
72	Air Quality Data Particulates (mg/cm3) Winter Season	25-250
73	Air Quality Data Sulfur Dioxide (mg/cm3) Winter Season	10-100
74	Air Quality Data Carbon Monoxide (ml/cm3) Winter Season	1-10
75	Air Quality Data Oxides of Nitrogen (mg/cm3) Winter Season	25-250
76	Air Quality Data Hydrocarbons Winter Season	200-2,000

D. Transportation Route Studies:

A player may request a Transportation Route Study so he can determine the cost of purchasing property and the construction costs for a series of planned highway segments in APEX County. The Transportation Route Studies will give the following information:

(a) Length of the highway in a given Analysis Area
(b) Total number of acres required in a given Analysis Area
(c) Total cost of developed and vacant property in that A.A.
(d) Calculate the Right-of-Way acquisition costs
(e) Roadway construction costs in an A.A.
(f) Total cost of the highway in that A.A.
(g) and then a total cost of the entire highway through all A.A.'s.

Description of Data Cards

The program will be executed by the Job Control Language cards. Replace the word METEQEX with TRANS on the EXEC card. Also you will have to add this card to the JCL:

```
//FT07F001 DD SYSOUT=B,DCB=BLKSIZE=80
```

This FT07 DD card is used to punch any required cards that the program may calculate.

The next card the program requires is a series of OPTIONS that the Game Overall Director may with to exercise. These include:

1. If the route study will eventually be implemented as a capital project, the program will punch out the necessary land purchase cards (LT), the appropriate rezoning cards (RZ), the appropriate Capital Project Cards (CP number 21 with correct number of acres in the F-2 field) and the special grant that will be used to finance this project (SG).

2. The program assumes this highway has a 300 feet right-of-way. The Game Overall Director may wish to change this highway into an Interstate highway with a 600 feet right-of-way.

3. If you are using the highway grid that has been provided, the program assumes that 5 inches = 3.7 miles which equals the distance between the coordinates (0,0) and (0,860). You may wish to change the scale

settings and use a different map of APEX County for your own use. You would then need to indicate your new coordinates and the distance between these two points in miles.

If none of those OPTIONS are being implemented then a blank card is required.

Options Card Format: (I2, 2F5.0, 4F4.0)

Columns	Description	
1-2	Punching and Ownership	Blank if no cards are to be punched; 16 if City is to be owner and punched; 17 if County is to be owner and punched.
3-7	Right-of-Way	Assumes 300' right-of-way unless changed. Be sure and add decimal point.

The following assumes a change in scale settings:

Columns	
8-12	Miles between coordinates. (Be sure and add decimal point.)
13-16	X coordinate for 1st point
17-20	Y coordinate for 1st point
21-24	X coordinate for 2nd point
25-28	Y coordinate for 2nd point

Note: if none of the OPTIONS are being implemented then a blank card is required.

Grid Cards

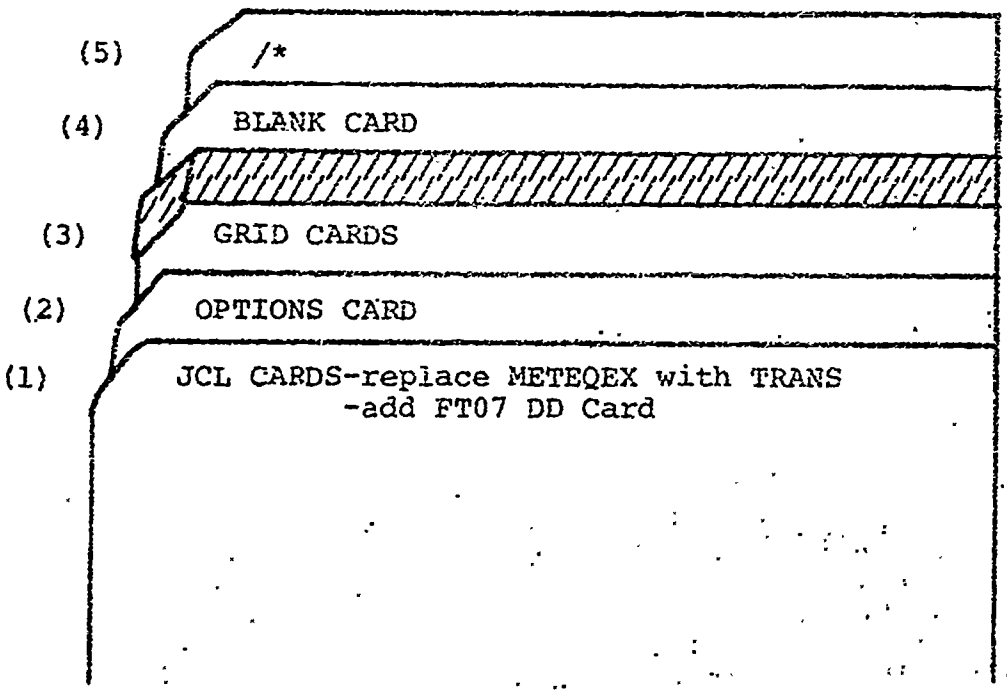
The APEX Base Map has a X-Y grid of 4500 units by 4500 units (see Figure 13). The distance between the larger tick marks is 100 units. The alignment should be digitized reading the X-coordinate (horizontal) first and then the Y-coordinate (vertical). On the data cards the analysis area should be punched in the first two card columns followed by the x-y coordinates in nine (or less) succeeding points of the highway alignment in that Analysis Area (in order). Each Analysis Area

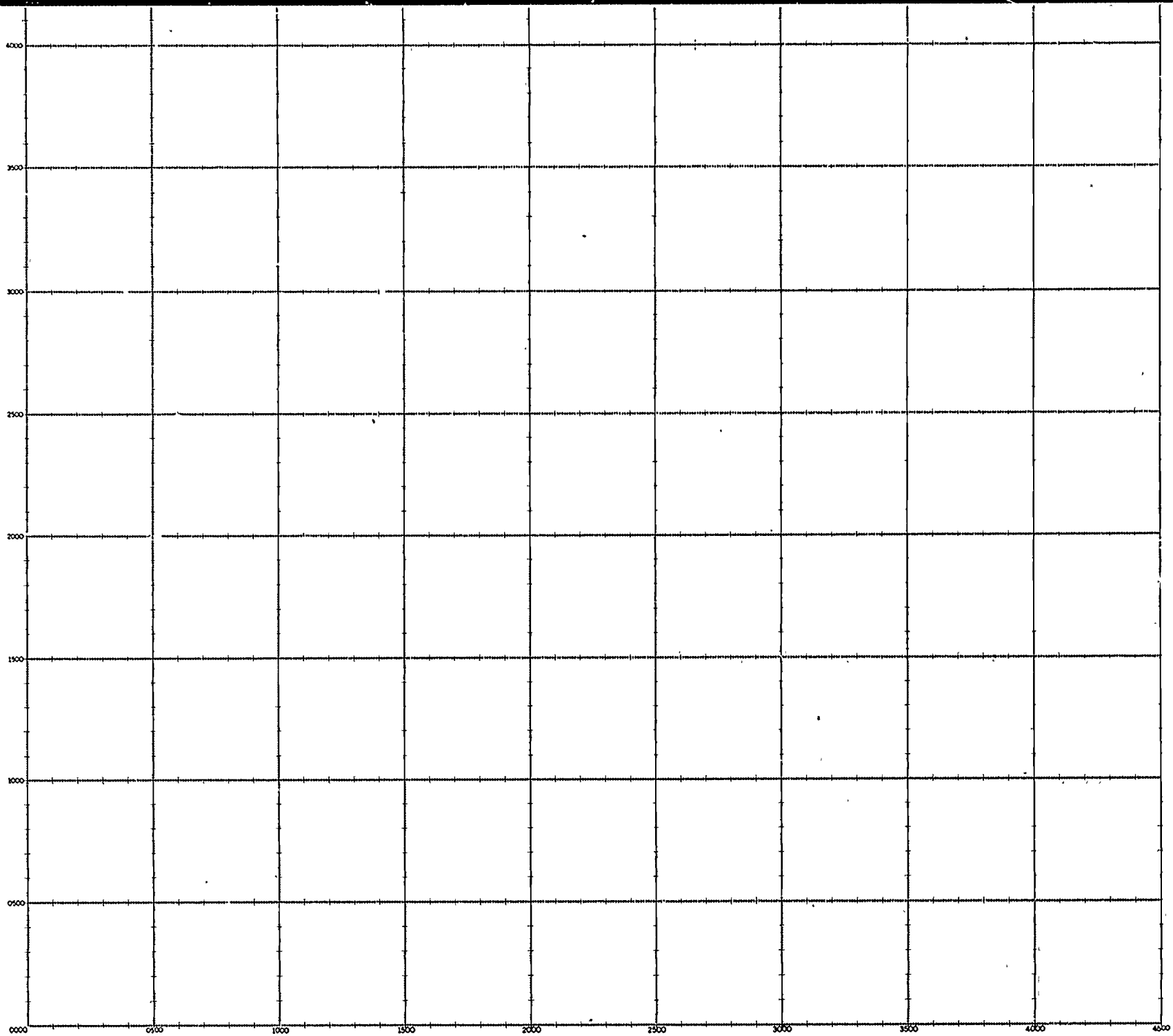
should be on a separate card or, if there are more than nine points within one Analysis Area, the Analysis Area number should be repunched on the additional cards, followed as above, by the x-y coordinates (format for all cards I2, 18F4.0). It is vital that the coordinates for the points at which the highway crosses Analysis Area boundaries be entered on the cards for both Analysis Areas, so that the first and last points punched on an Analysis Area card will be points at which the highway enters and leaves that Analysis Area. After the last card for this study has been read in a blank card is required.

The program will now read another set of Grid cards if more than one study has been ordered. Note: the OPTIONS card is used only once at the start of the program. The last card in the deck must be a /* which will terminate the program.

Figure 14

Transportation Route Study Deck Set-Up




4000
3500
3000
2500
2000
1500
1000
0500
0000
0500
1000
1500
2000
2500
3000
3500
4000
4500

E. Pressure Group Roles:

Pressure Group Initialization

The Pressure Groups are normally initialized only once before the beginning of a game. It allows the Game Overall Director to set up a maximum of 12 Pressure Groups with any starting conditions that he may chose. OPTIONS for the Pressure Groups are:

1. Cols. 1-40 The name of the group (required). A maximum of 40 characters are allowed. For the best affect center the name in the field.
2. Cols. 41-46 Initial membership (required).
3. Cols. 47-52 Old membership (optional).
4. Cols. 53-61 Subsistence level (required).
5. Cols. 62-70 Cash carryover (optional)

All optional items default to 0 if no values are entered. This is the equivalent to a Pressure Group having no history and therefore being in its first year of existence.

This section of the input deck is formatted as follows and must be the first cards read if initialization is to be used.

CARD 1
col 1-2 'IP'
col 3-6 The number of Pressure Groups to be played and initialized. (I-1)

CARDS 2 through ? (maximum of 12)
There must be as many cards in this section as there are listed in the I-1 field of the "IP" card. These cards have the information listed in the OPTIONS section above. The format is as follows.

(10A4,2I6,2F9.0)

The printout for initialization lists the input data and assigns each Pressure Group a number by which it is to be refered to for the duration of the game. In order to change a Pressure Group number, name, or history conditions to affect some special purpose in the next cycle, all the Pressure Groups must be re-initialized.

Expenditures and Added Newsletter Text

This section, if no initialization is to be done, must be the first in the input deck. The first 2 cards ("IA") list the total expenditures of each Pressure Group, one in each of the "F" fields in order of the reference numbers. So that Pressure Groups 1-6 would go in F-1 -- F-6 on the first card and Pressure Groups 7-12 would go in F-1 -- F-6 on the second card. Two cards must be used even if there are less than seven Pressure Groups playing.

The rest of the cards in this section are used to add additional lines to the newsletter that do not appear in the newsletter file. The Pressure Group number appears in columns 1-2 followed by the text to be added in columns 3-80 on that card and columns 1-40 on the second card. A maximum of 120 lines can be added, but there is no restriction on how many may be for any particular Pressure Group. To end the text addition put a card with -1 in columns 1-2 and follow it with a blank card. (The equivalent to adding a blank line to Pressure Group number -1.) The order of the lines makes no difference, however, the lines will be added in the order that they are read. Even if there are no additional lines to be added a -1 in columns 1-2 followed by a blank card are still required.

Newsletter Printing and Cash Calculation

This section consists of a 3 card set for each Pressure Group being played.

CARD 1

cols. 1- 2	"PR"
cols. 3- 6	Pressure Group number (I-1)
cols. 7-10	Number of items listed (I-2)
cols. 11-14	Number of items passed (I-3)
cols. 27-35	Total cash transfers (F-1)
cols. 36-44	Role advisor input goes into index model (F-2)

$$\text{Where the Index} = \frac{\text{PAST}}{\text{LIST}} + \frac{\text{EXP}}{\text{AVG}} + \text{Fudge Factor}$$

PASS = Total items acted upon
LIST = Total items wanted to affect
EXP = Total expenditure
AVG = Calculated average expenditure for all Pressure Groups

Fudge Factor=Role advisor input into model (usually -2 to 2)

cols. 45-53 Override to index calculation (F-3) Where the override multiplies the initilized membership value that was entered on the OPTIONS card.

CARDS 2-3

The next 2 cards use the I-1 through I-5 fields of each card. In these fields enter the numbers of the articles from the newsletter file to be listed on the printout. The articles will be printed in the order that they are listed on the data cards. If less than 5 articles are to be printed 2 cards must still be used.

An 'XX' card terminates the input stream.

Note: An error in any cycle requires rerunning all previous cycles.

Pressure Group Newsletter File Editing Routine

The purpose of this routine is to allow the Game Overall Director to add new newsletters to the supplied file so that they can be used on the player's printout by just specifying the number (see 'PR' card) instead of entering the text each time. To use this routine change the 'EXEC' card in the JCL to // EXEC PGM=PGEDIT,REGION=120K,TIME=1. There are three options available in this routine:

1. LIST copies of the file
2. DELETE articles from the file
3. ADD articles to the file

1. LIST

The keyword for this section is "LIST" punched in columns 1 to 4. The number of copies to be listed is an I2 field in columns 5-6.

The program will list as many copies of the file as specified with the unused newsletter numbers at the end of each list.

2. DELETE

The keyword for deletion is "DELE" punched in columns 1 to 4. The cards following this are the numbers of the

newsletter items to be deleted. There is only one number per card and it should be right justified in an I4 field in columns 1 to 4. To end the list of numbers deleted insert a card with -1 in columns 1-2.

The printout will be the numbers of the newsletter items deleted and the text of that article so that you can be sure that the right one was deleted.

3. ADD

The keyword is "ADD" in columns 1 to 3. The newsletters to be added are in the following format:

CARD 1

The number of the new article in columns 1 to 4 (I4). This must be chosen from the list of eligible numbers at the end of the "LIST" output.

CARDS 2-7

Each newsletter consists of three lines of 120 characters each (one and a half cards per line), or 6 cards. Any printable character can be used in the article, however, the first four columns cannot be blank, otherwise the line will be skipped when the cycle is run.

To end the addition section insert a card with -1 in columns 1-2. The printout from the addition will list the number of the article added and the text of the new article.

To end the entire input stream a card with "FINI" in columns 1 to 4 is put at the end of the deck before the "/*".

4. FILE EDITING ERROR MESSAGES

There are three messages generated by the program in case of errors in the input stream.

1. NEWSLETTER # XXX NOT DELETED; NO SUCH NUMBER.

To delete a newsletter from the file, the article must already exist. This message is issued when a newsletter that is not in the file has been specified for deletion.

2. NEWSLETTER # XXX NOT ADDED; ALREADY IN EXISTENCE.

   It is not possible to replace an existing newsletter until that newsletter has been deleted. This message is generated if the number of the newsletter specified for addition is already in use. The text after the number is ignored and the processing proceeds to the next article to be added.

3. NEWSLETTER NUMBER IS OUT OF RANGE; NO ADDED OR DELETED. NUMBER READ IS XXX.

   If the number specified for add or delete is greater than 180 or less than or equal to 0 then this message is issued. If it connected with an "ADD" function then the article after the number is ignored and then the next number is processed.

Figure 15

Initialization of Pressure Groups

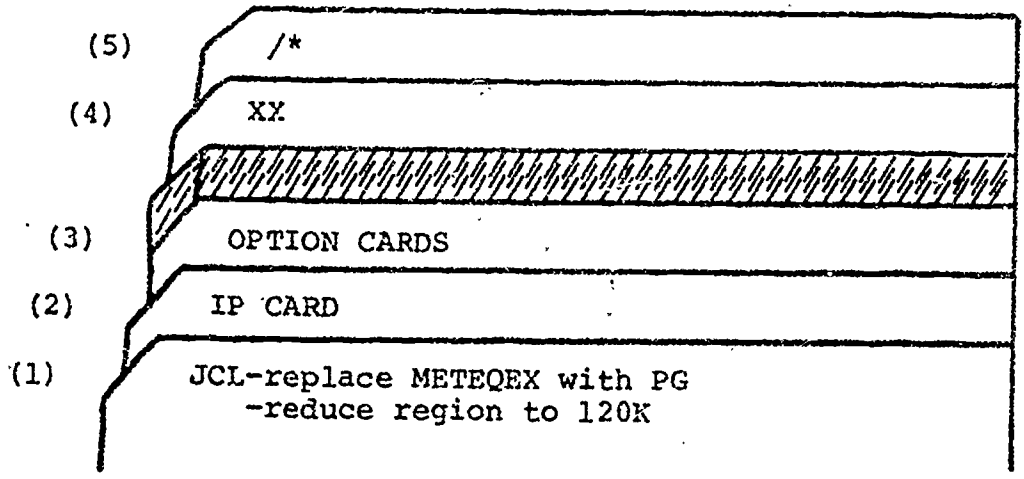


Figure 16

Running of Pressure Groups

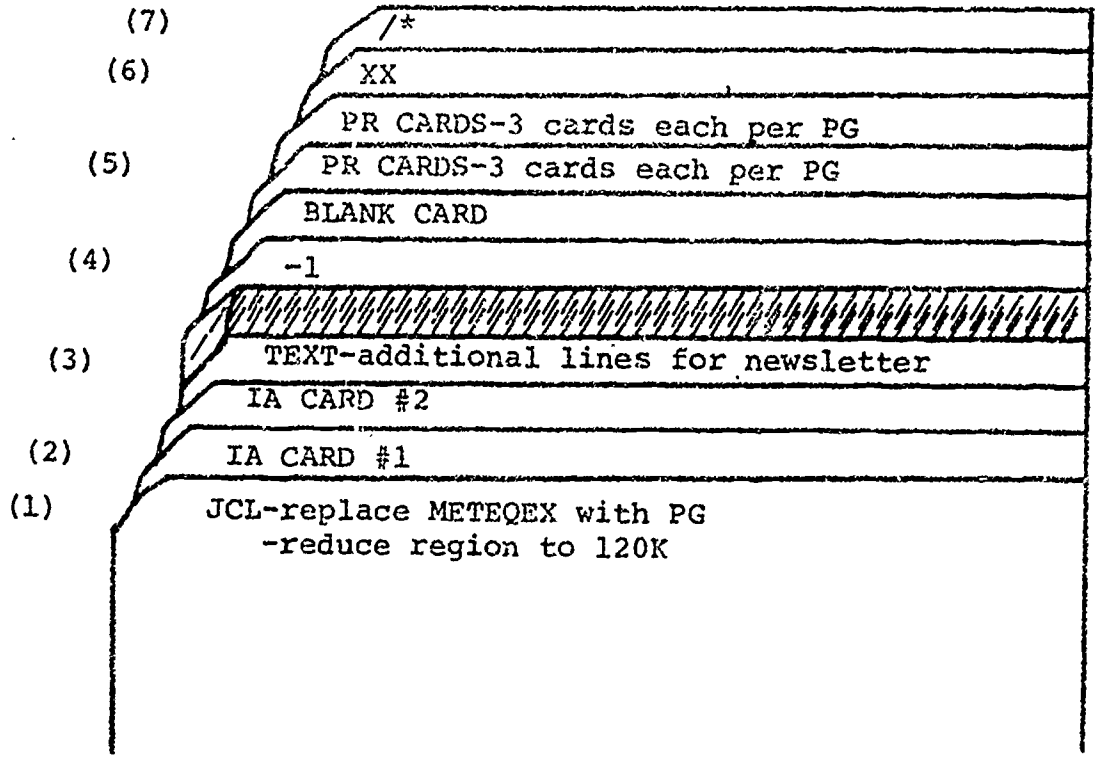
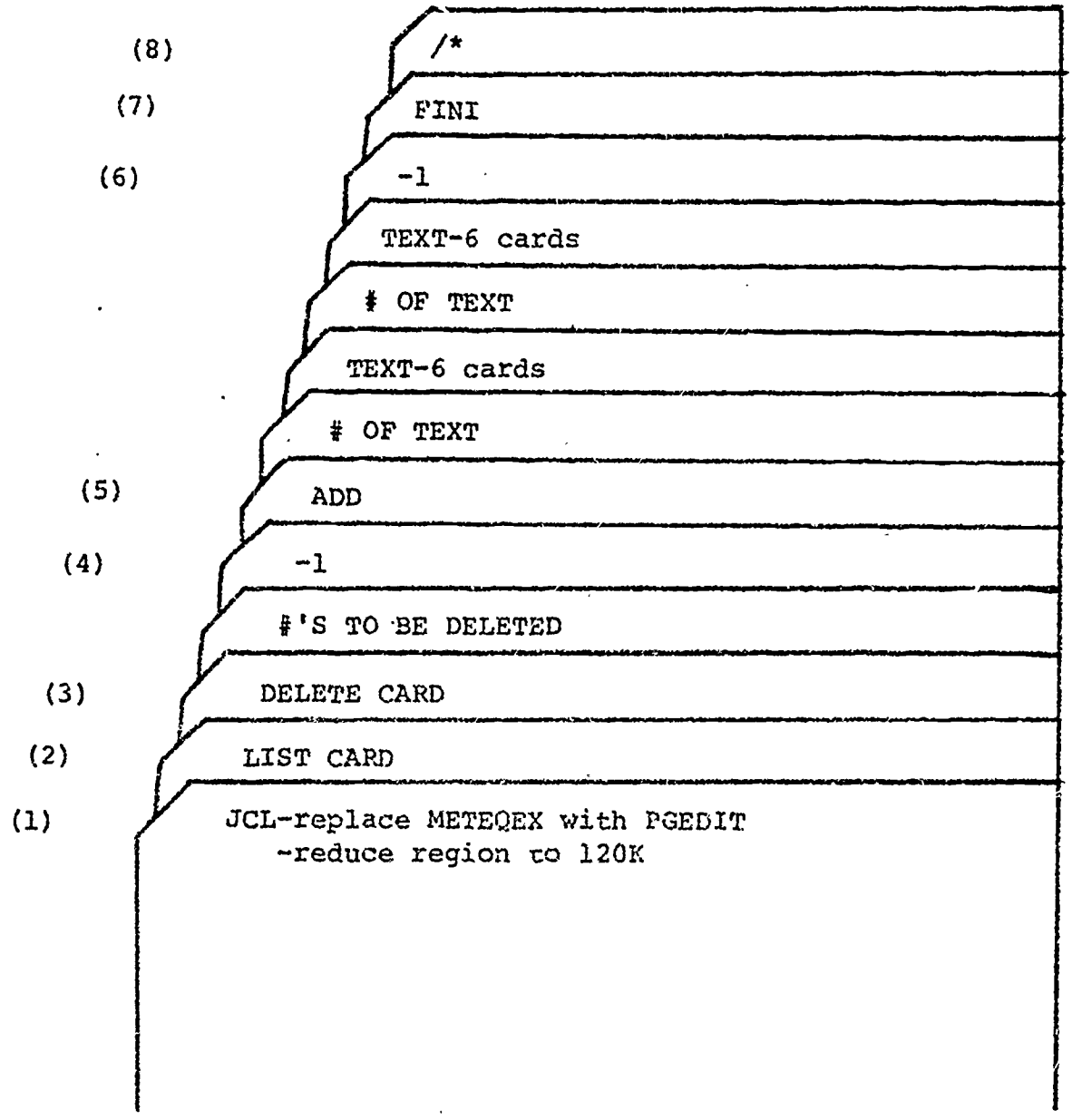


Figure 17

File Editions for Newsletter for Pressure Groups



CHAPTER 6

Chapter 6

METRO-APEX DATA FILE ORGANIZATION AND DESCRIPTION

Introduction:

The disk "files" for METRO-APEX contain and are used for three basic types of "data":

1. Actual land use, budget, population, etc., tables used to initialize the game and which are then updated from cycle to cycle as play progresses.

2. Tables of constants, conversion factors, and alphabetic character strings used for output.

3. Arrays of values saved temporarily during a cycle to make room for other data in core and then retrieved for further processing.

File Organization:

The files are organized by number into seven direct data sets. The term "file" as used in this volume refers to a consecutive group of records within a data set which have the same length and variable attributes or are otherwise logically related. The seven data sets have specific usages:

1. Data set 14 consists of eighteen "files" containing the "cycle 0" data base; that is, the tables and other variables representing the initial state of the game. It is referred to only when starting a NEWGAME by running cycle 1. The files in data set 14 are created by and, if necessary, are modified only by the FILEPRNT utility program. None of the files in data set 14 are ever written into by the main METEQEX program.

2. Data set 15 is the "working" data set during the processing of a cycle of the game. That is, it contains the accounts and stores variables of the various game roles which are added to or subtracted from or otherwise modified by the main section of the METEQEX program. It consists of 23 "files", the first 18 of which correspond to the 18 files in data set 14, the last 5 files are "temporarily-permanent"; that is, they are used only during the processing of a single cycle but are retained for possible value in tracing errors if any should occur.

3. Data set 16 consists of 18 files and is exactly analogous to data set 14 except that it contains the "preceding cycle" records. Data set 16 is not changed during the run of a cycle, but is retained for comparision with data set 15 at the end of the cycle.

4. Data set 17 consists of six files containing constant data which is "read-only" by the main program. Included in this set of files is the list of capital projects and special programs which may be modified by the FILEPRNT program.

5. Data set 18 consists of sixteen files which, with one exception, are used only by the issue, candidate election and newspaper processing section of the main program. The one exception is the list of exogenous industries which is used by both sections of the program. Several of the files within this dataset are subdivided into groups of records sufficient for recording up to five game runs (teams) concurrently.

6. Data set 19 consists of three files containing issues, alternatives and newspaper headlines. It is a read-only data set.

7. Data set 20 consists of one file which contains the information and newsheadlines for the Pressure Group roles.

Chapter 4, Error Messages, discussed the interaction of data sets 14, 15 and 16 during a game run. Because of its importance it will be repeated here.

At the beginning of a game run, when either NEWGAME, CYCLE=1 or REPEAT=1 is specified on the Main Header Card, the eighteen files in data set 14 are copied into both data sets 15 and 16. When this copy operation has been successfully completed, the program prints the message:

DATASETS 15 AND 16 HAVE BEEN INITIALIZED FOR NEW GAME

At the end of a normal termination of the main part of the program (indicated by either going on to the newspaper and issue section or by a normal termination message if the newspaper is suppressed) the cycle number in data set 15 is set equal to the number of the cycle just completed.

When CYCLE=i (i greater than 1) is specified on the Main Header Card data set 15, the record of the last cycle completed, is copied into data set 16 and when the copy operation has been successfully completed the following message is printed:

STATUS AT END OF CYCLE i HAS BEEN COPIED FROM DATASET 15 TO DATASET 16 FOR START OF NEW CYCLE.

When REPEAT=i (i greater than 1) is specified on the Main Header Card data set 16, the record of the cycle preceding the last one completed, is copied into data set 15 and when the copy operation has been successfully completed the following message is printed:

DATASET 16 HAS BEEN COPIED TO DATASET 15 FOR REPEAT OF CYCLE i

Notice that at the beginning of the main section of the program data set 15 and data set 16 both contain exactly the same information.

File Record Length and Format:

The following seven DEFINE FILE statements are included in both the root section of the main METEQEX program and the FILEPRNT utility program.

```
DEFINE FILE 14 (270,160,U,KX14)

DEFINE FILE 15 (360,160,U,KX15)

DEFINE FILE 16 (270,160,U,KX16)

DEFINE FILE 17 (400,94,U,KX17)

DEFINE FILE 18 (986,116,U,KX18)

DEFINE FILE 19 (2380,30,U,KX19)

DEFINE FILE 20 (320,370,U,II20)
```

Not all of the records within each data set utilize the maximum record length specified in the above DEFINE FILE statements. Where there is a discrepancy it will be noted in the discussion of each individual "file."

As noted earlier, each "file" is a group of consecutive records within a data set. In order for the program to reference the records within a "file" from 1 to n, each direct access

READ or WRITE statement within the program uses the algorithm (n+NRxx) where NRxx is an offset value for that "file" which is one less than the first record of "file" xx within the data set. These offsets or base record numbers are set in a BLOCK DATA subroutine and communicated to the program in a named COMMON BLOCK /FILES/.

Each "file" is individually numbered for reference by the program and within this description. Table 1 is a cross-reference index to file numbers, data set reference numbers and records within a data set.

Table 1

CROSS-REFERENCE LIST OF METRO-APEX FILES

File Number	Is in Data Set	Records
31	14	1-58
34	14	59-64
37	14	65-68
38	14	69-70
35	14	71
36	14	72-79
39	14	80-82
30	14	83-99
32	14	100-101
61	14	102-180
62	14	181-182
64	14	183-191
68	14	192-243
531	14	244
532	14	245
33	14	246-248
65	14	249-259
66	14	260-263

Table 1 (continued)

File Number	Is in Data Set	Records	
1	15	1-58	
4	15	59-64	
7	15	65-68	
8	15	69-70	
15	15	71	
16	15	72-79	
19	15	80-82	
20	15	83-99	
22	15	100-101	
51	15	102-180	
52	15	181-182	
54	15	183-191	
58	15	192-243	
511	15	244	
512	15	245	
23	15	246-248	
55	15	249-259	
56	15	260-263	
2	15	264-273	
513	15	274-302	
12	15	303	
AIR	15	304	(contains diffusion data for MAPEX)
11	15	311-360	

Note: 305-310 reserved for future expansion.

File Number	Is in Data Set	Records
41	16	1-58
44	16	59-64
47	16	65-68
48	16	69-70
45	16	71
46	16	72-79
49	16	80-82
40	16	83-99
42	16	100-101
71	16	102-180
72	16	181-182
74	16	183-191
78	16	192-243
541	16	244
542	16	245
43	16	246-248
75	16	249-259
76	16	260-263

Table 1 (continued)

File Number	Is In Data Set	Records
3	17	1
21	17	2
6	17	3-202
28	17	203-318
53	17	319-398
25	17	399-400

File Number	Is In Data Set	Records
204	18	1-10
205	18	11-20
206	18	21-30
207	18	31-35
208	18	36-40
209	18	41-88
210	18	89-688
211	18	689-698
212	18	699-703
217	18	704-708
237	18	709-716
247	18	717-731
101	18	732-821
102	18	822-901
103	18	902-981
104	18	982-986

File Number	Is In Data Set	Records
201	19	1-400
202	19	401-880
203	19	881-2380

In the description of each file which follows, the "words" referred to are two bytes long, the length of all integers in METRO-APEX, or an IBM 360/370 half-word. The type of variable is abbreviated I for Integer *2 and R for Real*4 unless otherwise specified.

For convenience, the file descriptions are in numeric order from 1 to 513. Since the first eighteen files in data sets 14, 15 and 16 have identical descriptions they are listed by the data set 15 number which is the first value in the following list:

Dataset 15	Dataset 14	Dataset 16
1	31	41
4	34	44
7	37	47
8	38	48
15	35	45
16	36	46
19	39	49
20	30	40
22	32	42
23	33	43
51	61	71
52	62	72
54	64	74
55	65	75
56	66	76
58	68	78
511	531	541
512	532	542

METRO-APEX FILES 1, 31 and 41:

These files contain land-use ownership, value and price data which differs in each of the 29 METRO-APEX analysis areas. A logical record for each analysis area requires two physical records, accounting for the 58 physical records in the file. The word count given is the sequence within each physical record. The following variables are for one logical record, they are identical for each analysis area.

Record 1

Words	Elements	Type	Name	Description
1-35	1-35	I	BDR(5,7)	Number of developed units of each of the five residential housing types owned by each of the 7 gamed Developers. B (Game Realtors) Developed Residential Units By rules of FORTRAN storage the first 5 values (words 1-5) are for realtor 1; the next 5 (words 6-10) for realtor 2 and so on. The 5 values represent in order of storage, the 5 developed residential zoning combinations in the following order: R-1,R-2,R-3,M-1,M-2.
36-70	36-70	I	INDR(5,7)	Same as above for up to 7 Industrialists.
71-75	71-75	I	MDR(5)	Same as above for rest of private sector (market). Market Developed Residential Units.
76-80	76-80	I	PDR(5)	Same for the municipality (either real or simulated), depending on the analysis area.

Record 1 (continued)

Words	Elements	Type	Name	Description
81-85	81-85	I	CDR(5)	Same for County.
86-90	86-90	I	QR(5)	Empty residential units in each of the five categories. This is a subset of MDR; that is MDR includes both occupied and empty dwelling units. This array contains values as a result of emigration of families from an analysis area and is used to meet demands not met by Developers in the case of immigration or for sales to Developers and the public sector.
91-95	91-95	I	EMF(5)	Emigrated Families (formerly F array in METRO). Families leaving M (general market residential) matrix in the analysis area, by zoning type. Added to: (1) when market sells more developed residential units than are empty (QR array), i.e., occupied dev. residential; (2) when market developed residential land is rezoned, thereby causing it to become vacant. It is not initialized and it is set to zero at beginning of each cycle.
96			IFIL	2-byte filler for boundary alignment.

Record 1 (continued)

Words	Elements	Type	Name	Description
97-180	49-90	R	BDC(6,7)	Developers developed commercial industrial and agricultural acres. B (Gamed Developers) Developed Commercial property in acres. Developed Non-residential Zoning: 1=CL, Local Commercial 2=CR, Regional Comm. 3=IE, Endogenous Ind. 4=IX, Exogenous Ind. 5=O, Office 6=A, Developed Agri.
181-264	91-132	R	INDC(6,7)	Industrialists developed industrial and commercial.
265-276	133-138	R	MDC(6)	Market Developed Commercial and Industrial property in acres. This array does include acres devoted to developed exogenous commerce and industry.
277-288	139-144	R	PDC(6)	Public Developed Commercial.
289-300	145-150	R	CDC(6)	County Developed Commercial.
301-312	151-156	R	QC(6)	Empty developed "commercial." This is a subset of MDC(1), MDC(2) MDC(3) in the same way QR is a subset of MDR.
313-318	157-159	R	P(3)	Public developed property: P(1) = Municipality P(2) = County P(3) = Right of way and streets

Record 1 (continued)

Words	Elements	Type	Name	Description
319-320	160	R	U	Base density factor for developed residential. This value is the unit per acre for the least dense zoning category (R-1) in the particular analysis area. It is stored as the reciprocal. For example, 3 units/acre is stored as .3333 (1/3). (Multiplication factors for more dense zoning categories, which are constant across all analysis areas, are stored in array UDENV (5) in File 21.) The values are used to convert from units to acres and vise-versa. ACRES=UNITS x UDENV(TYPE) x U UNITS=ACRES/ (U x UDENV (TYPE)) For example, 9 units of R-3 houses at a multiplier of 2 (.5) in an analysis area with a base factor of .33 would require 9 x .33 x .5 = 1.5 acres.

Record 2

Words	Elements	Type	Name	Description
1-84	1-42	R	BVRC(6,7)	B (Game Developer's) Vacant Residential and Commercial property holdings in acres.

Record 2 (continued)

Words	Elements	Type	Name	Description
				The six zoning categories, in order of storage are: 1 = Residential, single family R 2 = Residential, multiple family M 3 = Commercial C 4 = Industrial I 5 = Office O 6 = Agricultural A
85-168	43-84	R	IVRC(6,7)	Same as BVRC for gamed Industrialists.
169-180	85-90	R	MVRC(6)	Same as BVRC for non-game "market." This is the balance of all vacant land not in one of the other VRC arrays.
181-192	91-96	R	PVRC(6)	Same as BVRC for the municipality (public) in the analysis area.
193-204	97-102	R	CVRC(6)	Same as BVRC for County in the analysis area. Note: in some METRO-APEX routines, for example, where we are summing all vacant land, these 5 arrays are combined and dimensioned as BVRC (6,17). This is permissible since they are all stored consecutively by columns.
205-216	103-108	R	VVRC(6)	Value of Vacant Residential and Commercial Land in dollars per acre. These are the "appraised" values printed in the large table at the end and used for all sales of vacant property and assessment.

Record 2 (continued)

Words	Elements	Type	Name	Description
217-226	109-113	R	VDR(5)	Value of Developed Residential in dollars per unit of the 5 zoning categories, R-1 through M-2. This is the value used for assessing developed residential property and also the minimum sales price for sales of market developed residential units to game Developers.
227-238	114-119	R	VDC(6)	Value of Developed Commercial (and industrial property in dollars per acre. Same as VDR except for the six commercial/industrial categories. See note above.
239-250	120-125	R	ROWF(6)	Right-of-way (streets, sidewalks, etc.) factor for each of the six categories of vacant land. The number of acres being developed is multiplied by the appropriate ROW factor to obtain the number of acres added to or subtracted from P (3) above. Note: Because of right-of-way is always subtracted from vacant acres used for development, when developed land becomes vacant, the number of acres for right-of-way is taken from city and added to the vacant acres.
251-252	126	R	E	This is now a constant 1.0 for all analysis areas.

Record 2 (continued)

Words	Elements	Type	Name	Description
				EVEC (in file 21) contains cost per unit or per acre for each developed type. If at some time we conclude that improvement costs vary by AA, the factor could be changed.
253-254	127	R	ADDTB	Added tax base for exogenous property.
255-276	128-138	R	PDRC(11)	Price of Developed Residential and Commercial property. These prices are only used for sales of game players' developed property. Dollars per unit for the first 5 values which correspond to the 5 price classes for single family and then multiple family residential. Dollars per acre for the last six values which correspond to the six classes of commercial, industrial and agricultural property the game players may deal in. Initial 6 percent over corresponding value.
277-320				88 unused bytes available for expansion.

METRO-APEX FILE 2

Water Quality Constants (Read Only File)

Record 1

Word	Type	Name	Description
1-80	R	TITLE(8,5)	Title for output purposes
81-240	R	RCHID(20,4)	Names of Reaches
241-280	R	RMTHOR(20)	River mile at head of reach
281-320	R	RMTEOR(20)	River mile at end of reach

Record 2

Word	Type	Name	Description
1-40	R	COEFQV(20)	Coefficient of flow for velocity in a reach
41-80	R	EXPOQV(20)	Exponent of flow for velocity in a reach
81-120	R	COEFQH(20)	Coefficient of flow for depth in a reach
121-160	R	EXPOQH(20)	Exponent of flow for depth in a reach
161-200	R	CMANN(20)	Manning's Chanel Roughness Coefficient in a reach
201-202	R	PTIME	Report time in hours
203-204	R	DELX	Length of computational element in miles
205-206	R	DELT	Time interval of computational element in hours
207-208	R	ELEV	Height of basin in feet
209-210	R	TMAX	Maximum route time in hours
211-212	R	LAT	Lattitude of basin in degrees

Record 2 (continued)

Word	Type	Name	Description
213-214	R	LSM	Standard Meridian in degrees
215-216	R	LLM	Longitude of basin in degrees
217	I	NHWTRS	Number of headwaters
218	I	NREACH	Number of reaches
219	I	NJUNC	Number of junctions
220	I	NCS	Number of conservative minerals
221-226	I	JUNC(2,3)	Elements around the junctions

Record 3 - Winter Season

Word	Type	Name	Description
1-40	R	CK1(20)	Deoxygenation coefficient for conservative mineral 1 (base e)
41-80	R	CK2(20)	Deoxygenation coefficient for conservative mineral 2 (base e)
81-120	R	CK3(20)	Deoxygenation coefficient for conservative mineral 3 (base e)
121-126	R	HWFLOW(3)	Headwater flow
127-132	R	HWTEMP(3)	Headwater temperature
133-138	R	HWDO(3)	Headwater DO
139-144	R	HWBOD(3)	Headwater BOD
145-162	R	HWCONS(3,3)	Headwater Conservative Minerals
163-168	R	QATOT(3)	Headwater Flow Augmentation
169-198	R	HWTRID(3,5)	Headwater Names

Record 4

Same as Record 3 except for Spring Season

Record 5

Same as Record 3 except for Summer Season.

Record 6

Same as Record 3 except for Fall Season.

Record 7 - Winter Season

Word	Type	Name	Description
1-280	R	WEATH(140)	Weather Data--Cloud, Drybulb, Wetbulb, Atmosphere and Wind
281-282	R	DAYOFY	Day of year
283-284	R	AE	Evaporation coefficient A
285-286	R	BE	Evaporation coefficient B
287-288	R	DAT	Dust Attenuation coefficient

Record 8

Same as Record 7 except for Spring Season

Record 9

Same as Record 7 except for Summer Season

Record 10

Same as Record 7 except for Fall Season

METRO-APEX FILE 3

This is a single record "file" in data set 17 containing constants for use by the TOMM model.

Words	Elements	Type	Name	Description
1-58	1-29	R	ZH(29)	Maximum allowable density in persons per acre for each analysis area. This is used in the residential loop within TOMM model as a constraint on growth in an area.
59-116	30-58	R	ATOT(29)	Total land area in acres for each analysis area. This is used in TOMM to compute the available land for commercial use by subtracting out all other uses.

METRO-APEX FILES 4, 34, and 44

These files each require six physical records. They are best described as government and schools financial data. This data from file 4 is retained in named COMMON block /FILE4/ during program execution.

Record 1

Words	Elements	Type	Name	Description
1-2	1-2	I	NKK(2)	Count of 10 word bond or millage records in sectors 4-5 (NKK(1)). NKK(2) is presently unused.
3-12	2-6	R	VTPP(5)	Total assessed value of all private property in each jurisdiction. Note that VTPP(5) is the sum of VTPP(1)...VTPP(4) and is total for county.
13-162	7-81	R	TVBK(5,15)	Total appraised value of all private property for each of the seven land developers (1-7), the seven Industrialists (8-14) and the general market (15) in each of the 5 jurisdictions.
163-192	82-96	R	BKVT(15)	Total value of vacant property for each of the 15 elements of the private sector.
193-222	97-111	R	BKDT(15)	Total value of developed property for each of the 15 elements of the private sector.
223-230	112-115	R	ASSF(4)	Assessment factor for each of the four jurisdictions.
231-248	116-124	R	TAM(9)	Total assessment millage for each of the following jurisdictions: 1-4 = Municipalities 5 = County 6-9 = Simulated Schools This is used for computing tax due from private sector. It is the sum of AMS + SPECO + SPECD.

Record 1 (continued)

Words	Elements	Type	Name	Description
249-266	125-133	R	OPMIL(9)	Total operating millage. Sum of AMS + SPECO.
267-284	134-142	R	AMS(9)	Total Normal Operating Mills
285-302	143-151	R	SPECO(9)	Total of Special Operating Mills in effect.
303-320	152-160	R	SPECD(9)	Total of all debt retirement millages.

Record 2

Words	Elements	Type	Name	Description
1-18	1-9	R	CLL(9)	Current Local Limit on Operating Mills.
19-36	10-18	R	SLIM(9)	State Limit on Operating Mills.
37-54	19-27	R	BDOTG(9)	Total General Obligation Bonds Outstanding.
55-72	28-36	R	GONEW(9)	Total New GO Bonds this cycle.
73-90	37-45	R	BDPGO(9)	Total Minimum Payments Due Next Cycle for GO Bonds.
91-108	46-54	R	DRDOL(9)	Total dollars in debt retirement fund at beginning of cycle. Generated from debt retirement millage + surplus from last cycle. Calculated for "this" cycle in last cycle's output links.
109-126	55-63	R	DRFGF(9)	Dollars for debt retirement transferred from general fund in current cycle.
127-144	64-72	R	CPFND(9)	Total dollars in Capital Fund. At beginning of cycle the value in file 44 is that remaining from preceding

Record 2 (continued)

Words	Elements	Type	Name	Description
				cycle. This is a continuous total reflecting additions from new bonds and transfers from general fund less amount disbursed to pay for projects.
145-162	73-81	R	TNEWB(9)	Total new bonds this cycle. Sum of approved GO bonds and all revenue bonds.
163-180	82-90	R	CFTRN(9)	Funds transferred to capital budget from general fund this cycle.
181-190	91-95	R	BDOTR(5)	Revenue Bonds Outstanding (no schools).
191-200	96-100	R	BDPRV(5)	Total Payment due on revenue bonds next cycle.
201-210	101-105	R	CREDP(5)	Percentage of state equalized valuation which determines GO bond limit.
211-220	106-110	R	BLIM(5)	GO Bond limit.
221-229	111-119	I	CREDS(9)	Credit rating for each jurisdiction. Integer values 1 to 3.
230	120	I	IWAST	Filler for boundary alignment.
231-236	121-123	R	RATEI(3)	Interest rate on new GO bonds of the three credit ratings.
237-238	124	R	REDUX	Reduction factor applied to reduce CREDP when credit rating drops.
239-320				Unused.

Record 3

Words	Elements	Type	Name	Description
1-160	1-80	R	OPVEC(16,5)	Operating budget percentages or dollars of the 4 municipalities and county (#5) carried from preceding cycle in file 44 and to next cycle in file 4. Value will be negative if a percent and positive if dollars. Columns are as follows for Municipalities (1-4) and County (5): 1 = Legislative, executive (Note: this item will be carried as a dollar value which cannot drop. It may only be increased by player input. 2 = Planning 3 = Financial 4 = Judicial 5 = Fire and Police (Public safety for county) 6 = Parks and recreation 7 = Water and Sewage 8 = Refuse collection 9 = Streets 10 = Employees benefits 11 = Public relations 12 = Library 13 = Public health (county only) 14 = EOA (county only) 15 = Welfare and hospitalization (county only) 16 = Unused
161-320	81-160	R	STPCV(16,5)	Standard per capita dollar values for each budget expenditure item. Analogous to OPVEC. Zero if does not apply.

Record 4

Words	Elements	Type	Name	Description
1-18	1-9	R	TCYRV(9)	Total General Fund Revenue.

Record 4 (continued)

Words	Elements	Type	Name	Description
19-36	10-18	R	SURPL(9)	Surplus (or deficit) for each jurisdiction.
37-54	19-27	R	GENPT(9)	General Fund Property Tax revenue.
55-64	28-32	R	OTHAG(5)	Revenue from other agencies, in dollars. For county in-services revenue.
65-74	33-37	R	POTH(5)	Percent change in other agency revenue each cycle.
75-84	38-42	R	FFLRV(5)	Dollar revenue from licenses, fees and fines.
85-94	43-47	R	PLFF(5)	Percent change in license, fee and fines revenue.
95-104	48-52	R	ONTR(5)	Dollar revenue from other non-tax sources.
105-114	53-57	R	PONT(5)	Percent change in other non-tax revenue.
115-134	58-67	R	SPGRT(5,2)	Special grant revenue. i, 1 = General fund grants i, 2 = Capital project fund grants
135-136	68	R	RCREV	Road commission revenue for county.
137-138	69	R	PRCV	Percent change in road commission revenue.
139-156	70-78	R	TGOPY(9)	Total payments made on General Obligation bonds current cycle.
157-174	79-87	R	SURPL(9)	Surplus in debt retirement fund after all bond payments.
175-176	88	R	DRINT	Interest paid on debt retirement surplus.
177-320				Unused at present.

Records 5 and 6

Records 5 and 6 (640 words) contain a record of Government (politicians') bonds and special millages which are in effect. Each bond or millage requires a 10 word block, the contents of which are described below. Since the 10 word blocks contain four integer variables and three real variables, the 640 word array is dimensioned twice and equivalenced as follows:

```
DIMENSION KSMR (10,64), SMR (5,64)

EQUIVALENCE (KSMR (1), SMR (1))
```

Within this array new bonds or millages are added to the bottom of the list; and each cycle, as bonds or millages expire, the table is packed so that the oldest (first added) are always at the top of the list.

The 10 elements of each description block are as follows:

KSMR (1,I)	Jurisdiction; municipalities are 1-4. County is 5. Schools are 6-9.
KSMR (2,I)	Bond or millage number. Must be a three-digit integer starting with the cycle number times 100. For example, 301, 302, etc., for cycle 3.
KSMR (3,I)	Type (ISPEC) code: 1 = General Obligation Bond 2 = Revenue Bond 3 = Special Operating Millage 4 = Debt Retirement Millage
KSMR (4,I)	Years to run.
SMR (3,I)	Dollar amount of bond first year, unpaid balance after that.
SMR (4,I)	Interest rate (as, for example, 6.25) for bonds or number of mills.
SMR (5,I)	Minimum payment due on bond next cycle (calculated in output link and carried to next cycle) or temporary storage of bond over or under payment (calculated in BDMIL and saved here until output link).

METRO-APEX FILE 5

Exofirm File--See File 209 for description.

METRO-APEX FILE 6

This file contains the details of up to 140 capital plant projects and 60 special programs defined for the Politicians. The FILEPRNT utility program may be used to add projects or programs to the file, using a MAKE 6 control card. The first 140 records are capital plant projects and records, 141-200 are special programs.

Each 72 byte record (36 "words") -- one project -- is made up in the following manner for capital projects:

Word	Type	Name	Description
1	I	LOC	Physical location, scale and restriction of project. Most projects will not be restricted, but a few which are an expansion of existing facilities, may be restricted to a special analysis area (there will be no ward nor jurisdiction restrictions). Values 1-29 indicate location restricted to the corresponding analysis area. 30 = May be located in any analysis area. 31 = Must be located in an entire ward. 32 = Must be located in an entire jurisdiction.
2	I	ITYPE	Budget Category: 1 = Streets 2 = Sewer 3 = Water 4 = Parks and Recreation 5 = Miscellaneous
3	I	IMPACT	CPI Impact of the project: 0 = Analysis Area 1 = Ward 2 = Jurisdiction 3 = County

Note: Player input will be by jurisdiction (Pols 1-4, County=5). If location of project (item 1) not in player's jurisdiction, then the cost--impact on CPI--will apply to that player's jurisdiction, not to the jurisdiction where located.

4	I	NYRS	Years required to construct project.

METRO-APEX FILE 6 (continued)

Word	Type	Name	Description
5	I	NBOND	0 = May not be financed by revenue bond. 1 = May be financed by revenue bond.
6	I	NISS	Issue number which will be printed in newspaper when Planner recommends the project. (currently unused)
7-8	R	ACRES	Acres required, if any. Asterisks on the printout require the number of acres to be entered in the F-2 field of CP card.
9-10	R	CMIN	Minimum cost (total).
11-12	R	CMAX	Maximum cost (total).
13-36	I	KTITL(24)	45 character project title (last three bytes of array not used).

Each 36 word record for Special Programs is formatted as follows;

Word	Type	Name	Description
1	I	LOC	Same as preceding records, except 33 = County-wide program.
2			Not used.
3			Not used.
4	I	NYRS	Number of years program is to run.
5	I	NCPRJ	Capital plant project also required, if any. To be started at minimum cost. Cost of each program is Jurisdiction wide.
6	I	NISS	Related issue to be printed when program has one year to go.
7-8			Not used.
9-10	R	CMIN	Cost per year.

METRO-APEX FILE 6 (continued)

Word	Type	Name	Description
11-12			Not used.
13-36	I	KTITLE(24)	48 character description of program.

METRO-APEX FILES 7, 37, and 47

These files contain records of capital plant projects in effect, recommended by Planners or not carried by Politicians.

The first record of each file is a record of Politicians (government) projects and the second contains those projects and programs recommended by the Planners during the current cycle for inclusion by the Politicians next cycle. The third record is discussed on a following page.

The array name usually used for the first sector is KAPLT (5,63) and for the second KPLAN (5,63). The first five words of each of the first two records are reserved for counters, etc., of the projects actually stored. Each project record consists of a five word sequence; that is, words 6, 7, 8, 9 and 10 of each sector are a record of a project; words 11, 12, 13, 14 and 15 are the record of another project, and so on. Only words 6-320 of each record are used for project records.

The five words in each project record are defined as follows:

Word	Example	Description
1	KAPLT(1,I) or KPLAN(1,I)	This word is set non-negative when a project is added to a list. It is equal to the associated bond number if it is tied to a bond or to zero if not (all Planner's recommendations, of course, carry a zero code). The years the project is to run (4th word) is decremented by one in the output subroutine and, if the years remaining is zero, this first word is set equal to -1. (For Planners' recommendations, record 2, this word is set to -1 in CPI if a recommendation matches a Politician's output.) Politicians project lists are "packed" at the beginning of the CPI each cycle to move all multi-year projects, i.e., projects for which the first word is non-negative, to the head of the list before any new projects are added.
2	KAPLT(2,I) or KPLAN(2,I)	Project number * 10 + CPI Impact

METRO-APEX FILES 7, 37, and 47 (continued)

Word	Example	Description
3	KAPLT(3,I) or KPLAN(3,I)	Location of project * 100 + jurisdiction inputting (to force county projects to print in county budget). Location code is as follows: 1-29 = Specific analysis area 30 = Ward 1 31 = Ward 2 32 = Ward 3 33 = Ward 4 34 = Ward 5 35 = Ward 6 36 = Jurisdiction 1 37 = Jurisdiction 2 38 = Jurisdiction 3 39 = Jurisdiction 4 40 = APEX County
4	KAPLT(4,I) or KPLAN(4,I)	Years project is to run, if new. Years remaining after the first year of a multi-year project.
5	KAPLT(5,I) or KPLAN(5,I)	Cost per year in thousands of dollars. In other words, a project cost of $325,000 would be stored as the integer 325. If, due to division, a cost is not an even 1000, it is rounded up to even 1000s.

The first five words of each record are used as follows:

1	NCP	Count the number of projects in the list in the corresponding record at any time.
2		Unused.
3-4	PJCST	Total dollar value of the projects in effect in the list.
5		Unused.

METRO-APEX FILES 7, 37, and 47 (continued)

The third record of each of these files is used for two purposes:

(1) A record of special programs in effect.
(2) A record of those projects and programs recommended by the Planners the preceding cycle but not put into effect by the Politicians.

Unlike the first two records, the third record is divided into four word subrecords (since cost is not needed).

The first four words of the third record are:

Word	Type	Name	Description
1	I	NSP	Number of special programs in the first list.
2	I	NOP	Number of project records in the second list.
3-4	R	PGCST	Total dollar cost of special programs.

Words 5-164 are array KPROG (4,40). The use of the first four words is the same for each special program as the first four words of each project description in sector 1. The first word may be the number of a special operating millage.

Words 165-320 are array KHOPR (4,39). Only the first three words are pertinent and are as described for records 1 and 2.

METRO-APEX FILE 8, 38, and 48

This is a file of two 640 byte records used by the Planner's output link during a cycle. The social indicators--unemployment, low income families, non-white population, deteriorating buildings, etc.--are calculated and ranked for all 29 analysis areas. Note that the total 908 byte logical record spans two physical records.

Words	Type	Name	Description
1-29	I	KPOPL(29)	Total population, number of persons.
30-58	I	NUNEM(29)	Number of unemployed.
59-87	I	RNKEM(29)	Unemployment rank--largest percent.
88-116	I	RNKLO(29)	Rank 1 (highest) to 29 (lowest) percent in low income families.
117-145	I	RDETR(29)	Rank from 1 (highest) to 29 (lowest) in deterioration.
146-174	I	RNKNW(29)	Rank from 1 (highest) to 29 (lowest) percent non-white.
175-232	R	PUNEM(29)	Percent unemployed.
233-290	R	PLOIN(29)	Percent of families with income below $3000/year. (Household Type 5.)
291-348	R	DETER(29)	Percent deteriorating residential structures.
349-406	R	PNONW(29)	Percent non-white population.
407-454	R	HP(6,4)	Percent of people in each of the six wards preferring each of 4 fuel types--used by AIR model.

METRO-APEX FILE 11

This file is used to store "STUFFed" records of input decisions and special output calculations.

Each "STUFF" is a record 16 words long which may contain a combination of real and integer elements depending on the tyne of STUFF. Therefore, each 320 word physical record can store up to 20 STUFF records. Since the file contains 50 physical records a total of 1000 STUFF's can be made each cycle.

METRO-APEX FILE 12

This is a single 320 word file used for temporary or working storage between subroutines at several different points in the program.

It should not be used for other purposes between the points listed unless care is taken to read and restore the number of words indicated at the beginning of the record.

Many of these variables are retained in named COMMON block /FILE12/ during the main section of the program.

A. In the READA subroutine the following arrays are accumulated as BS, RE and AC cards are input--a total of 72 words--and saved until after the calculation of voter turnout in TRNOT.

Words	Name	Description
1-10	TTNSM(5)	Total non-school millage.
11-18	TTSCM(4)	Total school millage.
19-28	TTNED(5)	Total non-school dollars in bond proposals.
29-36	TTSCD(4)	Total school bond proposals--dollars.
37-54	RMRCY(9)	Requested millage rate, current year.
55-62	RAF(4)	New assessment factor, if any.
63-72	SCAMP(5)	Sum of campaign contributions, by jurisdiction.

B. Saved during TOMM model.

Words	Name	Description
73-246	ERRM(29,3)	Endogenous employment prior to growth. Saved during TOMM for comparisons at end.

C. Saved from the end of BDMIL to CPI.

Words	Name	Description
73-111	MWORK(39)	Numbers of bonds and/or millages passed in BDMIL.
112	NPASS	The number of useful elements stored in MWORK.

METRO-APEX FILE 12 (continued)

D. Newspaper Flags.

Words	Name	Description
121		Bits set to indicate low per capita budget items for Central City.
122		Bits set to indicate low per capita budget items for County.

METRO-APEX FILE 15

Arrays carried from main program to newspaper section.

Words	Type	Name	Description
1-16	R	CMPDL(8)	Total Campaign dollars for each of 8 Politicians.
17-32	R	OPDOL(8)	Total campaign dollars opposed to 8 Politicians.
33-72	R	DOL(20)	Campaign expenditures (algebraic sum) for each of 20 bond or millage proposals.
73	I	NBS	Number of bond or millage proposals this cycle.
74-93	I	LBS(20)	Numbers of proposals.
94	I	IFIL	Filler
95-104	I	PROMO(5)	Total promotional dollars for each of 5 jurisdictions.
105-114	R	PCSTD(5)	For CEN--Numbers of voters by ward.
145-164	I	ISFLG(20)	Numbers of issues to be printed in newspaper when special program has only one year to go. Stored as (issue number + 1000 x jurisdiction).

METRO-APEX FILES 16, 36, and 46

These are key files in METRO-APEX.

Only the first 6 records of the eight possible records are currently being used. The first represents the first 60 words of blank COMMON storage. Since these words contain some pointers and indicators for STUFF and for searching the STUFFed file (File 11) as well as o

carefully saved and restored if this upper common area is ever to be used for other purposes, and must also be saved at various points for restarts.

Record 1

The use of the sixty words is as follows:

Words	Type	Name	Description
1	I	NCYCL	Cycle number. Set to 0 in file 36. Incremented by 1 in core if going on to new cycle, but cycle number not incremented in the file until the end of successful execution.
2-4	I	KDATE(3)	Date of run. Set in METEQEX for use by EJECT in output links. First word is month, second is day, third is year.
5	I	LDP	The first seven bits (0-6) are set by ISET to indicate those realtors playing in the CYCLE. Bits 7-13 are set for playing Industrialists.
6	I	LRAND	Initial 5 digit random number value. Set to 24683 for cycle 1. Thereafter it is the "old" value plus the sum of the 3 elements of KDATE and adjusted to be an odd number.
7-10 11-22	I R	MIN(4) ZIN(6)	These sixteen words are used in STUFFing and searching. The first four words are always integer *2, sometimes referred to as the first four elements

METRO-APEX FILES 16, 36 and 46 (continued)

Words	Type	Name	Description
			of MIN(16) but also referred to by specific names in some links. The next twelve words may be either INTEGER *2 or REAL *4, depending on the STUFF record. They are usually returned to as ZIN(6). MIN and ZIN are equivalenced as follows: EQUIVALENCE (MIN(5), ZIN(1)) Other specific variable names are frequently equivalenced to specific elements of MIN or ZIN.
23	I	PACKI	The number indicates which of the 20 sixteen word STUFF records in a physical record was the last one STUFFed.
24	I	PACK2	Which sector of the 50 in file 11 was last stuffed.
25	I	IXPRK	Index of "found" STUFF from subroutine QERCH.
26-29	I	INFO(4)	See comments in QERCH.
30	I	LPK1	QERCH analogues of PACK1 and
31	I	LPK2	PACK2.
32	I	KC44	Player number (Developer, Industrialist, Politician, etc.). Used by EJECT for page headings.
33	I	IROLE	Flag for EJECT to indicate output heading. 1 = Developer 2 = Politician 3 = Environmental Quality Agency 4 = General Summary 5 = APCO

Record 1 (continued)

Words	Type	Name	Description
			6 = Industrialist 7 = Planners 8 = Health Officer (not currently being played) 9 = Water Quality Manager 10 = Solid Waste Manager 11 = No Head
34	I	IFUSE	Flag set in output subroutines, primarily miscellaneous output, to decide if number of lines printed requires skipping to the top of a new page. Used only in output links.
35	I	NPAGE	Used by EJECT subroutine in output links to keep running page number.
36	I	LSW	Switch set for print suppression of individual players in output links by data switch setting. 1 = Print 2 = Don't Print
37	I	NOIO	Master print suppression flag. Set in response to SUPPRES$=ALL to suppress all printing.
38	I	NTEAM	Team number.
39-60			Temporary use in LAND section of program.

Record 2

Words	Type	Name	Description
1-28	R	CASH(14)	Running cash balance in account of each of the Developers (1-7) and industrialists (8-14).
29-60			Not used at present.

Record 3

Words	Type	Name	Description
1-20	R	TNAME(10)	Team name (10A4).
21-60			Unused.

Record 4 - Water and Sewage Treatment Plant Parameters

Words	Type	Name	Description
1-4	R	WCOST(2)	Cost of purchasing water/1000 gals. 1=City, 2=County
5-8	R	SEWCST(2)	Cost of sewage treatment/1000 gals.
9-12	R	STPCAP(2)	Design capacity of STP, MGD.
13-16	R	SEWVOL(2)	Volume dumped to STP by industry this cycle.
17-20	R	STORMV(2)	Total storm sewer volume to STP.
21-24	R	SANSV(2)	Volume to STP from sanitary sewers.
25-28	R	AVGFLO(2)	Average daily flow.
29-32	R	PEAK(2)	Peak daily flow.
33-36	R	BYPASS(2)	Amount (MGD) of sewage by-passed.
37-60	R	STPCON(6,2)	Concentrations of effluent to STP added in order, IND., STORM., and SANIT.
61-62	I	ISTEF(2)	Efficiency level of STP (1, 2 or 3).
63-64	I	IWOUT(2)	Wasteflow number for WQUAL of STP emptying into river: Central City = 15 County = 9 (temp. numbers)

Record 5

Words	Type	Name	Description
1-4	R	WATPOP(2)	Population served by WTP: 1 = Central City 2 = County
5-8	R	WATIND(2)	Water purchased by industry in MGD.
9-12	R	WTPCAP(2)	Capacity of WTPs in MGD
13-16	R	WATDMD(2)	Total average water demand
17-18	I	INWAT(2)	Wasteflow number (for WQUAL) of WTP intake: 13 = Central City 7 = County
19-20	I	N54FLG(2)	0 = Project 54 not done 1 = Project 54 completed -1 = If headline to be triggered due to poor river quality. Reset to 0 after head printed.
21-22	I	KAPFLG(2)	0 = if demand is less than 90% of capacity 1 = if demand = 90-100% of capacity 2 = if demand is greater than 100-110% of capacity 3 = if demand is greater than 110% capacity
23-51	I	NSWPOP(29)	Population (persons) that can be served by STP in each analysis area. (May be greater or less than actual population.)
52-55	I	IWTHED(4)	Issue numbers of headlines to be printed due to KAPFLG (1..3) or (4) for N54FLG.
56-64	I	IWSSWT(9)	Reserved for expansion

Record 6

Words	Type	Name	Description
1-36	R	EFFSTP(6,3)	Treatment efficiencies for primary, secondary & tertiary treatment--column numbers equal treatments Row 1 = Temp Row 2 = DO (**New value, not %) Row 3 = BOD Row 4 = Nutrients Row 5 = Total Dissolved Solids Row 6 = Coliform All in % reduction except DO
37-60	R	SEWTRT(6,2)	Final treated effluent concentration of both STPs.

METRO-APEX FILES 19, 39, and 49

These files contain capital plant values, indices, ranks, population equivalents. One logical record of 1888 bytes spans three physical records of 640 bytes.

The following is a summary of the file 19 contents; a detailed variable description follows the summary:

Consecutive Words	Variable Type	Name & Dimensions	Physical Record Name	Physical Record Word	Elements
1-648	R	CPTOT(36,9)	-	-	-

The 9 columns of the above array are as follows:

Consecutive Words	Variable Type	Name & Dimensions	Physical Record Name	Physical Record Word	Elements
1-72	R	Col. (1) Streets: CPTOT(1,1) to CPTOT(36,1)	1	1-72	1-36
73-144	R	Col. (2) Sewers	1	73-144	37-72
145-216	R	Col. (3) Water	1	145-216	73-108
217-288	R	Col. (4) Parks & Recreation	1	217-288	109-144
289-360	R	Col. (5) Miscellan.	1 2	289-320 1-40	145-160 1-20
361-432	R	Col. (6) Total Government (sum of first 5 columns.)	2	41-112	21-56
433-504	R	Col. (7) Total Elementary School	2	113-184	57-92
505-576	R	Col. (8) Total High School	2	185-256	93-128
577-648	R	Col. (9) Total School (sum 7&8)	2 3	257-320 1-8	129-160 1-4

METRO-APEX FILES 19, 39, and 49 (continued)

Consecutive Words	Variable Type	Name & Dimension	Physical Record Name	Physical Record Word	Element
649-792	R	CPI(36,2)	3	9-152	5-76
793-864	R	POPEQ(36)	3	153-224	77-112
865-866	R	CONVF	3	225-226	113
867-938	I	KPRNK(36,2)	3	227-298	114-185
939-940	R	COCPT	3	299-300	186
941-942	R	COCPI	3	301-302	187
943-944	R	COPOP	3	303-304	188
945-960		Unused at present			

Variable Descriptions for Files 19, 39 and 49:

CPTOT(36,9) — Total capital plant value in each of 9 categories (see below) for each of 36 geographic areas. In actual practice the program adds cost per year from file 6 as each project is processed in SUBROUTINE CPADD. Each year the values will depreciate at 5% per year.

The first 29 rows correspond to the 29 METRO-APEX analysis areas.

Row 30	Ward 1	Total $
Row 31	Ward 2	Total $
Row 32	Ward 3	Total $
Row 33	Ward 4 or Jur. 2	Total $
Row 34	Ward 5 or Jur. 3	Total $
Row 35	Ward 6 or Jur. 4	Total $
Row 36	Jur. 1, C.C.	Total $

Variable Descriptions for Files 19, 39 and 49 (continued)

CONV	Conversion factor for converting number of employees to population equivalents, POPEQ. It is presently (3-31-74) equal to 1.25. Population equivalents are calculated as: POPEQ(1)=Total Employees in all categories/CONVF
CPI(36,2)	Capital plant indices for each of the 36 areas described above. Column one is government (Politicians) and is column 6 of CPTOT/POPEQ. Column two is elementary school capital plant index: $CPI(I,2) = \frac{CPTOT(I,7)}{\#\text{ of elementary pupils}}$
KPRNK(36,2)	The rank of the corresponding capital plant indices--the largest value is ranked 1.
COCPT	Total dollar value of County capital plant (misc.).
COCPI	County capital plant index.
COPOP	County population equivalents.

METRO-APEX FILES 20, 30 and 40

This seventeen record file contains records of the seven game Developers' and seven Industrialists' loans and taxes as well as other arrays and constants necessary in subroutine TAXLN for loan and tax processing.

Each of the first 14 records in these files are only 80 bytes long and contain variables pertaining to one of the game Developer's (records 1-7) or Industrialists (records 8-14). The variables in each of the records are as follows:

Words	Type	Name	Description
1-2	R	OLDCH	Cash balance at end of preceding cycle for the player.
3-4	R	PROPV	Total property value for the player at end of preceding cycle.
5-6	R	TTXPD	Total taxes paid current cycle for the player.
7-16	R	TAX(5)	Taxes for the player for each jurisdiction computed at end of preceding cycle or total unpaid delinquent taxes during current cycle after payments are processed.
17-26	R	TDELT(5)	Total delinquent taxes paid during current cycle in each jurisdiction by the player due to land confiscation.
27-31	I	DELTX(5)	Counters of number of times taxes were not paid in full for the player, in each of the 5 jurisdictions. If unpaid for two consecutive cycles, land is confiscated for the payment.
32	I	LSF	Financial standing of the player from 1 (highest) to 3 (lowest). Presently based only on loan underpayments.
33-34	R	TLDBT	Total outstanding loan balance for player.

METRO-APEX FILES 20, 30 and 40 (continued)

Words	Type	Name	Description
35-36	R	TNEWL	Total dollar value of new loans in the current cycle for the player.
37-38	R	TLPAY	Total loan payments made in current cycle by the player.
39-40	R	FLLMT	Loan limit factor for the player--the proportion of his net worth which he can borrow. Currently set at 30%.

The 15th record of these files is 128 bytes long and contains variables not specific to any one player but which are used for calculations relating to all players:

Words	Type	Name	Description
1	I	NJ	Count of number of loans in the loan table--which follows--or pointer to last used 10 word block.
2	I	NEXT	The last loan number assigned. This is, in effect, a count of the total number of loans processed during a game since loan numbers are not reused once a loan is paid off. It does not necessarily represent the number of loans in the table.
3-14	I	IRATE(4,3)	Interest rates at which new loans are granted. The four rows are different due to life (length) of the loan: IRATE(1,I) = 1 or 2 years IRATE(2,I) = 3 to 5 years IRATE(3,I) = 6 to 10 years IRATE(4,I) = over 10 years The three columns are for the 3 possible credit standings (LSF).
15-16	R	XINT	Interest rate paid on cash savings for players. Added at beginning of cycle to cash from preceding cycle.

METRO-APEX FILES 20, 30 and 40 (continued)

Words	Type	Name	Description
17-18	R	TINT	Interest rate charged and added to unpaid taxes.
19-20	R	PENFC	Penalty factor against loan underpayments.
21-22	R	REDOX	Factor for reducing FLLMT if loan underpayment, i.e., reducing loan limit.
23-36	I	LUC(14)	Loan underpayment counters for each player. If delinquent in loan payments, 3 consecutive cycles, payment is forced from cash balance.
37-64	R	TNETW(14)	Net worth at end of cycle for each player. Used primarily from file 40 for comparison with current value.

The 16th and 17th physical records of these files make up one logical record which is the table of loans outstanding for the Developers and Industrialists. Each loan requires a block of ten words (20 bytes) so that a maximum of 64 loans may be outstanding at any one time. (When the table becomes full during play, the table is packed by eliminating all loans with a zero balance.)

The first four words of each 10 word loan record are 2 byte integers and the last three elements (6 words) are REAL * 4. For this reason the array is identified by two names and equivalenced as follows:

```
DIMENSION XJ (5,64)
COMMON J (10,64)
EQUIVALENCE (J(1), XJ (1))
```

The elements of each loan record are as follows:

Words	Name	Description
1	J(1,I)	Number of the Developers or Industrialists receiving the loan. Integer from 1-14.
2	J(2,I)	Loan number. Assigned by the program from 1-N, printed on the output, and used to identify loan payments.

METRO-APEX FILES 20, 30 and 40 (continued)

Words	Name	Description
3	J(3,I)	Interest rate. Note; this is an integer value, e.g., 81=8.1%.
4	J(4,I)	Years remaining in loan life.
5-6	XJ(3,I)	Dollar amount of loan or, after the first year, the unpaid balance.
7-8	XJ(4,I)	Dollar penalty for underpayment.
9-10	XJ(5,I)	Minimum payment next cycle.

METRO-APEX FILE 21

A single record file containing constants used in land transactions in LAND and SELL. All values are preset and are not initialized or saved from preceding cycle.

Words	Type	Name	Description
1-10	R	UDENV(5)	Spread vector used with "U" variable (see File 1 description) to get increasing land use density.
11-22	R	DTS(6)	Proportion of total property value which is demolition cost when property goes from developed to vacant. Values for the six vacant categories.
23-24	R	PNF	Public N Factor--a proportion of public land which becomes right-of-way when public land is developed.
25-26	R	PDFS	Dollar per acre cost of public land demolition.
27-48	R	RCDEV(11)	Residential-Commercial Development cost. Dollars per unit (or acre, if commercial) to construct or develop property for the 11 developed categories.
49-70	R	EVEC(11)	Raw land improvement cost (clearing, streets, curbing, sidewalks, etc.) for the same 11 categories as RCDEV. May be modified by E factor in File 1 which is presently at 1.0.
71-72	R	R2R2V	Proportion of multiple zoning type 2 (MDR(5)) family or housing units which can be displaced by commercial demand in SELL. Presently set at 10%.
73-122	R	HPREF(5,5)	Percent of each household type (2nd subscript) that prefers each of the five developed residential housing types (1st subscript). Used to allocate demand after TOMM.

METRO-APEX FILE 21 (continued)

Words	Type	Name	Description

Housing Type

H.H. Type	R1	R2	R3	M1	M2	
1	50%	30%	0	20%	0	100%
2	20%	20%	20%	20%	20%	100%
3	10%	30%	20%	25%	15%	100%
4	0	20%	40%	10%	30%	100%
5	0	0	40%	0	60%	100%

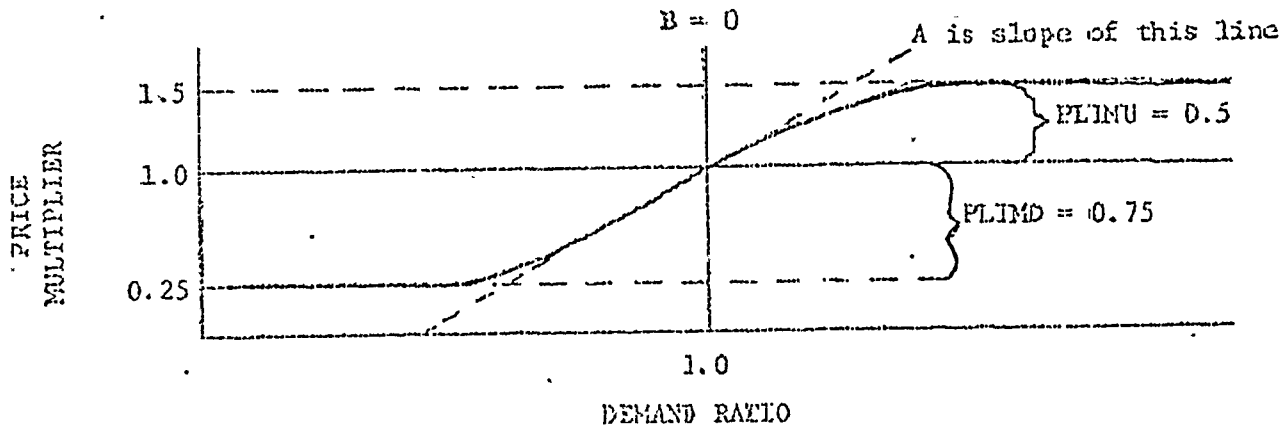
			Percentage of each type of household living in each housing type. Used to allocate displaced households when units go from developed to vacant.

Household Type

	H-1	H-2	H-3	H-4	H-5	
R1	62.5%	25.0%	12.5%	0	0	
R2	30.0%	20.0%	30.0%	20.0%	0	
R3	0	16.7%	16.7%	33.3%	33.3%	
M1	26.7%	26.7%	40.0%	13.4%	0	
M2	0	16.0%	12.0%	24.0%	48.0%	

173-174	R	PLIMU	Related to price adjustment for residential property. See following discussion.
175-176	R	PLIMD	
177-178	R	PA	
179-180	R	PB	
181-182	R	CLIMU	Analogous to preceding four variables for commercial prices.
183-184	R	CLIMD	
185-186	R	CA	
187-188	R	CB	
189-320			Unused at present.

METRO-APEX FILE 21 (continued)



Price adjustments each cycle are computed as a function of the ratio of demand for a particular type of property within an analysis area to the demand for the same type over the entire APEX County area. The function generates a multiplier which is applied to the corresponding price and which is calculated from an S-curve algorithm. In other words, if demand is greater in a specific area than overall a multiplier such as 1.03 or 3% increase would be used. If demand were lower the multiplier might be a 0.96 or 4% decrease.

Mathematically the multiplier is calculated as follows:

If T is equal to or greater than 1.0, then
X = T-1 and M = S * LIMU + 1.

If T is less than 1.0, then
$X = \frac{(T-1)}{T}$ and M = S * LIMD + 1.

Where T = demand ratio
M = price multiplier
$S = \frac{2.}{e^{(-AX + B)} + 1} - 1.$

METRO-APEX FILE 21 (continued)

In simple terms, LIMU = maximum proportion of increase in price, i.e., how much greater than 1.0 can the multiplier be.

LIMD = maximum proportion of decrease in price, i.e., how much less than 1.0 can the multiplier be.

A. = maximum slope of S curve, which determines how rapidly the multiplier increases or decreases with a change in demand ratio.

B. = horizontal-axis intercept. It is set at 0.0 which causes a ratio of 1.0 to produce a multiplier of 1.0. If B is greater than 0, the axis would be moved to the right, meaning that it would require a demand ratio greater than 1.0 to keep the price from going down as might be the case in a depression or, if B is less than 0, the axis would be moved to the left which would mean that a demand less than 1.0 could still cause an increase in price.

METRO-APEX FILES 22, 32, and 42

Counters of families and employment.

Record 1

Words	Type	Name	Description
1-145	I	PDM(29,5)	Number of families in each of 5 types in each analysis area.
146-232	I	NJGTC(29,3)	Number of employees in each of the 3 endogenous employment categories in each analysis area. Column 1 is local commercial; column 2 is regional commercial; column 3 is local industrial.
233-319	I	JDELT(29,3)	(Used only in file 22, not initialized). Change in employment from TORM--used in SELL.
320			Unused.

Record 2

Words	Type	Name	Description
1-58	R	EBUR(29)	Number of exogenous bureaucratic employees in each analysis area.
59-116	R	EIND(29)	Exogenous industrial employees in each analysis area.
117-118	R	TEXIP	Total exogenous employment after GROW.
119-128	R	HPCT(5)	Persons per household by type.
129-140	I	EXBIT(12)	Same as words 54-65 of file 512. Set to zero in file 532.

METRO-APEX FILE 23, 33, and 43 -- Access Coefficients

This file consists of a matrix of 29 by 29 real values which represent the average travel time (in minutes) from one analysis area to another analysis area. The file consists of 3 records with:

Record 1 equal to 320 words (160 real)
Record 2 equal to 320 words (160 real)
Record 3 equal to 230 words (115 real)

These 3 records are read in and stored in a named COMMON array called /TTIME/TIMES(435). These access coefficients will change based upon the projects the Politicians implement. These access coefficients are used by the CPI, TOPM, AIR, and Solid Waste models.

METRO-APEX FILE 25 -- Solid Waste Constants File

Words	Type	Name	Description
1-29	I	IWTL(29)	Water table by analysis area.
30-58	I	ISOIL(29)	Soil type by analysis area: 1 = Clay 2 = Sand 3 = Gravel
59-116	R	PERM(29)	Permiability of soil by analysis areas.
117-174	R	ACALL(29)	Number of acres allowed for SLF's.
175-182	R	TRKVOL(4)	Capacity of truck by type
183-190 /	R	TRKOCC(4)	Operating costs during collection by truck type.
191-198	R	TRKOCH(4)	Operating costs during haul by truck type.
199-200	R	WFGM	Wage for a garbage man $/min.
201-272	R	TIM(4,3,3)	Time per refuse location, truck type and crew size.
273-286	R	OPERCO(7)	Operating cost by disposal type.
287-300	R	CAPAC(7)	Capacity by disposal site.
301-314	R	TPLIM(7)	Through-put limit by disposal type.
315-320	I	IFILL(6)	Not currently being used.

METRO-APEX FILE 28

This 116 record file (four seasons times 29 analysis areas) is a special matrix of wind diffusion data for the AIR model. It shows the relative concentration and effect one analysis area has on another analysis area. This is just one of the inputs for AIR. The remaining inputs are a function of the existing industries, an estimate of line sources and space heating.

METRO-APEX FILES 51, 61 and 71 -- Process File

Data on each industrial process for gamed and simulated industries. Note: the record number of each process is indexed in the Industry File (58). That is, process x for Industry I is in record number IRECD + x - 1, e.g., process 2 for Industry ' would be in IRECD + 2 - 1 and if IRECD = 10, process 2 is in record 11 of the process file.

Words	Elements	Type	Name	Description
1-10	1-5	R	REMIS(5)	Rate of contaminant emission current (in lb/hr).
11	11	I	RSMOK	Rate of smoke emitted (Ringelmann's).
12	12	I	RODOR	Rate of odor emitted (Stinkelmann's).
13-22	7-11	R	GEMIS(5)	Potential (uncontrolled) rates.
23	23	I	GSMOK	Potential Ringelmann.
24	24	I	GODOR	Potential Stinkelmann.
25-27	25	I	ICS(3)	Control system applicable. Negative: not operating, not installed. .LT. 100: operating. .GT. 100: installed, not operating.
28	28	I	ITYPE	Odor type: 1 = putrid 2 = acrid 3 = sulphurous 4 = pugent
29-30	15	R	RPROC	Process rate, in input mat./day, except for fuel, quid in lb/unit output.
31-35	31-35	I	MUNIT(5)	Name of units in RPROC. (10 characters)
36	36	I	IRATE	Conversion factor for RPROC. RPROC * IRATE = production rate in 1000 lb/hr.
37-38	19	R	OPER	Operating period as % of day.
39-48	20-24	R	PNAME(5)	Process name. (20 characters)

METRO-APEX FILE 52, 62, and 72 -- EQA, APCO, WQI, SWI information

Record 1

Words	Type	Name	Description
1-10	R	PRIOP(5)	Cost of operation of AP monitoring equipment.
11-20	R	PUR(5)	Cost of purchasing of AP monitoring equipment.
21-22	R	STAT	Cost of constructing monitoring station building.
23-24	R	COSTI	Cost of plant inspection.
25-26	R	COSTM	Cost of emission measurement.
27-36	R	APASK(5)	Reporting levels at monitoring stations.
37-66	R	PDSHR(5,3)	Pounds/hour limitation on pollutants.
67-96	R	PDSPU(5,3)	Pounds/processing unit limitation. (1000 lbs/hr.)
97-99	I	IMOKE(3)	Smoke limit (Ringelmann).
100-102	I	IODOR(3)	Odor limit (Stinkelmann)
103-108	R	FINE(3)	Fine levels for 3 levels of regulations.
109-118	R	COEFF(5)	Coefficients for complaint generator. (Odor and Smoke.)
119-166	R	CBC(6,4)	County share of budget current cycle: 1 = EQA 2 = APCO 3 = WQI 4 = SWI
167-214	R	FBC(6,4)	Federal share of budget current cycle: 1 = EQA 2 = APCO 3 = WQI 4 = SWI

Record 1 (continued)

Words	Type	Name	Description
215-262	R	CBR(6,4)	County budget request for n+1. 1 = EQA 2 = APCO 3 = WQM 4 = SWM
263-310	R	FBR(6,4)	Federal budget request for n+1. 1 = EQA 2 = APCO 3 = WQM 4 = SWM
311-312	R	EQTOT	County allocation to EQA this cycle.
313-314	R	CCATPG	Dollars available for categorical programs from county.
315-316	R	FCATPG	Dollars available for categorical programs from federal.
317-318	R	SSCOST	Cost of stream sample.
319-320	R	ESCOST	Cost of effluent sample.

Record 2

Words	Type	Name	Description
1-80	I	KATPRG(4,20)	Categorical program record--format same as File 7 (special programs)
81	I	NCATPG	Number of categorical programs.
82-92	I	KTYPE(11)	Bit array (5,29 +) set = 1 for presence of type of monitoring equipment in each analysis area, first 145 bits analogous to array LTYPE (5,29) in APCO, EMISS, AIR. Bits 146-174 indicate presence or absence of building in analysis area. (Formerly array MONS (29)).

Record 2 (continued)

Words	Type	Name	Description
93-98	R	FGEQ(3)	3 year Federal grant to EQA.
99-104	R	FGAP(3)	3 year Federal grant to APCO.
105-110	R	FGWQ(3)	3 year Federal grant to WQM.
111-116	R	FGSW(3)	3 year Federal grant to SWM.
117-124	R	FMATCH(4)	% matching required for 4 agencies.
125-132	R	EQCASH(4)	Extra cash for: 1 = EQA 2 = APCO 3 = WQM. 4 = SWM. Primarily for cash transfer to.
133-180	R	CBEST(6,4)	These arrays are carried in COMMON Block /R52/ in program but are not stored in desk file between cycles.
181-228	R	FBEST(6,4)	
229-236	R	CTC(4)	
237-244	R	CTR(4)	
245-252	R	CTEST(4)	
253-260	R	FTC(4)	
261-268	R	FTR(4)	
269-276	R	FTEST(4)	
277-292	I	ISS(16)	
293-308	I	IES(16)	
309-320	I	IFIL(12)	Filler--not currently being used.

METRO-APEX FILE 53 -- Control Systems Air and Water

This file holds the percentages for reducing emission rates due to installation of the named system. The record number is the control number.

Words	Type	Name	Description
1-10	R	PCT(5)	Percent reduction in emissions--particulates, SO2, CO, NOx, HC.
11-12	I	LSMOD(2)	Reduction in smoke and odor.
1-12	R	WPCT(6)	Percent reduction in water effluents--Temp., DO, BOD, Nutrients, Total Dissolved Solids and Coliform. (See note overlap).
13-14	R	ORIGD	Original cost of installation ($).
15-16	R	OPERD	Cost of annual operation ($/unit).
17-40	I	NAME(24)	48 character control system name.

Only for those AP Controls which may cause water pollution. Added to AP Controls records 1-50.

Words	Type	Name	Description
41-42	R	EFFVOL	Effluent flow volume (gals/prod. Unit).
43-54	R	WPOLL	Water pollution caused by air pollution control on Temp., DO, BOD, Nutrients, Total Dissolved Solids and Coliform.

Only for WP Controls which may cause air pollution. Records 51-80.

41-42	R	STINK	Number of Stinkelmann units added to air pollution odors.

METRO-APEX FILES 54, 64 and 74 -- Gamed Industries Data

Words	Type	Name	Description
1-3	I	NEMP(3)	Number of employees last 3 cycles.
4	I	IAA	Analysis area of plant.
5-6	R	TEQBG	Total value equipment, building and air and water pollution equipment.
7	I	IOP	1 - if available for play 0 - if not available for play
8	I	MFUEL	Fuel used this cycle.
9-10	R	CINCP	Capacity increment due to invest in equipment (units/$).
11-12	R	CPMIN	Minimum expenditure on equipment.
13-14	R	CINCB	Potential capacity increase due to building increase (units/sq/ft).
15-16	R	BINVM	Minimum building investment increment allowable.
17-18	R	CLAND	Building capacity change due to land increase (sq.ft./sq.ft.).
19-20	R	SINCB	Increment in sq. ft. building/ $ expenditure on building.
21-22	R	EMPDR	Employment/Production ratio (employees/unit).
23-32	I	IPCTS(10)	% changes in sales standard MKTSL.
33-42	I	IPCTP(10)	% changes in PRMKT.
43-52	I	IPCTC(10)	% changes in product-costs.
53-54	R	MCAP	Maximum capacity of firm next cycle.
55-60	R	NPL(3)	Production level.
61-66	R	NESTS(3)	Estimated sales (units).

METRO-APEX FILES 54, 64 and 74 (continued)

Words	Type	Name	Description
67-72	R	NACTS(3)	Actual sales (units).
73-78	R	PRICE(3)	Price set by Industrialist ($).
79-84	R	PRMKT(3)	Market price ($).
85-90	R	ESTS(3)	Estimated sales ($).
91-96	R	ACTS(3)	Actual sales ($).
97-102	R	INSLD(3)	Inventory sold (units).
103-108	R	IVNT(3)	Inventory last 3 cycles (units).
109-110	R	ICOVR	Inventory carry over (units).
111-112	R	AVEWG	Average yearly wage/employee.
113-114	R	UMC	Unit material cost ($/unit).
115-116	R	UAC	Unit administration cost ($/unit).
117-118	R	CCIVN	Total inventory carrying cost ($).
119-120	R	CPINV	Current investment in equipment (non-pollution). ($)
121-122	R	CPLIM	Equipment investment limit (maximum). ($)
123-124	R	BINVE	Current investment building. ($)
125-126	R	BDLIM	Building investment limit ($).
127-128	R	DPREX	Depreciation expenditure (deterioration).
129-130	R	SQFTB	Sq. ft. of building.
131-133	I	ICAP(3)	% capacity used.
134	I	ISHP	Flag to indicate purchase of control system data this cycle.
135-136	R	TLC	Total labor cost.

METRO-APEX FILES 54, 64 and 74 (continued)

Words	Type	Name	Description
137-138	R	TMC	Total material cost.
139-140	R	TFC	Total fuel cost.
141-142	R	TAC	Total administrative cost.
143-144	R	TPCOP	Total pollution control operating expenses.
145-146	R	APFPD	Air pollution fines paid.
147-148	R	EMMEX	Emission measurement expenditure this cycle.
149-150	R	CAMEX	Campaign contributions.
151-152	R	DPAL	Depreciation allowance made.
153-154	R	PROG	Gross profits.
155-156	R	FEDS	Federal-state taxes.
157-158	R	PRON	Net profit.
159-160	R	CEXEQ	Capital expenditure on equipment (non-pollution).
161-162	R	CEXLD	Capital expenditure on land.
163-164	R	CEXBG	Capital expenditure on building.
165-166	R	CEXAP	Capital expenditure on air pollution.
167-178	R	CFUEL(6)	Unit cost of each of six fuels ($/unit).
179-180	R	TLPAY	Total loan payments.
181-182	R	TTXPD	Total tax payments (local).
183-188	I	IFUEL(6)	Fuels available for use: 1 = available 0 = not available The six fuels are: Low grade coal, high grade coal,

METRO-APEX FILES 54, 64 and 74 (continued)

Words	Type	Name	Description
			low grade oil high grade oil natural gas electricity
189-190	R	UNIT	Name of product unit.
191-192	R	TAPCV	Total Air Pollution Control value.
193-194	R	DVLPD	Acres developed land.
195-196	R	VACNT	Acres vacant land.
197-198	R	MKTSL	Market sales standard.
199-204	R	MAXC(3)	Capacity last 3 cycles.
205-206	R	UICC	Unit inventory carrying cost.
207	I	NPROC	Number of subprocesses.
208-222	I	NAME(15)	Industry name (30 characters).
223-224	R	TOTC	Total cost of production.
225-226	R	TCASH	Total cash available.
227-228	R	TCAP	Total capital expenditures.
229-230	R	AVAL	Total land value.
231-232	R	ALLOW	Maximum depreciation allowance for next cycle.
233-234	R	WCNTEX	Total water pollution capital expenditures current cycle.
235-236	R	TWCVAL	Total investment in water pollution control.
237-238	R	TWCOP	Cost of operating water pollution controls this cycle.
239-240	R	WPMEX	Expenditures for buying water pollution effluent data this cycle.

METRO-APEX FILES 54, 64 and 74 (continued)

Words	Type	Name	Description
241-242	R	CWATER	Cost of buying water this cycle.
243-244	R	CSEWER	Cost of buying sewage treatment from municipal treatment plant.
245-250	R	SWTON(3)	Solid waste contribution in tons by industry, recovery from air controls and recovery from water pollution controls.
251-252	R	CTON	Cost/ton to haul solid waste away.
253-260	R	EXTRA(4)	Unused.

METRO-APEX FILES 55, 65 and 75 -- Water Quality Files

Record 1

Words	Type	Name	Description
1-40	R	QI(20)	Quality of water runoff for Winter Season.
41-80	R	TI(20)	Temperature of runoff for Winter Season.
81-120	R	DOI(20)	Dissolved Oxygen in runoff for Winter Season.
121-160	R	BODI(20)	BOD runoff for Winter Season.
161-280	R	CONSI(20,3)	Conservative mineral runoff for Winter Season.

Record 2

Same as Record 1 except for Spring Season.

Record 3

Same as Record 1 except for Summer Season.

Record 4

Same as Record 1 except for Fall Season.

Record 5

Words	Type	Name	Description
1-40	R	TINIT(20)	Initial temperature for Winter Season.
41-80	R	DOINIT( )	Initial DO for Winter Season.
81-120	R	BOINIT( )	Initial BOD for Winter Season.
121-240	R	COINIT(20,3)	Initial conservation minerals for Winter Season.
241-280	R	AVF(20)	Average flow for Winter Season.

METRO-APEX FILES 55, 65 and 75 (continued)

Record 6

Same as Record 5 except for Spring Season.

Record 7

Same as Record 5 except for Summer Season.

Record 8

Same as Record 5 except for Fall Season.

Record 9

Words	Type	Name	Description
1-40	R	TARGDO(20)	Target for DO
41-60	I	NHWWAR(20)	Number of headwater for augmentation.
61-100	I	IAUGOR(20,2)	Elements of the headwater for augmentation (in order).
101	I	IAUGOP	Flow augmentation option.
102	I	NWASTE	Number of waste sources.

Record 10

Words	Type	Name	Description
1-20	I	NCELRH(20)	Number of computational elements by reach.
21-320	I	IFLAG(20,15)	Type of computation element: 1 = H.W. 2 = Plain 3 = Element before a junction 4 = Junction 5 = Last 6 = Waste Input 7 = Withdrawal

METRO-APEX FILES 55, 65 and 75 (continued)

Record 11

Words	Type	Name	Description
1-300	I	ICLORD(20,15)	Order of computational elements.
301	I	NCELLS	Total number of computational elements.

METRO-APEX FILES 56, 66 and 76 -- Solid Waste Data

Record 1

Words	Type	Name	Description
1-210	R	SWG(35,3)	Solid waste generated (tons/year) stored by analysis area and ward by type.
211-246	R	PIIHID(6,3)	Pounds/household/day of waste generated by ward and type.
247-266	R	PCICY(10)	% increase in trash generated each cycle.
267-278	R	TRTRAD(6)	Trade in value of trucks by ward. Depreciates at 20% each cycle.
279-284	I	KRKTY(6)	Type of trucks by ward.
285-290	I	NTRKS(6)	Number of trucks by ward.
291-305	I	ISV(15)	Soil survey analysis areas ordered this cycle.
306	I	NSV	Number of soil surveys ordered this cycle.
307	I	NCD	Number of collection/disposal studies.
308-320	I	IFIL(13)	Unused at present.

Record 2

This record must be viewed as a 6 20-word subrecords followed by 12 10-word subrecords. The first 6 subrecords contain the collection/disposal information for type 2 solid waste for the 6 wards. The next 6 subrecords have the abbreviated collection/disposal information for type 1 solid waste for the 6 wards. The final 6 subrecords are for type 3 solid waste for the 6 wards. The subrecords are retrieved through the subroutine GETARR and stored through the subroutine PUTARR.

Record 2 (continued)

The format of the first 6 records:

Words	Type	Name	Description
1	I	MIAA	Pointer to subrecord in record 3-4 of transfer station.
2	I	MJAA	Pointer to subrecord in record 3-4 of disposal site.
3	I	MDT	Disposal site type: 1 = Incinerator 2 = Open dump 3 = SLF1 4 = SLF2 5 = SLF3 6 = Transfer station 7 = Contract 8 = Other
4	I	MFL	Flag for newspaper headlines: 1 = no remaining capacity in present disposal site. 100 = private collection, no transfer station, and no disposal site locally.
5-6	R	TONS	Amount of refuse (annual).
7-8	R	TSC	Charge made by transfer station (annual).
9-10	R	DSC	Charge made by disposal site (annual).
11	I	MPK	Picked up by: 1 = City 2 = County 3 = Private
12	I	MRL	Refuse location: 1 = backyard bag 2 = backyard can 3 = frontyard bag 4 = frontyard can
13	I	MTT	Truck type (1-3)

Record 2 (continued)

Words	Type	Name	Description
14	I	MCS	Crew Size (1-3)
15	I	MNC	Total crew size.
16	I	MPU	Number of pickups/week (1 or 2).
17-18	R	PHLC	Pickup and haul labor cost (annual).
19-20	R	PHTC	Pickup and haul truck cost (annual).

The format of the next 12 records:

Words	Type	Name	Description
1	I	MIAA	Same as word 1 above.
2	I	MJAA	Same as word 2 above.
3	I	MDT	Same as word 3 above.
4	I	MFL	Same as word 4 above.
5-6	R	TONS	Same as words 5-6 above.
7-8	R	TSC	Same as words 7-8 above.
9-10	R	DSC	Same as words 9-10 above.

Records 3 and 4

This record must be viewed as 32 20-word subrecords with each subrecord containing data pertinent to one disposal site. The format is:

Words	Type	Name	Description
1	I	NTYP	Type of disposal site: 0 = Not activated 1 = Incinerator 2 = Open dump 3 = SLF1 4 = SLF2 5 = SLF3 6 = Transfer station

Records 3 and 4 (continued)

Words	Type	Name	Description
2	I	IAA	Analysis area.
3-14	R	TP(6)	Total annual waste to site by ward (all three types of solid waste).
15-16	R	CPT	Charge per ton (to all users) defaults to operating cost unless a fee card is used.
17-18	R	TR	Tons remaining for types 2-5 and rate/year for types 1 and 6.
19-20	R	THRPT	Maximim throughput--tons/year.

METRO-APEX FILES 58, 68 and 78

Record of all industries, gamed and simulated. Note: the record number corresponds to the industry number.

Words	Type	Name	Description
1	I	IOP	Operational status of industry.
2	I	IAA	Analysis area.
3-4	R	RPROD	Output of firm.
5-6	R	PRODC	Production capacity of firm.
7	R	IRECD	Record number in File 51 of the first process of gamed industries. Except for the iron foundry (Ind. 3), IRECD is the fuel process. For simulated industries, it is the only process.
8	I	NPROC	Number of production processes used by the firm. For simulated industries, NPROC = 0 (really one less than actually exists).
9-13	I	NUNIT(5)	Name of appropriate production unit per unit of time.
14-28	I	FNAME(15)	Firm name--30 characters.
29-30	R	FLOW	Volume of effluent/prod. unit (gals/unit).
31-32	R	WATUSE	Volume of water required from WTP/prod. unit (gals/unit).
33-36	I	JCS(4)	Water pollution control system numbers (records in File 53).
37-38	R	TEMP	Temp. of effluent (°F.).
39-40	R	DO	DO concentration (mg/1).
41-42	R	BOD	BOD (mg/1).
43-44	R	XNUTS	Nutrients (mg/1).
45-46	R	SOSSOL	Total Dissolved Solids (mg/1).
47-48	R	ECOLI	Coliform concentration (MPN/100ml).
49	R	IWAST	Wasteflow number for WQUAL

WPOLL(6)

METRO-APEX FILE 204

This file consists of ten 64-byte records, where each record corresponds to a cycle of the game. Each record is identical.

Words	Type	Name	Description
1-32	I	ISSUT(32)	Each non-zero value is the number of a "record" in file 201. These are the preset issues for the cycle represented by the record number. A listing of these preset issue numbers may be obtained by running FILEPRNT and specifying PRINT 204.

METRO-APEX FILE 205

This file consists of ten 12-byte records. Each record corresponds to a cycle of the game from 1 to 10.

Words	Type	Name	Description
1-6	I	IEXO(6)	The numbers from 1 to 6 exofirms which are preset to desire entry into the community the following cycle. Used only by the newspaper printing section of the program.

METRO-APEX FILE 206

Thisfile consists of ten 40-byte records, where each record corresponds to a cycle of the game. Each record is identical and consists of a set of from 1 to 20 preset state and national headlines. Since the one vector contains both national and state headlines and since they may be a combination of single-line heads and multiple-line heads the following scheme is used to identify the values in the file:

1. The first values in each record are national headlines. As the program interprets each record from left to right the first state headline is identified by being a negative value. All values following the negative number are state headlines. A zero value terminates the list.

2. Values less than 1000 are record numbers in the issue file (File 201). All values greater than 1000 are record numbers in the headline file (File 203) to which 1000 have been added.

METRO-APEX FILE 209 -- also referred to as File 5 in some instances

This file contains descriptions of all of the preset exogenous industries which wish to locate in the METRO-APEX area during the game. Only 45 of the 48 records are initially used allowing room for expansion of the file.

Each exofirm record consists of the following data:

Words	Type	Name	Description
1-16	I	NAME(16)	Name of the exofirm. Up to 32 characters, 2 characters per word (16A2).
17-20	I	IPREF(4)	Analysis area in which the firm wishing to locate in order of preference. May be one to three given, fourth is unused.
21	I	NEMP	Number of employees.
22	I	IZONE	Coded to indicate the land use type which needed to be rezoned Industrial. Now unused since the restriction has been abondoned.
23	I	NISSU	Number of issue generated if the firm enters the community.
24	I	NYRS	Years over which the realtors receive a return on their investment.
25-26	I	RATE	Rate of return on realtors investments, stored as 1.05 equiv. to 5%.
27-28	R	AMT	Amount of realtor investment required in order for an exofirm to enter.
29-30	R	ACRES	Number of acres of Industrial land needed for this exofirm.
31-32	R	TAX	Dollar addition to the tax base in the analysis area in which the firm locates.

METRO-APEX FILE 209 (continued)

Words	Type	Name	Description
33-34	R	COST	Cost of capital plant additions (sewer, streets) required for entry of this exofirm.
35	I	IBIT	Word containing bits set to indicate conditions. These bits are tested by function ITEST: Bit 0 = 1 if Industrial 0 if Office (bureaucratic) Bit 1 = 1 if on--firm should be forced in even though all Politicians and/or realtors conditions are not met. Bit 2 = On if rezoning required. Bit 3 = On if new sewers required. Bit 4 = On if street improvements required. Bit 5-15 = Unused.
36	I	INDEF	If non-zero number of record of industry in File 58 which must be activated if firm enters. Will be 0 if no industry in File 58.
37-40			Unused at present.

METRO-APEX FILES 511, 531, and 541

This single record file contains vectors of preset growth percentages for various sectors of the local economy for ten cycles plus records of national and local employment and unemployment. (In the 1130 version of the program it was a single file included as part of File 3. It was made a separate file because it may vary from team to team.)

Words	Elements	Type	Name	Description
1-10	1-5	R	UNEMP(5)	Local unemployment for each of the five household types in current cycle. Calculated from UNAPX(t+1).
11-32	6-16	R	UNAPX(11)	APEX area unemployment rate. The subscript is cycle number +1. The first value for cycle 0, the second value calculated for cycle 1, etc.
33-34	17	R	STPPA	The starting, cycle 0, student population of the university presently set at 27,000.
35-54	18-27	R	STPOP(10)	A record of the new student population for each cycle. The value for the current cycle is printed in the Planner's printout.
55-74	28-37	R	PCTNE(10)	Percent change in total national employment.
75-94	38-47	R	PEXTC(10)	Percent change in exogenous employment in APEX this cycle, both bureaucratic and industrial, for 10 cycles. This change includes addition of exofirms and gamed industrial growth after national growth rate applied.

METRO-APEX FILES 511, 531, and 541 (continued)

Words	Elements	Type	Name	Description
95-114	48-57	R	GOVTG(10)	The preset growth proportion of exogenous bureaucratic employment (EBUR) in AA 8 (state government) for 10 cycles. A 3% growth would be stored in this array as 1.03.
115-134	58-76	R	UNIVG(10)	The growth proportion of university enrollment by cycle.
135-154	68-77	R	CUSLF(10)	Percent change in total U.S. labor force.
155-174	78-87	R	CAPLF(10)	Percent change in labor force in APEX area.

METRO-APEX FILES 512, 532, and 542

These files contain records of which exofirms are preset to enter in up to 10 cycles, which exofirms did and did not enter and other information pertaining to exofirms for newspaper printing.

Words	Type	Name	Description
1-40	I	NEXOP(4,10)	This array is used by the GROW section of METEQEX to indicate those exofirms desiring to locate in the area in each of the 10 cycles. Each column of the array represents a single cycle. The four elements NEXOP(1,i) through NEXOP(4,i) constitute an array of 64 consecutive bits which are set on (1) by the ISET routine for those exofirms desiring to enter. Only six may be so set for any one cycle. All other bits are set off (0). They are tested in GROW by the ITEST routine (an alternate entry point in ISET).
41	I	NUMEX	The count in any single cycle of the number of exofirms which did enter.
42-47	I	NEXAA(6)	The number of the analysis area in which the firm in the corresponding element of NEXIN located.
48-53	I	NEXIN(6)	The numbers of the exofirms which entered in a cycle. For an example, if NEXIN(1) = 12 and NEXAA(1) = 17, it means that exofirm 12 located in analysis area 17.
54-57	I	EXOUT(4)	A 64 bit vector, cleared at the beginning of GROW, in which the corresponding bit is set on by ISET for each exofirm which does not enter in a cycle.

METRO-APEX FILES 512, 532, and 542 (continued)

Words	Type	Name	Description
58-61	I	EXTHS(4)	A similar vector of bits containing a bit set on for each exofirm which entered in the current cycle. It is the same information as that in NEXIN but in a different form.
62-65	I	EXIN(4)	A vector of 64 bits which is cleared only at cycle zero and has a bit set on for each exofirm entering during a game. In other words, a cumulative record of all exofirms which entered during a game.
66-67	I	IAIRQ(2)	Bit corresponding to analysis area set on if flagged for air pollution headline in newspaper. Set in AIR.

Notice that each of the above arrays is explicitly defined as integer *2. Any integer *2 array, EXBIT(12), is also dimensioned in GROW and the above arrays are equivalence as follows:

(EXBIT(1), EXOUT(1)), (EXBIT(5), EXTHS(1)), (EXBIT(9), EXIN(1)).

METRO-APEX FILE 513

(Note: in the IBM 1130 version of METEQEX each record of this file was a third physical record in each logical record of File 1 only. It was made a separate file to facilitate the copy operation.) It is used only during the processing of the "current" cycle of the game but is retained in data set 15 until the beginning of the next cycle for possible error analysis.

Words	Type	Name	Description
1-154	I	OFRC(11,14)	Property (units for 1-5 and 10ths of acres for 6-11) offered by the game realtor and industrialists in the analysis area in current cycle.
155-308	I	SORC(11,14)	Property (analogous to OFRC) actually sold by the game realtors and industrialists.
309-319	I	FOVER(11)	Corresponds to the 5 developed residential zoning categories, plus six endogenous commercial/ industrial classifications. This array is used only in SELL and represents the unfilled demand for land (in 10ths of an acre) after all "cascading" or pre-empting of land by higher use types on the first four iterations.

PRESSURE GROUP FILE DESCRIPTION

Record 1

Words	Type	Name	Description
1	I*4	NIM	Total number of pressure groups being played.

Records 2-13 -- Pressure Group Number = Record 1

Words	Type	Name	Description
1-10	I*4	NAME(10)	Name of the Pressure Group (10A4)
11	I*4	MEMINT	Initial membership.
12	I*4	MEMO	Old membership.
13	R	CSHOV	Cash carryover.
14	R	SUBSIS	Subsistence Level.

Records 14-133

Words	Type	Name	Description
1	I*4	N	Number of Pressure Group
2-31	I*4	IPG(30)	Text (30A4)--for lines being added.

Records 134-313

Words	Type	Name	Description
1-90	I*4	ITXT(90)	Text of newsletter.

Records 314-319 - not currently being used

PRESSURE GROUP FILE DESCRIPTION (continued)

Record 320

Words	Type	Name	Description
1-90	I	LIST1(180)	Newsletter numbers currently being used: 0 = not in use 1 = in use

Instructions for Coding Politician Codesheet

1. or 2. Change in Operating Expenses

(City or County)

See worksheet section II-10 budget balance sheet lines II-13 and II-14.

Code = UV

I-1 = Politician Number

1 = Central City
2 = Suburb
3 = Township 1
4 = Township 2
5 = County

I-2 = Budget Category

1 = Legislative and Executive
2 = Planning
3 = Financial
4 = Judicial
5 = Fire and Police
6 = Parks and Recreation
7 = Water and Sewage (public works for County only)
8 = Refuse Collection (Note: estimate only; value is calculated in program)
9 = Road and Street Maintenance
10 = Employee Benefits
11 = Public Relations
12 = Library Fund
13 = Public Health (County only)
14 = E.Q.A. (County only)
15 = Welfare - Hospital (County only)
17 = Transfer to Capital Fund (line II-13 of budget balance sheet)
18 = Transfer to Debt Retirement (line II-14 of budget balance sheet)

F-1 = New percent
OR (Code % or $ value - not both)
F-2 = New dollar value (leave the amount column blank in categories 17 and 18 and do not keypunch if $0. is to be transferred)

3. Normal Operating Millage

See worksheet section II-2.

Code = RM

I-1 = Politician Number

1 = Central City
2 = Suburb
3 = Township 1
4 = Township 2
5 = County

F-1 = Total New Operating Millage

4. Cash Transfers

See worksheet section II-15.

Code = CT

I-1 = From Whom

1-7 = Land Developers
8-14 = Industrialists corresponding to 1 through 7
16 = Central City Politicians
17 = County Politicians
99 = Game Overall Director

I-2 = To Whom

Same as Code I-1

F-1 = $ Amount

5. Special Grants

See worksheet sections II-7 and III-2.

Code = SG

I-1 = Politician Number

1 = Central City
2 = Suburb
3 = Township 1
4 = Township 2
5 = County

I-2 = Type of Grant

1 = Operating Budget
2 = Capital Budget

F-1 = $ value of grant

6. Land Transfers

See worksheet sections II-8 and III-9.

Code = LT

I-1 = Seller

1-7 Land Developers
8-14 Industrialists (corresponding to 1 through 7)
15 = Market (non-game private)
16 = Central City Politicians
17 = County Politicians

I-2 = Analysis Area (1-29)

I-3 = Present Use

0 = Vacant
1 = Developed
2 = Public Buildings, Parks, etc.

I-4 = Present Zoning Category

IF VACANT (I-3 = 0)
1 = Residential/Single
2 = Residential/Multiple

3 = Commercial
4 = Industrial
5 = Office
6 = Agricultural

IF DEVELOPED (I-3 = 1)
1 = R-1 (single family residential - low density)
2 = R-2 (single family residential - medium density)
3 = R-3 (single family residential - high density)
4 = M-1 (multiple family residential - low density)
5 = M-2 (multiple family residential - medium density)
6 = CL (commercial local)
7 = CR (commercial regional)
8 = IL (local industrial)
9 = IX (exogenous industry)
10 = O (office)
11 = A (active farming)

Note: Players may not develop in categories 9, 10, and 11.

I-5 = Buyer

Same as Code I-1

I-6 = Number of Household Units

(This is used for developed residential only-- if I-3 = 1 and I-4 = between 1 and 5.) Blank otherwise.

F-1 = Number of acres of other than developed residential.

Blank otherwise.

F-2 = $ Price offered by buyer for each unit or acre as appropriate

(If buyer is Market [I-5 = 15], leave blank.)

7. Bond, Special Millages

See worksheet sections II-2, II-11, III-3, III-6, III-8, IV-3.

Code = BS

I-1 = Politician Number

1 = Central City
2 = Suburb
3 = Township 1

4 = Township 2
5 = County

I-2 = Unique 3 digit number given to player by role advisor where 1st digit corresponds to the cycle number.

I-3 = Purpose

1 = Millage for water, sewer, streets
2 = Millage for parks, special projects, miscellaneous
3 = Bond for water, sewers, streets
4 = Bond for parks, miscellaneous
5 = Raise current local limit

I-4 = Type

1 = G.O. Bond
2 = Revenue Bond
3 = Special Millage
4 = Debt Retirement Millage (Code for purpose = 1 in I-3 above)

I-5 = Number of years

I-6 = Elite Opinion Poll "Number for" minus "Number against"

F-1 = Dollar if bond; Mills if I-4 = 3 or 4

F-2 = Promotional expenses related to this referendum, in dollars

F-3 = Resubmit (Blank = no, 1 = yes)

8. Capital Improvements

See worksheet section III-8.

Code = CP

I-1 = Politician Number

1 = Central City
2 = Suburb

3 = Township 1
4 = Township 2
5 = County

I-2 = Location

(Analysis Area 1-29; Wards 1-6 = 30-35; Jurisdictions 1-4 = 36-39; County = 40)

I-3 = Project Number (1-140)

I-4 = Bond Number to which project is tied,

Blank otherwise.

F-1 = Amount to be spent on project

(Note: must fall within range shown on project list and must be in even $000.)

F-2 = Number of acres for capital projects which have asterisks in the "Acres Required" column on the capital project list

This allows the Politician to set the number of acres to be used for those projects only. This field must be filled in if there are asterisks for that project on the "Acres Required" column on the capital project list. (Usually used for Project 21)

9. Special Program

See worksheet section II-11.

Code = SP

I-1 = Politician Number

1 = Central City
2 = Suburb
3 = Township 1
4 = Township 2
5 = County

I-2 = Location

Same as for Capital Projects above.

I-3 = Program Number (1-60, from Program List)

I-4 = Millage Number

I-6 = 1, if there is a capital project associated with the special program and it is already in existence.

(Otherwise, Politicians will have to rebuild the facility.)

Instructions for Coding Planner Codesheet

1. Capital Improvements

See recommendations for capital improvement projects.

Code = CP

I-1 = Planner Number

6 = Central City
7 = Suburb
8 = Township 1
9 = Township 2
10 = County

I-2 = Location

(Must agree with location in project list)

1. . . 29 = specific Analysis Area
30 = Ward 1 in Central City
31 = Ward 2 in Central City
32 = Ward 3 in Central City
33 = Ward 4 -- Suburb
34 = Ward 5 -- Township 1
35 = Ward 6 -- Township 2
36 = Jurisdiction 1
37 = Jurisdiction 2
38 = Jurisdiction 3
39 = Jurisdiction 4
40 = County

I-3 = Project Number (1-140)

F-1 = Total amount to be spent on project

(Note: Must fall within range shown on project list and must be in even $000.)

F-2 = Number of acres used for those projects which have an asterisk on the project list.

(Usually Project 21)

2. Special Programs

See recommendations for special programs.

Code = SP

I-1 = Planner Number

6 = Central City
7 = Suburb
8 = Township 1
9 = Township 2
10 = County

I-2 = Location

(Must agree with location in programs list)

1. . . 29 = specific Analysis Area
30 = Ward 1 in Central City
31 = Ward 2 in Central City
32 = Ward 3 in Central City
33 = Ward 4 — Suburb
34 = Ward 5 — Township 1
35 = Ward 6 — Township 2
36 = Jurisdiction 1
37 = Jurisdiction 2
38 = Jurisdiction 3
39 = Jurisdiction 4
40 = County

I-3 = Program Number (1-60)

3. Rezoning Application

All rezoning application forms should be submitted first to the Planner for recommendation. The Planner then submits them to Politicians for approval. When worksheets are requested, Planner submits all rezoning forms.

Code = RZ

I-1 = Owner

1-7 = Land Developers
8-14 = Industrialists
15 = Market
16 = Central City Politicians
17 = County Politicians

I-2 = Analysis Area (1-29)

I-3 = Present Use

0 = Vacant
1 = Developed
2 = Public Buildings, Parks, etc.

I-4 = From Present Zoning Category

IF VACANT (I-3 = 0)
1 = Residential/Single
2 = Residential/Multiple
3 = Commercial
4 = Industrial
5 = Office
6 = Agricultural

IF DEVELOPED (I-3 = 1)
1 = R-1 (single family residential - low density)
2 = R-2 (single family residential - medium density)
3 = R-3 (single family residential - high density)
4 = M-1 (multiple family residential - low density)
5 = M-2 (multiple family residential - medium density)
6 = CL (commercial local)
7 = CR (commercial regional)
8 = IL (local industrial)
9 = IX (exogenous industry)
10 = O (office)
11 = A (active farming)

I-5 = To Zoning Category

1 = Residential/Single
2 = Residential/Multiple
3 = Commercial
4 = Industrial
5 = Office
6 = Agricultural

I-6 = Number of household units

(This is used for developed residential only-- if I-3 = 1 and I-4 = between 1 and 5.) Blank otherwise.

F-1 = Number of acres if other than developed residential

Blank otherwise.

4. Planned Unit Developments

Code = DL

I-1 = Land Developer (1-7)

I-2 = Analysis Area (1-29)

I-3 = 1 = R-1 (single family residential - low density)
2 = R-2 (single family residential - medium density)
3 = R-3 (single family residential - high density)
4 = M-1 (multiple family residential - low density)
5 = M-2 (multiple family residential - medium density)

I-6 = Number of units being developed

F-2 = New density units/acre

(Good only for this PUD)

Instructions for Coding EQA Codesheet

1. Budget Request Summary

See worksheet section III-1.

Code = BR

I-1 = 1 for EQA Role

I-2 = Source

1 = County
2 = Federal

I-3 = Cycle

1 = this cycle
2 = next cycle
3 = N + 2 cycle

F-1 = $ Public Education

F-2 = $ Administration and Enforcement

F-3 = $ Allocation to APCO

F-4 = $ Allocation to WQM

F-5 = $ Allocation to SWM

F-6 = $ Intergovernmental Coordination

SPECIAL NOTE: ADDITIONAL FUNDS ABOVE THE TOTAL OF THE ABOVE SIX BUDGET CATEGORIES WILL BE USED FOR CATEGORICAL PROGRAMS.

2. Federal Grant

See worksheet section III-2 and 3.

Code = FG

Note: EQA budget items A. B. F and G only

I-1 = 1 for EQA Role

F-1 = $ Federal Funds for EQA Federal Items A, B, F, and G This (N) Cycle

F-2 = $ Federal Funds for EQA Federal Items A, B, F, and G Next (N + 1) Cyc.

F-^ = $ Federal Funds for EQA Federal Items A, B, F, and G Following (N + 2) Cycle

F-4 = Matching Ratio

Example: 3 to 1, code 3

F-5 = Cutback %

To reduce amount of Federal Grant approved in earlier cycles, enter percent cutback.

3. Special Programs

See worksheet section II-G.

Code = SP

I-1 = Role = 11

I-2 = Location

1-29 = Analysis Area
30-35 = Wards 1-6
36-39 = Jurisdictions 1-4
40 = County

I-3 = Program Number

Instructions for Coding APCO Codesheet

1. Budget Request Summary

See worksheet sections III-1, III-2, III-3.

Code = BR

I-1 = Role

APCO = 2

I-2 = Source of Funds

1 = County
2 = Federal

I-3 = Cycle Funded

1, 0, or blank = Awarded for this cycle (N)
2 = Awarded for next cycle (N + 1)
3 = Awarded for 3rd cycle (N + 2)

F-1 = $ Public Education

F-2 = $ Administration and Enforcement

F-3 = $ Plant Inspections

F-4 = $ Emission Measurements

F-5 = $ Monitoring Station and Equipment Purchases

F-6 = $ Monitoring Station Equipment Relocation and Operating Costs

2. Federal Grant Application

See worksheet section III-4, a and b.

Code = FG

I-1 = Role

APCO = 2

F-1 = $ Federal Funds This (N) Cycle

F-2 = $ Federal Funds Next (N + 1) Cycle

F-3 = $ Federal Funds Following (N + 2) Cycle

Note: If a supplemental grant is awarded, add it into the Federal Grant for that year.

F-4 = Matching Ratio = $\frac{\text{Federal Grant}}{\text{County Funding}}$

Blank = Current Ratio
To change to a different ratio, code ratio desired, i.e., 3 to 1, code 3.

F-5 = Cutback %

To reduce amount of Federal Grant approved in earlier cycles, enter percent cutback.

3. Plant Inspection

See worksheet section II-C, 1.

Code = PI

(Numbers in boxes are in order of priorities.)

I-1 through I-15 enter the industry numbers on which the inspections are ordered.

4. Smoke Inventory

See worksheet section II-C, 2.

Code = SI

I-1 through I-5 in order of priority

1 = Central City
2 = Suburb
3 = Township 1
4 = Township 2
5 = County

5. Emission Measurements

See worksheet section II-D.

Code = EM

(Numbers in boxes are in order of priority.)

I-1 through I-15 are the industry numbers for which the measurements are ordered.

6. Relocate (Move) Monitoring Equipment

See worksheet section II-E, 1.

Code = MV

I-1 = Old (current) AA location

I-2 = New (move to) AA

F-1 through F-5 = Type of Equipment Moved in Order of Priority

1 = Particulate
2 = SO_2
3 = CO

4 = NOX
5 = HC

Note: Any equipment number may go in any "F" field. Station not in existence automatically purchases.

7. Monitoring Station and Equipment-- Purchase and Operate

See worksheet section II-E, 2.

Code = MS

I-1 = AA of Station or Equipment

I-2 = Priority

F-1 through F-5 = Type of Equipment in Order of Priority

1 = Particulate
2 = SO_2
3 = CO^2
4 = NOX
5 = HC

Note: Stations not in existence automatically purchased.

8. Monitoring Station Reporting Levels (Air Quality)

See worksheet section II-E, 4.

Code = AQ

F-1 = Reporting Level for Particulates

F-2 = Reporting Level for SO_2

F-3 = Reporting Level for CO

F-4 = Reporting Level for NOX

F-5 = Reporting Level for HC

No Card = Same as last cycle

Note: If one "F" field is coded, all must be coded.

9. Air Pollution Legislation

See worksheet section IV.

Code = AF

I-1 = Type of Decision

1 = State Regulation
2 = County Regulation
3 = Recommendation to State

I-2 = Fine Level in Even Dollar Amount, not to exceed $9999.

(There is no fine associated with recommendations; i.e., if I-1 = 3, then leave blank.)

I-3 = Type of Regulation

1 = Emission Regulations (in lbs./hr.)
2 = Process Rate Regulation (in lbs./1000 lbs.)
3 = Smoke and Odor Regulation

If I-3 = 1 or 2:	If I-3 = 3:
F-1 = Particulate Emission Regulation	F-1 = Smoke Regulation in Ringelmann Units (0-5)
F-2 = SO_2 Emission Regulation	F-2 = Odor Regulation in Stinkelmann Units (0-5

If I-3 = 1 or 2 /

F-3 = CO Emission Regulation /

F-4 = NOX Emission Regulation /

F-5 = HC Emission Regulation /

Note: For no regulation, code -1 not zero.

Instructions for Coding WQM Codesheet

1. Budget Request Summary

See worksheet section III-1.

Code = BR

I-1 = 3 for WQM Role

I-2 = Source

1 = County
2 = Federal

I-3 = Cycle

1 = This Cycle
2 = Next Cycle
3 = N + 2 Cycle

F-1 = $ Public Education

F-2 = $ Administration and Enforcement

F-3 = $ Stream Samples

F-4 = $ Effluent Samples

F-5 = $ Planning and Evaluation

F-6 = $ Intergovernmental Coordination

2. Federal Grant

See worksheet section III-2.

Code = FG

I-1 = 3 for WQM Role

F-1 = $ Federal Funds This (N) Cycle

F-2 = $ Federal Funds Next (N + 1) Cycle

F-3 = $ Federal Funds Following (N + 2) Cycle

F-4 = Matching Ratio

Example: 3 to 1, code 3 (code only if changed)

F-5 = Cutback %

To reduce amount of Federal Grant approved in earlier cycles, enter percent cutback.

3. Stream Samples

See worksheet section II-C.

Code = SS

I-1 through I-15 are the river reaches to be sampled

Maximum of 15 can be ordered in any one cycle.

4. Effluent Samples

See worksheet section II-D.

Code = ES

I-1 through I-15 are the industry numbers for which effluent measures are ordered

5. Fee Changes for Municipal Services

Code = FC

I-1 = Jurisdiction

16 = Central City
17 = County

I-2 = Type of Service

2 = Sewage Treatment
3 = Water Treatment

F-3 = Fee Charged-- $/1000 Gallons

Instructions for Coding SWM Codesheet

1. Budget Request Summary

See worksheet section III, 1 and 3.

Code = BR

I-1 = Solid Waste Manager = 4

I-2 = Source of Funds

1 = County
2 = Federal

I-3 = Cycle Number

Present Cycle (N) = 0 or 1
Next Cycle (N + 1) = 2
Following Cycle (N + 2) = 3

F-1 = $ Public Information and Education

F-2 = $ Administration and Enforcement

F-3 = $ Planning and Evaluation

F-4 = $ Soil Survey

F-5 = $ Collection and Disposal Studies

F-6 = $ Intergovernmental Coordination

2. Federal Grant

See worksheet section III-2.

Code = FG

I-1 = Solid Waste Manager = 4

F-1 = $ Federal Funds This (N) Cycle

F-2 = $ Federal Funds Next (N + 1) Cycle

F-3 = $ Federal Funds Following (N + 2) Cycle

F-4 = Matching Ratio = $\frac{\text{Federal Funds}}{\text{County Funds}}$

Note: Automatic maximum of 3 to 1 unless F-4 coded.

F-5 = Cutback % of Previously Granted Federal Funds (i.e., code 30 percent as 30.)

3. Soil Survey

See worksheet section II-D.

Code = SV

I-1 through I-15 = Analysis Areas in order of priority

4. Collection and Disposal (Studies & Implementation)

See worksheet sections II-E and IV.

Code = CD

I-1 = Ward in Which Refuse Collected

1 = Ward 1
2 = Ward 2
3 = Ward 3
4 = Suburb
5 = Township 1
6 = Township 2

I-2 = Submitter (study or implementation of collection/disposal system)

1 = Solid Waste Manager Study
2 = Implementation Order by Politicians

Note: For I-2 = 2, check for Politicians associated capital projects.

I-3 = Solid Waste Type

1 = Type 1 (Hazardous Materials)
2 = Type 2 (Household/Commercial)
3 = Type 3 (Solid Fill)

I-4 = Analysis Area of Transfer Station

0 = No Transfer Station
Analysis Area Number (1-29) = Transfer Station

I-5 = Analysis Area of Disposal Site

0 = No Disposal Site
Analysis Area (1-29) = Disposal Site

I-6 = Disposal Site Type

Note: If I-2 = 2 (implementation of system) then check for Politicians associated capital projects.

1 = Incinerator
2 = Open Dump
3 = Sanitary Land Fill, Class I
4 = Sanitary Land Fill, Class II
5 = Sanitary Land Fill, Class III
6 = Transfer Station
7 = Contract

I-7 = Collected By

1 = City
2 = County
3 = Private

I-8 = Refuse Location

1 = Backyard Bag (BYB)
2 = Backyard Can (BYC)

3 = Frontyard Bag (FYB)
4 = Frontyard Can (FYC)

I-9 = Truck Type (Refuse Collection)

Note: If I-2 = 2 (implementation of system) then check for Politicians associated capital projects.

1 = Truck Type 1
2 = Truck Type 2
3 = Truck Type 3

I-10 = Crew Size

Number of Men per Truck = 1, 2, or 3

I-11 = Number of Household Pickups per Week

1 = Once per Week (standard condition)
2 = Twice per Week (normally used only when player requests; not on his worksheet)

5. Fee Card (Change of Fee Charged by Disposal Site

See worksheet section IV-2.

Code = FC

I-1 = Jurisdiction (Location and Owner of Site)

16 = City
17 = County

I-2 = Service

1 = Solid Waste

I-3 = Analysis Area of Disposal Site (1-29)

I-4 = Disposal Site Type

Same as 4. Collection and Disposal, I-6, above.

F-1 = New Fee ($/Ton)

NOTE: IF FEE CARD IS ENTERED ON DISPOSAL SITE TYPE I-6, FEE WILL REMAIN CHANGED FOR FOLLOWING CYCLES. FOR DISPOSAL SITE TYPE 7 (CONTRACT) A FEE CHANGE MUST BE REENTERED EACH CYCLE TO STAY IN EFFECT.

Instructions for Coding Industrialist Codesheet

1. Production Level

Code = PL

I-1 = Industrialist Number

Industrialist No. 1 = 8
Industrialist No. 2 = 9
Industrialist No. 3 = 10
Industrialist No. 4 = 11
Industrialist No. 5 = 12
Industrialist No. 6 = 13
Industrialist No. 7 = 14

I-2 = Fuel for Production

See worksheet, II-C, Estimated Operating Cost.

1 = Low Grade Coal
2 = High Grade Coal
3 = Low Grade Oil
4 = High Grade Oil
5 = Natural Gas

I-3 = Purchase Emission Data

See worksheet under Estimated Operating Costs, II-H and II-O.

1 = Air
2 = Water
3 = Both

I-4 = Purchase Control System Data

See worksheet under Estimated Operating Costs, II-I, 1 and 2.

1 = Air
2 = Water
3 = Both

F-1 = Production Level, Units

See worksheet under Estimated Income, I-B.

F-2 = Unit Sales Price, $

See worksheet under Estimated Income, I-B.

F-3 = Estimated Sales, Units

See worksheet under Estimated Income, I-B.

F-4 = Annual Wage, $

(Only needed if charged from printout cost factors)

2. Land Transfers

See worksheet under Estimated Income, I-D, and under Capital Expenditure Estimation.

Code = LT

I-1 = Seller

(For land sales section I-D under Estimated Income)

For land purchases:
1-7 = Land Developers
8-14 = Industrialists
15 = Market (non-game private)
16 = Central City Politicians
17 = County Politicians

I-2 = Analysis Area (1-29)

I-3 = Present Use

0 = Vacant
1 = Developed
2 = Public Buildings, Parks, etc.

I-4 = Present Zoning Catefory

IF VACANT (I-3 = 0)
1 = Residential/Single
2 = Residential/Multiple
3 = Commercial
4 = Industrial
5 = Office
6 = Agricultural

IF DEVELOPED (I-3 = 1)
1 = R-1 (single family residential - low density)
2 = R-2 (single family residential - medium density)
3 = R-3 (single family residential - high density)
4 = M-1 (multiple family residential - low density)
5 = M-2 (multiple family residential - medium density)
6 = CL (commercial local)
7 = CR (commercial regional)
8 = IL (industrial local)
9 = IX (industrial exogenous)
10 = 0 (office)
11 = A (active farming)

I-5 = Buyer

Same code as I-1 for land purchases

I-6 = Number of household units

(This is used for developed residential only-- if I-3 = 1 and I-4 = between 1 and 5.) Blank otherwise.

F-1 = Number of acres if other than developed residential

Blank otherwise.

F-2 = $ Price offered by buyer for each unit or acre as appropriate

This field is blank if buyer is 15 (the market).

SPECIAL NOTE: IF THE LAND TRANSFER IS BETWEEN 2 GAMED PLAYERS, ONLY THE SELLER RECORDS THE LAND ON THE CODING SHEET.

3. Loan Payments

See worksheet section II-J under Estimated Operating Costs.

Code = LP

I-1 = Industrialist (8-14)

I-2 = Loan Number as indicated on worksheet

F-1 = $ Amount of Payment

4. Tax Payments

See worksheet section II-K under Estimated Operating Costs.

Code = TP

I-1 = Industrialist (8-14)

I-2 = Jurisdiction to which paid

1 = Central City
2 = Suburb
3 = Township 1
4 = Township 2
5 = County

F-1 = $ Amount of Payment

5. Cash Transfers

See worksheet section II-L under Estimated Operating Costs.

Code = CT

I-1 = From Whom

Industrialists (8-14)

(Note: Only code those CT specified by Giver.)

I-2 = To Whom (Player)

1-7 = Land Developers
8-14 = Industrialists
16 = Central City Politician
17 = County Politicians
99 = Game Overall Director

F-1 = $ Amount

6. Campaign Contributions

See worksheet section II-M under Estimated Operating Costs.

Code = CC

I-1 = Industrialist Number (8-14)

I-2 = Politician Number

1 = Central City - Ward 1
2 = Central City - Ward 2
3 = Central City - Ward 3
4 = County Politician, Suburb
5 = County Politician, TW1
6 = County Politician, TW2
7 = County Politician At Large
8 = County Politician, Central City At Large

OR

Bond or Special Millage Number

(Must agree with I-2 of BS Card for the same cycle)

F-1 = Dollars

Precede with minus sign if opposed to Politician or bond or special millage.

7. Pollution Controls

See worksheet section II-F and II-P under Estimated Operating Costs and Capital Expenditures Estimation, E, 1 and 2.

Code = PC

I-1 = Industrialist Number (8-14)

I-2 = Process Number

1-5 = Air Pollution Control.
1 = Water Pollution Control

I-3 = Control Number (1-80)

8. Exofirm Investments

See worksheet section II-T.

Code = BI

I-1 = Industrialist Number (8-14)

I-2 = Exofirm Number

(Must agree with newspaper for that cycle)

F-1 = $ Amount of Investment

9. Non-Pollution Expenditure

Code = NP

I-1 = Industrialist Number (8-14)

F-1 = $ Depreciation Allowance

See worksheet section III-B under Profit and Income Tax Estimates.

F-2 = $ Production Equipment Expansion

See worksheet section Capital Expenditures Estimation, item B.

F-3 = $ Building Expansion

See worksheet section Capital Expenditures Estimation, item C.

F-4 = $ Plant Maintenance Cost

See worksheet section II-G under Estimated Operating Costs.

10. Loan Requests

See worksheet section IV-C, Cash in Estimate, New Loans Requested.

Code = LR

I-1 = Industrialist Number (8-14)

I-2 = Number of years requested for repayment

(If player indicates between 3-5, use the number 4, etc. Maximum is 20 years.)

F-1 = $ Amount Requested

11. Dividends

See worksheet section V-D under Cash Out Estimate, Estimated Dividends Payment. Check below for Board of Directors signature and amount.)

Code = DV

I-1 = Industrialist Number (8-14)

F-1 = $ Amount of Dividends

(Enter $ amount designated by role advisor or Game Director acting as Board of Directors. If no DV card entered automatic dividend will be taken.)

Instructions for Coding Developer Codesheet

1. Cash Transfers

See worksheet section II-C.

Code = CT

I-1 = From Whom*

1-7 = Land Developers

I-2 = To Whom

1-7 = Land Developers
8-14 = Industrialists (corresponding to 1-7)
16 = Central City Politician
17 = County Politicians
99 = Game Overall Director

F-1 = $ Amount of Transfer

*Note: Only code those LT specified by Giver.

2. Loan Payments

See worksheet section II-E.

Code = LP

I-1 = Land Developer Number (1-7)

I-2 = Loan Number as indicated on worksheet and on printout

F-1 = $ Amount of Payment

3. Loan Requests

See worksheet section II-F.

Code = LR

I-1 = Land Developer Number (1-7)

I-2 = Number of years requested for repayment

(If player indicates between 3-5, use the number 4, etc. Maximum number of years is 20.)

F-1 = $ Amount Requested

4. Tax Payments

See worksheet section II-G.

Code = TP

I-1 = Land Developer Number (1-7)

I-2 = Jurisdiction to which paid

1 = Central City
2 = Suburb
3 = Township 1
4 = Township 2
5 = County

F-1 = $ Amount of Payment

5. Campaign Contributions

See worksheet section II-A.

Code = CC

I-1 = Land Developer Number (1-7)

I-2 = Politician Number

1 = Central City -- Ward 1
2 = Central City -- Ward 2
3 = Central City -- Ward 3
4 = County Politician -- Suburb
5 = County Politician -- Township 1
6 = County Politician -- Township 2
7 & 8 = County Politician -- Central City At Large

OR

Bond or special millage number (must agree with I-2 of the Politician's BS Card for the same cycle)

F-1 = Dollars

(Precede with minus sign if opposed to Politician or bond or special millage.)

6. Exofirm Investments

See worksheet section II-I.

Code = BI

I-1 = Land Developer Number (1-7)

I-2 = Exofirm Number

(Must agree with newspaper for that cycle)

F-1 = $ Amount of Investment

7. Land Transfers

See worksheet section II-J.

Code = LT

I-1 = Seller

(For land sales worksheet section II-O always Developer 1-7)

For land purchases:
1-7 = Land Developers
8-14 = Industrialists
15 = Market (non-game private)
16 = Central City Politicians
17 = County Politicians

I-2 = Analysis Area (1-29)

I-3 = Present Use

0 = Vacant
1 = Developed
2 = Public Buildings, Parks, etc.

I-4 = Present Zoning Category

IF VACANT (I-3 = 0)
1 = Residential/Single
2 = Residential/Multiple
3 = Commercial
4 = Industrial
5 = Office
6 = Agricultural

IF DEVELOPED (I-3 = 1)
1 = R-1 (single family residential - low density)
2 = R-2 (single family residential - medium density)
3 = R-3 (single family residential - high density)
4 = M-1 (multiple family residential - low density)
5 = M-2 (multiple family residential - medium density)
6 = CL (commercial local)
7 = CR (commercial regional)
8 = IL (Local industrial)
9 = IX (exogenous industry)
10 = O (office)
11 = A (active farming)

Note: Players may not develop in categories 9, 10, and 11.

I-5 = Buyer

Same code as I-1 for land purchases (on selling option only for developed property in one Analysis Area -- code 99 to sell <u>all</u> developed property in that AA)

I-6 = Number of Household Units

(This is used for developed residential only— if I-3 = 1 and I-4 = between 1 and 5.) Blank otherwise.

F-1 = Number of Acres, if other than developed residential

Blank otherwise.

F-2 = $ Price offered by buyer for each unit or acre as appropriate

(This field is blank if buyer is the Market— I-5 = 15.)

SPECIAL NOTE: IF THE LAND TRANSFER IS BETWEEN 2 GAMED PLAYERS-- ONLY THE SELLER RECORDS THE LAND ON THE CODING SHEET.

8. Developed Costs

From worksheet section II-M.

Code = DL

I-1 = Land Developer Number (1-7)

I-2 = Analysis Area (1-29)

I-3 = Use same coding as for I-4 if DEVELOPED under Land Transfers section above.

I-6 = Number of units being developed if residential

Not Both

F-1 = Number of acres being developed if non-residential

KEYPUNCH FOR POLITICIAN ROLE

Central City Politician ( )
County Politician ( )

Cycle Number_____

Politician Number: 1=City 2=Suburb 3=TW1 4=TW2 5=County

1. City Change in Operating Expenses (UV)

	Pol. No. (I-1)	Category (I-2)	% Total Revenue (F-1)	Amount (F-2)
A	1	1	XXXXXXXX	
B	1	2		
C	1	3		
D	1	4		
E	1	5		
F	1	6		
G	1	7		
H	1	8		
I	1	9		
J	1	10		
K	1	11		
L	1	12		
O	1	17	XXXXXXXX	
P	1	18	XXXXXXXX	

OR

2. County Change in Operating Expenses (UV)

	Pol. No. (I-1)	Category (I-2)	% Total Revenue (F-1)	Amount (F-2)
A	5	1	XXXXXXXX	
B	5	4		
C	5	5		
D	5	6		
E	5	7		
F	5	13		
G	5	14		
H	5	8		
I	5	9		
J	5	10		
K	5	11		
L	5	12		
M	5	15		
P	5	17	XXXXXXXX	
Q	5	18	XXXXXXXX	

3. Normal Operating Millage (RM)

Pol. No. (I-1)	Total Operating Millage (F-1)

(Note: Total millage, not change)

4. Cash Transfer (CT)

From (I-1)	To (I-2)	Amount (F-1)

From and To = Dev 1-7
Ind 8-14
CC Pol = 16
Co Pol = 17
Game Dir = 99

5. Special Grant (SG)

Pol. No. (I-1)	Type (I-2)	Amount (F-1)

Type: 1 = Operating Budget
2 = Capital Budget

6. Land Transfer (LT)

Seller (I-1)	AA (I-2)	Vac/Dev (I-3)	Zone Cate (I-4)	Buyer (I-5)	No. Units or No. Acres (I-6)	(F-1)	Price/Acre Price/Unit (F-2)

Seller & Buyer

1-7 = Dev
8-14 = Ind
15 = Market
16 = CC Pol
17 = Co Pol

Vac = 0
Dev = 1

If Vacant =

1 = Res
2 = Mult
3 = Com
4 = Ind
5 = Off
6 = Agr

If Developed =

1 = R-1
2 = R-2
3 = R-3
4 = M-1
5 = M-2
6 = CL
7 = CR
8 = IL
9 = IX
10 = 0
11 = A

7. Bond, Special Millages (BS)

Pol. No. I-1)	Number (I-2)	Purpose (I-3)	Type I-4)	Years to Run (I-5)	EOP (For-Against) (I-6)	$ (if Bond) or Mills (F-1)	Promotion Exp. (F-2)	Resubmit (F-3)

I-3 Purpose

1 = Mill/Water, sewer, sts.
2 = Mill/Parks, SP's, misc.
3 = Bond/Water, sewers, sts.
4 = Bond/Parks, SP's, misc.
5 = Raise current local limit

I-4 Type

1 = G.O. Bond
2 = Revenue Bond
3 = Special Mill.
4 = Debt Retire. Mill. (Code 1 in I-3)

F-3 Resubmit

Blank =
1 = yes

8. Capital Improvements (CP)

Pol. No. (I-1)	Location (I-2)	Proj. No. (I-3)	Bond No. (I-4)	Total Cost (F-1)	# Acres Only If Required (F-2)

Location

1-29 AA's
30-35 Wards 1-6
36-39 Jur 1-4
40 County

F-2
Not usually required.
(See coding instructions)

9. Special Programs (SP)

Pol. No. (I-1)	Location (I-2)	Prog. No. (I-3)	Millage No. (I-4)	Proj. in Existence (I-6)

I-6

1 = If there is a capital projec required and it is already in existence.

KEYPUNCH FOR PLANNER ROLE

Planner Number _____ Cycle Number _____

1. Capital Improvements (CP)

Planner Number (I-1)	Location (I-2)	Project Number (I-3)	Total Cost (F-1)	# of Acres Only if Required (F-2)

Planner	Location
6=City	1-29 AA's
7=Sub	30-35 Wards
8=TW1	36-39 Jur
9=TW2	40 County
10=County	

2. Special Programs (SP)

Planner Number (I-1)	Location (I-2)	Program Number (I-3)

3. Rezoning Application (RZ)

Owner (I-1)	AA (I-2)	Vac/ Dev (I-3)	From (I-4)	To (I-5)	Number Units (I-6)	OR	Number Acres (F-1)

Owner
1-7=Dev
8-14=Ind
15=Market
16=C.C. Pol
17=Co. Pol

Vac/ Dev
0=Vac
1=Dev
2=Pub Bldgs, Parks

From
Dev 1-11 or Vac 1-6

To=1-6

Dev
1=R-1
2=R-2
3=R-3
4=M-1
5=M-2
6=CL
7=CR
8=IL
9=IX
10=O
11=A

Vac
1=Res/Sin
2=Res/Mult
3=Comm
4=Ind
5=Off
6=Agr

4. Planned Unit Developments (DL)

Dev. No. (I-1)	AA (I-2)	Dev. Type (I-3)	No. of Units (I-6)	New Density Units/Acre (F-2)

Dev. Type
1=R-1
2=R-2
3=R-3
4=M-1
5=M-2

KEYPUNCH FOR EQA

Cycle Number _____

1. Budget Request Summary (BR)

Role (I-1)	Source (I-2)	Cycle (I-3)	Pub. Ed. (F-1)	Admin. & Enforc. (F-2)	Funds APCO (F-3)	Funds WQM (F-4)	Funds SWM (F-5)	Inter. Coord. (F-6)
1								
1								
1								
1								
1								
1								

Role Source Cycle

1=EQA 1=County 0 or 1 = present cycle (N)
2=Federal 2 = N + 1 cycle
3 = N + 2 cycle

2. Federal Grant (FG) (EQA Fed. Fund only)

Role (I-1)	Funds This Cycle (F-1)	Funds N + 1 Cycle (F-2)	Funds N + 2 Cycle (F-3)	Matching Ratios (F-4)	Cutback % (F-5)
1					

3. Special Programs (SP) (Categorical Programs)

Role (I-1)	Location (I-2)	Program Number (I-3)
11	40	
11	40	
11	40	
11	40	
11	40	
11	40	
11	40	
11	40	

Location Prog. # = Same as for Special Programs

40 = County only

KEYPUNCH FOR APCO

Cycle Number _____

1. Budget Request Summary (BR)

Role (I-1)	Source (I-2)	Cycle (I-3)	Pub. Ed. (F-1)	Admin. & Enforc. (F-2)	Plant Insp. (F-3)	Emis. Meas. (F-4)	M.S. Purch. (F-5)	M.S. Oper. (F-6)
2								
2								
2								
2								
2								
2								

Role
2=APCO

Source
1=County
2=Federal

Cycle
1 or 0=present cycle (N)
2=N + 1 cycle
3=N + 2 cycle

2. Federal Grant (FG)

Role (I-1)	Funds This Cycle (F-1)	Funds N + 1 Cycle (F-2)	Funds N + 2 Cycle (F-3)	Matching Ratio (F-4)	Cutback % (F-5)
2					

3. Plant Inspection (PI)

	Priority														
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15
	(I-1)	(I-2)	(I-3)	(I-4)	(I-5)	(I-6)	(I-7)	(I-8)	(I-9)	(I-10)	(I-11)	(I-12)	(I-13)	(I-14)	(I-1
Ind. No.															

4. Smoke Inventory (SI)

Priority	#1 (I-1)	#2 (I-2)	#3 (I-3)	#4 (I-4)	#5 (I-5)

1 = Central City
2 = Suburb
3 = Township 1
4 = Township 2
5 = County

5. Emission Measurements (EM)

	Priority														
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15
	(I-1)	(I-2)	(I-3)	(I-4)	(I-5)	(I-6)	(I-7)	(I-8)	(I-9)	(I-10)	(I-11)	(I-12)	(I-13)	(I-14)	(I-1
Ind. No.															

6. Relocate (Move) Monitoring Equipment (MV)

Old AA (I-1)	New AA (I-2)	Types of Equipment Moved (F-1)	(F-2)	(F-3)	(F-4)	(F-5)

Types of Equipment Moved

1 = Particulate
2 = SO_2
3 = CO^2
4 = NOX
5 = HC

7. Monitoring Station and Equipment Purchase and Operate (MS)

AA (I-1)	Priority (I-2)	Types of Equipment (F-1)	(F-2)	(F-3)	(F-4)	(F-5)

Types of Equipment

1 = Particulate
2 = SO_2
3 = CO
4 = NOX
5 = HC

8. Monitoring Station Reporting Levels (AQ)

Particulates (F-1)	SO_2 (F-2)	CO (F-3)	NOX (F-4)	HC (F-5)

Same as last cycle

If one changed, all must be coded.

9. Air Pollution Legislation (AF)

(I-1)	Fines (I-2)	(I-3)	Emission Rates in lbs/hr. Part. (F-1)	SO_2 (F-2)	CO (F-3)	NOX (F-4)	HC (F-5)
1		1					
2		1					
3	XXXXXXXX	1					

1 = State
2 = County
3 = Recommendation to State

Fines $9999 Max.

For no regulation, Code -1 not 0.

9. Air Pollution Legislation (AF) (Cont.)

(I-1)	Fines (I-2)	(I-3)	Emission Rates in lbs/1000 hrs Part. (F-1)	SO_2 (F-2)	CO (F-3)	NOX (F-4)	HC (F-5)
1	XXXXXXX	2					
2	XXXXXXX	2					
3	XXXXXXX	2					

1=State
2=County
3=Recommendation to State

For no regulation, code -1 not 0.

(I-1)	Fines (I-2)	(I-3)	Smoke Ring. No. (F-1)	Odor Odor Units (F-2)
1	XXXXXXX	3		
2	XXXXXXX	3		
3	XXXXXXX	3		

1=State
2=County
3=Recommendation to State

For no regulation, code -1 not 0.

KEYPUNCH FOR WQM

Cycle Number _____

1. Budget Request Summary (BR)

Role (I-1)	Source (I-2)	Cycle (I-3)	Pub. Ed. (F-1)	Admin. & Enforc. (F-2)	Stream Samples (F-3)	Eff. Samples (F-4)	Plan. Eval. (F-5)	Inter. Coord. (F-6)
3								
3								
3								
3								
3								
3								

Role — 3=WQM

Source — 1=County, 2=Federal

Cycle — 0 or 1=present cycle (N), 2= N + 1 cycle, 3= N + 2 cycle

2. Federal Grant (FG)

Role (I-1)	Funds This Cycle (F-1)	Funds N + 1 Cycle (F-2)	Funds N + 2 Cycle (F-3)	Matching Ratio (F-4)	Cutback % (F-5)
3					

Role

3=WQM

3. Stream Samples (SS)

	Priority														
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15
	(I-1)	(I-2)	(I-3)	(I-4)	(I-5)	(I-6)	(I-7)	(I-8)	(I-9)	(I-10)	(I-11)	(I-12)	(I-13)	(I-14)	(I-15)
Reach No.															

4. Effluent Samples (ES)

	Priority														
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15
	(I-1)	(I-2)	(I-3)	(I-4)	(I-5)	(I-6)	(I-7)	(I-8)	(I-9)	(I-10)	(I-11)	(I-12)	(I-13)	(I-14)	(I-15)
Ind. No.															

5. Fee Change (FC)

Juris. (I-1)	Type of Service (I-2)	Fee Charged ($/1000 gals) (F-1)

Juris.

16=Central City
17=County

Type of Service

2=Sewage Treatment
3=Water Treatment

KEYPUNCH FOR SWM

Cycle Number _____

1. Budget Request Summary (BR)

Role (I-1)	Source (I-2)	Cycle (I-3)	Pub. Ed. (F-1)	Admin. & Enforc. (F-2)	Planning & Eval. (F-3)	Soil Survey (F-4)	Coll. & Disp. Studies (F-5)	Inter. Coord. (F-6)
4								
4								
4								
4								
4								
4								

Role

4=SWM

Source

1=County
2=Federal

Cycle

0 or 1=present cycle (N)
2= N + 1 cycle
3= N + 2 cycle

2. Federal Grant (FG)

Role (I-1)	Funds This Cycle (F-1)	Funds N + 1 Cycle (F-2)	Funds N + 2 Cycle (F-3)	Matching Ratio (F-4)	Cutback % (F-5)
4					

Role

4=SWM

3. Soil Survey (SV)

	Priority														
	#1 (I-1)	#2 (I-2)	#3 (I-3)	#4 (I-4)	#5 (I-5)	#6 (I-6)	#7 (I-7)	#8 (I-8)	#9 (I-9)	#10 (I-10)	#11 (I-11)	#12 (I-12)	#13 (I-13)	#14 (I-14)	#15 (I-15)
AA															

4. Collection/Disposal (CD)

Ward (I-1)	Submitter (I-2)	SW Type (I-3)	AA or Transfer Station (I-4)	AA of Disposal Site (I-5)	Dis-posal Type (I-6)	Coll. By (I-7)	Ref. Loc. (I-8)	Truck Type (I-9)	Crew Size (I-10)	# of Pick-ups/Wk (I-11)

Ward= 1-6

Submitter
1=SWM (study)
2=Pol. (imple-menta-tion)

SW Type
1=Hazardous Wastes
2=Household/ Commercial
3=Solid Fill

Disposal Type
1=Incinerator
2=Open Dump
3=SLF I
4=SLF II
5=SLF III
6=Transfer Station
7=Contract

Coll. By
1=City
2=County
3=Private

Ref. Loc.
1=BYB
2=BYC
3=FYB
4=FYC

Truck Type= 1-3

Crew Size= 1-3

# of Pickups= 1 or 2 (Normally one

*Note: AA of Transfer Station or AA of Disposal Site-- if none, code 0.

5. Fee Card (FC)

Juris. (I-1)	Service (I-2)	AA of Dis-posal Site (I-3)	Disposal Type (I-4)	Fee (F-1)
	1			
	1			
	1			
	1			

Juris.
16=City
17=County

Service
1=SW

*Note: If a fee card is being used on Disposal Type 07 (contract) this card must be reentered each cycle.

KEYPUNCH FOR INDUSTRIALIST ROLE

Industrialist Number _____ Cycle Number _____

1. Production Level (PL)

Ind. No. (I-1)	Fuel (I-2)	Emission Cons. (I-3)	Control Cons. (I-4)	Production Level Units (F-1)	Sales Price (F-2)	Estimated Sales Units (F-3)	Annual Wage Options (F-3)

Ind.	Fuel	Cons.
8-14	1=Lo Coal 2=Hi Coal 3=Lo Oil 4=Hi Oil 5=Nat Gas	1=Air 2=H_2O 3=Both

2. Land Transfer (LT)

Seller (I-1)	AA (I-2)	Vac/ Dev (I-3)	Zoning Cat. (I-4)	Buyer (I-5)	No. of Units (I-6)	OR	No. of Acres (F-1)	Price/Acre or Price/Unit (F-2)

Seller & Buyer	Vac/ Dev	Vac	Dev
1-7 Dev 8-14 Ind 15 Mkt 16 C.C. Pol 17 Co. Pol	0=Vac 1=Dev	1=Res/Sin 2=Res/Mult 3=Comm 4=Ind 5=Off 6=Agr	1=R-1 2=R-2 3=R-3 4=M-1 5=M-2 6=CL 7=CR 8=IL 9=IX 10=O 11=A

3. Loan Payment (LP)

Ind. No. (I-1)	Loan No. (I-2)	Amount (F-1)

Ind=8-14

4. Tax Payment (TP)

Ind. No. (I-1)	Juris. (I-2)	Amount (F-1)

Ind=8-14 Juris.

1=C.C.
2=Sub
3=TW1
4=TW2
5=Co.

5. Cash Transfer (CT)

From (I-1)	To (I-2)	Amount (F-1)

From & To are same as Land Transfer "Seller" above.

18=EQA
19=APCO
20=WQM
21=SWM
99=Game Director

6. Campaign Contribution (CC)

Ind. No. (I-1)	Pol/Bond/ Mill No. (I-2)	Amount (F-1)

Ind=8-14 Pol. No.

1=C.C. Ward 1
2=C.C. Ward 2
3=C.C. Ward 3
4=Co. Suburb
5=Co. TW1
6=Co. TW2
7=Co. Pol. at Large
8=Co. Pol. C.C. at Large

7. Pollution Controls (PC)

Ind. No. (I-1)	Process No. (I-2)	Control No. (I-3)

Ind=8-14 1=H_2O

8. Exofirm Investment (BI)

Ind. No. (I-1)	Exo. No. (I-2)	Amount (F-1)

Ind=8-14

9. Non-Pollution Expenditure (NP)

Ind. No. (I-1)	Depreciation Allowance (F-1)	Equipment Expansion (F-2)	Building Expansion (F-3)	Plant Maintenance (F-4)

Ind=8-14

10. Loan Request (LR)

Ind. No. (I-1)	No. Years (I-2)	Amount (F-1)

Ind=8-14 No. Years

Years=If 2-4
use 3, etc.
Max = 20

11. Dividends (DV)

Ind. No. (I-1)	Amount (F-1)

Ind=8-14

(If not coded, will be automatic)

KEYPUNCH FOR DEVELOPER ROLE

Developer Number _____ Cycle Number _____

1. Cash Transfer (CT)

From (I-1)	To (I-2)	Amount (F-1)

From and To =

Dev 1-7
Ind 8-14
C.C. Pol=16
Co. Pol=17
Game Director=99

2. Loan Payment (LP)

Dev. No. (I-1)	Loan No. (I-2)	Amount (F-1)

3. Loan Request (LR)

Dev. No. (I-1)	Years (I-2)	Amount (F-1)

Years=

If 2-4,
use 3, etc.

Max. = 20

4. Tax Payment (TP)

Dev. No. (I-1)	Juris. (I-2)	Amount (F-1)

Juris.

1=C.C.
2=Sub
3=TW1
4=TW2
5=Co.

5. Campaign Contribution (CC)

Dev. No. (I-1)	Po./Bond/Mill No. (I-2)	Amount (F-1)

6. Exofirm Investment (BI)

Dev. No. (I-1)	Exo. No. (I-2)	Amount (F-1)

Pol. No. =

1-3 Central City, Wards 1,2, or 3
4 County Suburb
5 County TW1
6 County TW2
7 County at Large
8 County Pol., Central City at Large

7. Land Transfer (LT)

Seller (I-1)	AA (I-2)	Vac/ Dev. (I-3)	Zone Cat. (I-4)	Buyer (I-5)	No. of Units (I-6)	or	No. of Acres (F-1)	Price/Acre Price/Unit (F-2)

Seller & Buyer=

Dev 1-7
Ind 8-14
Market 15
C.C. Pol 16
Co. Pol 17

Vac=0
Dev=1

Vac

1=Res/Sin
2=Res/Mult
3=Comm
4=Ind
5=Off
6=Agr

Dev

1=R-1
2=R-2
3=R-3
4=M-1
5=M-2
6=CL
7=CR
8=IL
9=IX
10=0
11=A

If Buyer = Market, do not indicate price/acre or price/unit

8. Development Costs (DL)

Dev. No. (I-1)	AA (I-2)	Dev. Type (I-3)	No. of Units (I-6)	or	No. of Acres (F-1)

Dev. Type

Units
1=R-1
2=R-2
3=R-3
4=M-1
5=M-2

Acres
6=CL
7=CR
8=IL

KEYPUNCH FOR PRESSURE GROUP

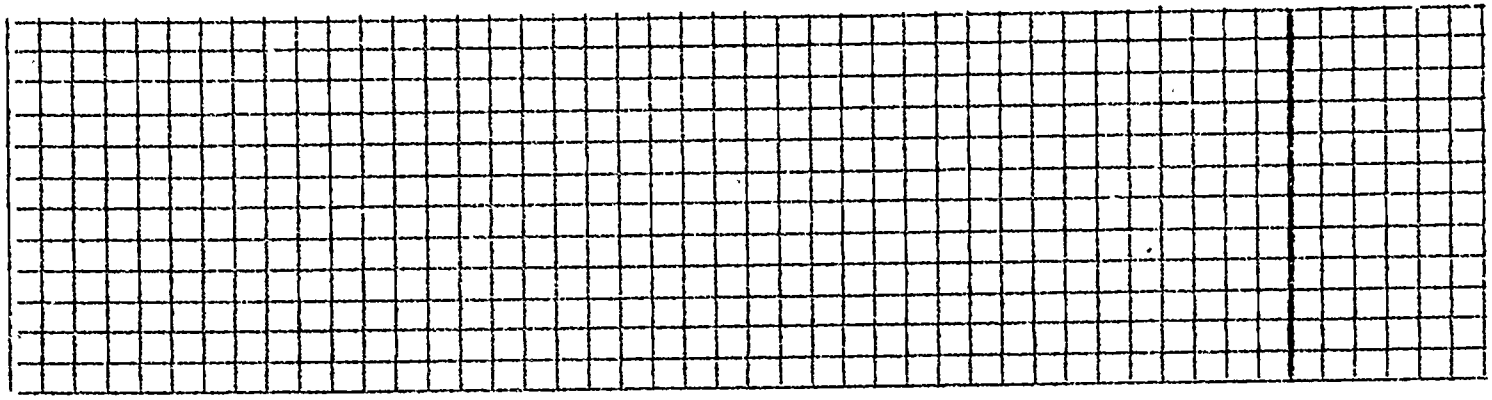
Pressure Group Number _____ Cycle Number _____

1. Initialize Pressure Groups (IP)

Playing (F-1)

Pressure Group Name (cols 1-40)

Initial Membership (I 6) (cols 41-46)

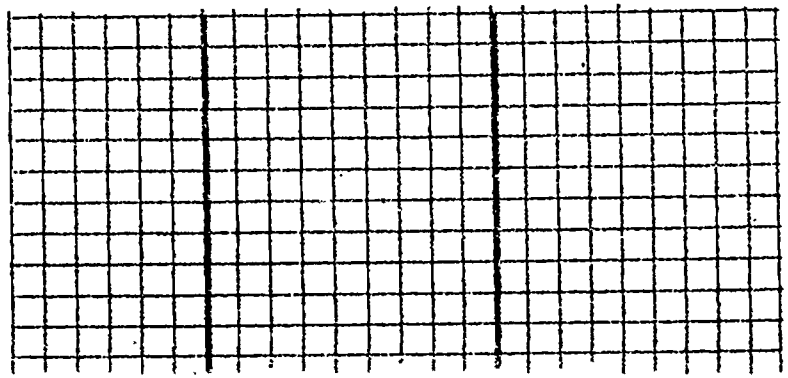


Card Continued Below

Old Membership (I 6) (cols 47-52)

Subsistence Level (F 9.0) (cols 53-61)

Cash Carryover (F 9.0) (cols 62-70)



2. Expenditures (IA)

PG-1 (F-1)	PG-2 (F-2)	PG-3 (F-3)	PG-4 (F-4)	PG-5 (F-5)	PG-6 (F-6)

PG-7 (F-1)	PG-8 (F-2)	PG-9 (F-3)	PG-10 (F-4)	PG-11 (F-5)	PG-12 (F-6)

If no additional Newsletter text (see 5) punch -1 and blank card.

3. Pressure Group Printing (PR)

Pressure Group # (I-1)	# Listed (I-2)	# Passed (I-3)	Cash Transfer (F-1)	Fudge Factor (F-2)	Index Override (F-3)

4. Newsletter from File (NW)

(I-1)	(I-2)	(I-3)	(I-4)	(I-5)

5. Added Newsletter Text (120 characters/line)

Instructions to Computer Operator 360/370

Cycle Number _____

Game Director _____ Date _____

Computer Operator _____

Add Capital Projects and/or Special Programs— (usually done prior to running the next cycle— see manual for format). Yes _____ No _____

Number of Project Lists Needed _____

Number of Copies of Total Printout Needed _____

(1) Is more than one team currently playing at this installation?
Yes _____ No _____

If yes, check JCL so it corresponds to proper data sets for present team.

(2) Main Header Card

A. TEAM = _____, CYCLE = _____, DATE = __/__/__,
mm dd yy

(card continued A + B).

B. '_____'

Team Identification up to 40 characters

C. For a new game replace CYCLE with NEWGAME or CYCLE = 1.

D. For a replaying of the last cycle played, replace CYCLE with REPEAT = _____ (last cycle played).

E. For skipping directly to the newspaper:
TEAM = _____, NEWSPAPER

F. Cycle 0 newspaper:
NEWSPAPER, CYCLE = 0

(3) Program Control Card Options

NOPLAY = ALLDEV _____, DEV(1) _____, DEV(2) _____, DEV(3) _____,
DEV(4) _____, DEV(5) _____, DEV(6) _____, DEV(7) _____
NOPLAY = ALLIND _____, IND(1) _____, IND(2) _____, IND(3) _____.
IND(4) _____, IND(5) _____, IND(6) _____, IND(7) _____

SUPPRESS = ALL _____, (To Suppress All Printing)
= EQA _____,
= APCO _____,
= WQM _____,
= SWM _____,

= DEV(1) _____, DEV(2) _____, DEV(3) _____, DEV(4) _____.
DEV(5) _____, DEV(6) _____, DEV(7) _____, ALLDEV _____

= IND(1) _____, IND(2) _____, IND(3) _____, IND(4) _____,
IND(5) _____, IND(6) _____, IND(7) _____, ALLIND _____

= POL(1) _____, POL(5) _____

= PL(1) _____, PL(2) _____ (Planners)

= DIST _____ (Special Percent Distribution of Land Tables)

= SUMMARY _____ (All Summary Tables)

= NEWS _____ (Suppress the newspaper section)

= DATA _____ (List of Data Input Cards-- Errors will still be printed)

PRINT = POL(2) _____ (Suburb)
= POL(3) _____ (Township 1)
= POL(4) _____ (Township 2)
= PL(2) _____ (Recommendations for Suburb)
= PL(3) _____ (Recommendations for Township 1)
= PL(4) _____ (Recommendations for Township 2)
= WQUAL _____ (Summary of all Reaches)
= TOMMSTART _____ (Diagnostics)
= TOMMSTART _____ (Diagnostics)

DIFFUS = ALL _____
= AUTUMN _____
= WINTER _____
= SPRING _____
= SUMMER _____

(None of the above will be printed unless checked.)

The following options apply to newspaper and issue processing but must be included with main program control cards.

ELECTION _____ (Diagnostic Results; does not effect printing in newspaper)

CEM = RESULTS _____
= DIAGNOSTICS _____

BYPASS = CYCLEONE _____
= LINKS _____
= NATIONAL _____
= LOCAL _____

(4) RUN or DATA

Must always be punched.

(5) Player Decision Cards:

Game Director Operator additions to Main Player Decision Cards

Optional Data Cards:

Change U.S. Employment Growth Rate Percentage:

Code Columns 1-2	Percent (F-1)
EG	

Force Exofirms:

Code Columns 1-2	Exofirm Number I-1	Force into AA Number* I-2
XF		
XF		
XF		
XF		

*If I-2 field blank, will force into exofirm's first choice of Analysis Areas.

Additional Exogenous Employment:

Code Columns 1-2	AA I-1	Type 1=Exog. 2=Office I-2	Number of Employees F-1	No. of Acres F-2	Added Tax Base in $ F-3
EE					
EE					

Enter Background Pollution Levels: micrograms/cm^3 except CO = mg/cm^3

Code Columns 1-2	Season I-1	Particulates F-1	SO_2 F-2	CO F-3	NOX F-4	HC F-5
BP	1=Winter					
BP	2=Spring					
BP	3=Summer					
BP	4=Fall					

Add Pollution Control Equipment:

Code Columns 1-2	Ind. # I-1	Type 1=Air 2=Water I-2	Process # (air only) I-3	Pollution Control # I-4
AP				
AP				

Public Reaction to Smoke & Odor (Increase or decrease APCO complaint table Note-- 10% = 10)

Code Columns 1-2	Putrid Odor F-1	Acrid Odor F-2	Sulfurous Odor F-3	Pungent Odor F-4	Smoke F-5
PR					

Headwater Conditions:

Code Cols. 1-2	River 1=Great 2=Red Oak I-1	Season 1=Win 2=Spr 3=Sum 4=Fall I-2	Flow (CFS) I-3	Temp °F F-1	DO mg/1 F-2	BOD mg/1 F-3	Nut mg/1 F-4	TDS mg/1 F-5	Coliform mpn/100ml F-6
HW									
HW									

Runoff Conditions:

Code Cols. 1-2	Reach # I-1	Season 1=Win 2=Spr 3=Sum 4=Fall I-2	Flow (CFS) I-3	Temp °F F-1	DO mg/1 F-2	BOD mg/1 F-3	Nut mg/1 F-4	TDS mg/1 F-5	Coliform mpn/100ml F-6
RO									
RC									

Solid Waste Generation Factors:.

Code Columns 1-2	Ward I-1	Type - 1 lbs/HH F-1	Type - 2 lbs/HH F-2	Type - 3 lbs/HH F-3
BG				
BG				
BG				

Note: If there is a change in one of the types, a value must be entered in the other 2 types-- otherwise assumes 0.

Fee Charge for Private Collection of Industrial Solid Wastes:

Code Columns 1-2	Ind # I-1	Type of Service I-2	Fee Charge $/Ton F-1
FC		1	
FC		1	
FC		1	

Operate or Turnoff Simulated Industry:

Code Columns 1-2	Ind # I-1	Status 1=Operate 0=Turnoff I-2	Simulated Indus. Change in AA I-3*
OI			
OI			
OI			

*Note: Will not work with the gamed industries (i.e., Ind. # 1-7). If the dumps are closed be sure and make appropriate changes in the collection and disposal systems (CD cards).

Change State Equalization Factor (for assessment):

Code Columns 1-2	Juris. Number I-1	Assessment Proportion F-1
AC		
AC		

(6) Options for XX Card Following Main Player Decision Cards

Code Columns 1-2	Option I-1
XX	

One of the following must be punched:

Normal stop if errors in data cards; go on if no errors
(I-1 = blank)

Stop unconditionally after reading data cards
(I-1 = -1 negative)

Go on even if there are errors in data cards
(I-1 = 1 positive)

(7) Newspaper Header Card: Must Be Punched

COPIES = _____, IGNORE _____, NOHEADS _____, REREAD_____,
CEMI _____, NEWI _____

IGNORE to skip missing issue decisions.

NOHEADS for no special headline cards in input deck.

REREAD is used to read a new list of issue decisions for an election or new headlines.

CEMI is used if you want a specific issue to appear in this cycle's newspaper.

NEWI is used for adding new issues into the newspaper (see manual for specific formats).

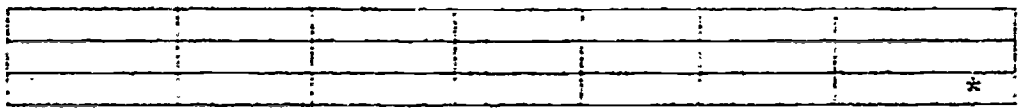
(8) Issue Decision Card

(Required except for Cycle one-- unless BYPASS = CYCLEONE was used.)

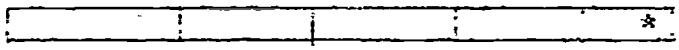
General format: iiia(bbb),iiia,... iiia*

where iii = 1 to 3 digit issue number
a = an alternative to that issue
(bbb) = optional 3 digit bond number

(a)



(b)



used for CEMI or REREAD options

(9) Candidate Election Cards

Optional-- See Manual for Format.

(10) Special Headlines (Optional)

1 = Editorial	4.= Metropolitan & County	7 = Township 1
2 = National News	5.= Central City	8 = Township 2
3 = State News	6 = Suburb	9 = Business Pg.

(11) /* (Must Be Punched)

Additional Options: Usually run after the cycle has been completed.

	Yes	No
MAPEX		
TRANSPORTATION		
PRESSURE GROUP		
OTHER		

Map #'s _____

KEYPUNCH FOR CANDIDATE ELECTION MODEL

Cycle #_____

	Cand Number Col 1-2	Oppon. Type Col 3	Party Support Col 4-6	Candidate Name Col 9-28	Elite Opinion Poll Voting Record Col 29 - ? format: iiia(ss), iiia,...iiia* (Maximun of 40 issues)
C.C. Ward 1					
C.C. Ward 2					
C.C. Ward 3					
Co. Suburb					
Co. Twn 1					
Co. Twn 2					
Co. CC at Large					
Co. Co. at Large					

Candidate No.:

1-8 = Incumbents
9-16 = Challengers

Opponent Type/Incumbent:

1 = Gamed
2 = Simulated

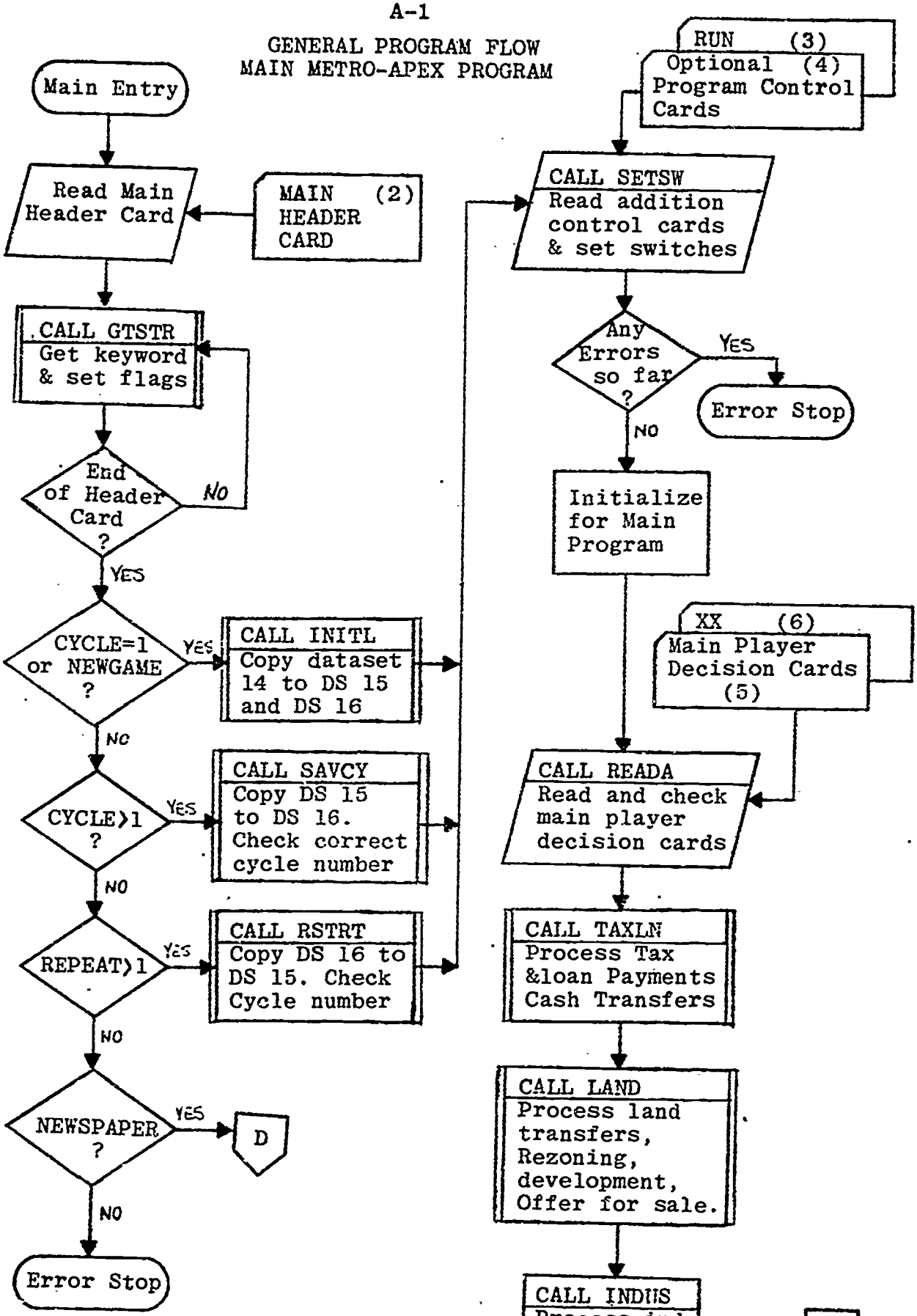
Opponent Type/Challenger:

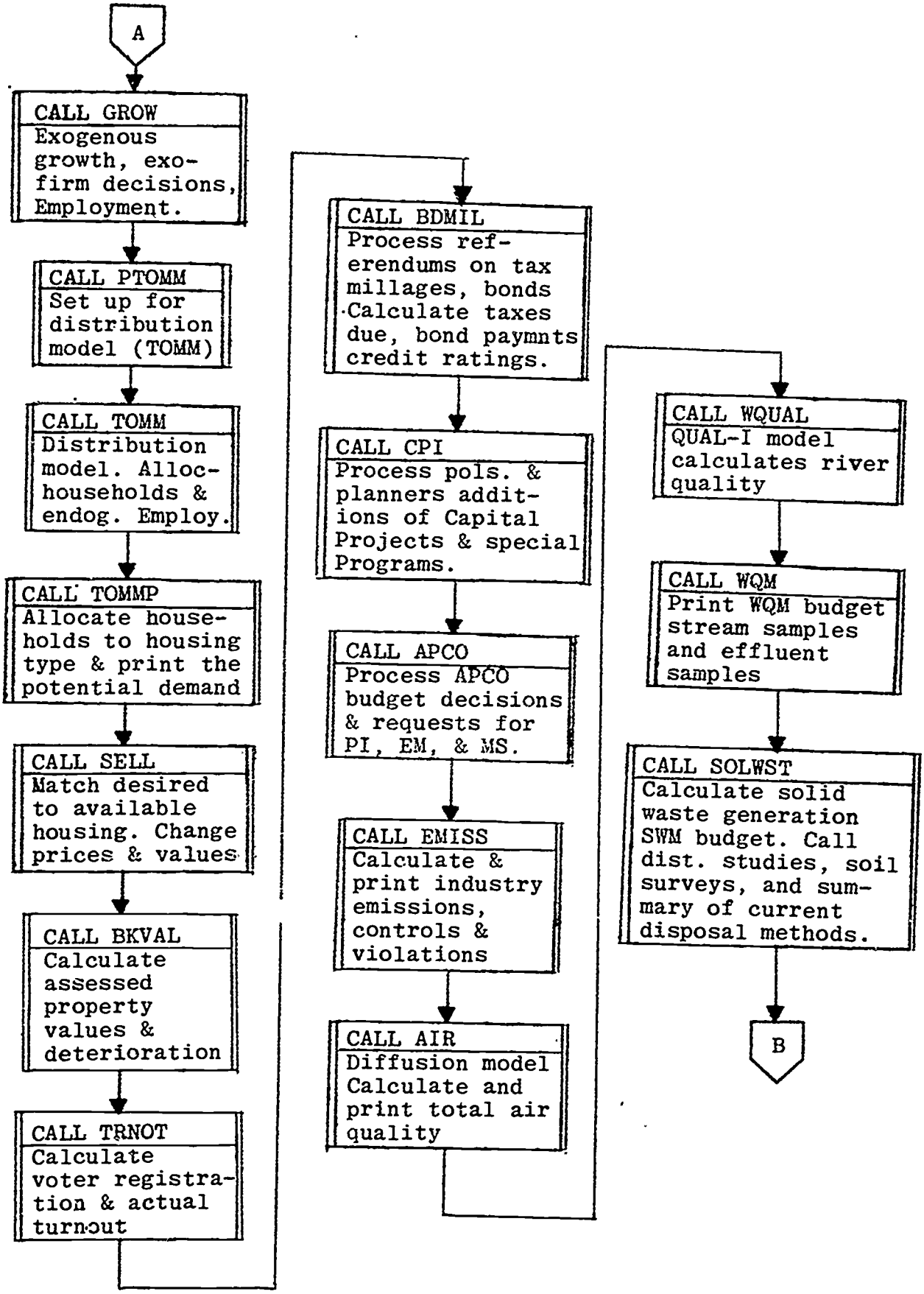
1 = Conservative
2 = Mod. Repub.
3 = Labor Liberal
4 = New Left Liberal
5 = Working Class Conserv.
6 = Ultra Conservative
7 = Business
8 = Black
9 = Reform

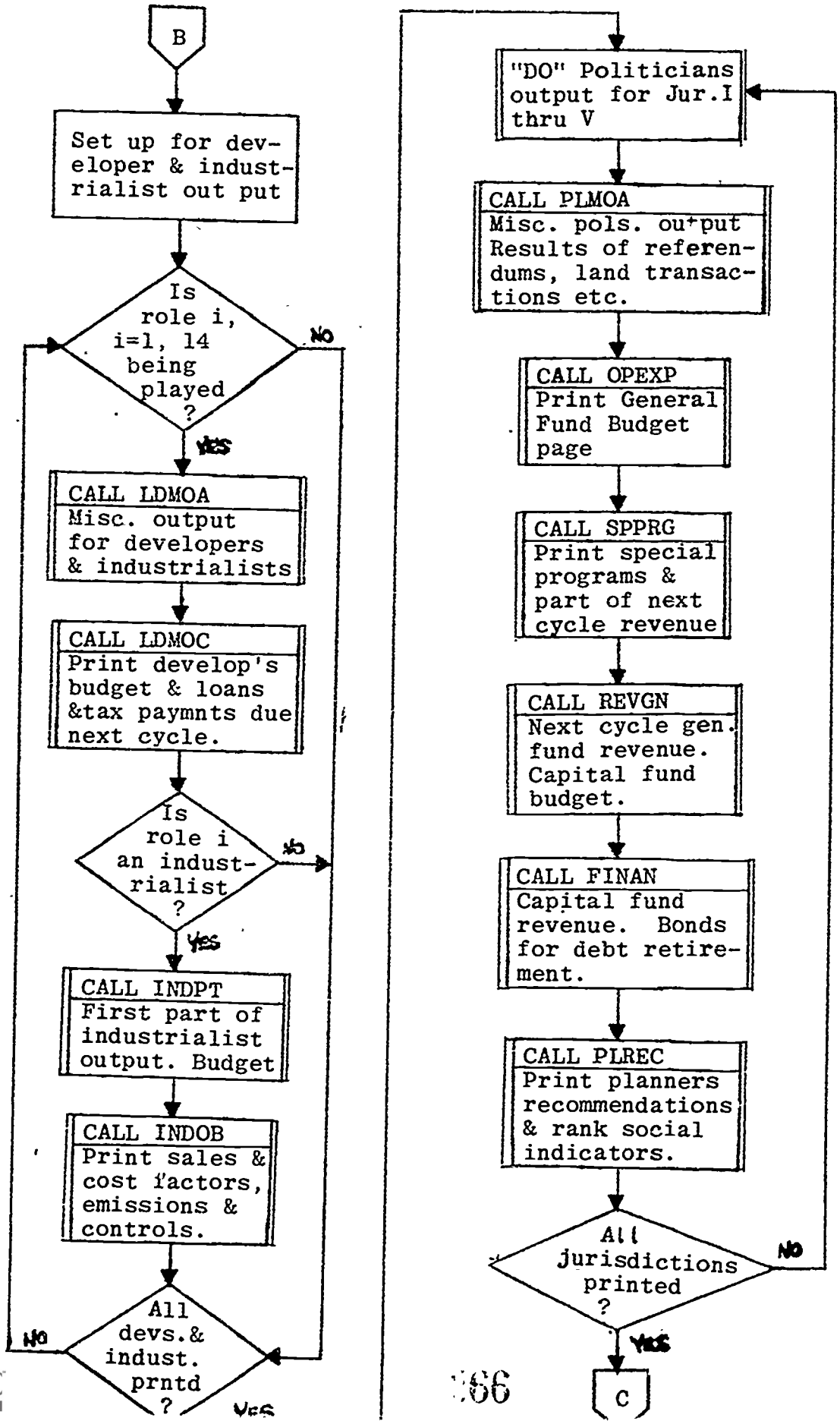
Party Support:

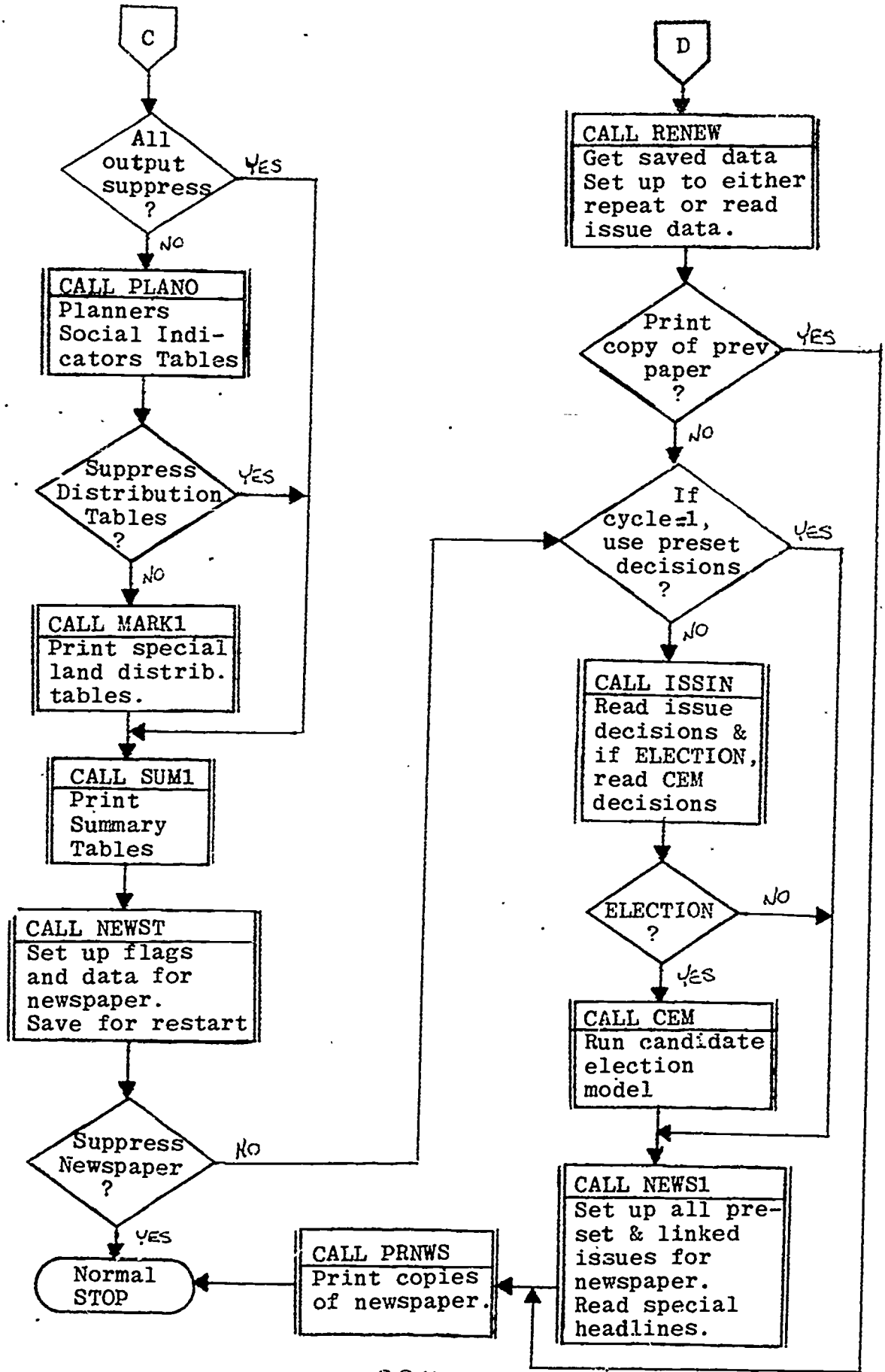
1. - 60.
none for challenger

GENERAL PROGRAM FLOW
MAIN METRO-APEX PROGRAM




A
CALL GROW
Exogenous growth, exo-firm decisions, Employment.
CALL PTOMM
Set up for distribution model (TOMM)
CALL TOMM
Distribution model. Alloc-households & endog. Employ.
CALL TOMMP
Allocate households to housing type & print the potential demand
CALL SELL
Match desired to available housing. Change prices & values
CALL BKVAL
Calculate assessed property values & deterioration
CALL TRNOT
Calculate voter registration & actual turnout
CALL BDMIL
Process referendums on tax millages, bonds Calculate taxes due, bond paymnts credit ratings.
CALL CPI
Process pols. & planners additions of Capital Projects & special Programs.
CALL APCO
Process APCO budget decisions & requests for PI, EM, & MS.
CALL EMISS
Calculate & print industry emissions, controls & violations
CALL AIR
Diffusion model Calculate and print total air quality
CALL WQUAL
QUAL-I model calculates river quality
CALL WQM
Print WQM budget stream samples and effluent samples
CALL SOLWST
Calculate solid waste generation SWM budget. Call dist. studies, soil surveys, and summary of current disposal methods.
B


B
Set up for developer & industrialist out put
Is role i, i=1, 14 being played ?
NO
YES
CALL LDMOA
Misc. output for developers & industrialists
CALL LDMOC
Print develop's budget & loans &tax paymnts due next cycle.
Is role i an industrialist ?
NO
YES
CALL INDPT
First part of industrialist output. Budget
CALL INDOB
Print sales & cost factors, emissions & controls.
All devs.& indust. prntd ?
NO
YES
"DO" Politicians output for Jur.I thru V
CALL PLMOA
Misc. pols. output Results of referendums, land transactions etc.
CALL OPEXP
Print General Fund Budget page
CALL SPPRG
Print special programs & part of next cycle revenue
CALL REVGN
Next cycle gen. fund revenue. Capital fund budget.
CALL FINAN
Capital fund revenue. Bonds for debt retirement.
CALL PLREC
Print planners recommendations & rank social indicators.
All Jurisdictions printed ?
NO
YES
C


C
All output suppress ?
YES
NO
CALL PLANO
Planners Social Indicators Tables
Suppress Distribution Tables ?
YES
NO
CALL MARK1
Print special land distrib. tables.
CALL SUM1
Print Summary Tables
CALL NEWST
Set up flags and data for newspaper. Save for restart
Suppress Newspaper ?
NO
YES
Normal STOP
CALL PRNWS
Print copies of newspaper.
D
CALL RENEW
Get saved data Set up to either repeat or read issue data.
Print copy of prev. paper ?
YES
NO
If cycle=1, use preset decisions ?
YES
NO
CALL ISSIN
Read issue decisions & if ELECTION, read CEM decisions
ELECTION ?
NO
YES
CALL CEM
Run candidate election model
CALL NEWS1
Set up all preset & linked issues for newspaper. Read special headlines.