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ABSTRACT

A study was made to explore how a time sharing computer system can help the coach of high school sports. A structural analysis determined that the computer's capability to process information helps the coach: (1) store large quantities of information; (2) perform numerous operations in a very short amount of time; (3) provides consistent accuracy while also providing versatility. Next, a computer model encompassing thirteen sports was grouped according to each sport's individual needs. This grouping enabled a coach to develop general types of computer programs for "common" activities. Here, the computer was used as a problem solving tool to assist the coach in the analysis of activities and the data which they generate. The programs need to be sufficiently general to suit a variety of coaches and activities, but have built in definable parameters to meet specific needs. Five areas of secondary athletic computer application areas have been: simulations, scheduling, scoring, statistics, and scouting. As a result, a great deal of a coach's time has been saved and a more meaningful type of information has been obtained from computer usage. (WCM)

SECONDARY ATHLETICS

AND THE COMPUTER

January 1974

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SECONDARY ATHLETICS AND THE COMPUTER

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SECONDARY ATHLETICS AND THE COMPUTER

I. Introduction

Athletics and computers - an unlikely and odd couple?! Not really, although existing literature is almost mute on the relationship. Professional sports of today depend for their very existence on computers. Scouting data is processed by computers before being analyzed by coaches; scheduling of games and travel avoiding the many possible conflicts requires a computer; and storing and calculating various statistics, the backbone of generating fan interest and of coaching decisions is comfortably handled by computers.

Athletic departments of most colleges have also discovered that there has been a very willing participant in a their program, resident on campus for a decade at the data processing center. Yes, the computer, an integral part of our daily life, has been found to be an extremely powerful coaching tool. By using the computer, you have recruited the only player you will ever coach who will do exactly what you tell him to do, and do it that way everytime.

Because of the advent of timesharing computer systems, it is safe to project that all school districts will have in the near future computer power available to them. Indeed, many already have terminals connected to computers in their schools. Thus, this powerful aide to coaching does not have to remain with the exclusive club of college and professional coaches, but its usage is available to all secondary coaches.

The purpose of this presentation is to explore how the computer can help the coach of high school sports using a timesharing computer system.

II. Computers

A. Description

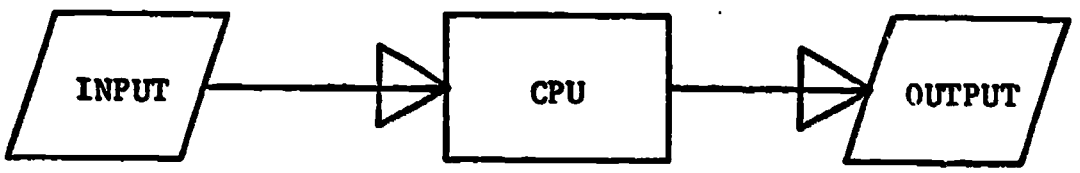
Although only a quarter century old, the computer has already had a profound impact on our world. Their incorporation into our technologically oriented lives has been extremely rapid. In fact, our roles in society are greatly influenced and somewhat dependent upon these electrical machines. Yes, the computer is a machine, a device for doing work. As in the past, many manual tasks were relieved by the aid of labor-saving machinery, so too the computer is rapidly relieving many of the menial repetitive mental tasks in a similar manner.

The type of work computers do is process information or data. Thus with the use of a computer at our disposal, is the ability to access a great deal more information than we did in the past. This information explosion of today is similar to the impact Guttenburg's movable printing press had upon the Western World of the 16th Century. Computers afford us an opportunity to greatly enhance our knowledge in any subject matter area by the rapid organization of information to be used at our discretion.

Therefore, a computer may be defined as a machine which accepts information, performs mathematical or logical operations with the information and then supplies the results of the operation as new information. An underlying premise to this whole field of technology is that information may be prepared in some manner for processing by an electrical machine. The action of preparing and entering data into a machine is called input. Where the data is massaged, compared, is termed the central processing unit (CPU), "where the action is." It is assumed that the rules for processing problems of an algorithmic nature may be specified in a logical manner so that the machine may operate on the data on the basis of these

rules. Operations include such things as calculations, comparisons, and logical connectives. Finally the results of these actions on the data are returned to the user in some meaningful form which is output. Computers do not make judgments on their results; humans do!

Thus the basic components of a computer may be diagrammed as follows:



It becomes readily apparent that the computer as any other machine is in the control of the user. Its ability to store not only data but programs and execute a set of rules for solving a problem makes it appear to be other than human-operated. Nevertheless, the program, or set of instructions, must be prepared by somebody; the net result as to a computer's effectiveness (quality of usage) as a data processor is in the hands of the person who writes the programs. Poor programs yield poor usage and conversely good program yield good usage. An acronym has been coined by the computer world to amplify this concept: GIGO - Gargabe in, garbage out. Therefore, the computer must be instructed exactly what to do; how effectively the computer performs these tasks depends directly on how well it has been taught or programmed.

B. Capabilities

From this brief structural analysis of a computer we may now examine what advantages or capabilities does a computer have in assisting us with the processing information.

1. The computer has the ability to store large quantities of information which are quickly accessable to the user. This information may be in the form of programs or data files thus storing either instructions

for the computer or the data on which the computer is to operate.

2. Because the computer is an electrical device, it may perform numerous operations in a very short amount of time. One-half million additions per second is possible by most present day computers. Thus, speed is an advantage of great importance by affording the user an opportunity to have almost "immediate" results to complex calculation tasks or jobs involving large amounts of data.
3. Although computers may be instructed to perform a particular informational process they are basically quite stupid. But this becomes a distinct advantage because computers do not get bored, thus allowing errors to appear. They may be asked to repeat the same task millions of times and they will do it in the same manner each time. Their results because it is an electrical process, will be consistent and precise. Thus, the asset of consistent accuracy gives us another advantage of computer usage.
4. The computer is extremely versitile. This will be illustrated by the varying types of usages cited in discussing athletic applications.

For effective computer usage the user extends his abilities and experiences by taking advantage of the computer's capabilities. A word of caution must be made that inspite of the numerous capabilities of this powerful tool when better methods exist for obtaining the information do not force the usage of the computer. A philosophy of "Computer can, computer do" should never govern our thinking.

C. Timesharing

The advent of timesharing made computer services available and economically feasible for secondary schools. Timesharing allows several

users to simultaneously access the computer, with the computer's time being shared among the users. To each user it appears that the computer is solely devoted to their activities, because no one user, normally, requires all of the processing powers of the computer. Thus, assuming that the computer is in general available to the secondary school coach, the remainder of our attention will be focused on a matching of the needs of athletics with the computer's capabilities.

III. Athletics

A. Activities

For the purpose of examining various athletic activities, the following list was obtained from the Minnesota State High School League.

1973-74 Minnesota Interscholastic Athletic Activities

1. Baseball
2. Basketball
3. Cross Country
4. Football
5. Golf
6. Gymnastics
7. Hockey
8. Skiing
9. Soccer
10. Swimming
11. Tennis
12. Track
13. Volleyball

B. Model

From the standpoint of the developer of computer applications it is advantageous to group these activities according to their specific needs. By examining the nature of these activities several natural groupings occur. Some factors considered include the following:

1. Is it a team activity or essentially individual with team scores based on the placing, judging, times, and/or scores of the member participants? Normally the word game is used to describe "team" activities whereas match or meet is used to describe "individual" activities.
2. Is the type of play a continuous flow of action or stop-action (episodic)?
3. Is the length of the activity determined by a time measure or not?
4. Is the scoring based on tallying by goals (points) or placement by judging or time measures?

It was found by using the first two categories, a grouping model of "like" type activities with common needs can be constructed, as seen on the following page.

	CONTINUOUS	STOP-ACTION
TEAM (GAME)	BASKETBALL HOCKEY SOCCER	BASEBALL FOOTBALL VOLLEYBALL
INDIVIDUAL (MATCH/MEET)	CROSS COUNTRY	GOLF GYMNASTICS SKIING SWIMMING TENNIS TRACK WRESTLING

Utilizing these groupings enables a person to develop general types of programs which apply and may be readily used by a whole set of "common" activities, thus eliminating the necessity of writing numerous programs limited to a unique activity. These groups with differing needs will be referred to when discussing actual types of athletic computer applications.

IV. Applications

The computer is used as a problem solving tool to assist the coach in the analysis of activities and the data which they generate. Although actual programs to be used may be written by the coach, in general, it is assumed that a coach has no programming experience and therefore wants to use existing programs in a system library. This points out the need for programs to be sufficiently general to suit a variety of coaches and activities, but have built-in definable parameters to meet specific needs.

The following secondary athletic computer application areas have been identified: simulations, scheduling, scoring, statistics, and scouting.

Drill and practice has not been included in this listing because it is felt that this is too limited a usage in this area. Nevertheless, football players could use this tutorial mode for the learning of plays. Also, it is not being assumed that programs may be developed which do not fit into any of the above areas.

A. Simulations

Simulations are a means of having the computer approximate the actual athletic activity. A program must be developed which incorporates an accurate model of this activity. A great deal of value can be derived from the actual writing of such a program, because it is necessary to thoroughly analyze the activity in such a way that the instructions given to the computer clearly model what happens in reality. Most athletic simulations have been developed for stop-action type of activities such as football, baseball, and golf. These types are especially suited to an interactive mode, where each normal pause in the action affords an opportunity to input new decisions. More benefits can be derived from simulations than just game playing. A thorough examination of an

accurate model will reflect which factors are most important and their effect on the play of the activity.

Thus, strategies may be tested as to their net effect on the outcome of a game. Earnshaw Cook in his book, Percentage Baseball, with the assistance of a computer has examined several commonly accepted practices such as the sacrifice bunt and intentional walks and illustrates statistically that in many cases their usage may actually hinder total team run production. Gross and Brainard in Fundamental Programming Concepts use a simplified baseball model for finding the optimal run producing batting order. The selection of football plays and golf clubs may be studied with a simulation.

Although a randomness is incorporated with branching on the basis of probabilities for many simulations, models may also be developed using actual data. These types of usage are usually found in individual stop-action sports such as track and swimming. The actual times, distances, and/or points for an opponent are entered in the meet simulation, then the coach using his team's data places his participants into the various events of the meet model attempting to maximize the team's points by finding the best arrangement of his team members in the events of the meet.

B. Scheduling:

Many man-hours are spent scheduling both teams and individuals in various activities. Teams in most secondary conferences play some sort of round robin schedule each season. This type of conflict free schedule can be easily generated, balancing home-away games, for any number of teams. (See the program SCHDL1). However, more difficult problems arise when modifications must be made to the basic round robin scheme. This is especially true in individual activities where more than two teams may

compete at one time. Several reasons may be cited: non-school facilities usage necessary, restrictions on the maximum number of meets or matches, and travel limitations. For example, a nine team conference was limited to a maximum of fourteen golf matches per season but still wanted every team to play every other team twice. Although some scheduling idosyncracies may be rectified by using a general round robin schedule as the basis, many cases necessitate the creation of a program which is specific to the situation. The computer is used to great advantage here by examining all possibilities, checking to see if it meets all the necessary requirements, and then generating a schedule.

Probabilities of outcomes and length of various series of games may be examined using the computer. A Mathematics Teacher article "Predicting the Outcome of the World Series" by Richard Brown investigated using the computer outcomes, lengths, home/away advantages of this seven game series.

For large meets or matches involving numerous teams the problem of individual event assignments is often foreboding. Participants are commonly seeded in heats or flights on the basis of past performance. This is a task which the computer can effectively perform. For example, in a track meet, once all the entrants and corresponding data have been entered, the numeric data for a particular event needs to be sorted in either ascending (time) or descending (distance) order and the heat/lane or flight assignments made (See the program SCHDL2).

C. Scoring

The scoring at the match or meet of individual stop-action activities often becomes a difficult task. Not only are the people working at the scoring table required to figure the final team outcome of the match or meet, but individual and event totals must be computed, maintained, sorted,

and points allocated to the appropriate team totals which also must be computed and maintained. Usually the more teams involved, the more difficult this scoring task. A gymnastics scoring program was developed by LACE for usage at the 1973 NAIA National Championships held in La Crosse, Wisconsin. Because gymnastics meets are similar in format to other individual stop-action type activities such as swimming, wrestling, track, and skiing, one general program can be developed to handle their scoring needs.

D. Scouting

Many secondary athletic team type activities do scouting. The opponent is examined in an attempt to find predictable patterns of play which may assist the coach in preparing his team. It is ironic that a great deal of effort is spent in scouting opponents, and very little scouting is done of a coach's own team. If this were done the coach would not only know what the future opponents discern, but he is able to use his team's scouting report by directly affecting patterns over which he has some control.

In most cases other than football there is not a sufficient amount of quantitative data generated from a scouting report to necessitate the usage of the computer. One of the primary concerns of any team stop-action activities, is the tendencies of the initiator of the action. In football it is the offensive play; in baseball it is the pitch; and in volleyball it is the serve. The more predictable the initiator, the better a coach can prepare his team. (Initiatees).

Thus extracting meaningful information from a large amount of football scouting data is an application especially suited to computer usage. By using an information retrieval program a scouting data file may be

created and examined. (See the program INFRET). From this data base information on common play tendencies may be extracted such as:

1. Position (Horizontal & Vertical)
2. Down & Distance
3. Formation

The key to usage of any information retrieval system is the identification of categories and characteristics within the categories which are "scoutable" and may be used to satisfy overall objectives of a scouting report. A great deal of time must be spent in determining whether the specific piece of data is essential or not. The development of codes which includes a set of similar actions can simplify the process of classifying, entering, and extracting meaningful information from the data base. A sample category and coding schemes is included in the INFRET documentation.

Data Base usage is not limited to football scouting but may be used in other situations such as inventory where a data file is created and interogated. The Minnesota State High School League Football Ratings utilizes a computer data bank of schedules and game results for determining playoff participants at the end of a regular season.

E. Statistics

The final area of consideration encompasses all athletics, namely statistics. Numerical data from the activities is used for evaluation, publicity, and records (quantitative goals) on both teams and individual participants. Assuming an objective tallying of statistics, if common definable criterion are used, individuals and teams may be compared. In some cases for the evaluation of players on a team, programs which are designed primarily for classroom grading purposes may be used.

Since it is desirable that all coaches maintain some statistics the question of which obtainable ones to use may be raised. Extreme care should be exercised in the usage of numeric data to evaluate an individual's performance. The individual and team data which are maintained should attempt to reflect in their computation and usage the philosophy of the coach. In timed team sports it is necessary to calculate on the basis of some common time measure (periods) to more equitably compare players with varying amounts of playing time.

Commonly used sports statistics by the various publicity mediums may not best represent the player's value to the team. Often times they more or less measure a player's value, more less than more. Thus, if a hockey player is being evaluated on the difference in the number of goals for and the number of goals against while he is on the ice, these should be the statistics publicly announced, rather than the points (the sum of goals and assists). Many other calculatable statistics have been derived in other activities which more fairly reflect the player's contribution to the team. With the assistance of the computer, the coach need no longer shy away from the computation of these valuable measures. Hence, from the specific categories of data to be tallied, a coach may derive more meaningful information to his situation possible.

The following factors should be taken into consideration when determining the statistics to be tallied.

1. Quality of data categories and not quantity is important.
2. Minimize the number of data categories and maximize the computations using the data, thereby extracting as much meaningful information as possible.
3. Measure and calculate only statistics which are going to be used.

4. Avoid discreationary tallying by measuring only overt happenings.

The objective should be the statistically reward the player in proportion to his activity and contribution with respect the the overall team objective.

By the very nature of all athletic activities two types of statistics are necessary; the most recent or latest and cumulative. Thus a generalized flow pattern computer program can be developed for the storing, calculating and updating of data. The rapid and accurate calculating and storing powers of the computer are used to great advantage with this type of application. (See the program package STIX).

In determining whether a particular set of statistics should be maintained via the computer the following points should be considered:

1. Are the data and corresponding computations easier and quicker to maintain by hand? Usually this is more dependent upon the number of players than the number of data categories.
2. Is it easy to use both the statistical program and the terminal?
3. How much time is required for the entering data and printing out the results? Charts should be prepared which arrange the data to be entered for rapid input.
4. Are the reports generated by the computer in a usable and easy to read format?

F. Summary

This summary of athletic applications represents a sampling of the types of things which may be and have been done using the computer as a valuable and viable assistant to the coach. It is felt a great deal of coach's time may be saved and more meaningful type of information may be obtained from computer usage. Also it has been noted that coaches using

the computer in athletics discover many of these capabilities may be put to good advantage in their classroom activities.

V. Documentation

This section is used to describe the programs mentioned in the text. Included in the documentation for each program is the following information:

1. Name
2. Description
3. Comments
4. Instructions
5. Acknowledgements
6. Length
7. Sample Run
8. Listing

The materials are arranged in outlined order as follows:

A. Scheduling
   1. SCHDL1
   2. SCHDL2

B. Scouting
   1. INFRET

C. Statistics
   1. STIX
   2. STIX10
   3. STIX11
   4. STIX12
   5. STIX17
   6. STIX20
   7. STIX21
   8. STIX30
   9. STIX31

A. SCHEDULING

SCHDL1
July, 1973

NAME: SCHDL1

DESCRIPTION: This program constructs a round robin schedule for up to fifty teams. The output includes a game schedule matrix and the numbered games for each playing period with home/away teams indicated.

COMMENTS: The only input data necessary is the number of teams.

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 493 words

```
GET-SCHDL1
RUN
SCHDL1

ROUND ROBIN SCHEDULE
INPUT # TEAMS?6
 0      1      2      3      4      5

 1      0      3      4      5      2

 2      3      0      5      1      4

 3      4      5      0      2      1

 4      5      1      2      0      3

 5      2      4      1      3      0

PERIOD 1
GAME          HOME  AWAY
   1             1     2
   2             5     3
   3             6     4

PERIOD 2
GAME          HOME  AWAY
   4             3     1
   5             6     2
   6             4     5

PERIOD 3
GAME          HOME  AWAY
   7             1     4
   8             2     3
   9             5     6

PERIOD 4
GAME          HOME  AWAY
  10             5     1
  11             4     2
  12             3     6

PERIOD 5
GAME          HOME  AWAY
  13             1     6
  14             2     5
  15             3     4


DONE
```

NAME: SCHDL2

DESCRIPTION: This program constructs a file of names, schools, and numeric data for participants in an athletic event (ie., track and swim meets, golf matches, etc.). When all the participants and corresponding data have been input, the program then sorts the data in either ascending or descending order and may be output as a schedule of heat/lane or flight assignments.

COMMENTS: The following options are used in the program:

1 = ADD	Adds input information into the file. This may be done in several different teletype sessions. To terminate entering names, type an X for the name.
2 = SORT	Sorts on the numeric data in either ascending (smallest to largest) or descending (largest to smallest) order. This option should be run before using the output options (3 & 4).
3 = HEAT/LANE	Outputs the sorted inforamtion file data, making heat and lane assignments.
4 = FLIGHT	Groups the sorted information file data into flights.
5 = STOP	Terminates program execution.

Prior to usage, a separate data file must be opened for each event used. Type the following:

OPEN - file name, number of records.

The file name can be any alphanumeric combination with a minimum of one and maximum of six characters. In general, the number of records can be determined by figuring that 16 participants will fit in one record.

For example: If your file name is TEAM and there are 30 participants, you should type:
OPEN-TEAM,2

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 1157 words

```
OPEN-EVENT,2
GET-SCHEDL2
RUN
SCHDL2

OPTIONS:  1=ADD, 2=SORT, 3=HEAT-LANE, 4=FLIGHT, 5=STOP.
FILE?EVENT


OPTION?1
NAME?PARTICIPANT
SCHOOL?ABC
DATA?12
NAME?OPPONENT
SCHOOL?XYZ
DATA?27
NAME?PLAYER WON
SCHOOL?123
DATA?2.3
NAME?PLAYER TOO
SCHOOL?XYZ
DATA?9.9
NAME?SAMPLE NAME
SCHOOL?ABC
DATA?22.2
NAME?TEST NAME
SCHOOL?ABC
DATA?20
NAME?X
```

```
OPTION?2
SORT (ASCENDING=1, DECENDING=0)?1

OPTION?3
TOTAL NUMBER ENTRANTS =  6
HEATS?2
LANES?8

HEAT            1
LANE
 3              SAMPLE NAME     ABC             22.2
 4              PLAYER TOO      XXX             9.9
 5              TEST NAME       ABC             20

HEAT            2
LANE
 3              OCCUPANT        XXX             27
 4              PARTICIPANT     ABC             12
 5              PLAYER WON      123             12.3

OPTION?2
SORT (ASCENDING=1, DECENDING=0)?0

OPTION?4
TOTAL NUMBER ENTRANTS =  6
FLIGHTS?3

FLIGHT          1
 1              OCCUPANT        XXX             27
 2              SAMPLE NAME     ABC             22.2

FLIGHT          2
 1              TEST NAME       ABC             20
 2              PLAYER WON      123             12.3

FLIGHT          3
 1              PARTICIPANT     ABC             12
 2              PLAYER TOO      XXX             9.9

OPTION?5

DONE
```

B. SCOUTING

INFRET
July, 1973

NAME: INFRET

DESCRIPTION: This program allows the user to build a data base file of information and then to retrieve selected portions of the information on the basis of various data categories.

COMMENTS: To use this program, a file must be opened with the number of records depending upon the amount of data to be stored. The following list of options are used in accessing the information in your file:

ADD = Enter data into the file
CHANGE = Modify the name or data for a specific item.
DELETE = Omit a data item and its corresponding data.
LIST = Output entire file.
PERCENT = Calculate percentage of occurance of ratings within a data category with respect to a specified situation.
RETRIEVE = Obtain information on specified data categories.
STOP = Terminate program.
HELP = Give hints on input items in the program.

Other information which must be input by the user are listed below. The four questions listed are answered the first time you use your file; any subsequent runs will just ask for your file name.

What is the name of your information file? File name

What is the maximum number of letters in a name? number of characters in longest name

Number of items per entry? Number of data categories

Alphabetized? Yes or No? If the response is yes, the names and corresponding data will be alphabetized when they are entered.

Data No = Data category number
Ratings = Specific values within a data category
Stop = Terminates type of input being asked
Separate listings or composite? (Retrieval option)
  Separate = Any item which satisfies at least one of the conditions
  Composite = Any item which satisfies all of the conditions
List or Count? (Retrieval Option)
  List = Outputs items which satisfy specified conditions
  Count = Tally items which satisfy specified conditions

Each item placed in the file must have a name and corresponding ratings for each data category.

The maximum number of characters in a name is 72, and the maximum number of data categories is 50.

Before entering information into the file:

1. Determine the data categories and assign each a number.
2. Specify divisions under each category and assign a rating scale, values from 0 - 98.
3. List the names of the things being ranked and assign a rating to each data category.

ACKNOWLEDGEMENTS: TIES

LENGTH: 3930 words

OPEN-SAMPLE,3
GET-SAMPLE
RUN
INPUT

WHAT IS THE NAME OF YOUR INFORMATION FILE?SAMPLE
WHAT IS THE MAXIMUM NUMBER OF LETTERS IN A NAME?5
NUMBER OF ITEMS PER ENTRY?4
ALPHABETIZED? YES OR NO?YES

OPTION?ADD
NAME?STD1
DATA ITEMS
?1,3,5,6
NAME?STD2
DATA ITEMS
?2,3,4,1
NAME?STD3
DATA ITEMS
?6,5,3,9
NAME?STD4
DATA ITEMS
?2,4,7,1
NAME?STOP

OPTION?HELP
WHAT DO YOU WANT TO DO - ADD, CHANGE, DELETE, LIST, RETRIEVE, SORT, PERCENT, OR STOP? TYPE ONE OF THE PRECEDING WORDS?CHANGE
NAME OF ITEM TO BE CHANGED?STD2
CORRECTED NAME?STD2
CORRECTED DATA
?2,3,5,1
CHANGE COMPLETED
NAME OF ITEM TO BE CHANGED?STOP

OPTION?DELETE
NAME OF ITEM TO BE DELETED
?STD3
STD3 IS NOT FOUND
NAME OF ITEM TO BE DELETED
?STOP

```
OPTION?LIST
STD1
 1        3        5        6
STD2
 2        3        5        1
STD4
 2        4        7        1


OPTION?RETRIEVE
DATA NO?1
RATINGS
?1
?2
?STOP
DATA NO?2
RATINGS
?3
?STOP
DATA NO?STOP
SEPARATE LISTINGS OR COMPOSITE?COMPOSITE
LIST OR COUNT?LIST


COMPOSITE LISTING

STD1
STD2
END OF LISTING


OPTION?SORT
SORT ON WHICH DATA NUMBER?3
 5                STD1
 5                STD2
 7                STD4


OPTION?PERCENT
DATA NO?1
RATINGS
?2
?STOP
DATA NO?STOP
NUMERATOR DATA NO?3
RATING           PERCENT
    5                50
    7                50
NUMERATOR DATA NO?2
RATING           PERCENT
    3                50
    4                50
NUMERATOR DATA NO?4
RATING           PERCENT
    1
+1.000000E+02

NUMERATOR DATA NO?STOP


OPTION?STOP
```

Football Scouting

SCOUT INFORMATION RETRIEVAL (SAMPLE CATEGORIES)

NAME

1 #
0 - Kick
1 - Run
2 - Pass

2 DOWN DIS
0 - xtra pt
1 - 1st
2 2nd & short (0-5 yds)
3 2nd & long (>5)
4 3rd & short (0-3 yds)
5 3rd & long (> 3)
6 4th & short (0-2 yds)
7 4th & long (> 2 yds)

3 VERTICAL POS FIELD
0 - +19 to +0
1 - +39 to +20
2 - -40 to +40
3 - -20 to -39
4 - -0 to -19

4 HORIZONTAL POS FIELD
0 Middle
1 left
2 Right

5 CARRIER RECEIVER
0 K
1 QB
2 FB
3 LH
4 RH
8 RE
9 LE

6 HOLE AREA
0 CRG
1 CLG
2 RG-T
3 LG-T
4 RT-E
5 LT-E
6 >RE
7 >LE
8 R
9 Short Pass L
10 M
11 -K
18 R
19 Long pass L
20 M

7 FORMATION
0 K
1 T
2 WR-SR
3 WL-SL
4 IR
5 IL
6 Spread strong R
7 Spread strong L
8 Unbalanced R
9 Unbalanced L

8 RESULT
0 = 0 no gain
1 0-2
2 3-5
3 5-10
4 >10
5 LOP
6 Score
7 <0 Loss

Other Possible Categories
Play #
Sequence #
Quarter
Time
Score Difference
Blocking
Defense

SCOUT INFORMATION RETRIEVAL (SAMPLE FILE)

10 Character Name Maximum
8 Data Categories

Name	1 #	2 DD	3 VERT	4 HOR	5 CR	6 HA	7 F	8 R
P34	1	1	3	0	3	4	2	1
S36	1	3	3	0	3	6	2	2
Roll R P	2	5	3	2	4	6	2	1
Punt	0	7	3	2	0	11	0	5
P34	1	1	3	0	3	4	2	1
S47	1	3	3	2	4	7	3	3
D20	1	4	3	1	2	0	2	2
P34	1	1	2	1	3	4	2	1
P34 AP	2	3	2	1	9	10	2	4
D 42	1	1	2	0	4	2	1	0
Roll R P	2	3	2	0	8	8	2	0
Quick P	2	5	2	0	8	10	2	4
S36	1	1	1	1	3	6	2	2
C43	1	3	1	2	4	3	2	4
Quick P	2	4	0	0	9	10	3	4
D20	1	1	0	0	2	0	2	6
K PT	0	0	0	0	0	11	0	6
D42	1	1	3	1	4	2	1	1
S36	1	3	3	1	3	6	2	1
DBP	2	5	3	2	9	20	3	5
CB34	1	1	4	1	3	4	2	2
CB21	1	3	3	0	2	1	2	2
D20	1	4	3	0	2	0	1	2
D42	1	1	3	0	4	2	1	1
CB34 AP	2	3	3	2	9	10	2	4
P34	1	1	2	0	3	4	2	1
S47	1	3	2	2	4	7	3	3
D20	1	1	1	1	2	0	1	1
D33	1	3	1	1	3	3	1	0
Roll R P	2	5	1	1	9	18	2	6
P22	1	0	0	0	2	2	8	6

```
GET-$INFRET
RUN
INFRET

WHAT IS THE NAME OF YOUR INFORMATION FILE?SCOUT


OPTION?RETRIEVE
DATA NO?8
RATINGS
?3
?4
?6
?STOP
DATA NO?1
RATINGS
?1
?2
?STOP
DATA NO?STOP
SEPARATE LISTINGS OR COMPOSITE?COMPOSITE
LIST OR COUNT?LIST

(LISTS THE LONG OR SCORING RUNNING AND PASS PLAYS)
COMPOSITE LISTING

S47
P34 AP
QUICK P
C43
QUICK P
D20
CB34 AP
S47
ROLL R P
P22
END OF LISTING


(HORIZONTAL FIELD POSITION---MIDDLE)
OPTION?PERCENT
DATA NO?4
RATINGS
?0
?STOP
DATA NO?STOP
NUMERATOR DATA NO?6              (HOLE AREA)
RATING          PERCENT
   0              8
   2             25
   4             25
   6              8
   8              8
  10             17
  11              8
NUMERATOR DATA NO?7              (FORMATION)
RATING          PERCENT
   0              8
   1             17
   2             58
   3              8
   8              8
NUMERATOR DATA NO?STOP
```

```
(HORIZONTAL FIELD POSITION---LEFT)
OPTION?PERCENT
DATA NO?4
RATINGS
?1
?STOP
DATA NO?STOP
NUMERATOR DATA NO?6                (HOLE AREA)
RATING          PERCENT
   0             25
   1              8
   2              8
   3              8
   4             17
   6             17
  10              8
  18              8
NUMERATOR DATA NO?7                (FORMATION)
RATING          PERCENT
   1             33
   2             67
NUMERATOR DATA NO?STOP

(HORIZONTAL FIELD POSITION---RIGHT)
OPTION?PERCENT
DATA NO?4
RATINGS
?2
?STOP
DATA NO?STOP
NUMERATOR DATA NO?6                (HOLE AREA)
RATING          PERCENT
   3             14
   6             14
   7             29
  10             14
  11             14
  20             14
NUMERATOR DATA NO?7                (FORMATION)
RATING          PERCENT
   0             14
   2             43
   3             43
NUMERATOR DATA NO?STOP


OPTION?STOP

END
```

C. STATISTICS

STIX
July, 1973

NAME: STIX

DESCRIPTION: This program uses a generalized option flow which allows the user to process statistical data. Any combination of input, storage, and output patterns can be used with the options.

STIX was written for athletic team statistics although it can be used in other areas. A computational output subroutine must be appended to the program.

COMMENTS: The number of players must be less than 31. The number of data items must be less than 17. If data and name files are not used, then answer the file input questions with any non-existent file name. Files must be opened and initialized (option 8 & 9) before using the first time. In general the number of data items and number of players will remain the same for a particular output subroutine and corresponding files.

Run - 180 omits the listing of the options.

The following options are used in the program:

1 = Input Data
The user inputs the data separated by commas for each player after the player's number (name) and the question mark. An input matrix is used, thus if a mistake is made at most one player's statistics will be affected.

2 = Read Data
Before typing run, the user must include data statements with line numbers between 9000 and 9990. This option reads the statistics from the data statements into the matrix.

3 = Update File Data
The user is able to update the data in any data files used for storage. The data file name is needed each time this option is used; hence by running more than once, more than one file can be updated and utilized for storing data.

4 = Output Latest Data
This option uses the output subroutine appended to the program. The last data input or read will be output.

5 = Output File or Total Data
This option uses the output subroutine appended to the program. The cumulative or file data will be output.

6 = Output Data Tape (Input)
This option outputs the cumulative data so that it may be stored on paper tape. An X-off character is printed after each line on the tape so that the data may be input using Option 1.

7 = Output Data Tape (Read)
This option outputs the cumulative data as data statements to be stored on paper tape. The line numbers start at 9001 with the last digits corresponding to the player number. The information from this tape may be read into the program matrix using Option 2.

8 = Input Names Into Name File
Names may be loaded into a name file by typing the name after each question mark. The maximum length name is 20 characters. This option needs to be used only once, to load the names in the file.

9 = Initialize Data File to Zero
Before each data file is used the first time, it must be initialized to zero. This option needs to be used only once to initialize the data.

10 = Stop

All options except 4 & 5 may be run without appending an output subroutine, but including 2000 REM subroutine
2001 Return
9999 End

To open files type the following:

```
OPEN-FILE NAME,1     (name file)
OPEN-FILE NAME,4     (data file)
```

The file name should be different for each file used.

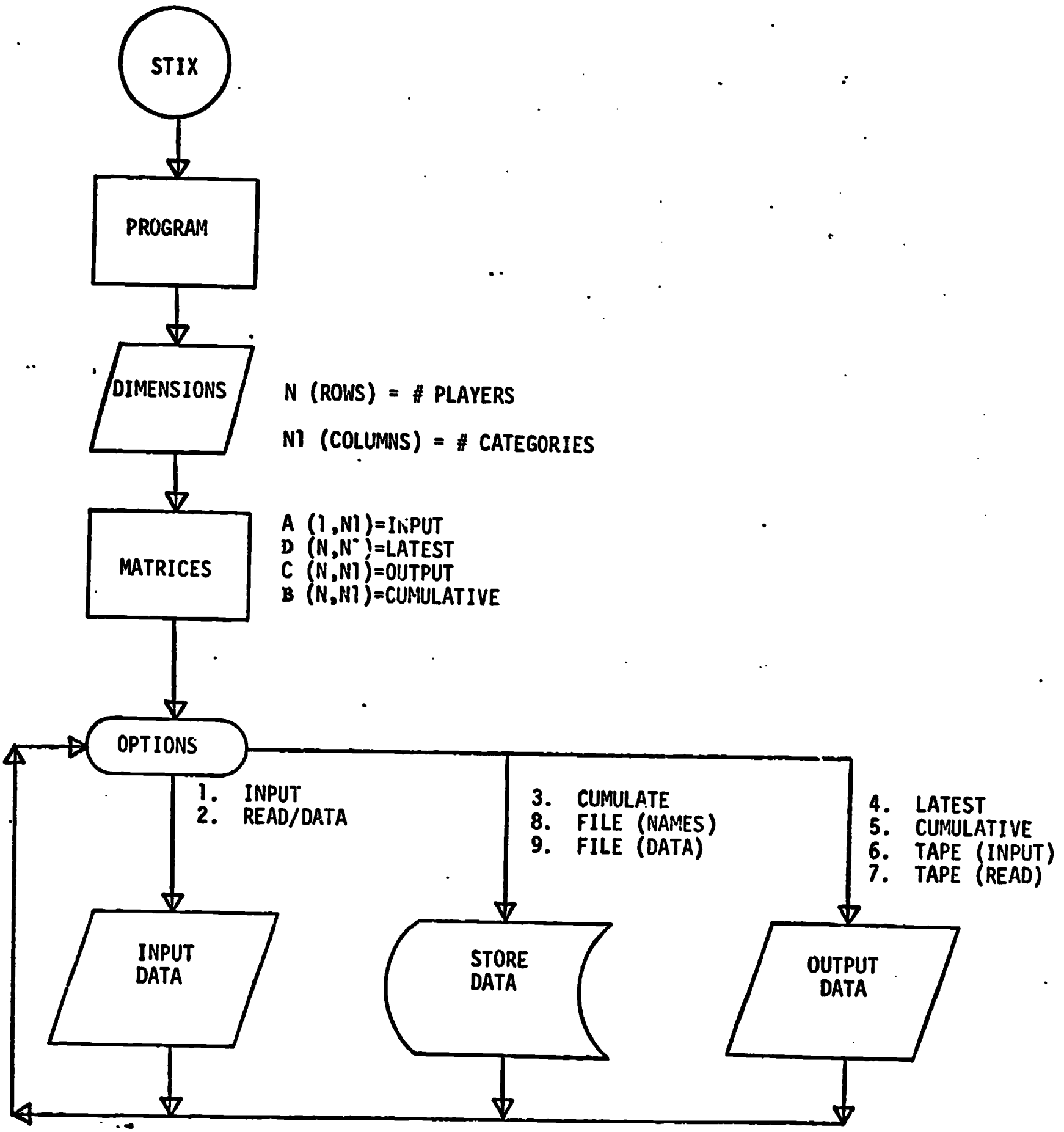
The following variables are needed in the output subroutine:

MAT C = Data Matrix
N = # Players
N1 = # Data Items
F = File Flag (return value from assign statement)
N$ = Players Name
The appended output subroutine must start with line number 2000 and include an end statement in line 9999.

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 1215 words

A sample run illustrating all possible options is included with STIX10.


STIX
PROGRAM
DIMENSIONS
N (ROWS) = # PLAYERS
N1 (COLUMNS) = # CATEGORIES
MATRICES
A (1,N1)=INPUT
D (N,N)=LATEST
C (N,N1)=OUTPUT
B (N,N1)=CUMULATIVE
OPTIONS
1. INPUT
2. READ/DATA
3. CUMULATE
8. FILE (NAMES)
9. FILE (DATA)
4. LATEST
5. CUMULATIVE
6. TAPE (INPUT)
7. TAPE (READ)
INPUT DATA
STORE DATA
OUTPUT DATA

STIX
July, 1973

NAME: STIX10

DESCRIPTION: This is a team basketball statistics subroutine which compares team and opponent statistics. Output includes a listing of input data, per game averages, and differences between team and opponent data.

COMMENTS: A name file is not needed for this subroutine. To run, this subroutine must be appended to STIX.

The 13 data items for the team first and then the opponent are input in the following order:

Points by Quarter: 1, 2, 3, 4
FGM = Field Goals Made
FGA = Field Goals Attempted
FTM = Free throws Made
FTA = Free Throws Attempted
REB = Rebounds
F = Fouls
TO = Turnovers
G = Games
W = Wins

Calculated Statistics are per game averages, total points, field goal and free throw percentages, and the difference between team and opponent statistics for each data category.

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 840 words

```
GET-SSTIX
APP-SSTIX10
OPEN-NAMES,1
OPEN-DATUM,A
RUN
STIX

OPTIONS:
1=INPUT DATA
2=READ DATA
3=UPDATE FILE DATA
4=OUTPUT LATEST DATA
5=OUTPUT FILE OR TOTAL DATA
6=OUTPUT DATA TAPE (INPUT)
7=OUTPUT DATA TAPE (READ)
8=INPUT NAMES INTO NAME FILE
9=INITIALIZE DATA FILE TO ZERO
10=STOP

# PLAYERS?2
# DATA ITEMS?13
OPTION?8
NAME FILE?NAMES
TYPE NAME AFTER EACH QUESTION MARK
?TEAM
?OPPONENT
OPTION?9
DATA FILE?DATUM
OPTION?10

DONE
```

```
GET-$STIX
APP-$STIX10
MIN-1#0
STIX

# PLAYERS?2
# DATA ITEMS?13
OPTION?1
NAME FILE?NAMES
 1       TEAM?21,12,13,18,25,76,14,20,32,14,17,1,1
 2       OPPONENT?18,10,10,12,20,52,10,12,28,19,15,1,0
OPTION?3
DATA FILE?DATUM
OPTION?4
NAME FILE?NAMES
```

BASKETBALL TEAM STATISTICS

GAME = 1 WIN = 1 LOSS = 0

	POINTS PER QUARTER 1	2	3	4	POINTS TOTAL
TEAM	21	12	13	18	64
OPPONENT	18	10	10	12	50
DIFFERENCE	3	2	3	6	14

	FGM	FGA	FG%	FTM	FTA	FT%	REB	F	TO
TEAM	25	76	32.9	14	20	70.0	32	14	17
OPPONENT	20	52	38.5	10	12	83.3	28	19	15
DIFFERENCE	5	24	-5.6	4	8	-13.3	4	-5	2

```
OPTION?10

DONE
9201 DATA 196,132,146,160,257,775,116,[illegible],691,177,162,16,14
9202 DATA 116,[illegible]
SUN-1#0
STIX

# PLAYERS?2
# DATA ITEMS?13
```

```
OPTION?2
OPTION?3
DATA FILE?DATUM
OPTION?5
DATA FILE?DATUM
NAME FILE?NAMES
```

BASKETBALL TEAM STATISTICS

GAME = 17 WIN = 15 LOSS = 2

	POINTS PER QUARTER 1	2	3	4	POINTS TOTAL
TEAM	207	150	159	178	694
AVERAGE/GAME	12.2	8.8	9.4	10.5	40.8
OPPONENT	132	114	118	111	475
AVERAGE/GAME	7.8	6.7	6.9	6.5	27.9
DIFFERENCE	75	36	41	67	219
AVERAGE/GAME	4.4	2.1	2.4	3.9	12.9

	FGM	FGA	FG%	FTM	FTA	FT%	REB	F	TO
TEAM	282	851	33.1	130	348	37.4	653	191	179
AVERAGE/GAME	16.6	50.1	33.1	7.6	20.5	37.4	38.4	11.2	10.5
OPPONENT	187	614	30.5	126	233	54.1	413	248	217
AVERAGE/GAME	11.0	36.1	30.5	7.4	13.7	54.1	24.3	14.6	12.8
DIFFERENCE	95	237	2.7	4	115	-16.7	240	-57	-38
AVERAGE/GAME	5.6	13.9	2.7	0.2	.6.8	-16.7	14.1	-3.4	-2.2

```
OPTION?6
DATA FILE?DATUM
READY PAPER TAPE WITH RUBOUT LEADER (15 SECONDS)
207,150,159,178,282,851,130,348,653,191,179, 17, 15
132,114,118,111,187,614,126,233,413,248,217, 17,  2

OPTION?7
DATA FILE?DATUM
READY PAPER TAPE WITH RUBOUT LEADER (15 SECONDS)
9001 DATA207,150,159,178,282,851,130,348,653,191,179, 17, 15
9002 DATA132,114,118,111,187,614,126,233,413,248,217, 17,  2

OPTION?10

DONE
```

NAME: STIX11

DESCRIPTION: This subroutine analyzes individual player statistics for basketball. The statistics are measured in four general categories:

1) Defense (Opponent Ball Possession)
2) Neutral (Neither Ball Possession)
3) Offense (Team Ball Possession)
4) Minus (Mistakes)

These are combined on a per quarter basis to calculate a number which measures all phases of the game for each player. Output for individual players and team totals includes input data, category totals, field goal and free throw percents, points per game, and totals per quarter.

COMMENTS: If a name file is used, the names will be printed with the totals per quarter chart. To run this subroutine must be appended to STIX.

The 16 data items for the respective players are input in the following order:

3 Defensive categories
3 Neutral categories
3 Minus categories
5 Offensive categories
(Assists, FGM, FGA, FTM, FTA)
2 Time categories
(Quarters, Games)

The three specific items to be measured in the first three general categories are left to the discretion of the user.

Calculated Statistics are derived in the following manner:

D = Total Defense = D1 + D2 + D3
N = Total Neutral = N1 + N2 + N3
M = Total Minus = M1 + M2 + M3
O = Total Offense = Assists (A) + Points (P)
FG% = FGM/FGA * 100
FT% = FTM/FTA * 100
P = Points = 2 * FGM + FTM
P/G = Points per game
D/Q = Defense per quarter
N/Q = Neutral per quarter
O/Q = Offense per quarter
+/Q = Plus per quarter = (D + N + O)/Q
-/Q = Minus per quarter = M/Q
T/Q = Total per quarter = (D + N + O - M)/Q

Team Totals for each item are calculated by taking the sum of all the players.

ACKNOWLDEGEMENTS: J. Sydow, TIES

LENGTH: 1287 words


```
GET-SSTIX
APP-SSTIX11
RUN-1230
STIX

# PLAYERS?2
# DATA ITEMS?16
OPTION?1
NAME FILE?NONE
 1     ?3,2,3,3,5,2,1,1,2,3,4,12,0,0,3,1
 2     ?5,3,4,1,0,1,2,2,3,1,13,23,13,15,8,2
OPTION?4
NAME FILE?NONE
```

BASKETBALL STATISTICS

	DEFENSE				NEUTRAL				MINUS			
#	D1	D2	D3	D	N1	N2	N3	N	M1	M2	M3	M
1	3	2	3	8	3	5	2	10	1	1	2	4
2	5	2	4	11	1	0	1	2	2	2	3	7
TEAM	8	4	7	19	4	5	3	12	3	3	5	11

#	A	FGM	FGA	FG%	FTM	FTA	FT%	P	P/G	O
1	3	4	12	33.3	0	0	0.0	8	8.00	11
2	1	12	23	52.2	13	15	86.7	37	18.50	38
TEAM	4	16	35	45.7	13	15	86.7	45	22.50	49

#	NAME	Q	G	D/Q	N/Q	O/Q	+/Q	-/Q	T/Q
1		3	1	2.67	3.33	3.67	9.67	1.33	8.33
2		8	2	1.37	0.25	4.75	6.37	0.88	5.50
TEAM		8	2	2.37	1.50	6.12	10.00	1.37	8.62

```
OPTION?10

DONE
```

NAME: STIX12

DESCRIPTION: This subroutine is written for wrestling statistics measuring both points (team and individual) and how the points were scored. By creating an opponent file the user can also measure the corresponding data for his opponent, with a difference being calculated for each item.

COMMENTS: If a name file is used, the names will be printed on each chart. A separate file should be opened of four records each, if both, latest opponent statistics and cumulative opponent statistics, are to be used. Each time the latest opponent statistics file is used, it should be initialized to zero (option 9). The opponent data file utilizes the options in the STIX program for data input and storage. To run, the subroutine must be appended to STIX.

The 11 data items for the respective players are input in the following order:

Wins, Team points, points period 1, points period 2, points period 3, pins, near falls, take downs, reversals, escapes, penalty/forfeit/disqualification.

Calculated Statistics include team totals, total points, and difference on all data items between the participant and the opponent.

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 934 words

```
GET-SSTIX
APP-SSTIX10
RUN-180
STIX

# PLAYERS?3
# DATA ITEMS?11
OPTION?8
NAME FILE?NAMES
TYPE NAME AFTER EACH QUESTION MARK
?RUSSEL ERR
?WES LING
?PLAYER WON
OPTION?9
DATA FILE?DATUM
OPTION?9
DATA FILE?OPPON
OPEN-FILE NAME, RECORDS
OPTION?10

DONE
OPEN-OPPON,4
RUN-180
STIX

# PLAYERS?3
# DATA ITEMS?11
OPTION?9
DATA FILE?OPPON
OPTION?1
NAME FILE?NAMES
 1        RUSSEL ERR?4,17,15,16,14,2,5,6,3,3,0
 2        WES LING?3,11,14,17,14,1,4,7,3,6,1
 3        PLAYER WON?0,0,3,2,0,0,1,2,1,1,0
OPTION?3
DATA FILE?DATUM
OPTION?1
NAME FILE?NAMES
 1        RUSSEL ERR?2,8,13,14,11,1,3,3,5,3,1
 2        WES LING?3,10,[illegible]
 3        PLAYER WON?1,5,10,3,5,1,4,4,2,4,0
OPTION?3
DATA FILE?OPPON
OPTION?5
DATA FILE?DATUM
NAME FILE?[illegible]
OPPONENT FILE?OPPON
```

WRESTLING STATISTICS

#	NAME	WIN	T PT	1	2	3	PT
1	RUSSEL ERR	4	17	15	16	14	45
	OPPONENT	2	8	13	14	11	38
	DIFFERENCE	2	9	2	2	3	7
2	WES LING	3	11	14	17	14	45
	OPPONENT	3	10	24	9	5	38
	DIFFERENCE	0	1	-10	8	9	7
3	PLAYER WON	0	0	3	2	0	5
	OPPONENT	1	5	10	3	5	18
	DIFFERENCE	-1	-5	-7	-1	-5	-13
TEAM		7	28	32	35	28	95
	OPPONENT	6	23	47	26	21	94
	DIFFERENCE	1	5	-15	9	7	1

#	NAME	PIN	NF	TD	REV	ESC	PFD
1	RUSSEL ERR	2	5	6	3	3	0
	OPPONENT	1	3	3	5	3	1
	DIFFERENCE	1	2	3	-2	0	-1
2	WES LING	1	4	7	3	6	1
	OPPONENT	2	6	7	6	1	0
	DIFFERENCE	-1	-2	0	-3	5	1
3	PLAYER WON	0	1	2	1	1	0
	OPPONENT	1	4	4	2	4	0
	DIFFERENCE	-1	-3	-2	-1	-3	0
TEAM		3	10	15	7	10	1
	OPPONENT	4	13	14	13	8	1
	DIFFERENCE	-1	-3	1	-6	2	0

OPTION?10

DONE

NAME: STIX17

DESCRIPTION: This subroutine calculates various individual player hockey statistics and cumulative team totals. Also, the opponent team statistics are entered, and the program computes the differences between the team and opponent statistics.

COMMENTS: If a name file is used, the names will be printed on the second chart only. .To run, this subroutine must be appended to STIX.

The opponent team statistics should always be entered for player number one.

Thus, the maximum number of players which may be entered is twenty-nine. When responding to the question number of players ("# PLAYERS?"), the user should enter the number of players on your team plus one.

The 9 data items should be entered in the following order:

Periods, games, shots, shots on goal, goals, assists, plus, minus, penalties.

The user may enter whether the calculated statistics are to be on a per period or per game basis.

Calculated statistics are derived in the following manner.

SOG = Shots on Goal

SHOTS BLKD (blocked) = SOG - Goals

SHOTS PER = Shots per time measure (period or game)
= shots/time measure

SOG PER = shots on goal per time measure (period or game)
= SOG/Time Measure

SOG % = Percent of shots that are shots on goal
= SOG/Shots * 100

GOALS % = Percent of shots on goal that are goals
= GOALS/SOG * 100

PIM = Penalties in minutes
= Penalties * 1.5

POINTS = Goals + Assists

POINTS PER = points per time measure (period or game)
= points/time measure

NET = Plus (on ice when team scores) - minus (on ice when opponent scores)

NET PER = NET per time measure (period or game)
= NET/Time Measure

Team totals are calculated for each item by taking the sum of all players. The difference is found by subtracting the opponent team statistics (player number one from the team totals).

ACKNOWLEDGEMENTS:J. Sydow, TIES

LENGTH: 1254 words

```
GET-$STIX
APP-$STIX17
RUN-180
STIX

# PLAYERS?3
# DATA ITEMS?9
OPTION?1
NAME FILE?NONE
 1?3,1,15,7,1,2,1,2,3
 2?3,1,7,3,1,0,1,1,1
 3?2,1,5,2,1,1,2,0,3
OPTION?4
NAME FILE?NONE
CLACULATED STATISTICS PER TIME MEASURE: 0=PERIOD, 1=GAME?0
```

HOCKEY STATISTICS

#	PERIOD	GAME	SHOTS	SOG	GOALS	SHOTS BLKD	SHOTS PER	SOG PER	SOG %	GOALS %	PEN	PIM
2	3	1	7	3	1	2	2.3	1.0	42.9	33.3	1	1.5
3	2	1	5	2	1	1	2.5	1.0	40.0	50.0	3	4.5
TEAM	3	1	12	5	2	3	4.0	1.7	41.7	40.0	4	6.0
OPP	3	1	15	7	1	6	5.0	2.3	46.7	14.3	3	4.5
DIFF	0	0	-3	-2	1	-3	-1.0	-0.7	-5.0	25.7	1	1.5

#	NAME	GOALS	ASSTS	POINT	POINT PER	PLUS +	MINUS -	NET	NET PER
2		1	0	1	0.3	1	1	0	0.0
3		1	1	2	1.0	2	0	2	1.0
TEAM		2	1	3	1.0	2	1	1	0.3
OPPONENT		1	2	3	1.0	1	2	-1	-0.3

```
OPTION?10

END
```

STIX
July, 1973

NAME: STIX20

DESCRIPTION: This is a baseball statistics subroutine which uses thirteen hitting and fielding categories for each player. A team total will be output for both the hitting and fielding charts.

COMMENTS: If a name file is used, the names will be printed with the fielding chart.

To run, this subroutine must be appended to STIX.

The 13 data items should be input in the following order:

Games, at bats, hits, runs, runs batted in, extra base hits, stolen bases, free passes (walks and hit by pitch), strike outs, sacrifices (bunts and flys), assists, putouts, errors.

Computes statistics include team totals, data updates, batting average, chances, and fielding percentage.

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 618 words

```
GET-SSTIX
APP-SSTIX20
RUN-160
STIX

# PLAYERS?2
# DATA ITEMS?13
OPTION?1
NAME FILE?NONE
 1     ?2,13,5,3,3,2,2,3,4,1,7,4,2
 2     ?3,16,6,4,3,2,1,2,1,2,13,5,1
OPTION?4
NAME FILE?NONE
```

BASEBALL STATISTICS
HITTING

#	AB	H	R	RBI	EB	SB	FP	K	SAC	AVE
1	13	5	3	3	.2	2	3	4	1	0.385
2	16	6	4	3	2	1	2	1	2	0.375
TEAM	29	11	7	6	4	3	5	5	3	0.379

FIELDING

#	NAME	G	C	A	P	E	PCT
1		2	13	7	4	2	0.846
2		3	19	13	5	1	0.947
TEAM		3	32	20	9	3	0.906

```
OPTION?10

DONE
```

STIX
July, 1973

NAME: STIX21

DESCRIPTION: This is a baseball statistics subroutine which computes offensive efficiency, on base percentage, bases advanced percentage, runs produced percentage, and strike out percentage for each player and the team.

COMMENTS: If a name file is used, the names will be printed with the data chart. To run, this subroutine must be appended to STIX.

The 5 data items should be input in the following order:

OA = Offensive Appearances
OB = On base
BA = Bases advanced (self & teammates)
RP = Runs produced (self & teammates)
SO = Strike outs

Calculated statistics are derived in the following manner:

OE = Offensive Efficiency = (OB + BA + RP - SO)/OA
% = Percentages are calculated per offensive appearance.

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 468 words

```
GET-SSTIX
APP-SSTIX?1
RUN-180
STIX

# PLAYERS?2
# DATA ITEMS?5
OPTION?1
NAME FILE?NONE
 1     ?5,2,4,1,1
 2     ?7,3,7,2,0
OPTION?4
NAME FILE?NONE
```

BASEBALL OFFENSIVE EFFICIENCY

#	NAME	OA	OB	BA	RP	SO
1		5	2	4	1	1
2		7	3	7	2	0
TEAM		12	5	11	3	1

#	OE	OB%	BA%	RP%	SO%
1	1.200	0.400	0.800	0.200	0.200
2	1.714	0.429	1.000	0.286	0.000
TEAM	1.500	0.417	0.917	0.250	0.083

```
OPTION?10

DONE
```

NAME: STIX30

DESCRIPTION: This is a football statistics subroutine which handles rushing, passing, and scoring data from offensive scrimmage plays.

COMMENTS: If a name file is used, the names will be printed with the rushing chart and the totals/scoring chart. To run this subroutine must be appended to STIX.

The 13 data items for each respective player should be input in the following order:

5 rushing: carries, yards, >4 yards, fumbles, touchdowns
7 passing: attempts, completions, interceptions, yards, receptions, receiver yards, touchdowns
1 extra points: 2 point conversions

Calculated Statistics include team totals, average yards per carry, percentage of rushes greater than four yards, percentage of pass completions, average yards per pass attempt. average yards per pass reception, total plays, total yards, average total yards per total plays, touchdowns, and total points.

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 1033 words

```
GET-$STIX
ASG-$STIX30
RUN-150
STIX

# PLAYERS?3
# DATA ITEMS?13
OPTION?1
NAME FILE?NONE
 1     ?7,43,3,1,1,0,0,0,0,1,15,1,1
 2     ?2,5,0,0,0,15,8,1,1,23,0,0,0,0
 3     ?1,13,1,0,1,0,0,0,0,4,72,2,1
OPTION?4
NAME FILE?NONE
```

FOOTBALL OFFENSIVE STATISTICS

# NAME	RUSHING CARRY	YARD	Y/C	>4	%>4	FMBL	TD
1	7	43	6.1	3	42.9	1	1
2	2	5	2.5	0	0.0	0	0
3	1	13	13.0	1	100.0	0	1
TEAM	10	61	6.1	4	40.0	1	2

#	PASSING ATT	COM	%	INT	YARD	Y/A	REC	YARD	Y/R	TD
1	0	0	0.0	0	0	0.0	1	15	15.0	1
2	15	8	53.3	1	123	8.2	0	0	0.0	0
3	0	0	0.0	0	0	0.0	4	72	18.0	2
TEAM	15	8	53.3	1	123	8.2	5	87	17.4	3

# NAME	TOTALS AND SCORING PLAYS	YARDS	Y/P	TD	XPT	PT
1	8	58	7.2	2	1	14
2	17	128	7.5	0	0	0
3	5	85	17.0	3	1	20
TEAM	30	271	9.0	5	2	34

```
OPTION?10

DONE
```

NAME: STIX31

DESCRIPTION: This is a football defensive statistics subroutine.

COMMENTS: To run, this subroutine must be appended to STIX.

The user must determine the number of data items (maximum = 12) and define each data category. The program will calculate the sum of all the data categories for each player and the team totals for each item.

ACKNOWLEDGEMENTS: J. Sydow, TIES

LENGTH: 355 words

```
GET-$STIX
APP-$STIX31
RUN-IPO
STIX
# PLAYERS?3
# DATA ITEMS?11
OPTION?1
NAME FILE?NONE
 1     ?1,2,3,4,5,6,7,8,9,0,1
 2     ?3,2,1,3,2,1,3,21,0,0,1
 3     ?2,2,2,2,2,2,2,5,6,0,1
OPTION?4
NAME FILE?NONE

                    FOOTBALL DEFENSIVE STATISTICS
 # NAME        1   2   3   4   5   6   7   8   9  10  11 TOTAL

 1            1   2   3   4   5   6   7   8   9   0   1    46
 2            3   2   1   3   2   1   3  21   0   0   1    37
 3            2   2   2   2   2   2   2   5   6   0   1    26
TEAM          6   6   6   9   9   9  12  34  15   0   3   109


OPTION?10

DONE
```