Applied and
Computational
Mathematics
Division

Center for Computing and Applied Mathematics

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Paul D. Domich

June 1989

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June 12, 1989

Abstract

This paper presents a computer model to allocate Internal Revenue Service staff to field offices so to satisfy a user-defined level of workload. The system is microcomputer-based and uses menus and graphically displayed zip code maps of IRS districts for interactive inputs and solution outputs. The level of workload is interactively specified and a detailed report of workload and staff assignments is automatically generated.

Keywords: staffing, IRS Examination Division, application to tax service, microcomputer, interactive graphics.

1 INTRODUCTION

The Internal Revenue Service (IRS) maintains approximately 60 district offices throughout the United States. A district office usually has jurisdiction over the tax activities of an entire state, except in the most populous states where there are as many as five districts. Currently, district boundaries do not cross state lines. Within each district, the IRS operates a number of field offices, called Posts-of-Duty (POD's). An important consideration for the IRS is to determine where to situate POD's and staff to best perform their tax related activities.

An earlier study, (Domich, Hoffman, Jackson, and McClain (1986)), resulted in a graphics-based microcomputer system called LOCATE that finds locations for POD's that minimizes

[*]Center for Computing and Applied Mathematics, National Institute of Standards and Technology, Boulder, CO 80303-3328

staff travel costs and facility costs while maintaining accessibility to taxpayers. The LOCATE package is made up of a FORTRAN graphics system for displaying map-related data and a PASCAL facility location solution procedure. The system is menu driven and provides interactive graphical problem formulation and automatic solution procedures. The report generation function documents the problem formulation, the resulting solution, and the staffing estimates.

Now whenever economic and demographic shifts within a district cause corresponding shifts in the location of tax activities, the optimal number and location of POD's in the district can be easily analyzed. The graphics system also provides an extremely valuable means of displaying and analyzing workload within a district. Field personnel can now view their workload graphically by zip code regions (through the *zoom* feature), by type of workload (e.g. return class), and (when data is routinely supplied on a yearly basis) over time. (See Domich *et al.* (1986) for a complete description of the model.)

The model presented here called STAFF generates a refined staffing estimate once the optimal POD locations have been determined using the results from the LOCATE package. The identical graphics system developed for LOCATE provides the user with interactive problem specification and graphical output. With this new system, the number of *staff years* for each IRS staff type now can be interactively adjusted for each of the 27 return classes, so that the user can analyze the resulting changes in the workload production rates and in the assignment of staff to POD's. Other modifications to the LOCATE system include a more detailed staffing report and the workload totals by category. Several new menus for modifying staffing factors used in estimating staff requirements were developed.

The STAFF system uses the same data input files as for the LOCATE package, thus providing a shared environment for the two packages. For example, POD locations found from the location package can be used directly in the staffing package. This report will describe the new features of STAFF and the modifications that were made in developing this system.

2 THE MODEL AND THE DATA

The STAFF package was designed to provide staffing estimates for the Examination Division of the IRS responsible for examining tax returns for possible audits. The staffing problem for this application can be described as: *Given* a set of predetermined POD locations, the user *allocates* staff by type and number for each return class, and the model *finds* the resulting level of workload production *and* the assignment of staff to POD's. The result is an interactive display of staffing levels by type and a staffing report that records the input parameters and lists the assignment of staff and workload for each POD for a specified level of projected workload.

The new model STAFF differs from LOCATE in that the locations of the POD's are fixed, and the workload levels are variable so that the user may change staff levels that result in new production rates, i.e., workload levels. This model provides the user with the ability to experiment with different staff allocation schemes for each return class and generate new estimates of the production rates and assignment of staff to POD's. All of the graphical display features of the LOCATE model are available in STAFF. The display of the workload data, the location of POD's, and the assignment of zip codes to POD's can be accessed graphically by the user to evaluate staffing and workload decisions. In place are several new menus for the specification of the staffing problem input parameters.

A new top-level menu option *Change Workload Production Rates* (see §3) is used to specify the allocation of staff by two basic types: tax auditor (TA) and revenue agent (RA) for each of the 27 return classes. The menu displays the levels of production as suggested by the National Office and the current production levels for that district. The user can modify the levels for each class in that district resulting in new production levels. Two other new interactive menus are accessed during report generation and are required to translate between workload and TA and RA staff hours.

The conversion between workload and staff hours requires two sets of factors. The first determines the percentage of the workload total processed by TA's and RA's by type for each of the 27 different return types. The second translates the partial workload totals into the number of staff hours required for each of the staff types for each of the return types.

When the user changes the number and type of staff for each of the 27 classes, the corresponding production rate is computed. A workload file is then produced using the specified production rate for the district. The package automatically adjusts the percentage breakdown of RA and TA staff per return type and updates the staff input data file. The user can graphically display the new workload information (see §3) and evaluate the effect of the staffing changes on production levels.

During the report generation phase of the package, the staffing factors contained in the staff input file can be further modified, (possibly changing the TA and RA staff levels specified in the previous menu). A report file summarizing the staff allocation is generated and documents the staffing input parameters used. Included in the report file are the workload totals and the assignment of staff by type to each POD.

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```
27      4       2080    .45
TA      RA11    RA12    RA13
1.      2.      3.      2.      50  50  30  20
1.      2.      3.      2.      50  50  30  20
                        .
                        .
                        .
1.      2.      3.      2.      50  50  30  20
```

Figure 1: Sample STAFF.xx File

2.1 THE DATA FILES

The staffing model uses two types of input data. The first type is cartographic data used to map workload data and assignment solutions at a zip code level within each district. This data provides the user with the ability to *zoom in* and display any region in a district to examine workload levels, to examine POD locations, or to graphically display the assignment of zip codes to POD sites. The second type of data is IRS workload and POD data. This data includes workload levels for up to 36 different classes of returns, staffing and production rates, and characteristics of the current POD's. Several system generated files contain the POD locations and the assignment of workload to the POD's, and another contains workload totals for a given production level.

Most of the data files required by the staffing system are identical to those used for the facility location system LOCATE. The files ADJACENT.xx, DISTRICT, CENTROID.xx, OUT-LINE.xx, PODSITE.xx, PONAMES.xx and ZIPCODE.xx remain unchanged. The file WORK-LOAD.xx has its second line changed to reflect the production rates used to generate this file replacing the taxpayer trip factors used in LOCATE. The reader may wish to refer to Domich *et al.* (1988) for a further description of these files. Three new data files used by the STAFF package are STAFF.xx, EXAMLOAD.xx and TOTALS.xx and are described below.

The STAFF.xx file contains the staffing factors required to convert workload in each of the return classes into the number of man-hours for each IRS staff type. Referring to Figure 1, the first line of the file lists the number of return classes, the number of different staff types, the *hours per year* and the *direct exam-time percentage (DEP)* factor. The total man-hours reflects the number of hours in the current staff year. The DEP factor reflects the portion of time staff performs examination activities. The second line lists the names of the staff types: these entries are to be 4 characters including spaces separated by a space, *e.g.*, ra13␣ or ta␣␣␣.

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col01	col02	col03	col04	col05	...	col36				
0.4	0.9	2.0	4.7	1.6	...	3.7				
	353	706	1059	1918	...	3836	5754	...	1493	2986
90001	15	5	2	9	...	3	11	...	5	3
90002	17	8	1	7	...	2	9	...	3	1
	⋮			⋮			⋮			
96137	13	7	2	11	...	6	13	...	5	1

Figure 2: Sample EXAMLOAD.xx File

The remaining lines of the STAFF.xx file include the workload translations and the percent breakdown of TA and RA staff for each return type. The first four entries in the third line are the translation factors that convert returns from each return class into examination hours for each of the four staff types in the order given in line two. The last four entries represent the percentage breakdown of TA and RA staff for each return class. The first percentage factor is restricted to be in the range 0 to 100 and specifies the percentage of staff performing TA level activities. The sum of the last three percentage factors must equal 100 and represents the percentage breakdown of the RA staff activities. The model automatically checks the integrity of the user modifications to this file.

The EXAMLOAD.xx file contains four groups of information. They are the column identifiers, the national office RA and TA suggested production levels, the workload totals for each workload column, and the incremental workload by zip code for three levels of production for each return class. The information in this file is used to generate the WORKLOAD.xx file.

The first line of EXAMLOAD.xx contains the return class identifiers. Each identifier begins with a single space followed by a 5 character descriptor, *e.g.*, ⊔col01. In the sample data file provided in Figure 2, 36 identifiers are listed for the 36 columns. The next line contains the National Office recommended staff levels of TA's and RA's for each of the 36 return classes. The third line in EXAMLOAD.xx lists the workload totals for each of the three production levels described below for each return class.

Each remaining line contains workload in "triples" for each return type (1-36) for each zip code in the district. The first item of the triple represents the workload required to satisfy the *minimum* production rate, the second is the incremental workload required to attain the *suggested* rate, and the third is the remaining workload required to achieve the *maximum* production

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35	27	59.55356598			
116	1101	641	...	2681	1010
		$\vdots$			
29	208	169	...	1004	268
15	140	108	...	487	98

Figure 3: Sample TOTALS.xx File

rate. The user may specify a production rate between 0 and the *maximum* rate. The corresponding WORKLOAD.xx file will be generated having for each entry the appropriate amount of workload drawn from each of the three corresponding entries from the EXAMLOAD.xx file.

The STAFF package assumes 36 columns exist in the workload file, hence 36 column identifiers, RA and TA pairs, and production triples, must be specified in the EXAMLOAD.xx file. Currently, only the first 27 are used in the staffing function and the remaining 9 columns may be set to zero. These 9 remaining triples may be used, though, to display aggregate workload information or other nonstaffing related data for display purposes . (The *suggested* production rate is used for columns 28 through 36 when generating the WORKLOAD.xx file.)

The TOTALS.xx file is used to maintain the staffing totals by POD as determined by a particular WORKLOAD.xx file. This file is generated by the system and should not be modified by the user. The first two entries in the first row of TOTALS.xx are the number of POD's and the number of return classes. The third entry is a *numerical identifier* used to detect if the production rates and the associated WORKLOAD.xx file have changed. The remaining lines in TOTALS.xx are the workload totals determined from the current WORKLOAD.xx file for each POD in order of index, for each of the 27 return types. If a new production rate is specified and a new workload file is generated, the TOTALS.xx file will be recomputed automatically to reflect the new workload data.

3   OVERVIEW OF THE SOLUTION PROCEDURE

This section outlines the steps required to use the staffing model. Some of the operations are identical to those for LOCATE and will not be described in detail here. The more extensive development here will be concerned with the new features required by STAFF. In the sample menus and output to follow, all the staffing input parameters have been fabricated. Their value

is only to illustrate the STAFF system and to provide insight into the staff estimates. It will be assumed that the user has properly installed the STAFF package and all the appropriate graphics device drivers. The general installation procedure is identical to that for LOCATE, with the additional requirement that the files EXAMLOAD.xx and STAFF.xx are present. Refer to the earlier report (Domich *et al.* (1988)) for a complete description of this procedure.

The actual execution of the staffing package is handled by the STAFF.BAT file. Typing STAFF at the DOS prompt initiates the package. A banner page is displayed followed by the *top-level menu* from which the user has the following options: *Exit, Display Workload, Display Current POD's, Change Workload Production Rates, Display Zip Code Assignments,* and *Report Zip Code and Staff Assignments.* Control of the execution of the package is handled by the function keys, F1-F6, and the keypad.

The top-level menu has 6 possible options (F1-F6). The F1 option allows the user to exit the system and return to DOS. In general, the first option selected should be F4 used to create the workload data using the user-specified staff levels for display and staffing purposes.

Change Workload Production Rates: The F4 option allows the user to change the TA and RA staff levels. Here a new menu is displayed (see Figure 4). To change the TA and RA staff levels for any of the 27 return classes, the user enters the appropriate column number (#) and the new district plan TA and RA staff levels. The new staff levels are translated into a production rate for that return class. The minimum workload level for each return class is zero while the maximum workload level is specified in the EXAMLOAD.xx file. If the maximum is exceeded, the user is warned and the RA and TA levels are proportionately reduced to the maximum level for that return class. Once the new TA and RA staff levels are properly specified, a WORKLOAD.xx file is generated.

If a WORKLOAD.xx file already exists, the production rates used to generate that file along with the staffing factors in STAFF.xx determine the initial TA and RA staff levels. Otherwise, the suggested (SUGG'D) level of production appearing in the EXAMLOAD.xx file is used as the default production rate value, and the district plan TA and RA levels are computed as before.

Display Workload: The F2 option on the top-level menu provides a graphical display of the generated workload. The user is first prompted to specify the type of workload data to be displayed. A map is then drawn that displays up to 6 levels of workload activity for the selected item using color to indicate the different levels of activity. The user can find a particular zip code region, zoom-in further to a more localized map, display a map key specifying the different workload levels, redefine the ranges and number of levels, or exit to the top-level menu.

Figure 4: Staff Year Production Menu

STAFF YEAR PRODUCTION ADJUSTMENTS

| | | NAT'L OFFICE | | DISTRICT PLAN | | | | NAT'L OFFICE | | DISTRICT PLAN | |
#	CLASS	TA	RA	TA	RA	#	CLASS	TA	RA	TA	RA
1	col01	0.4	0.9	0.8	0.8	15	col15	6.7	15.3	7.0	16.0
2	col02	2.0	4.7	3.0	3.1	16	col16	3.6	8.3	4.0	9.0
3	col03	1.6	3.7	2.0	4.0	17	col17	10.5	24.1	11.0	25.0
4	col04	4.3	9.9	5.0	10.0	18	col18	5.8	13.3	6.0	14.0
5	col05	1.9	4.4	2.0	5.0	19	col19	16.5	38.0	17.0	38.0
6	col06	7.5	17.3	8.0	18.0	20	col20	15.5	35.6	16.0	36.0
7	col07	3.6	8.2	4.0	9.0	21	col21	2.5	5.8	3.0	7.0
8	col08	1.4	3.1	2.0	4.0	22	col22	3.0	7.0	3.0	7.0
9	col09	0.2	0.5	0.5	0.5	23	col23	4.9	11.2	5.0	12.0
10	col10	98.7	227.1	99.0	228.0	24	col24	0.4	0.9	0.0	1.0
11	col11	12.8	29.4	13.0	30.0	25	col25	0.3	0.6	0.8	0.0
12	col12	3.4	7.8	4.0	8.0	26	col26	1.1	2.4	1.9	2.9
13	col13	10.0	23.0	10.0	23.0	27	col27	0.0	0.0	0.0	0.0
14	col14	0.2	0.5	0.3	0.8						

Do you wish to change these default values (Y or N)?

Display Current POD Locations: The next top-level menu option (F3) displays the current POD locations graphically. Here, the user has the same options as workload display except that the map now displays only the current POD's using color to differentiate between zip code types. The user does *not* have the option to modify the POD sites as in the LOCATE package.

Display Optimal Zip Code Assignments: The fifth option on the top-level menu (F5) displays the zip codes as they are assigned to the POD's. Zip code areas assigned to the same POD have the same color on the map. The colors are assigned to each group of zip codes so that no adjacent zip code areas that are assigned to different POD's have the same color. The user can locate zip codes and zoom-in for a more localized map as before.

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Report Zip Code and Staff Assignments: The final option is to generate the staffing report (F6). This phase of the system provides the user with two menus for changing two types of staffing factors and interactively displays the resulting staffing estimates. The user may iteratively alter the staffing factors and view the corresponding changes in staff assignments for a fixed level of production. Once this option is completed, a report is generated documenting the final staffing factors and the resulting solution.

Figure 5: Translation Factors Menu

STAFFING INFORMATION: TRANSLATION FACTORS

```
------------------------------------------------------------------------
  # CLASS  TA    RA11   RA12   RA13|  # CLASS  TA    RA11   RA12   RA13
  1  col01 1.0000 2.0000 3.0000 2.0000| 15 col15 1.0000 2.0000 3.0000 2.0000
  2  col02 1.0000 2.0000 3.0000 2.0000| 16 col16 1.0000 2.0000 3.0000 2.0000
  3  col03 1.0000 2.0000 3.0000 2.0000| 17 col17 1.0000 2.0000 3.0000 2.0000
  4  col04 1.0000 2.0000 3.0000 2.0000| 18 col18 1.0000 2.0000 3.0000 2.0000
  5  col05 1.0000 2.0000 3.0000 2.0000| 19 col19 1.0000 2.0000 3.0000 2.0000
  6  col06 1.0000 2.0000 3.0000 2.0000| 20 col20 1.0000 2.0000 3.0000 2.0000
  7  col07 1.0000 2.0000 3.0000 2.0000| 21 col21 1.0000 2.0000 3.0000 2.0000
  8  col08 1.0000 2.0000 3.0000 2.0000| 22 col22 1.0000 2.0000 3.0000 2.0000
  9  col09 1.0000 2.0000 3.0000 2.0000| 23 col23 1.0000 2.0000 3.0000 2.0000
 10  col10 1.0000 2.0000 3.0000 2.0000| 24 col24 1.0000 2.0000 3.0000 2.0000
 11  col11 1.0000 2.0000 3.0000 2.0000| 25 col25 1.0000 2.0000 3.0000 2.0000
 12  col12 1.0000 2.0000 3.0000 2.0000| 26 col26 1.0000 2.0000 3.0000 2.0000
 13  col13 1.0000 2.0000 3.0000 2.0000| 27 col27 1.0000 2.0000 3.0000 2.0000
 14  col14 1.0000 2.0000 4.0000 3.0000|
```

Do you wish to change these default values (Y or N)?

The first menu (see Figure 5) allows the user to modify the translation rates that convert workload to staff hours for each return type and for each staff type. Changing these translation rates requires that the user input the column number (#) and all four translation factors. The input factors are restricted to be non-negative and they are checked by the package.

The second menu (Figure 6) allows the user to change the percentage breakdown of TA and RA staff by return type. The breakdown of RA staff is further divided into the percentage of

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Figure 6: Percentage Factors Menu

STAFFING INFORMATION: PERCENTAGE FACTORS

```
--------------------------------------------------------------------------
 #  CLASS   TA     RA11    RA12    RA13|  #  CLASS   TA     RA11    RA12    RA13
 1  col01   50.0   50.0    30.0    20.0| 15  col15   50.0   50.0    30.0    20.0
 2  col02   50.0   50.0    30.0    20.0| 16  col16   50.0   50.0    30.0    20.0
 3  col03   50.0   50.0    30.0    20.0| 17  col17   50.0   50.0    30.0    20.0
 4  col04   50.0   50.0    30.0    20.0| 18  col18   50.0   50.0    30.0    20.0
 5  col05   50.0   50.0    30.0    20.0| 19  col19   50.0   50.0    30.0    20.0
 6  col06   50.0   50.0    30.0    20.0| 20  col20   50.0   50.0    30.0    20.0
 7  col07   50.0   50.0    30.0    20.0| 21  col21   50.0   50.0    30.0    20.0
 8  col08   50.0   50.0    30.0    20.0| 22  col22   50.0   50.0    30.0    20.0
 9  col09   50.0   50.0    30.0    20.0| 23  col23   50.0   50.0    30.0    20.0
10  col10   50.0   50.0    30.0    20.0| 24  col24   50.0   50.0    30.0    20.0
11  col11   50.0   50.0    30.0    20.0| 25  col25   50.0   50.0    30.0    20.0
12  col12   50.0   50.0    30.0    20.0| 26  col26   50.0   50.0    30.0    20.0
13  col13   50.0   50.0    30.0    20.0| 27  col27   50.0   50.0    30.0    20.0
14  col14   40.0   50.0    25.0    25.0|
```

Do you wish to change these default values (Y or N)?

staff handling revenue agent grade 11, grade 12, and grade 13 level activities[1]. These percentage factors are changed by entering the column number (#) followed by the 4 new percentage factors. The first factor determines the percentage of staff performing TA level activities. The last three factors determine how the RA staff is divided into GS11, GS12, and GS13 level activities. All factors must be in the range 0 to 100, with the sum of the last 3 entries equal to 100.

A summary of the four types of staff appearing in Figure 7 is then displayed for each POD in the district. After reviewing these figures, the user may modify the staffing factors described above, recompute the totals, and display the staffing totals again. Once the correct staffing factors are determined, the user can generate a report documenting current staffing factors and

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[1]Note that since the translation factors in the previous menu may not be identical between staff types, the percentage of workload processed by each staff type may be different from the percentage breakdown of staff by TA and RA type (see §4).

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Figure 7: Summary Report

```
POD 90012   TA     52.6   RA11  51.3   RA12   46.2   RA13   20.5
POD 91754   TA     11.6   RA11  11.3   RA12   10.1   RA13    4.5
POD 91790   TA      8.1   RA11   7.9   RA12    7.1   RA13    3.1
POD 92239   TA      1.4   RA11   1.4   RA12    1.2   RA13    0.5
POD 92262   TA      3.8   RA11   3.7   RA12    3.3   RA13    1.5

                                   ⋮

POD 96056   TA      0.6   RA11   0.6   RA12    0.5   RA13    0.2
POD 96097   TA      0.6   RA11   0.5   RA12    0.5   RA13    0.2
-------------------------------------------------------------------
TOTALS      TA    224.6   RA11 218.6   RA12  196.7   RA13   87.4
```

production rates and return to the top-level menu. The user may then exit the system and return to the DOS prompt.

4 THE WORKLOAD COMPUTATION

As in all mathematical models, the accuracy and usefulness of the model depends on the correct specification of all the input parameters. Most parameters described below are fictitious and do not represent the actual settings. The IRS National Office is currently addressing the proper specification of the parameters to this model. In this section these input factors are used only to demonstrate the staffing computation and the assignment of workload and staff to POD's.

The computation of workload estimates converts staff assignments into levels of workload for each of the return classes taking into account the translation and percentage factors previously described. Other input parameters needed to estimate workload and staff requirements accurately include the estimated *direct exam-time percentage (DEP)* factor and the *total man-hours* for a given fiscal year.

The computation begins with the user specifying the TA and RA staff levels for each return type as replicated in Figure 4. Both totals are converted into the estimated examination hours using the DEP and total man-hours factors described earlier. Once the TA and RA examination staff hours are found, they must be converted into the estimated examination workload using

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the current translation factors (see Figure 5) and the percentage factors (see Figure 6).

This operation can be described as follows. Since the RA staff type has three categories of revenue agents, each with a different translation factor, the RA staff total is broken down into the three staff types prior to converting the staff totals into examination hours. With the RA staff percentages found in the STAFF.xx file, the total RA staff hours are divided into the three RA types, then converted into the number of returns using their respective translation factors. Summing the return totals for each of the three RA staff types with the TA return total results in the total production level for that return type. If the total workload exceeds the maximum permitted, the RA and TA staff levels are reduced proportionately to the maximum level.

With the approriate production levels, the three columns of workload contained in the EX-AMLOAD.xx file are combined as determined by the production rates into a single column representing the estimated workload for a particular return class. The following example describes in detail how workload columns are generated.

Suppose that the user has indicated the following production level, $rate$, for the 1040 returns class after specifying the TA and RA levels as described above. Let $(rate_1, rate_2, rate_3)$ be the production rate triple from the EXAMLOAD.xx file representing the $minimum$, $suggested$, and $maximum$ levels for the 1040 class returns and assume $examload_{1040_1}$, $examload_{1040_2}$, $examload_{1040_3}$ represent the corresponding columns in the EXAMLOAD.xx file for the 1040 return class. Let $workload_{1040}$ represent the column of workload for the 1040 class returns. Then for zip code i

$$workload_{1040}(i) = \alpha_1 examload_{1040_1}(i) + \alpha_2 examload_{1040_2}(i) + \alpha_3 examload_{1040_3}(i)$$

where

$$
\begin{aligned}
\alpha_1 \;&=\; rate/rate_1 \text{ if } rate < rate_1 \\
&=\; 1 \text{ if } rate \geq rate_1 \\
\alpha_2 \;&=\; 0 \text{ if } rate \leq rate_1 \\
&=\; \left(\frac{rate - rate_1}{rate_2 - rate_1}\right) \text{ if } rate_1 < rate < rate_2 \\
&=\; 1 \text{ if } rate \geq rate_2 \\
\alpha_3 \;&=\; 0 \text{ if } rate \leq rate_2 \\
&=\; \left(\frac{rate - rate_2}{rate_3 - rate_2}\right) \text{ if } rate_2 < rate \leq rate_3.
\end{aligned}
$$

This operation is performed for each of the 36 different return classes. The resulting WORK-LOAD.xx file can be accessed for later use in the STAFF model and is compatible with the

workload file for the LOCATE model. The file will be perserved until the user changes the production rate as just described. With the WORKLOAD file generated, the assignment of workload and staff to each POD may be performed.

For a single POD site, the workload from all zip code areas in its jurisdiction is found for each of the 27 return types. *E.g.*, for POD 90012, the total workload for 1040 class returns is

$$total_{1040} = \sum_{i \mapsto 90012} workload_{1040}(i),$$

where $i \mapsto 90012$ represents all zip code areas i assigned to POD 90012. To compute the staffing totals, the workload totals are divided between the TA and RA staff types and between the three RA types representing the portion of the workload handled by each staff type.

Since the translation factors in Figure 5 are allowed to vary, the *percentage of workload* processed by a particular staff level differs from the *percentage of total staff* at that staff level assigned to process that workload. Hence, the fraction of workload processed by each staff type must be computed. Let p_{ta} and t_{ta}, for example, represent the percentage breakdown of staff and the translation factor for the 1040 class returns, respectively, for the TA staff type. The fraction of workload processed by staff type TA is

$$p_{1040 \mapsto ta} = \frac{p_{ta} t_{ta}}{p_{ta} t_{ta} + p_{ra11} t_{ra11} + p_{ra12} t_{ra12} + p_{ra13} t_{ra13}},$$

where $p_{1040 \mapsto ta}$ represents the fraction of 1040 workload assigned to staff type TA described earlier.

Multiplying the workload totals by the translation factor and the workload factor above results in hours spent by each staff type processing this class of returns. For POD 90012,

$$
\begin{aligned}
TA_{hours} &= total_{1040} \cdot p_{1040 \mapsto ta} \cdot t_{ta} \\
RA11_{hours} &= total_{1040} \cdot (1 - p_{1040 \mapsto ta}) \cdot p_{1040 \mapsto RA11} \cdot t_{ra11} \\
RA12_{hours} &= total_{1040} \cdot (1 - p_{1040 \mapsto ta}) \cdot p_{1040 \mapsto RA12} \cdot t_{ra12} \\
RA13_{hours} &= total_{1040} \cdot (1 - p_{1040 \mapsto ta}) \cdot p_{1040 \mapsto RA13} \cdot t_{ra13}
\end{aligned}
$$

Dividing the number of man-hours for each staff type by the *DEP* factor results in the total staff hours needed for IRS staff to examine returns and perform other duties. The final step is to divide the total number of man-hours by the *total man-hours* for that year, resulting in the final staff-year estimates. Thus, for the example developed, the actual number of staff-years required to process the specified workload for the 1040 return class is

$$TA_{years} = \frac{TA_{hours}}{DEP * HoursPerYear}$$

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$$RA11_{years} = \frac{RA11_{hours}}{DEP * HoursPerYear}$$

$$RA12_{years} = \frac{RA12_{hours}}{DEP * HoursPerYear}$$

$$RA13_{years} = \frac{RA13_{hours}}{DEP * HoursPerYear}$$

Summing the total staff of each type for each of the return classes provides staff estimates for POD 90012. Due to the extensive breakdown of the various staffing input factors, the user can also accurately determine both the projected number of cases examined for each return type, and also the projected number of hours spent in each of the 27 different return classes. This provides useful information both to staff and management on the expected use of the available staff.

5 CONCLUSIONS AND FUTURE WORK

This study extended the application and usefulness of the LOCATE facility location package to include more specific post-of-duty information such as workload and staff types. The STAFF system can accurately estimate staffing requirements and provides a necessary complement to determination of posts-of-duty and the allocation of workload to the posts. This system was designed to allow the user flexibility in estimating staff and provide a vehicle for examining the staff process. Many of the staffing parameters must be accurately specified for the STAFF system. Further research will be critical in estimating the various input factors used in this model.

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U.S. DEPT. OF COMM. **BIBLIOGRAPHIC DATA SHEET** (See instructions)	1. PUBLICATION OR REPORT NO. NISTIR 89-4059	2. Performing Organ. Report No.	3. Publication Date JULY 1989

4. TITLE AND SUBTITLE

Allocating Staffing to Tax Facilities: A Graphics-Based Microcomputer Allocation Model

5. AUTHOR(S)

Paul D. Domich

6. PERFORMING ORGANIZATION (If joint or other than NBS, see instructions) **NATIONAL BUREAU OF STANDARDS U.S. DEPARTMENT OF COMMERCE GAITHERSBURG, MD 20899**	7. Contract/Grant No.
	8. Type of Report & Period Covered

9. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS (Street, City, State, ZIP)
Center for Computing and Applied Mathematics
NIST, Boulder, CO 80303

10. SUPPLEMENTARY NOTES

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

11. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)

This paper presents computer model to allocate Internal Revenue Service staff to field offices so to satisfy user-defined level of workload. The system is microcomputer-based and uses menus and graphically displayed zip code maps of IRS districts for interactive inputs and solution outputs. The level of workload is interactively apecified and a detailed report of workload and staff assignments is automatically generated.

12. KEY WORDS (Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)

staffing, IRS Examination Division, application to tax service, microcomputer, interactive graphics.

13. AVAILABILITY	14. NO. OF PRINTED PAGES
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