AD-A172 372 AUTOMATED QUALITY ASSURANCE EVALUATOR SCHEDULING PROGRAM (AQSP)(U) AIR FORCE LOGISTICS MANAGEMENT CENTER GUNTER AFS AL C M COFFIN ET AL. AUG 86 1/1

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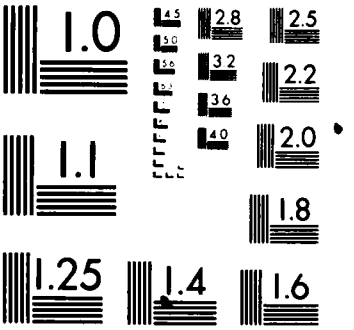

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AD-A172 372

AUTOMATED QUALITY ASSURANCE EVALUATOR SCHEDULING PROGRAM (AQSP)

CAPTAIN CHARLES M. COFFIN, JR.
SSGT TOM COLE

AFLMC PROJECT LC840712

AUGUST 1986

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ABSTRACT

This report documents the development of the Automated Quality Assurance Evaluator Scheduling Program (AQSP). The program was developed within the requirements of Air Force Regulation 400-28 and is designed to provide QAEs a tool to produce monthly random inspection schedules required to inspect a contractor's performance under an Air Force service contract. The manual process, which on average takes from 4 hours to 4 days each month to produce a schedule, has been automated and now the same schedule can be produced in minutes. The program can assist all QAEs who use random sampling as a method of producing a monthly inspection schedule, and was developed for use on a Z-100 microcomputer with a Winchester hard disk capability. A user's guide is available from the AFLMC to assist all users of this program.

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EXECUTIVE SUMMARY

The Automated Quality Assurance Evaluator Scheduling Program (AQSP) is designed to provide QAEs an automated scheduling program which will accurately and efficiently produce a randomly generated monthly surveillance schedule required by AFR 400-28. In a manual mode, Quality Assurance Evaluators (QAEs) routinely spend anywhere from 4 hours to 4 days every month producing inspection schedules. The manual process is paperwork intensive and requires precise follow through on numerous exacting procedures; therefore, it is not uncommon for QAEs to produce inaccurate and or incomplete schedules. Several Air Force Inspector General (IG) reports documented numerous problems with the QAE program. One recommendation made by the IG was to develop a computer generated random sample program. The QASP is a response to the IG's recommendation and it is a generic program for QAEs to use on a variety of service contracts.

Our initial efforts focused on developing a program which would be used for the refuse collection service contract at Barksdale AFB. Barksdale tested the prototype program and made recommendations for improvements. Also, coordination with HQ SAC/LGC, HQ USAF/RDCL and HQ AFESC/DE occurred throughout the development phase.

Our final product allows a QAE to generate a monthly surveillance schedule in 5 to 30 minutes on average versus the 4 hours to 4 days required under the manual process. To generate a schedule, the QAE needs only to answer some very basic computer prompted questions. Then the QAE can request a summary calendar output product which shows how many inspections are scheduled for each day in the month, and a monthly or daily checklist showing what, when, and where to inspect a particular service item on a particular day. The program uses a menu system and contains detailed HELP information to assist if needed. We estimate the average QAE who is totally unfamiliar with computers can be fully proficient with 1 to 2 days of training. Detailed user's and programmer's guides have also been developed to further assist all users of the program.

We recommend implementation Air Force wide.

PREFACE

Captain Charles S. Lail was the initial project manager on this project and thus deserves a great deal of credit for managing the project through its early developmental stages prior to his PCS move.

Special thanks to SSgt Gerald Axford of 2 CES/DEEC at Barksdale AFB, LA for his dedicated support as our primary point of contact throughout the test and development phase of the program.

Appreciation is also extended to Joseph S. Blackman, QAE, 3800 ABW/DEEC, Maxwell AFB, AL; A1C James Rachwal, QAE, 325 CES/DEEC and Paul Ziak, QAE, 325 SUS/SUF, Tyndall AFB, FL; Chong S. Son, QAE, 56 CES/DEEC, MacDill AFB, FL; and Larry Collins, QAE, 1776 ABW/SVF, Andrews AFB, for their assistance in testing our program and user's guide.

We also thank HQ USAF/RDCL, HQ AFESC/DE, HQ SAC/LGC, 2 BMW/LGC and 2 CES/DEE, Barksdale AFB, LA for all their support and assistance throughout this project.

Last but certainly not least, a great debt of gratitude is extended to SSgt Tom (T.C.) Cole, AFLMC/LGY, for the tremendous job he did in analyzing the requirements of AFR 400-28, and developing and writing the program.

TABLE OF CONTENTS

	PAGE
ABSTRACT	i
EXECUTIVE SUMMARY	iii
PREFACE	v
CHAPTERS	
1 - PROBLEM	1
Background	1
Problem Statement	1
2 - DEVELOPMENT	3
Approach	3
Results	7
Hardware/Software Requirements	13
3 - CONCLUSIONS AND RECOMMENDATIONS	15
Conclusions	15
Recommendations	15
FIGURES	
1 - List Service Locations	3
2 - Determine Lot Size	4
3 - Assign Sequential Numbers	4
4 - Select Random Numbers	5
5 - Matching Random Numbers	5
6 - Preparing A Monthly Schedule	6
7 - Master File Output Product	8
8 - Monthly Summary Calendar	10
9 - Monthly Schedule/Checklist	12

CHAPTER 1

PROBLEM

Background

AFRs 70-9 and 400-28 prescribe standard Air Force Quality Assurance Evaluation (QAE) program requirements. The AF Inspector General has documented many problems with the QAE program and recommended "a computer-generated random sample program should be developed..." as one of several solutions. This same recommendation was included in COPPER 90, an AFLMC report which outlined initiatives needed to transition Base Contracting into the 1990's. The Air Force expends a significant portion of its annual budget on a variety of service contracts designed to support the various missions of bases worldwide. As such, the performance of QAEs is crucial to the effective management of Air Force service contracts. QAEs help the Air Force get what it pays for. This project is just one of several identified enhancements necessary to improve the Air Force's QAE program.

Problem Statement

Monthly Quality Assurance Surveillance Plans for random sampling of Air Force service contracts are difficult and time consuming to develop properly. The exacting detail required by AFR 400-28 and extensive use of random number tables have caused many QAEs to have difficulty complying with requirements of the regulation. Therefore, a computer program which performs all of the tedious processes to produce an accurate monthly schedule is the recommended solution.

CHAPTER 2

DEVELOPMENT

Approach

Our original programming design focused on developing a random number generator program which would produce an inspection schedule for a refuse collection service contract. In order to accomplish this objective, we studied the requirements of AFR 400-28 and talked to a variety of people concerning the many manual QAE functions automation could eliminate. We concluded a QAE must perform six basic manual steps to produce a monthly schedule accurately each month.

The oversimplified steps for manually producing a monthly schedule are depicted graphically in figures 1 through 6 below:

Using the refuse contract at Barksdale AFB as an example, a QAE must first list all of the service locations required by the contract and the monthly frequency for performing each service.

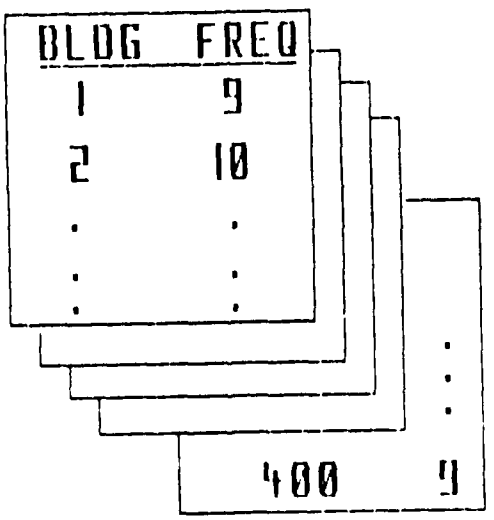

Fig 1 - List Service Locations

Next, the QAE multiplies the total number of service locations by their respective frequencies to obtain a lot size, which for Barksdale is 4,253.

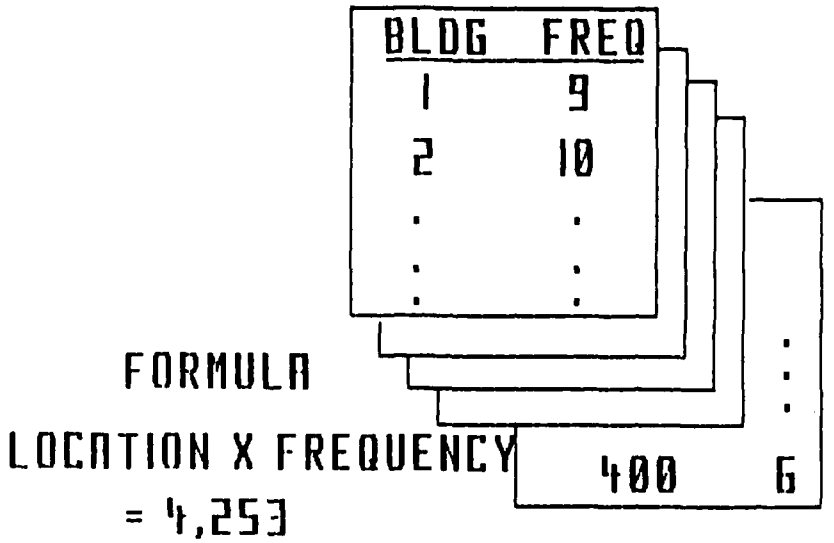

Fig 2 - Determine Lot Size

The third step is extremely time consuming, because the QAE must list all 4,000 plus service locations on paper and assign a sequential number to each one.

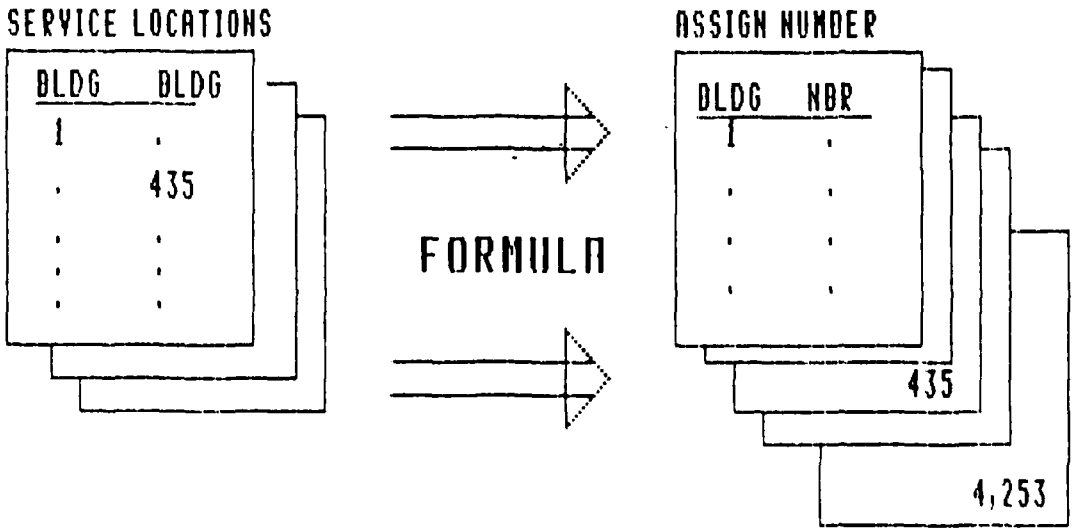

Fig 3 - Assign Sequential Numbers

The fourth step involves selecting random numbers from the random number table in AFR 400-28, which prescribes detailed procedures for accomplishing this task.

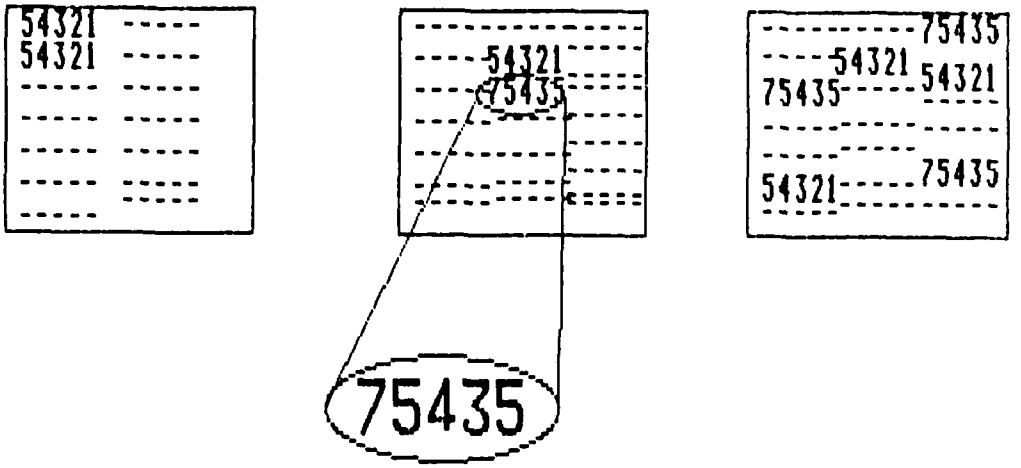

Fig 4 - Select Random Numbers

Step 5 requires the QAE to match the selected random numbers (In Barksdale's case, a total of 80 numbers were required) against the list of 4,000 plus service locations identified in Step 3.

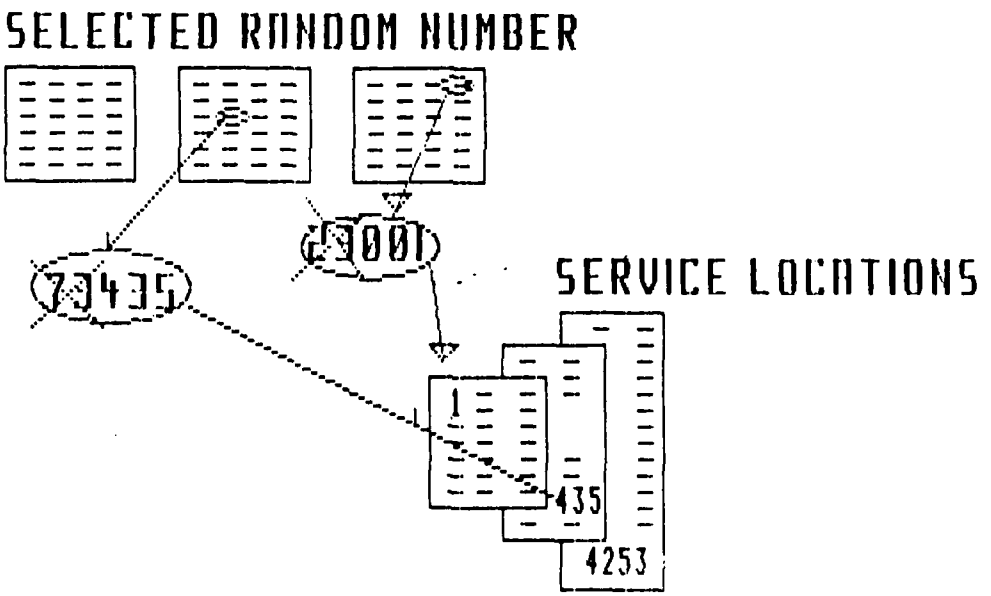

Fig 5 - Matching Random Numbers

The final step involves the actual preparation of the monthly schedule. The QAE must use a calendar to pinpoint exactly what dates the inspections for the randomly selected service locations fall on. The QAE then prepares a tally checklist for use during the inspections. These six steps complete the tedious and exacting routing required by QAEs to generate a schedule.

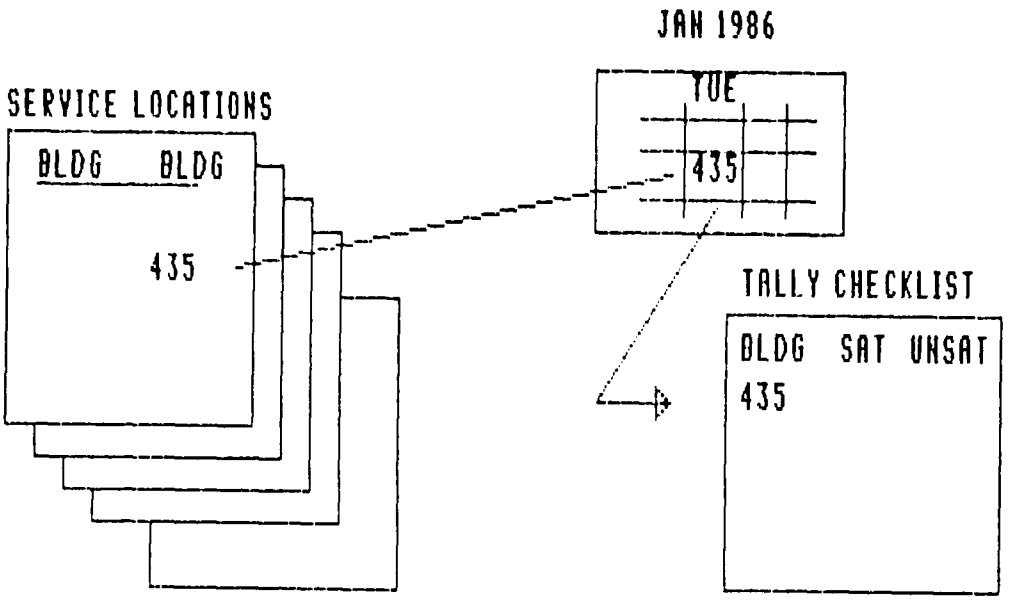

Fig 6 - Preparing a Monthly Schedule.

This process takes the average QAE anywhere from 4 hours to 4 days every month to produce a schedule. Our programming design effort was geared to maximize automation of the process and thus simplify it. This in turn will produce more accurate/complete schedules and reduce the time required by the QAE to produce the schedule.

From the outset of program development, we focused on making the program easy to use and kept this at the forefront of testing and demonstration. We demonstrated the prototype program at Barksdale AFB, LA on their refuse collection service contract. As a result, two enhancements were identified to further improve the program. They include developing: (1) a contractor performance management system, complete with notices when Acceptable Quality Levels (AQLs) are exceeded; and (2) a QAE management data base to track QAE appointments and training requirements. We also demonstrated the prototype program at Tyndall AFB, FL for the benefit of the Air Force Engineering and Service Center (AFESC) representatives, since the engineering and services functions will be the biggest users of the program.

After our initial reprogramming effort, we revisited Barksdale and Tyndall AFBs to demonstrate the revised program. To reinforce the emphasis on user friendliness, we also used a QAE from Maxwell AFB, AL to test the program.

After providing Barksdale an enhanced version of the program to use on their refuse collection contract, the QAE produced two consecutive problem-free monthly schedules. We then coordinated the program with HQ USAF/RDCL, HQ SAC/LGC and HQ AFESC/DE, and concluded the program met the criteria established in AFR 400-28. However, several additional tests were conducted to reverify the ease of using the program.

Additional tests on the user's guide were conducted at Maxwell, Tyndall, MacDill and Andrews AFBs. We concluded an effective user's guide should include a tutorial section in addition to specific reference information. The QAEs who tested the program and user's guide proved our products were effective. As a result, final software modifications to the program, the programmer's guide, and user's guide were completed.

Results

The Automated Quality Assurance Evaluator Scheduling Program provides a QAE the ability to accurately and efficiently produce a random sample monthly inspection schedule. Instead of spending many hours or days to produce a schedule manually each month, the program can produce the schedule in 5 to 30 minutes on average. This is a significant reduction in schedule preparation time; therefore, QAEs will have more time to inspect a contractor's performance.

Using the program requires the following three basic steps. In Step 1, a master file is created. The master file inputs consist of: (1) the name of the service and any additional services required for the primary service; (2) the AQL for each service; (3) the specific item location and name of item; (4) the service days scheduled during the week and the number of times an item is serviced per day. In Barksdale's case, a total 400 plus contract line items were input per the above referenced requirements. Once all inputs are loaded, the program will then automatically calculate the lot size, the sample sizes (normal, medium, small, reduced) for the lot size, and the monthly frequency of each specific service item. Figure 7 depicts a sample of a master file.

01/28/86 MASTER FILE LISTING FOR: INDUSTRIAL REFUSE COLLECT
FOR MONTH OF: February
START DAY OF MONTH: Saturday

Service	AQL	Un-Acc	Lot Size	Normal	Medium	Small	Reduced
REFUSE W/OUT GARBAGE	2.5	00	000760	0080	032	020	032
CONTAINER SERVICABILITY	2.5	00	000760	0080	032	020	032
EMPTY CONTAINERS	6.5	00	000760	0080	032	020	032
POSITION OF CONTAINERS	6.5	00	000760	0080	032	020	032
SANITATION	6.5	00	000760	0080	032	020	032
SPILLAGE	6.5	00	000760	0080	032	020	032

Location	Item Designation	Freq	Not-Weekly	Per-Day	Alt	5-or-7	SMTWTFS
001-8122	TRANSMITTER SITE	004	0	1	0	0	0100000
Acc Freq: 000000	Service Dates: 03 10 17 24						
002-8930	BX CONVENIENCE STORE	008	0	1	0	0	0100100
Acc Freq: 000004	Service Dates: 03 06 10 13 17 20 24 27						
003-7664	CULLEN PARK	004	0	1	0	0	0100000
Acc Freq: 000012	Service Dates: 03 10 17 24						
004-7662	FORESTRY OFFICE	004	0	1	0	0	0100000
Acc Freq: 000016	Service Dates: 03 10 17 24						
005-0001	CLEAR LAKE PARK	004	0	1	0	0	0100000
Acc Freq: 000020	Service Dates: 03 10 17 24						
006-7632	NAVY COMPOUND	004	0	1	0	0	0000100
Acc Freq: 000024	Service Dates: 06 13 20 27						
007-7835	RECEIVER SITE	004	0	1	0	0	0100000
Acc Freq: 000028	Service Dates: 03 10 17 24						
008-7588	CONVENTIONAL WSA	004	0	1	0	0	0000100
Acc Freq: 000032	Service Dates: 06 13 20 27						
009-7056	K-9 KENNELS	004	0	1	0	0	0000100
Acc Freq: 000036	Service Dates: 06 13 20 27						
010-6394	FAA	004	0	1	0	0	0000100
Acc Freq: 000040	Service Dates: 06 13 20 27						
011-6564	RIFLE RANGE	004	0	1	0	0	0000100
Acc Freq: 000044	Service Dates: 06 13 20 27						
012-7428	WSA (RESTRICTED)	004	0	1	0	0	0000100
Acc Freq: 000048	Service Dates: 06 13 20 27						
013-7318	WSA (RESTRICTED)	004	0	1	0	0	0000100
Acc Freq: 000052	Service Dates: 06 13 20 27						
014-7322	WSA (RESTRICTED)	004	0	1	0	0	0000100
Acc Freq: 000056	Service Dates: 06 13 20 27						
015-7201	SUPPLY	008	0	1	0	0	0100100
Acc Freq: 000060	Service Dates: 03 06 10 13 17 20 24 27						

Figure 7 - Master File Output Product

Step 2 requires the QAE to update the master file for each month a schedule is desired by answering computer-prompted questions such as: (1) What month is the schedule being prepared for?; (2) What day is the first day of the month?; (3) Are there any days to be excluded from consideration for random selection, etc.? Also, any maintenance work required to change, add or delete any information pertaining to a particular master file input is accomplished at this time in order to make the final step valid.

Step 3 requires the QAE to decide via menu driven screen displays what output products to generate. The two main outputs available are the monthly calendar which summarizes the total number of inspections scheduled for each day during the month and the monthly schedule/checklist. The monthly summary calendar depicted in Figure 8, provides a QAE with a quick snapshot of the inspection workload for the following month. The calendar indicates the total number of inspections scheduled for each day during the month.

SUMMARY OF QAE MONTHLY SCHEDULE FOR: INDUSTRIAL REFUSE COLLECT
As of: 1/28/86

<<<<< FEBRUARY 1986 >>>>>

SUN	MON	TUE	WED	THU	FRI	SAT
						01
02	03	04	05	06	07	08
	6	1	2	4	3	2
09	10	11	12	13	14	15
	1	1	3		3	
16	17	18	19	20	21	22
	2	1	1	2	2	
23	24	25	26	27	28	
	4	3	3	3	2	

NOTE: Number in lower right corner indicates the total number of inspections to be performed on that day. "EXCL" indicates excluded date(s).

****
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Figure 8 - Monthly Summary Calendar

The monthly schedule/checklist is a comprehensive document which provides the QAE a day by day breakdown of specific services randomly selected by the computer for inspection. The schedule indicates the actual random number selected by the computer and provides a space (i.e. the tally checklist) for the QAE to annotate after inspection remarks. Figure 9 depicts a sample of a monthly schedule.

QAE MONTHLY SCHEDULE FOR: INDUSTRIAL REFUSE COLLECT
For the month of: FEBRUARY
As of: 1/28/86

<<<<<<< Friday the 14th >>>>>>>

//

Service		Sample Requested		Sample Used	AQL%
REFUSE W/OUT GARBAGE		32		32	2.5
Location	Item Designation	Occ	Acc/UnAcc	Ranmbr	Remarks
1. 038-6415	HANGAR (5)		___/___	190	
***	CONTAINER SERVICABILITY		___/___	N/A	
***	EMPTY CONTAINERS		___/___	N/A	
***	POSITION OF CONTAINERS		___/___	N/A	
***	SANITATION		___/___	N/A	
***	SPILLAGE		___/___	N/A	
2. 052-5778	SHOP ENG I&R		___/___	278	
***	CONTAINER SERVICABILITY		___/___	N/A	
***	EMPTY CONTAINERS		___/___	N/A	
***	POSITION OF CONTAINERS		___/___	N/A	
***	SANITATION		___/___	N/A	
***	SPILLAGE		___/___	N/A	
3. 113-4314	DORM PARKING LOT		___/___	726	
***	CONTAINER SERVICABILITY		___/___	N/A	
***	EMPTY CONTAINERS		___/___	N/A	
***	POSITION OF CONTAINERS		___/___	N/A	
***	SANITATION		___/___	N/A	
***	SPILLAGE		___/___	N/A	

//

COMMENTS: _____

Figure 9 - Monthly Schedule

Additional features of the program include the ability to generate a set of random numbers only; an AQL monthly summary listing which depicts the status of a service items accept/reject level; and a 10% overdraw feature to complement the regular monthly schedule in case the QAE misses a required inspection date.

Hardware/Software Requirements

The following equipment is required:

- Zenith Z-100/Z-248 microcomputer with Winchester hard disk drive.

- MSDOS Version 2.1 or higher operating system.

- COBOL Software Version 1.12 or higher. (Microsoft COBRUN.EXE version 1.12 is included)

- Printer (any Z-100 compatible printer).

The AFLMC will provide initial program software and users/programmers guides to all MAJCOM LGCs and DEs.

- For information on ordering additional copies, call AV 446-4085.

CHAPTER 3

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. The Automated Quality Assurance Evaluator Scheduling Program (AQSP) provides QAEs the ability to accurately and efficiently produce monthly random inspection schedules with enough input flexibility to allow a QAE to perform duties without yielding to the temptation to "pencil-whip" inspection schedule preparation responsibilities. The program further eliminates the QAE's requirement for detailed written documentation as to how the schedule was produced which frequently involves burdensome paperwork. The program does not guarantee a contractor's actual performance will be measured more accurately; however, it will provide an objective schedule which meets AFR 400-28 criteria and it does solve the problem identified by the Air Force IG.

2. Because of the proven benefit of this program, the program should be distributed Air Force wide and become a standard Air Force system. Also, to further upgrade the QAE management information system concept, an effort to develop a contractor performance management system and a QAE management data base should also be considered for future development.

Recommendations

1. Approve use of the Automated Quality Assurance Evaluator Scheduling Program for use by QAEs Air Force wide. (OPR: HQ USAF/RDC)

2. Assist Air Force MAJCOM functional representatives with training and distribution of the software and users guide. (OPR: AFLMC/CC)

3. Transition the software to the Data Systems Design Office for maintenance as a standard Air Force data system. (OPR: USAF/RDC, OCR: DSDO/CC, AFLMC/CC).

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