

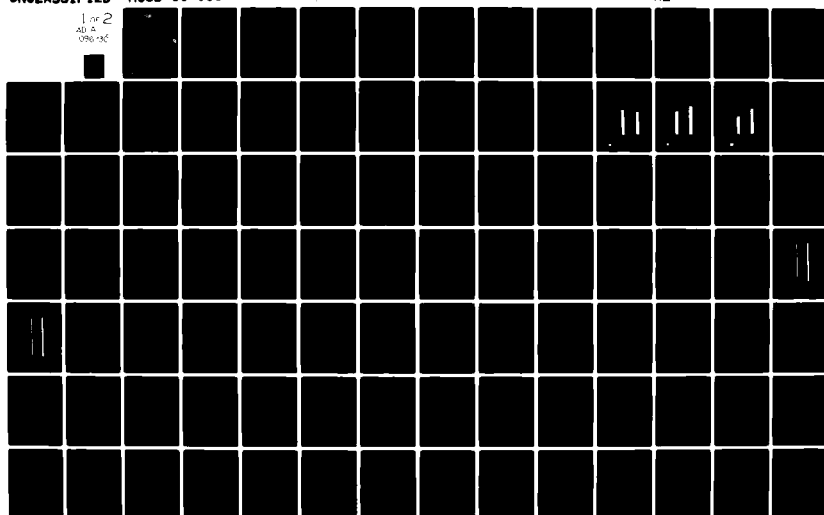
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COMPARISON OF THE OUTPUT IN WEIGHTED WORK UNITS OF INSTALLATION--ETC(U)
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HEALTH CARE STUDIES DIVISION REPORT -80-005

COMPARISON OF THE OUTPUT IN WEIGHTED WORK UNITS OF INSTALLATION
DENTAL LABORATORIES WITH THAT OF REGIONAL DENTAL ACTIVITIES,
Part II.

by

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11 July 1980

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Dental laboratories are essential to the mission of the Army dental care system. There are dental laboratories in almost every US Army dental clinic. There is also a system consisting of four large central dental laboratories whose primary mission is to provide support to a number of dental activities (DENTAC) within a defined geographical area. Both RDAs and dental laboratories are essential, although there is some duplication of effort. The objectives of this study were threefold: (1) to determine the actual utilization of		

dental laboratory technicians assigned to the DENTAC; (2) to identify patterns of technician assignment to the DENTAC, both civilian and military, for information which may be useful to higher headquarters upon which to base future policies; (3) to identify which laboratory, DENTAC, or RDA, is more productive in terms of average output per technician assigned. Six DENTAC laboratories were surveyed. The data collection and analysis automated system used by the RDAs was slightly modified for use in this study. It was concluded that: (a) military technicians assigned to DENTACs are clustered in the lower enlisted grades (E1-E4) while civilian technicians are primarily rated in the medium grades (GS6-8); (b) military technicians assigned to a DENTAC are utilized for the most part in their primary MOS; (c) the RDAs consistently are more productive than the DENTAC laboratories; (d) there is a need for a uniform system for accounting for laboratory production at the DENTAC level.

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SUMMARY

This study was requested by the Deputy Commander for Dental Services, Health Services Command (HSC). The Health Care Studies Division (HCSD), Academy of Health Sciences (AHS), was tasked to perform the study by the Commander, Health Services Command, US Army. The overall purposes of the study was to determine the productivity of DENTAC laboratories in terms of Weighted Work Units (WWU) per assigned technician.

The objectives of the study were threefold: (1) to determine the actual utilization of dental laboratory technicians assigned to the DENTAC; (2) to identify patterns of technicians assignment by grade for both military and civilian-hire; (3) to identify which laboratory (system), DENTAC or RDA, is more productive in terms of average output (in WWU) per available technician. The laboratory services of six DENTAC collected data for this study.

The results of a mail poll of all DENTAC within HSC revealed that, in general, military dental laboratory technicians are utilized in their primary MOS. This poll also revealed that military technicians in the DENTAC tend to be grouped in the lower enlisted grades (E1-E4) while civilian-hire technicians are clustered in the middle grades (GS6-8). Military and other non-job-related duties did not appear to significantly interfere with the performance of their primary duty to any greater degree than at the RDAs. Approximately 78 percent of available productive time was spent at the bench by technicians at the six DENTAC study sites. The same figure for technicians at the RDAs was about 71 percent.

Laboratory production data was submitted for the study using the Procedure Codes in AR 40-182 (December 1979), Regional Dental Activity Report. These are the same codes by which the DENTAC report monthly to HSC. The information was processed and analyzed using the computer program developed for use by the Regional Dental Activity system (Army). This program provided a production analysis report for each DENTAC which contained the following production data: (a) the total WWU for all 75 laboratory procedures as set forth in AR 40-182; (b) the average daily WWU for each DENTAC and each technician working in the DENTAC laboratory; (c) the average technician strength and productivity including:

- 1 Average daily number of technicians assigned.
- 2 Average daily technician hours present for duty.
- 3 Average daily WWU per assigned technician.
- 4 Average WWU per technician hour.

Descriptive statistics were used to compare each test site against the others and to the RDAs. Analysis of Covariance (ANCOVA) and Chi-square tests were also used to see if there were significant differences among the DENTACs studied in productivity and technician availability for duty. Results showed that the DENTACs reported a greater percentage of available time involved in productive activity than did the RDAs. However, the RDAs reported higher productivity figures in all categories.

The results of the study indicate that there is a great variance in both the quantity and type of laboratory production at DENTACs. The study also showed that while the DENTAC laboratories and the Regional Dental Activities provide some overlapping services, there is a distinct need for each. Comparison of workload reports submitted for this study and workload reports submitted to HSC by the same DENTAC for the same time periods show that there is a need for a uniform standard accounting system for dental laboratory production at the DENTAC level.

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The authors wish to acknowledge the invaluable help and cooperation of the participating Dental Activity commanders and project officers. The laboratory personnel who participated, and in particular the individuals responsible for laboratory activities at the study sites, also deserve our gratitude. The interest of these individuals contributed greatly to the accuracy of the data collection process. The authors are also indebted to Captain Terry Rauch who provided the statistical analyses and to the Health Care Systems Support Activity, especially Mr. Carlisle, for their computer support. A special thanks is due to Health Care Studies Division personnel for the typing of the manuscript and preparation of tables and graphs.

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I. INTRODUCTION.

A. Purpose.

(1) The overall purpose of this study was to determine the productivity of DENTAC laboratories in the role of direct support to their parent organization and to the overall mission of the US Army dental care system. Implicit in the study was the need to monitor the actual utilization of trained laboratory technicians by the DENTAC. Such utilization impacts directly upon the usefulness of the organizational laboratories as well as reflecting upon the most efficient use of dental personnel in general within the dental care system. The competition between the Regional Dental Activities and the various DENTAC for trained personnel makes the latter point most important.

(2) The information obtained by this study will be useful to the Deputy Commander for Dental Services, US Army Health Services Command, in the evaluation of the laboratory effort at the DENTAC level and in the future allocation of human and material resources to this effort.

B. Background.

(1) Dental laboratory support is provided at two organizational levels. Each DENTAC has integral laboratory facilities and assigned trained personnel. There are also four Regional Dental Activities (RDA) which provide support for a number of DENTAC based partly upon geographical location and partly upon the production capacity of the particular RDA.

(2) Because of ever-tighter fiscal and personnel restrictions, many DENTAC laboratories have reduced their capability while the RDA system has been forced to increase the support given to the DENTAC. There are certain laboratory procedures which DENTAC laboratories cannot do. A task such as the fabrication of metal frameworks for removable partial dentures requires specialized equipment and a level of expertise which can be utilized most effectively by centralized laboratories. Thus the need for such facilities is established.

(3) The DENTAC laboratories must perform tasks on an immediate basis, both because of the nature of certain tasks and the materials involved and because some tasks must be completed quickly to aid the patient. Thus the need for local laboratories is also established. However the DENTAC laboratories also perform a number of procedures commonly done at the RDA, and vice versa. The DENTAC laboratories, of necessity, are organized like a cottage industry in contrast to the RDA laboratories which are organized more industrially, stressing division of labor and the concept of departmentalization.

(4) Staffing of technicians at the RDA is based upon production, both historically and expected demand. At the DENTAC, staffing is based upon the number of dentists assigned, their specialties, and the presence or absence of prosthodontic training programs. With the newly-introduced reporting system which is procedure-specific, manning of DENTAC laboratories can be done more knowledgeably. However, it is vital that the production and productivity of both the DENTAC laboratories and the RDA laboratories be analyzed so that their actual mission can be more specifically defined. Until now, that has been very difficult to do.

II. OBJECTIVES.

- A. To determine the actual utilization of the dental laboratory personnel assigned to the DENTAC.
- B. To identify which laboratory, DENTAC or RDA, is more productive in terms of average output (in Weighted Work Units) per available technician.
- C. To identify patterns of laboratory technician utilization and assignment to the DENTAC upon which higher headquarters may base future personnel policy in this area.

III. METHODOLOGY-DATA COLLECTION.

A. Overview.

(1) The study was conducted at six DENTAC. It was divided into two parts. A mail poll was taken in which the commanders of all DENTAC within CONUS were asked to provide information concerning the assignment to and utilization of both military and civilian (GS) dental laboratory personnel within their organization. The data form used to gather this information can be seen at Appendix A-1.

(2) The second portion of the study involved on-site data collection at six large DENTAC within CONUS. The period of the data collection effort covered three months. The study sites were selected because of their comparable size which would allow fairly equitable comparisons to be made with the data. All dental laboratory procedures accomplished at each of the six DENTAC were reported according to the method used in the RDA system and recently adopted for use at the DENTAC level. Data was submitted to the project officer at Health Care Studies Division, Academy of Health Sciences, Fort Sam Houston, Texas for monitoring and correction of errors. Data was transferred to punch cards and analyzed by the Systems Division, Health Care Systems Support Activity (DMIS). Reports were forwarded to HCSD for analysis.

B. Procedure.

(1) A Prosthodontic Procedure Record (Appendix A-2) was initiated for each case submitted to the laboratory. This form was designed to permit multiple entries, which reduced paperwork and eased the clerical burden on the technicians and supervisors at the study sites.

(2) In Block 5 of the form the procedures accomplished were narratively described. The procedure code was entered in Block 6 according to AR 40-182 (Appendix A-3). The purpose of the double entry was to permit the investigators to check the accuracy of the entries and to make necessary corrections.

(3) One individual at each DENTAC was designated by the DENTAC commander to coordinate and supervise the recording and collection of data. The laboratory supervisor in each clinic was responsible for insuring that the required data was recorded on the forms provided. The coded Prosthodontic Procedure Records (PPR) were collected when work on a particular case was completed and they were submitted monthly to HCSD. Even though a particular case was not completed at the end of the test period, all PPRs remaining in the laboratories were collected and

submitted to HCSD. The information from the PPRs was posted to the keypunch worksheet (Appendix A-4) by the staff at HCSD. Monthly coding instructions and procedures are at Appendix A-5.

(4) To further examine the accuracy of the laboratory technician utilization data for management purposes, a Daily Laboratory Technician roster was maintained by each laboratory at each of the study sites for the duration of the test (Appendix A-6). Card Q, Technicians present for duty, and coding instructions for Card Q are shown at Appendix A-7 and A-8.

(5) Computer processing of the data collected on-site was accomplished utilizing the RDA program on-line at HSC-HCSSA (DMIS).

(6) The sample data was obtained from the following DENTAC: Fort Knox, Kentucky; Fort Campbell, Kentucky; Fort Jackson, South Carolina; Fort Bragg, North Carolina; Fort Hood, Texas; and Fort Ord, California.

IV. METHODOLOGY-DATA ANALYSIS.

A. Descriptive statistics were used to describe the results of the personnel information obtained via the mail poll. No further statistical analyses were attempted because such information, even if available, would have no significant impact on subsequent findings.

B. Analysis of Variance (ANOVA), Chi-Square, and Analysis of Covariance (ANCOVA) were the principal statistical tools used to evaluate differences among DENTAC for laboratory procedure accomplishment rates and technician productivity.

C. For the purposes of data consolidation and computer listing the Regional Dental Laboratory technician accounting system was used. This system is currently an active program on the HSC-HCSSA (DMIS) computer.

D. Computer printouts provided data for analysis. A production analysis report contained production data as follows:

- (1) by weighted work unit (WWU);
- (2) by major dental prostheses;
- (3) average daily weighted work units;
- (4) average daily strength and productivity data to include:
 - a average daily number of technicians assigned;
 - b average daily technician hours present for duty;
 - c average daily WWUs per assigned technician;
 - d average WWUs per available technician hour.

E. A station report showing what procedures and how many WWUs were accomplished at each site during two consecutive one-month intervals.

F. A consolidated production analysis report showing the same data as in (D2) but with the six study sites consolidated.

G. In addition to the analysis provided by the HSA-HCSEA printout, further statistical analyses were performed. Program and computer support was provided by the Operations Analysis Office, Combat Development and Health Care Studies Division, Academy of Health Sciences. The preprogrammed Statistical Package for the Social Sciences (SPSS) was employed for data analysis beyond that obtained from the HCSEA program. Analyses included:

(1) Descriptive statistics to compare each test site against the other to test the validity of the data submitted.

(2) Testing to determine if those procedures which must be done almost exclusively at the DENTAC laboratory level (clinic) have a significant impact on the ability of the local laboratories to accomplish other work (RDA-specific) on a timely basis.

(3) Comparison of the average daily hours present for duty per technician in DENTAC laboratories and in RDAs.

V. FINDINGS.

A. The data collected from the six study sites were reviewed and analyzed by the investigators at HCSD. Statistical analyses on the data were provided by HCSD statisticians.

B. The second quarter, Fiscal Year 1980, was chosen as the test period for two reasons. One, laboratory personnel had time to work with the new reporting system initiated at the beginning of FY80. Two, laboratory workload was expected to be high, thus ensuring optimal utilization of the laboratory technicians. January 1980 was chosen as the "shakedown" month to allow both the study sites and the investigators to work with the testing process and eliminate as many problems as possible. Data from February 1980 and March 1980 were used for this report.

C. The results of the personnel survey taken by mail at all thirty-seven DENTAC within Health Services Command are shown in Table 1P through 7P. The pertinent information gleaned from this survey is that the military laboratory technicians are clustered in the lower enlisted grades. By contrast, the civilian hire technicians are almost entirely rated in GS grades 6 or above. Also of interest from the survey was the finding that a relatively small percentage of military technicians were assigned duties other than in their primary specialty on a full time basis. The interesting factor here though was that when assigned outside their primary MOS the positions they filled were often those requiring a higher grade. The implications seem to be obvious, but no proved conclusions can be drawn.

D. Tables 8 through 11 show the proportion of available productive time spent in productive laboratory activity by technicians at both the study sites and the Regional Dental Activities (RDA). The number of civilian technicians employed at each study site and the ratio to the total laboratory technician force is shown in Table 12. Tables 13 and 14 present the volume in weighted work units of RDA-specific laboratory procedures accomplished at the study sites and compare it to the total production at each site. Orthodontics was excepted because it is not done at all laboratories, nor is this clinical service offered at all study sites. RDA-specific laboratory procedures are defined as those procedures commonly done at the large central laboratories as opposed to those tasks

which are done almost exclusively at the local (station) dental laboratories. They are listed in Appendix A-9.

The average daily weighted work units (WWU) produced per assigned technician at the study sites and at the RDAs are presented in Tables 15 and 16, and the total average daily WWUs produced per technician hour at the six study sites and at the four RDAs are at Tables 19 and 20. Tables 21 and 22 present a listing of those tasks performed almost exclusively at the local laboratories along with the average days in lab from submission to completion and the quantity produced during each of two consecutive months. See Appendix A-10 for a listing of these procedures. Tables 23 and 24 graphically portray a selection of procedures which are performed commonly by both local and central (RDA) laboratories. The tables also present the days-in-lab for each procedure.

E. A sample of a Consolidated Production Analysis Report (composite study data) is at Appendix A-11. Appendix A-12 is a Production Analysis Report for one study site for one month.

F. A Procedure Report for one of the study sites is at Appendix A-13. This report includes a listing of all procedures accomplished during one calendar month, the number of each produced, the weighted value for each procedure, and the average stay in the laboratory from submission to completion.

VI. DISCUSSION.

A. Personnel. It is important to describe the human resources which produce the output analyzed in reports such as this one. The technical competence of these resource persons cannot be described except by inference from the grade and rank levels. It can be assumed that a higher grade level denotes more experience and, hopefully, greater technical skill and competence. The number of technicians assigned or allocated to a DENTAC is also important when compared to the estimated workload demand which that DENTAC is expected to provide for them.

In Table 1P it can be seen that for both requirements and allocations of military technicians the majority are in the rank of E4 and below. Sixty-three percent of military requirements and sixty-two percent of allocations are for these lower grades while only about thirty-five percent in both categories are for grade E7 and above. By contrast, in all 37 DENTAC surveyed there is only one requirement and one allocation for a civilian technician in the grade of GS 5 or below. The survey showed that there are 129 requirements and 120 allocations for technicians in the grade of GS 6 and above (see Table 2P).

Intuitively, the experience level of a technician can be expected to have a significant effect upon the quality of the work produced. It is useful then to compare the mix of civilian and military technicians working at DENTAC dental laboratories. From Table 3P it can be seen that in each case, requirements, allocations, and assigned, approximately sixty percent are military, of which about sixty-three percent are in the lower grades (and lower experience/skill) levels.

Looking further into the personnel situations within the installation (DENTAC) laboratories, one can examine the degree to which personnel are assigned against both the recognized requirements and the positions authorized (allocations). The recognized requirements are based upon projected workload which a DENTAC is expected to generate while allocations are based primarily upon the expected available personnel resources. The latter figure is usually lower than recognized requirements because it is based upon what is, rather than the ideal. As can be seen from Table 4P, eleven DENTAC have less than 100 percent fill as compared to recognized requirements. Table 5P shows that only five DENTAC have

fewer personnel assigned than positions authorized while twenty DENTAC have greater than 100 percent fill as compared to allocations. Sixteen DENTAC have more personnel assigned than recognized requirements.

It is within the prerogative of the DENTAC commander to utilize the assigned personnel according to the greatest need. However, these personnel must be allowed to work in their primary MOS at least part of the time. The extent to which dental laboratory personnel are assigned to other duties will be reflected both in the quantity and quality of work produced. Civilian personnel normally cannot be assigned outside their specialty areas. In Table 7P it can be seen that only about ten percent of assigned military laboratory technicians are assigned to other duties at any one point in time. What may be significant however are the duties which they are delegated. Two of the more significant positions to which these personnel were assigned were that of clinic Non-Commissioned Officer-in-Charge (NCOIC) and acting chief dental NCO for the DENTAC. Implicit in both of these positions is fairly senior rank (grade). Thus, one might assume that in some DENTAC the very few senior laboratory technicians are not functioning in their primary MOS on a full-time basis.

B. Productivity. The effective utilization of personnel can be measured by comparing the average daily technician hours present for duty to the number of available work hours. The latter figure is derived by multiplying by eight hours the average daily number of technicians assigned. As can be seen in Tables 8 and 9 productive activity ranged from fifty-one percent to a high of ninety-two percent during the two months under study. Consolidated figures for the six DENTAC laboratories were seventy-six and eighty percent respectively for the two months. By comparison, the RDA figures were lower but more consistent, ranging from sixty-two percent to seventy-three percent with two month consolidated averages of seventy and seventy-one percent.

There were significant differences among the six study sites in the available time spent in productive activity. For Month 1, the results from a one-way analysis of covariance (ANCOVA) with technicians assigned as the covariate and duty hours worked as the dependent variable are presented in Table 27. When differences for the number of technicians assigned per laboratory, $F(1,113) = 538.27$, $p < .001$, was controlled for, there was a significant difference in the number of duty hours worked between laboratories, $F(5,113) = 39.61$, $p < .001$.

Table 28 shows the results of a one-way ANCOVA for Month 2. Since the six DENTAC laboratories significantly differed with respect to the number of technicians assigned, $F(1,119) = 449.82$, $p < .001$, ANCOVA was used to control for this variance. Inspection of the data again shows significant differences in the number of duty hours worked between laboratories, $F(5,119) = 43.69$, $p < .001$, after covarying out the number of technicians assigned.

A larger proportion of civilians on the staff will usually result in less productive time lost because they are away from their jobs less than their military colleagues. With a few exceptions this held generally true. The laboratories with more civilian technicians tended to report less time lost for non-productive duties and correspondingly they reported higher figures for time involved in productive activity.

Another measure of productivity is the average daily weighted work units produced per assigned technician. Table 15 presents this data for the study sites and Table 16 presents similar data for the Regional Dental Activities. In general the RDAs outperformed the DENTAC laboratories and the RDA performance as a system was more consistent. In both the DENTAC laboratories and the RDAs this measure of productivity showed wide variance between the two months studied, with Month 2 being more productive in both cases. The reasons for these variances are not

apparent. It is interesting to note, however, that technicians at the RDAs outproduced those in the DENTAC laboratories even though the DENTAC laboratories reported (significantly) higher figures for the proportion of available work hours engaged in productive activity. Using the average weighted work units produced monthly per technician as the dependent variable, there was a significant difference in the analysis of variance between DENTAC laboratories ($p < .001$).

Productivity can also be measured by the average weighted work units produced per technician hour. This figure is related directly to the percentage of available working hours that technicians are "at the bench." As can be seen in Tables 19 and 20, the RDAs individually and as a system outperformed the DENTAC laboratories. It is sometimes tempting to relate productivity in terms of weighted work units to the type of work being done. Orthodontic laboratory work has a high WWU value in comparison to the time required to fabricate an appliance. Crown and bridge laboratory work is also heavily weighted in proportion to the time involved in production. However, as can be seen from Table 29, there does not appear to be any evidence to confirm such hypotheses. DENTAC Sites 2 and 3 both produce a heavy orthodontic workload, whereas Site 1 did very little in Month 1. In Month 2, when Site 1 reported a significantly greater orthodontic workload, its productivity figures were still very similar to Sites 2 and 3. Site 4, which was the lowest in both months in productivity, reported a large percentage of their workload in the fixed prosthodontic category. Therefore, the reasons for variance in productivity are not apparent from these data.

Also directly related to the technician productivity figures is the production potential of dental laboratories. The figures given in computer printouts furnished by the RDA program are based upon a total month, with weekends and holidays included. When computed according to the number of working days in the month, the daily average figures are about thirty percent higher. Figures computed on both bases will be presented because the working days figures give a more realistic representation of worker productivity.

Tables 17 and 18 present the daily production in terms of WWU at the DENTAC study sites and at the RDAs. These figures merely illustrate the production potential for each type of laboratory and they are not presented for the purpose of making comparisons. The four RDAs are each much larger than any one of the DENTAC laboratories and thus they have both greater potential and larger production capacities.

C. Most DENTACs have both the facilities and the skilled laboratory technical staff to provide many of the services which RDAs provide. However, the DENTAC labs also have the responsibility to provide direct support to the clinic by doing such things as pouring casts and making dies. Impressions for dental casts must be poured quickly to prevent inaccuracies caused by the distortion of impression material which occurs upon standing. Other tasks, though not of such immediacy, are performed almost exclusively at the DENTAC level in direct support of the clinician.

Tables 21 and 22 present a number of laboratory procedures which are performed mostly by DENTAC laboratories as opposed to RDAs. Does this local requirement have a significant impact on the ability of the local laboratories to do other work on a timely basis? Procedure 18 includes the casts made for fixed prostheses and the removable dies which are a part of the cast. Each removable die is counted as one cast. The time-in-lab is only one day (with two exceptions) since these tasks are usually completed and returned to the doctor in one day or less. The average days-in-lab for other procedures range from one day to thirteen days (calendar), with most averages clustered around 2, 3, 4, 5, and 6 days. If one remembers that mailing time to and from an RDA would be at least four to six

days, these tables indicate that the DENTAC laboratories are able to produce prostheses and other direct clinician support procedures on a timely basis. Pouring casts and making dies, among other necessary tasks, do not interfere with this function.

For the purpose of comparing the ability of the different types of laboratories to be responsive, Tables 23 through 26 present the time-in-lab for procedures which are produced routinely at both DENTAC and RDA laboratories. In almost every instance, the figures are higher for the RDAs. It must be remembered, however, that the RDAs receive work from all of the DENTACs, including those in this study. DENTAC laboratories will often send what they cannot do themselves to the RDAs, which of course must accept this overflow. Therefore, the time-in-lab figures for DENTAC labs are somewhat misleading since they reflect what the DENTACs choose to do and may not include all of those procedures which the unit dentists are generating. The RDAs must accept the work submitted and thus have no way to control input, except for quality.

There are a number of laboratory procedures which are produced both at DENTAC laboratories and at the RDAs. However, for the purpose of this study report, a number of these tasks are being labeled RDA-specific. The term RDA-specific is defined as the type of work which a civilian dentist would normally send to a laboratory, and which in the Army system the RDA is specifically designated to provide. It can also be stated that these can be forwarded to an RDA for fabrication without causing any significant interruption or diminishment of optimum patient care. For the purpose of this discussion, the RDA-specific tasks are 01, 02, 03, 04, 05, 06, 07, 08, 20, 21, 22, 23, 25, 43, 44, and 45. (See Appendix A-9 for a listing and definition of these procedures.)

As mentioned earlier, most DENTAC laboratories can do these procedures too. There are a few, such as the fabrication of removable partial denture frameworks and some maxillofacial prostheses, which most DENTAC laboratories have neither the equipment nor trained personnel needed to accomplish. Orthodontic laboratory procedures are also excluded from this discussion because not all of the laboratories do them in significant volume and because in many cases their WWU value is disproportionately high in relation to the work and materials involved. As can be seen in Tables 13 and 14, the DENTAC laboratories workload taken together was comprised of fifty-seven and fifty-five percent RDA-specific procedures. Though the reported workload was significantly greater in the second month, the proportion of RDA-specific work was substantially the same as in the first month. The two largest DENTAC reported the largest percentages of RDA-specific accomplishments in both months (Sites 1 and 5), while the smallest DENTAC (Site 4) reported the lowest percentage for both months. These differences are not related to the staffing levels, however, since these three DENTAC have substantially the same number (and skill levels) of laboratory technicians.

Probably the most significant aspect of this discussion of RDA-specific workload is that the DENTAC laboratories assume responsibility for a large share of work that requires a high skill level and that by doing so they are providing a significant service for both the patient and dentist. In view of the much longer in-lab time for most procedures at the RDAs when compared to the DENTAC laboratories, it is not difficult to conjecture the problems which might be created should all of this workload be sent to the RDAs. The global mission of the RDAs to support those facilities which have little or no indigenous laboratory capability does not allow much room for expansion with present facilities or staff.

D. Beginning with the start of Fiscal Year 1980, the individual DENTAC have been submitting procedure-specific dental laboratory workload reports along with

the monthly clinical workload reports. Prior to this time workload reports were given only in a lump sum of weighted work units. This was very unsatisfactory because it allowed neither the DENTAC commander nor higher headquarters to know exactly what kinds of work an installation was doing nor how much. For example, a large total of weighted work units does not necessarily indicate that a significant volume of sophisticated prostheses are being produced.

A monthly report submitted by a DENTAC can be seen at Appendix A-13. Assuming that the information contained therein is accurate, managers at HSC and equivalent and higher command levels have valuable information upon which to make informed judgments concerning the allocation of resources to the RDA system and to the DENTAC "system." The need for both types of laboratories is widely acknowledged and accepted within the Army Dental Care System. But the supply of skilled and experienced dental laboratory technicians continues to shrink as the active Army becomes smaller and the attraction of opportunities in the civilian sector becomes greater. The smaller pool of technicians will require closer and better management because it will contain fewer experienced people.

The information contained in the new reporting system can be very useful as a management tool. However, a comparison of the reports submitted to HSC for the same two months included in this present study indicate that all is not well with the reporting system (at Table 30). In every case the reports submitted to HSC indicate higher production than the information submitted for this study. One would normally assume that when under close scrutiny, such as a study like this requires, the information submitted would be more carefully scrutinized than under more routine conditions. A thorough examination of the data submitted for this study effort indicates that this may not be the case in all instances.

First, a check of the raw data sheets against the information in the computer printouts showed that there was a very small error rate in the keypunching and computer analysis of the study data ($\pm 6\%$). This is an acceptable margin in data processing. Assuming that there is a comparable error rate in the data processing of the information submitted for the HSC reports, the effects should be neutralizing.

Second, a careful perusal of the HSC reports and the study reports showed that some serious reporting errors were made by the DENTAC involved in this study in their reports to HSC (see Appendix A-14). Procedures were reported which the DENTAC laboratories cannot perform, such as the fabrication of removable partial denture frameworks. One DENTAC, which has no orthodontic service, reported a heavy workload in orthodontic appliances. Procedure Code 75, which can easily be misused, was reported heavily to HSC, but very little to this study, possibly a reaction to the knowledge that data submitted for this study would be closely scrutinized. In general, the reports to HSC reflected higher WWU totals in most procedure categories. Even in one instance where the HSC report totals and the study workload total were very close, a comparison of individual procedure line items indicated that confusion still exists over the use of the laboratory reporting system.

There is another indication that the HSC reports may contain erroneous data. Based upon the workload totals submitted to HSC by the six DENTAC involved in this study, the average daily weighted work units (productivity) per assigned technician would range from 48.66 to 85.08 for the month of February. By comparison, the same figures for the four RDAs ranged from 44.57 to 64.69 with a consolidated average of 49.73. With the level of expertise in the RDAs and the assembly line production-oriented approach they use, it is unlikely that a DENTAC laboratory or group of them would be so much more productive. The RDA workload reporting system and computer analysis has been in use for many years. The information it supplies is accurate. The new HSC reporting system has not yet worked out the problems inherent in the start-up of such a system.

VII. CONCLUSIONS.

A. Military dental laboratory technicians tend to be clustered in the lower enlisted grades, while the government civilian employees are grouped in the middle grade levels.

B. Dental laboratory technicians assigned to the DENTACs are, for the most part, not delegated other duties.

C. The available time involved in production activity at the study sites, based upon an eight hour day and the number of technicians assigned, exceeded that reported by the RDAs.

D. The Regional Dental Activities are more productive than the DENTAC laboratories, with higher figures for average daily WWU per assigned technician and average WWU per technician hour.

E. Despite an improved workload reporting system, the lack of a standard internal accounting system for laboratory production at the DENTAC level appears to be responsible for inaccurate reporting to higher headquarters.

F. The data accounting and analysis program utilized by the RDA system and modified for use in this study was found to be usable and useful. The implementation of a similar system applied to all DENTAC within HSC would provide higher headquarters with important and pertinent management information.

VIII. RECOMMENDATIONS.

A. Recommend that the assignment and utilization of military laboratory technicians within each DENTAC be continuously and systematically monitored.

B. Recommend that a standard accounting system for dental laboratory production be instituted at the DENTAC level.

C. Recommend that DENTAC monthly laboratory reports be analyzed using a program similar to the data accounting and analysis program currently utilized by the RDAs.

FIGURES

Figure 1

PERCENT OF AVAILABLE TIME INVOLVED

IN PRODUCTIVE ACTIVITY

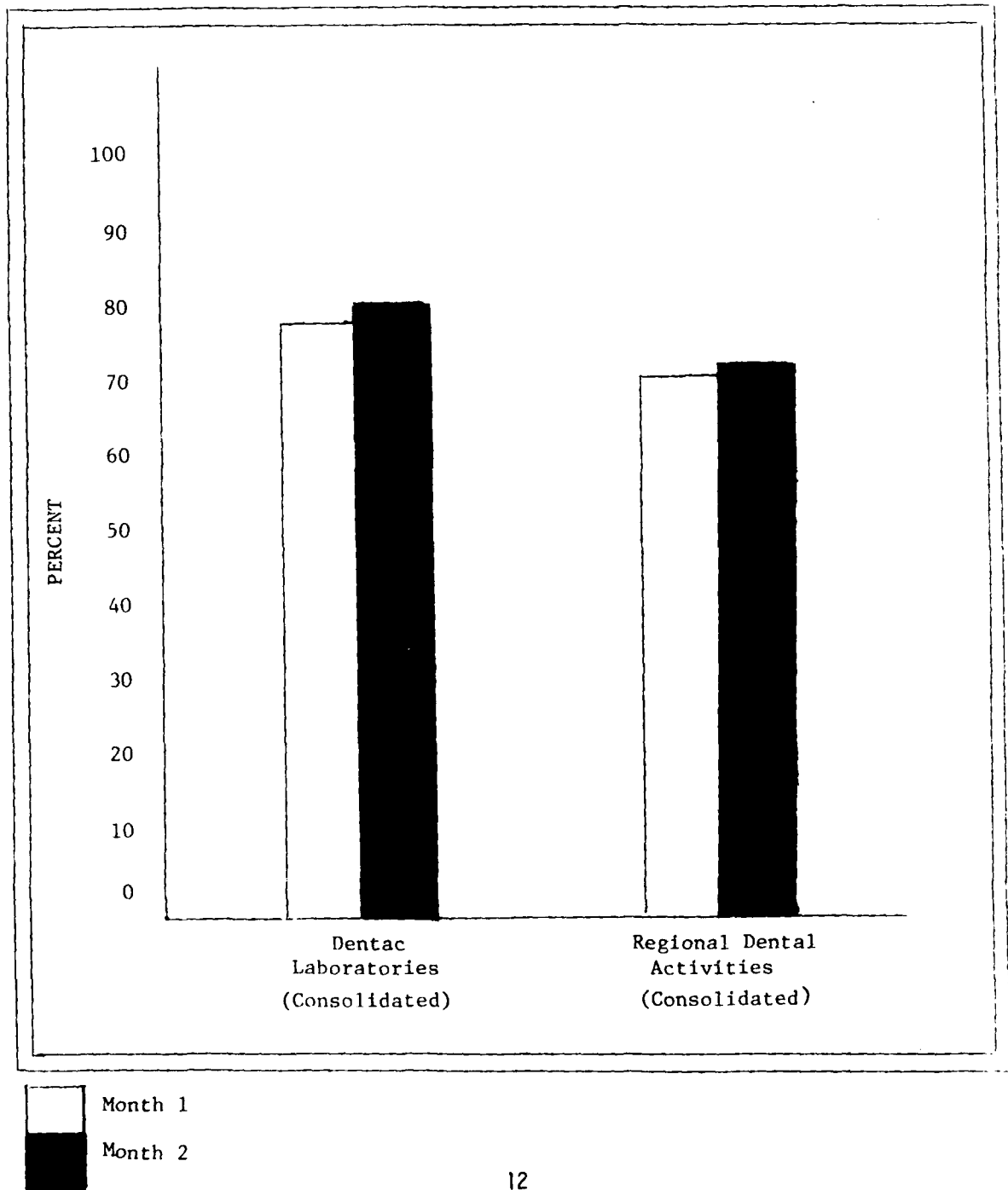
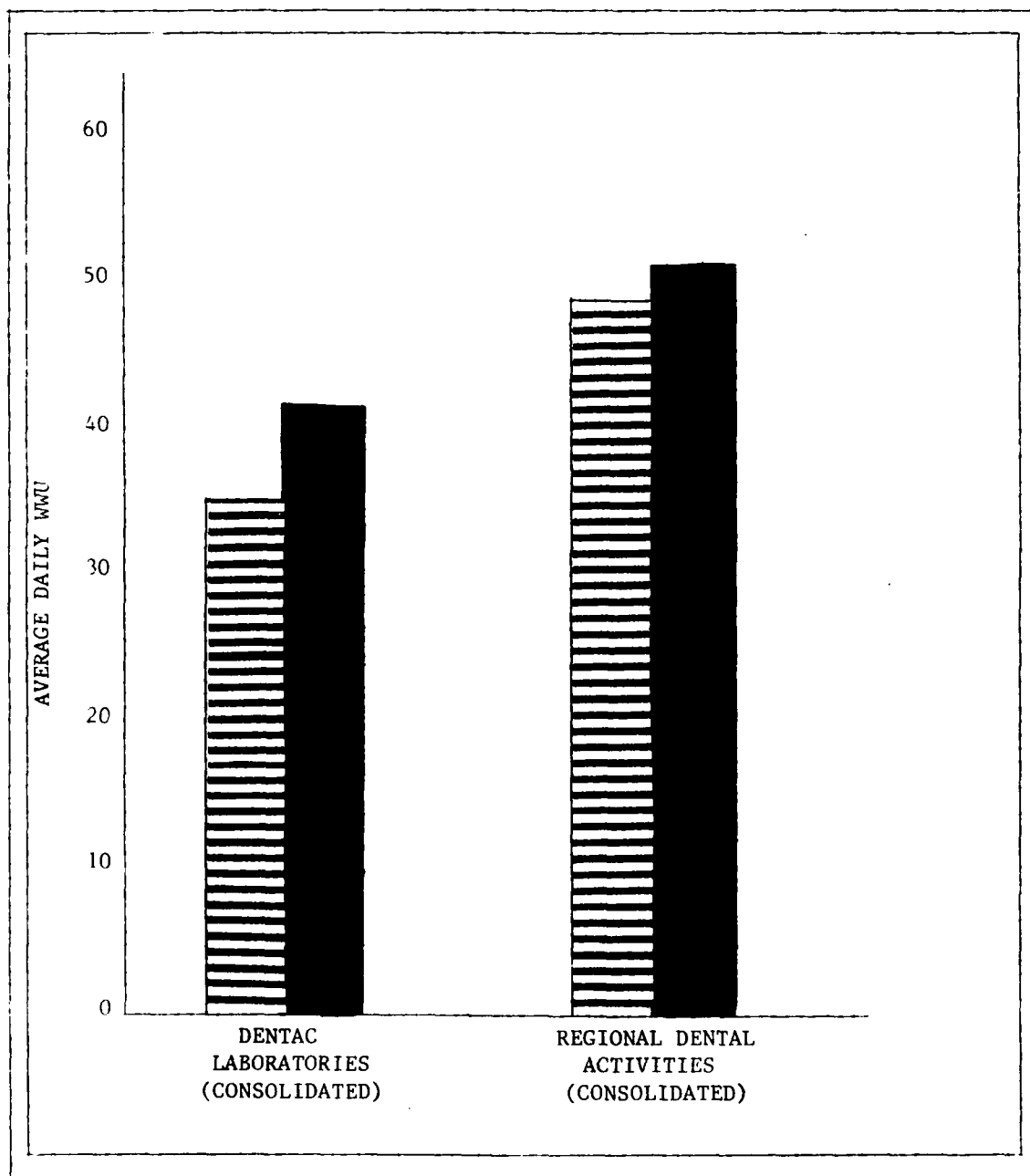


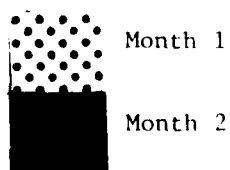
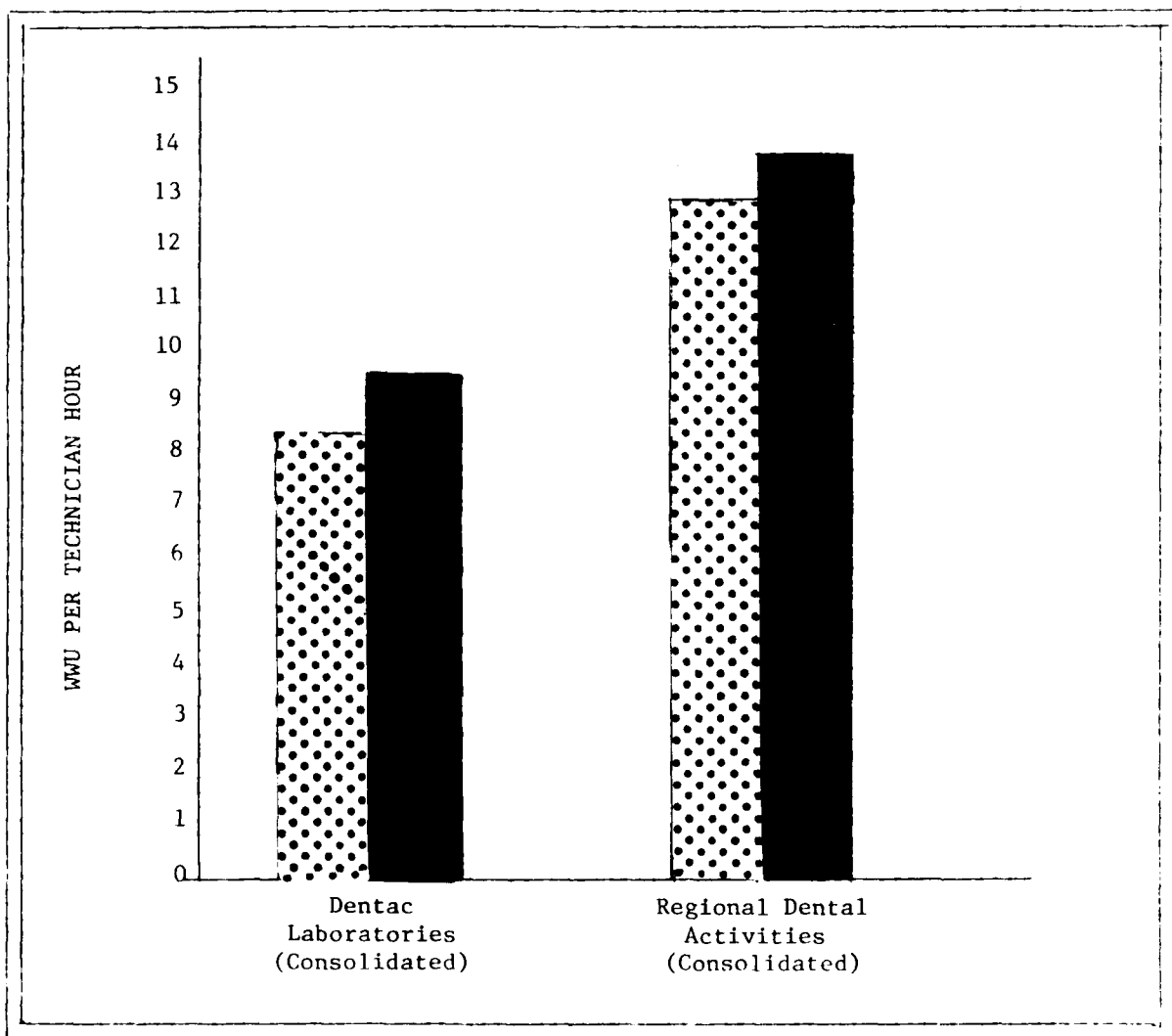
Figure 2
AVERAGE DAILY WEIGHTED WORK UNITS
PER ASSIGNED TECHNICIAN



 Month 1
 Month 2

Figure 3

AVERAGE WEIGHTED WORK UNITS PRODUCED
PER TECHNICIAN HOUR



TABLES

TABLE 1P

MILITARY REQUIREMENTS, ALLOCATIONS BY RANK

DENTAC	Requirements			Allocations		
	<u>E4 and Below</u>	<u>E5-E6</u>	<u>E7</u>	<u>E4 and Below</u>	<u>E5-E6</u>	<u>E7</u>
ALASKA	5	3	-	5	1	-
BELVOIR	1	-	-	1	-	-
BENNING	7	5	1	6	5	-
BLISS	6	3	1	5	3	1
BRAGG	2	3	-	2	3	-
CAMPBELL	7	3	-	7	3	-
CANAL ZONE	3	1	-	3	1	-
CARSON	3	3	-	3	2	-
DEVENS	-	-	-	-	-	-
DIX	-	-	-	-	-	-
EUSTIS	-	1	-	-	1	-
FITZSIMONS	1	-	-	1	-	-
GORDON*	NOT AVAILABLE			NOT AVAILABLE		
HOOD	6	2	-	6	2	-
HUACHUCA	3	3	-	2	3	-
JACKSON	6	2	-	6	2	-
KNOX	3	2	1	2	1	1
LEAVENWORTH	2	2	-	2	2	-
LEE	3	1	1	3	1	1
LEONARD WOOD	3	2	1	3	2	1
LEWIS	3	1	-	3	1	-
McCLELLAN	-	1	-	-	1	-
MEADE	6	1	-	6	1	-
MONMOUTH	-	-	-	-	-	-
ORD	2	1	-	2	-	-
POLK	8	1	-	3	1	-
PRESIDIO OF SAN FRANCISCO	3	1	-	3	1	-

REDSTONE	2	1	-	2	1	-
ARSENAL						
RILEY	2	7	-	1	6	-
RUCKER	2	1	-	1	1	-
SAM HOUSTON	2	1	-	1	1	-
SHERIDAN	1	-	-	1	-	-
SILL	6	4	-	6	4	-
STEWART	4	2	-	3	2	-
HAWAII	3	2	-	2	2	-
WALTER REED	5	-	-	5	-	-
WEST POINT	2	1	-	2	1	-
TOTALS	112	62	4	98	54	4

* Rank - Specific Data Was Not Available.

6 DENTAC have same number assigned as allocations.

5 DENTAC have fewer assigned than allocations.

23 DENTAC have more assigned than allocations

3 DENTAC have no military technician requirements, allocations, or assigned.

TABLE 2P

CIVILIAN REQUIREMENTS, ALLOCATIONS BY GRADE

DENTAC	Requirements		Allocations	
	<u>GS5 and Below</u>	<u>GS6 and Above</u>	<u>GS 5 and Below</u>	<u>GS 6 and Above</u>
ALASKA	-	-	-	-
BELVOIR	-	2	-	2
BENNING	-	9	-	9
BLISS	1	10	1	8
BRAGG	-	9	-	9
CAMPBELL	-	3	-	2
CANAL ZONE	-	1	-	1
CARSON	-	4	-	4
DEVENS	-	3	-	3
DIX	-	7	-	4
EUSTIS	-	2	-	2
FITZSIMONS	-	4	-	2
GORDON	-	-	-	-
HOOD	-	7	-	7
HUACHUCA	-	1	-	1
JACKSON	-	3	-	3
KNOX	-	8	-	8
LEAVENWORTH	-	1	-	1
LEE	-	2	-	2
LEONARD WOOD	-	2	-	2
LEWIS	-	7	-	7
MCCLELLAN	-	3	-	3
MEADE	-	2	-	2
MONMOUTH	-	3	-	3
ORD	-	5	-	5
POLK	-	5	-	5
PRESIDIO OF SAN FRANCISCO	-	1	-	1

REDSTONE	-	1		-	1
ARSENAL					
RILEY	-	2		-	2
RUCKER	-	2		-	2
SAM HOUSTON	-	2		-	2
SHERIDAN	-	1		-	1
SILL	-	-		-	-
STEWART	-	1		-	1
HAWAII	-	7		-	7
WALTER REED	-	8		-	8
WEST POINT	-	1		-	1
TOTALS	1	129		1	121

24 DENTAC have same number assigned as allocations.

6 DENTAC have fewer assigned than allocations.

4 DENTAC have more assigned than allocations.

3 DENTAC have no civilian slots on their TDA.

TABLE 3P

REQUIREMENTS, ALLOCATIONS, ASSIGNED, MILITARY AND CIVILIAN CONSOLIDATED

<u>DENTAC</u>	<u>REQUIREMENTS</u>	<u>ALLOCATIONS</u>	<u>ASSIGNED</u>	<u>DEVIATION</u>
ALASKA	8	6	6	-
BELVOIR	3	3	5	+2
BENNING	22	20	16	-4
BLISS	21	18	25	+7
BRAGG	14	14	15	+1
CAMPBELL	13	13	11	-2
CANAL ZONE	5	5	7	+2
CARSON	10	9	11	+2
DEVENS	3	3	3	-
DIX	7	4	6	+2
EUSTIS	3	3	4	+1
FITZSIMONS	5	3	5	+2
GORDON	9	8	10	+2
HOOD	15	15	15	-
HUACHUCA	7	6	6	-
JACKSON	11	11	10	-1
KNOX	22	20	13	-7
LEAVENWORTH	5	5	7	+2
LEE	7	7	8	+1
LEONARD WOOD	8	8	8	-
LEWIS	11	11	14	+3
McCLELLAN	4	4	5	+1
MEADE	9	9	14	+5
MONMOUTH	3	3	3	-
ORD	8	7	7	-
POLK	13	9	8	-1
PRESIDIO OF SAN FRANCISCO	6	6	7	+1

REDSTONE	4	4	5	+1
RILEY	11	9	9	-
RUCKER	5	4	5	+1
SAM HOUSTON	5	4	8	+4
SHERIDAN	2	2	2	-
SILL	10	10	8	-2
STEWART	7	6	7	+1
HAWAII	12	11	12	+1
WALTER REED	13	13	15	+2
WEST POINT	4	4	4	-
TOTALS	325	297	324	+27

TABLE 4P

PERCENT FILL - TOTAL TECHNICIAN REQUIREMENTS

	TOTAL REQUIREMENTS	TOTAL ASSIGNED	PERCENT FILL
ALASKA	8	6	75*
BELVOIR	3	5	167
BENNING	22	16	73*
BLISS	21	26	124
BRAGG	14	15	107
CAMPBELL	13	11	85*
CANAL ZONE	5	7	140
CARSON	10	11	110
DEVENS	3	3	100
DIX	7	6	86*
EUSTIS	3	4	133
FITZSIMONS	5	5	100
GORDON	9	10	111
HOOD	15	15	100
HUACHUCA	7	6	86*
JACKSON	11	10	91*
KNOX	22	13	59*
LEAVENWORTH	5	7	140
LEE	7	8	114
LEONARD WOOD	8	8	100
LEWIS	11	14	127
McCLELLAN	4	5	125
MEADE	9	14	156
MONMOUTH	3	3	100
ORD	8	7	86*
POLK	13	8	62*
PRESIDIO OF S.F.	6	7	117
REDSTONE	4	5	125
RILEY	11	9	82*
RUCKER	5	5	100

SAM HOUSTON	5	8	160
SHERIDAN	2	2	100
SILL	10	8	80*
STEWART	7	7	100
HAWAII	12	12	100
WALTER REED	13	15	115
WEST POINT	4	4	100

* Less Than 100% Fill Against Requirements

TABLE 5P

PERCENT FILL - TOTAL TECHNICIAN ALLOCATIONS

	TOTAL ALLOCATIONS	TOTAL ASSIGNED	PERCENT FILL
ALASKA	6	6	100
BELVOIR	3	5	167
BENNING	20	16	80*
BLISS	18	25	139
BRAGG	14	15	107
CAMPBELL	13	11	85*
CANAL ZONE	5	7	140
CARSON	9	11	122
DEVENS	3	3	100
DIX	4	6	150
EUSTIS	3	4	133
FITZSIMONS	3	5	167
GORDON	8	10	125
HOOD	15	15	100
HUACHUCA	6	6	100
JACKSON	11	10	91
KNOX	20	13	65*
LEAVENWORTH	5	7	140
LEE	7	8	114
LEONARD WOOD	8	8	100
LEWIS	11	14	127
McCLELLAN	4	5	125
MEADE	9	14	156
MONMOUTH	3	3	100
ORD	7	7	100
POLK	9	8	89*
PRESIDIO OF SAN FRANCISCO	6	7	117

REDSTONE	4	5	125
RILEY	9	9	100
RUCKER	4	5	125
SAM HOUSTON	4	8	200
SHERIDAN	2	2	100
SILL	10	8	80*
STEWART	6	7	117
HAWAII	11	12	109
WALTER REED	13	15	115
WEST POINT	4	4	100

* Less Than 100% Fill Against Allocations

TABLE 6P

LABORATORY TECHNICIANS POSITION FILL RATES - TECHNICIANS
ASSIGNED VS. TOTAL REQUIREMENTS AND TOTAL ALLOCATIONS

	<u>ASSIGNED VS. REQUIREMENTS (%)</u>	<u>ASSIGNED VS. ALLOCATIONS (%)</u>
ALASKA	75*	100
BELVOIR	167	167
BENNING	73*	80*
BLISS	124	139
BRAGG	107	107
CAMPBELL	85*	85*
CANAL ZONE	140	140
CARSON	110	122
DEVENS	100	100
DIX	86*	150
EUSTIS	133	133
FITZSIMONS	100	167
GORDON	111	125
HOOD	100	100
HUACHUCA	86*	100
JACKSON	91*	91*
KNOX	59*	65*
LEAVENWORTH	140	140
LEE	114	114
LEONARD WOOD	100	100
LEWIS	127	127
McCLELLAN	105	125
MEADE	156	156
MONMOUTH	100	100
ORD	86*	100
POLK	62*	89*
PRESIDIO OF SAN FRANCISCO	117	117

REDSTONE	125	125
RILEY	82*	100
RUCKER	100	125
SAM HOUSTON	160	200
SHERIDAN	100	100
SILL	80*	80*
STEWART	100	117
HAWAII	100	109
WALTER REED	115	115
WEST POINT	100	100

* Denotes Less Than 100% Fill

TABLE 7P

MILITARY LABORATORY TECHNICIANS ASSIGNED OTHER DUTIES
AT LEAST 50% OF AVAILABLE DUTY TIME

	<u>1ST QUARTER FY 80</u>	<u>AS OF 31 JANUARY 1980</u>	<u>TOTAL ASSIGNED</u>
ALASKA	-	-	6
BELVOIR	2	2	3
BENNING	1	1	9
BLISS	3	4	16
BRAGG	-	1	6
CAMPBELL	-	-	9
CANAL ZONE	-	-	6
CARSON	1	-	7
DEVENS	-	-	0
DIX	1	-	0
EUSTIS	-	-	2
FITZSIMONS	1	1	2
GORDON	-	-	10
HOOD	-	-	7
HUACHUCA	-	-	6
JACKSON	1	1	7
KNOX	1	1	6
LEAVENWORTH	1	1	6
LEE	-	-	6
LEONARD WOOD	-	-	6
LEWIS	-	-	7
McCLELLAN	-	1	2
MEADE	2	2	11
MONMOUTH	-	-	0
ORD	-	-	2
POLK	-	-	4
PRESIDIO OF SAN FRANCISCO	-	-	6

REDSTONE	3	1	4
RILEY	-	-	8
RUCKER	2	2	4
SAM HOUSTON	-	1	6
SHERIDAN	-	-	1
SILL	-	-	8
STEWART	-	-	6
HAWAII	2	1	5
WALTER REED	-	-	7
WEST POINT	1	-	3
 TOTALS	 22 (10.8%)	 20 (9.8%)	 204

DUTY POSITIONS TO WHICH ASSIGNED (FREQUENCY):

CLINIC NCOIC - 9
 ACTING CHIEF DENTAL NCO - 2
 ADMINISTRATION - 2
 DENTAL ASSISTING - 7
 RECEPTIONIST - 3

Table 8

AVAILABLE HOURS INVOLVED IN PRODUCTIVE ACTIVITY BY
TECHNICIANS AT THE STUDY SITES

Month 1

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Consolidated
Average Daily Number of Technicians Assigned	14.00	7.00	14.00	13.30	15.00	7.00	46.87
Average Work Hours Daily (Line 1 x 8 hrs)	112.00	56.00	112.00	106.40	120.00	56.00	374.96
Average Daily Technician Hours Present for Duty	80.20	40.90	103.25	60.25	94.85	50.15	286.40
Period of Available Time Involved in Productive Activity (Line 3 ÷ Line2)	71	73	92	56	79	89	76

Table 9
AVAILABLE HOURS INVOLVED IN PRODUCTIVE ACTIVITY BY
TECHNICIANS AT THE STUDY SITES

Month 2

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Consolidated
Average Daily Number of Technicians Assigned	11.57	7.00	14.38	12.48	14.48	7.29	44.09
Available Work Hours Daily (Line 1 x 8 hrs)	92.56	56.00	115.04	99.84	115.84	58.32	352.72
Average Daily Technician Hours Present for Duty	81.00	48.52	105.57	51.67	94.76	51.29	284.03
Percent of Available Time Involved in Productive Activity (Line 3÷Line 2)	87	86	91	51	81	87	80

TABLE 10

AVAILABLE HOURS INVOLVED IN PRODUCTIVE ACTIVITY BY
TECHNICIANS AT THE REGIONAL DENTAL ACTIVITIES

Month 1

	Walter Reed	Fort Sam Houston	Alameda	Fort Gordon	Consolidated
Average Daily Number of Technicians Assigned	51.60	49.00	59.00	83.00	242.60
Available Work Hours Daily (Line 1 x 8 hrs)	412.80	392.00	472.00	664.00	1940.80
Average Daily Technician Hours Present for Duty	264.30	288.50	331.25	491.65	1375.70
Percent of Available Time Involved in Productive Activity (Line 3÷Line 2)	64	73	70	74	70

Table 11

AVAILABLE HOURS INVOLVED IN PRODUCTIVE ACTIVITY
BY TECHNICIANS AT THE REGIONAL DENTAL ACTIVITIES

Month 2

	Walter Reed	Fort Sam Houston	Alameda	Fort Gordon	Consolidated
Average Daily Number of Technicians Assigned	54.67	48.48	58.19	82.90	244.24
Available Work Hours Daily (Line 1 x 8 hrs)	437.36	387.84	473.52	663.20	1953.92
Average Daily Technician Hours Present for Duty	272.86	277.86	330.24	510.10	1391.05
Percent of Available Time Involved in Productive Activity (Line 3÷Line 2)	62	71	69	76	71

Table 12

CIVILIAN TECHNICIANS EMPLOYED AT THE STUDY SITES

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Consolidated
Total Military and Civilian	15	11	15	10	13	7	71
Civilian	9	2	8	3	7	5	34
Percent Civilian	60	18	53	30	53	71	47

Table 13

RDA-SPECIFIC PROCEDURES AS A PROPORTION OF TOTAL
PRODUCTION AT DENTAC LABORATORIES (WEIGHTED WORK UNITS)

Month 1

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Total Weighted Work Units (WWU)*	12439	4934	15925	5811	10889	6609
RDA-Specific WWU **	7163	2635	9005	2753	7464	3813
Percent RDA- Specific WWU	57	53	56	47	68	57
*Orthodontics Deducted						

** Includes Procedures 01, 02, 03, 04, 05, 06, 07, 08, 20, 21,
22, 23, 25, 43, 44, 45."

Table 14

RDA - SPECIFIC PROCEDURES AS A PROPORTION OF
TOTAL PRODUCTION AT DENTAC LABORATORIES (WEIGHTED WORK UNITS)

Month 2

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Total Weighted Work Units (WWU)*	16458	6488	15442	5752	16110	12284
RDA-Specific WWU **	10130	3470	8148	2442	10831	6872
Percent RDA-Specific WWU	61	53	52	42	67	55
*Orthodontics Deducted						

** Includes Procedures 01, 02, 03, 04, 05, 06, 07, 08, 20, 21, 22, 23, 25, 43, 44, 45.

TABLE 15

AVERAGE DAILY WEIGHTED WORK UNITS PER
ASSIGNED TECHNICIAN AT THE STUDY SITES

Month 1

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Consolidated
Average Daily Number of Technicians Assigned	14.00	7.00	14.00	13.30	15.00	7.00	70.30
Average Daily WWU Per Assigned Technician	38.93	36.86	51.71	15.41	31.87	33.29	34.75

Month 2

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Consolidated
Average Daily Number of Technicians Assigned	11.57	7.00	14.38	12.48	14.48	7.29	67.19
Average Daily WWU Per Assigned Technician	46.15	44.29	47.15	15.87	43.09	54.32	40.79

Table 16

AVERAGE DAILY WEIGHTED WORK UNITS PER

ASSIGNED TECHNICIAN AT THE REGIONAL DENTAL ACTIVITIES

Month 1

	RDA 1	RDA 2	RDA 3	RDA 4	Consolidated
Average Daily Number of Technicians Assigned	51.60	49.00	59.00	83.00	242.60
Average Daily WWU Per Assigned Technician	44.57	64.69	48.44	45.02	49.73

Month 2

	RDA 1	RDA 2	RDA 3	RDA 4	Consolidated
Average Daily Number of Technicians Assigned	54.67	48.48	58.19	82.90	244.24
Average Daily WWU Per Assigned Technician	43.92	56.48	62.35	46.65	51.73

Table 17

AVERAGE DAILY WEIGHTED WORK UNITS PRODUCED
AT THE STUDY SITES

Month 1

	Average Daily WWU Calendar Month	Average Daily WWU Working Month
Site 1	545	790
Site 2	258	374
Site 3	724	1050
Site 4	205	297
Site 5	478	693
Site 6	233	337
Consolidated	2443	3541

Month 2

	Average Daily WWU Calendar Month	Average Daily WWU Working Month
Site 1	534	788
Site 2	310	458
Site 3	678	1001
Site 4	198	292
Site 5	624	921
Site 6	396	585
Consolidated	2741	4045

Table 18

AVERAGE DAILY WEIGHTED WORK UNITS PRODUCED
AT THE REGIONAL DENTAL ACTIVITIES

Month 1

RDA	Average Daily WWU Calendar Month (29 Days)	Average Daily WWU Working Month (20 Days)
Walter Reed	2300	3312
Fort Sam Houston	3170	4564
Alameda	2858	4116
Fort Gordon	3737	5351
Consolidated	12065	17374

Month 2

RDA	Average Daily WWU Calendar Month (31 Days)	Average Daily WWU Working Month (21 Days)
Walter Reed	2401	3529
Fort Sam Houston	2738	4025
Alameda	3628	5333
Fort Gordon	3867	5684
Consolidated	12634	18572

Table 19
AVERAGE WEIGHTED WORK UNITS PRODUCED PER
TECHNICIAN HOUR AT THE STUDY SITES

Month 1

Laboratory	Average WWU Per Technician Hour
Site 1	9.85
Site 2	9.15
Site 3	10.17
Site 4	4.93
Site 5	7.31
Site 6	6.73
Consolidated	8.25

Month 2

Laboratory	Average WWU Per Technician Hour
Site 1	9.73
Site 2	9.44
Site 3	9.49
Site 4	5.66
Site 5	9.72
Site 6	11.41
Consolidated	9.35

TABLE 20

AVERAGE WEIGHTED WORK UNITS PRODUCED PER
TECHNICIAN HOUR AT THE REGIONAL DENTAL ACTIVITIES

Month 1

RDA	AVERAGE WWU PER HOUR
Walter Reed	12.62
Fort Sam Houston	15.93
Alameda	12.51
Fort Gordon	11.02
Consolidated	12.72

Month 2

RDA	AVERAGE WWU PER HOUR
Walter Reed	12.99
Fort Sam Houston	14.55
Alameda	16.22
Fort Gordon	11.19
Consolidated	13.41

Table 21

COMMON DENTAC LABORATORY PROCEDURES. TIME-IN-LAB

AND QUANTITY PRODUCED - MONTH 1

PROCEDURE	DESCRIPTION	AVERAGE DAYS-IN-LAB						NUMBER OF PROCEDURES					
		A	B	C	D	E	F	A	B	C	D	E	F
18	Pour Cast Fixed	2	1	1	1	2	1	256	70	507	167	205	135
22	Set-up Only RPD	2	3	6	-	7	-	9	8	34	-	10	-
23	Set-up, Process RPD	5	5	3	6	12	3	26	14	5	12	3	4
24	Process Only RPD	5	5	5	2	8	2	10	8	27	9	10	2
26	Transitional RPD	4	8	11	2	5	10	22	18	30	23	11	8
27	Repair, RPD	1	1	1	1	1	1	61	31	34	17	22	25
34	Impression Tray Fixed or Removable	6	1	7	6	6	8	121	23	109	73	88	57
37	Pour Cast - Prelim Master, Opposing	1	1	1	1	1	1	598	296	808	287	432	208
40	Impression Tray Comp. Dent.	1	1	2	2	4	1	4	7	31	13	17	6
41	Record Base, Rim Comp. Dent.	1	1	2	3	7	2	27	29	40	37	49	7
43	Set-up, Wax-up Comp. Dent.	4	4	7	13	5	5	31	22	39	22	46	11
44	Process, Finish Comp. Dent.	4	4	5	4	5	7	26	21	33	18	45	11
46	Reline, Rebase Comp. Dent.	1	1	1	1	3	-	7	9	3	4	7	-
47	Repair, Comp.Dent.	1	2	1	1	1	1	24	17	17	4	16	21

Table 22

COMMON DENTAC LABORATORY PROCEDURES. TIME-IN-LAB
AND QUANTITY PRODUCED - MONTH 2

PROCEDURE	DESCRIPTION	AVERAGE DAYS-IN-LAB						NUMBER OF PROCEDURES					
		A	B	C	D	E	F	A	B	C	D	E	F
18	Pour Cast Fixed	1	1	1	1	1	1	360	119	401	300	343	193
22	Set-up Only RPD	1	1	7	3	3	5	6	18	36	3	22	8
23	Set-up, Process RPD	7	8	2	6	3	8	17	8	9	6	12	14
24	Process Only RPD	2	2	3	3	4	6	7	18	30	1	20	8
26	Transitional RPD	8	8	8	3	4	8	22	23	29	14	21	19
27	Repair, RPD	1	1	1	1	1	1	46	48	48	19	37	58
34	Impression Tray Fixed or Removable	9	7	6	7	10	10	209	32	142	126	123	86
37	Pour Cast, Prelim Master, Opposing	1	1	1	1	1	1	815	374	969	386	649	400
40	Impression Tray Comp. Dent.	6	8	5	4	5	5	40	17	78	18	53	33
41	Record Base, Rim Comp. Dent.	1	8	5	3	6	8	56	41	49	36	84	53
43	Set-up, Wax-up Comp. Dent.	5	2	8	7	5	10	38	22	42	19	49	48
44	Process, Finish Comp. Dent.	4	3	2	3	5	5	43	21	41	14	50	40
46	Reline, Rebase Comp. Dent.	1	1	1	1	2	1	7	6	7	1	12	4
47	Repair, Comp. Dent.	1	1	1	1	1	1	18	19	11	14	20	48

Table 23

DAYS-IN-LAB FOR PROCEDURES PRODUCED ROUTINELY
AT DENTAC LABORATORIES AND AT REGIONAL DENTAL ACTIVITIES

Month 1

DENTAC LABORATORIES

PROCEDURE	DESCRIPTION	DAYS-IN-LAB						
		A	B	C	D	E	F	Consolidated
01	Fully Fab Fixed Part. Dent. (Ven)	14	7	12	6	8	16	12
04	Fully Fab Fixed Part. Dent. (Unven.)	7	-	11	6	-	4	NA
05	Fully Fab Crown - (Veneered)	9	9	12	6	5	19	10
08	Fully Fab Crown - (Unveneered)	7	9	5	3	4	16	NA
23	Set-up - Process Rem Part Dent	5	5	3	6	12	3	NA
43	Set-up - Wax-up Comp. Dent.	4	4	7	13	5	5	8
63	Orthodontic Appliance	1	4	10	1*	9	1*	NA
* Only 1 Appliance Fabricated								

Table 24

DAYS-IN-LAB FOR PROCEDURES PRODUCED ROUTINELY

AT DENTAC LABORATORIES AND AT REGIONAL DENTAL ACTIVITIES

Month 2

DENTAC LABORATORIES

PROCEDURE	DESCRIPTION	DAYS-IN-LAB						
		A	B	C	D	E	F	Consolidated
01	Fully Fab Fixed Part. Dent. (Ven)	12	13	12	-	10	23	14
04	Fully Fab Fixed Part. Dent. (Unven.)	12	29	9	7	3	47	NA
05	Fully Fab Crown - (Veneered)	12	21	11	9	7	24	13
08	Fully Fab Crown - (Unveneered)	8	17	7	5	3	15	NA
23	Set-up - Process Rem Part Dent	7	8	2	6	3	8	NA
43	Set-up - Wax-up Comp. Dent.	5	2	8	7	5	10	7
63	Orthodontic Appliance	2	1	5	1	7	-	NA

Table 25

DAYS-IN-LAB FOR PROCEDURES PRODUCED ROUTINELY
AT DENTAC LABORATORIES AND AT REGIONAL DENTAL ACTIVITIES

Month 1

REGIONAL DENTAL ACTIVITIES

PROCEDURE	DESCRIPTION	DAYS-IN-LAB				
		A	B	C	D	Consolidated
01	Fully Fab Fixed Part Dent (Ven)	22	35	13	17	22
04	Fully Fab Fixed Part Dent (Unven.)	21	27	12	9	NA
05	Fully Fab Crown (Veneered)	20	30	13	16	20
08	Fully Fab Crown (Unveneered)	18	26	11	8	NA
23	Set-up - Process Rem Part Dent	3	11	9	5	NA
43	Set-up Wax-up Comp. Dent.	40	7	8	3	9
63	Orthodontic Appliance	31	-	-	6	NA

Table 26

DAYS-IN-LAB FOR PROCEDURES PRODUCED ROUTINELY
AT DENTAC LABORATORIES AND AT REGIONAL DENTAL ACTIVITIES

Month 2

REGIONAL DENTAL ACTIVITIES

PROCEDURE	DESCRIPTION	DAYS-IN-LAB				
		A	B	C	D	Consolidated
01	Fully Fab Fixed Part Dent (Ven)	30	29	17	20	23
04	Fully Fab Fixed Part Dent (Unven.)	26	22	12	9	NA
05	Fully Fab Crown (Veneered)	25	25	17	20	21
08	Fully Fab Crown (Unveneered)	21	18	9	8	NA
23	Set-up - Process Rem Part Dent	25	10	8	8	NA
43	Set-Up Wax-up Comp. Dent.	25	7	7	5	8
63	Orthodontic Appliance	32	-	-	3	NA

Table 27

ANALYSIS OF COVARIANCE FOR DUTY

HOURS WORKED BY DENTAC LABORATORIES

Month 1

Source of Variation	Sum of Squares	df	Mean Square	F	Sig
Technicians Assigned*	46053.59	1	46053.59	538.27	.001
Main Effects for DENTAC Laboratories	16943.01	5	3388.60	39.61	.001
Residual	9668.21	113	85.86		
Total	72664.80	119	610.63		

* Covariate = Technicians Assigned

Table 28

ANALYSIS OF COVARIANCE FOR DUTY
HOURS WORKED BY DENTAC LABORATORIES

Month 2

Source of Variation	Sum of Squares	df	Mean Square	F	Sig
Technicians Assigned*	47509.45	1	47509.45	449.82	.001
Main Effects for DENTAC Laboratories	23074.56	5	4614.91	43.69	.001
Residual	12568.70	119	105.62		
Total	83152.71	125	665.22		

* Covariate = Technicians Assigned

TABLE 29

WORK LOAD BY MAJOR CATEGORY - DENTAC LABORATORIES

(PERCENT OF TOTAL)

Month 1

	Fixed	Removable	Orthodontics	Other
Site 1	48	51	0.6	0.5
Site 2	18	49	33	0.6
Site 3	33	40	27	0.1
Site 4	35	58	6	0.2
Site 5	41	42	17	0.5
Site 6	45	54	0.0	0.2

Month 2

	Fixed	Removable	Orthodontics	Other
Site 1	39	39	21	0.5
Site 2	14	52	34	0.3
Site 3	41	34	24	0.7
Site 4	33	64	2	0.4
Site 5	36	42	21	0.4
Site 6	65	32	2	0.3

Table 30

TOTAL WEIGHTED WORK UNITS REPORTED BY STUDY
AND REPORTED TO HEALTH SERVICES COMMAND

Month 1

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Study Totals (WWU)	15799	7484	21005	5941	13869	6749
HSC Reports (WWU)	29368	17271	28541	18767	24243	12193

Month 2

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Study Totals (WWU)	16558	9618	21032	6142	19350	12284
HSC Reports (WWU)	27383	11520	27281	11167	20498	19080

APPENDIX A-1

MAIL SURVEY FORM - DENTAL LABORATORY TECHNICIAN
ASSIGNMENT AND UTILIZATION BY DENTACs IN HSC

MAIL SURVEY - DENTAL LABORATORY TECHNICIAN ASSIGNMENT
AND UTILIZATION BY DENTACs IN HSC

This questionnaire is being submitted to all DENTAC commanders in HSC. It is one part of a larger study to evaluate the utilization and efficiency of dental laboratory personnel within the US Army Dental Care System. You are requested to please report the information as accurately as you can. Include all dental clinics in the numbers you report.

1. The total number of MOS 42D requirements in your most recently approved TDA: _____
2. Requirements for MOS 42D personnel by rank:
E-4 and below _____
E-5 - E-6 _____
E-7 and above _____
3. The total number of MOS 42D allocations for your DENTAC: _____
4. Allocations for MOS 42D personnel for your DENTAC by rank:
E-4 and below _____
E-5 - E-6 _____
E-7 and above _____
5. The total number of MOS 42D personnel assigned to your DENTAC as of January 31, 1980: _____
6. The total number of GS 683 (civilian dental laboratory technicians) requirements on your most recently approved TDA: _____
7. Requirements for GS 683 personnel by grade:
GS 5 and below _____
GS 6 and above _____
8. The total number of GS 683 allocations for your DENTAC: _____

9. Allocations for GS 683 for your DENTAC by grade:

GS 5 and below _____

GS 6 and above _____

10. The total number of GS 683 personnel assigned to your DENTAC as of January 31, 1980: _____

11. Report the number of MOS 42D personnel assigned to your DENTAC laboratory as their principal duty as of January 31, 1980. (Principal duty assignment is defined as 50% or more of the work day or at least 2 weeks during the calendar month.) _____

12. Report the number of MOS 42D personnel assigned to duty areas other than the laboratory as their principal assignment as of January 31, 1980: _____

13. Estimate as closely as you can the average number of military dental laboratory technicians who have been assigned to duties other than their primary MOS as their principal assignment during the three-month period Nov-Dec 1979 - Jan 1980: _____

14. List the duties and/or positions to which the personnel noted in Item 12 and 13 above have been assigned:

15. This questionnaire submitted by the _____ DENTAC
Name

16. Type name and signature of individual who completed this questionnaire.

(Sig) _____

APPENDIX A-2

DENTAL LABORATORY STUDY
PROSTHODONTIC PROCEDURE RECORD

DENTAL LABORATORY OUTPUT STUDY

PROSTHODONTIC PROCEDURE RECORD

[illegible]

APPENDIX A-3

PROCEDURES CODES AND WEIGHTED PROSTHODONTIC
WORK UNITS (AR 40-182)

APPENDIX

Computation of Weighted Prosthodontic Work Units (WPWU)

Fixed Prosthodontic Cases

<i>Procedure Number</i>	<i>Procedure</i>	<i>WPWU Value</i>
01	Fully Fabricated Fixed Partial Denture (FPD) Porcelain to Metal	45/Unit
02	Cast Only, Fabricated FPD Porcelain to Metal	30/Unit
03	Veneer Only, FPD Porcelain to Metal	18/Unit
04	Fully Fabricated FPD Unveneered	35/Unit
05	Fully Fabricated Crown Porcelain to Metal	45/Unit
06	Cast Only, Crown Porcelain to Metal	30/Unit
07	Veneer Only, Crown Porcelain to Metal	18/Unit
08	Fully Fabricated Crown Unveneered	35/Unit
09	Solder	10/Unit
10	Glaze	5/Unit
11	Characterized Veneer (special staining)	5/Unit
12	Partial Veneer Crowns/Onlays	30/Unit
13	Castings	10/Unit
14	Post and Core	25/Unit
15	Precision Connector, FPD	75/Unit
16	Andrews Bridge	150/Unit
17	Temporary Bridge Former	5/Unit
18	Pour Cast Fixed	1/Unit
19	Mount Cast on Fully Adjusted Articulator	3/Unit

Removable Partial Denture Cases

20	Casting Only, Removable Partial Denture (RPD)	55/Unit
21	Casting and Set-Up, RPD	70/Unit
22	Set-Up Only, RPD	15/Unit
23	Set-Up and Process, RPD	30/Unit
24	Process Only, RPD	15/Unit
25	Fully Fabricated, RPD	85/Unit
26	Transitional, RPD	20/Unit
27	Repair, RPD	12/Unit
28	Reline and Rebase, RPD	15/Unit
29	Precision Attachment, RPD	350/Unit
30	Swing-Lock, RPD	300/Unit
31	Stressbreaker, RPD	180/Unit
32	Bar-Clip, RPD	120/Unit
33	Surgical Splint	50/Unit
34	Impression Tray, Fixed or Removable	5/Unit
35	Altered Cast Tray	5/Unit
36	Pour Altered Cast	5/Unit
37	Pour Cast, Preliminary, Master or Opposing	1/Unit
38	Articulation, Simple	1/Unit
39	Open	

Complete Dentures

<i>Procedure Number</i>	<i>Procedure</i>	<i>WPWU Value</i>
40	Impression Tray, Complete Denture (CD)	5/Unit
41	Record Base and Rim, CD	7/Unit
42	Casting Base, CD	30/Unit
43	Set-Up and Wax-Up, CD	30/Unit
44	Process and Finish, CD	30/Unit
45	Fully Fabricated, CD	58/Unit
46	Reline/Rebase, CD	20/Unit
47	Repair, CD	8/Unit
48	Surgical Template	7/Unit
49	Box and Pour Impression	5/Unit
50	Articulation, Semi-Adjustable	2/Unit
51	Characterized Denture Base	2/Unit
52-59	Open	

Orthodontics

60	Orthodontic Tooth Positioner	30/Unit
61	Diagnostic Set-Up	30/Unit
62	Orthodontic Study Models	10/Unit
63	Orthodontic Appliance	50/Unit
64-69	Open	

Miscellaneous

70	Mouthguard, Flexible	5/Unit
71	Mouthguard, Rigid	7/Unit
72	Demonstration Model, Resin	40/Unit
73	Demonstration Model, Stone	2/Unit
74	Maxillo-facial Prostheses	10/Unit
75	Special Projects	10/Unit

APPENDIX A-4
KEYPUNCH DAILY WORKSHEET

APPENDIX A-5
CODING INSTRUCTIONS, CARD P

CODING INSTRUCTIONS
CARD P

DENTAL LABORATORY TECHNICIAN
PRODUCTIVITY STUDY

1. Coding instructions are as follows:

a. DATE (1-6).

- (1) Code Block 1 and 2 Enter last digits of the calendar year.
- (2) Code Block 3 and 4 Enter 2 digits to describe current month.
- (3) Code Block 5 and 6 Enter 2 digits to describe the day on which procedures were completed.

EXAMPLE: 5 April 1979

1	2	3	4	5	6
7	9	0	4	0	5

b. STATION INPUT (7). Pre-Completed.

c. STATION CODES (8-11). Pre-Completed.

d. PROCEDURE (12-13), MATERIAL (14), UNITS (15-16). Copy from the coded data in block 38, DA 2868, see inclosure 2 for more detailed instructions.

e. ARCH (17). Leave blank.

f. TIME IN LAB (18-19). In code block 18 and 19 the full days the unit(s) were actually in the laboratory to include weekends and holidays are entered. This can be calculated from block 10 and 11, DA Form 2868. The day the case leaves the laboratory will NOT be counted as a day in the laboratory.

EXAMPLE: A case arrives on the 5 April and leaves on 13 April.
13 - 5 = 8 days in lab

g. COLUMNS (26-29). May be left blank.

h. CARD TYPE (30). Pre-Completed.

APPENDIX A-6
DAILY LABORATORY TECHNICIAN ROSTER

DAILY LABORATORY TECHNICIAN ROSTER

[illegible]

APPENDIX A-7

CARD Q - MONTHLY WORKSHEET - TECHNICIANS
PRESENT FOR DUTY

APPENDIX A-8
CODING INSTRUCTIONS - CARD Q

CODING INSTRUCTIONS

CODE

TECHNICIANS PRESENT FOR DUTY DENTAL LABORATORY TECHNICIAN PRODUCTIVITY STUDY

1. Coding worksheet B provides personnel assignment and utilization data. The card will be completed on a daily basis by the Dental Clinic NCO.

2. Coding instructions are as follow:

a. DATE (1-6). Follow same procedure as block 1 through 6 on Card A.

b. STATION INPUT (7). Pre-completed.

c. TOTAL ASSIGNED (8-11). Leave blank.

d. TECHNICIANS ASSIGNED (12-15). This will include all military personnel with MOS 42D or 42F, and all civilians with the GS-683 job series assigned on that particular day, even though they may work in administration, supply, or elsewhere.

e. TECHNICIAN HOURS PRESENT FOR DUTY (16-19). The total direct hours available for work by the number of technicians entered in blocks 12-15 for that particular day will be entered. Direct hours are defined as productive labor related to a service performed or a unit of work.

(1) Direct hours DO NOT include:

- (a) Annual leave
- (b) TDY
- (c) Sick leave
- (d) Excused absence
- (e) Military training
- (f) Personnel processing
- (g) Formal technical training
- (h) Administrative meetings
- (i) Medical and Dental appointments
- (j) Absences of more than 15 minutes for any reason

(2) Direct hours DO include:

(a) Breaks

(b) Absences of less than 15 minutes

(3) It is intended that this data accurately reflect those actual hours available to perform dental laboratory procedures.

f. NOT USED (20-23). Leave these columns blank.

g. CARD NUMBER (24-25). Indicates the number of working days in the month by numbering sequentially for each production day.

h. NOT USED (26-29). Leave these columns blank.

i. CARD TYPE (30). Pre-completed, will always be .

APPENDIX A-9
RDA-SPECIFIC LABORATORY PROCEDURES

DENTAL LABORATORY STUDY - PART II
RDA - SPECIFIC LABORATORY PROCEDURES

- 01 Fully Fabricated Fixed Partial Denture (FPD) Porcelain to Metal
- 02 Cast Only, Fabricated FPD Porcelain to Metal
- 03 Veneer Only, FPD Porcelain to Metal
- 04 Fully Fabricated FPD Unveneered
- 05 Fully Fabricated Crown Porcelain to Metal
- 06 Cast Only, Crown Porcelain to Metal
- 07 Veneer Only, Crown Porcelain to Metal
- 08 Fully Fabricated Crown Unveneered

- 20 Casting Only, Removable Partial Denture (RPD)
- 21 Casting and Set-Up, RPD
- 22 Set-Up Only, RPD
- 23 Set-Up and Process, RPD
- 25 Fully Fabricated, RPD

- 43 Set-Up and Wax-Up, CD
- 44 Process and Finish, CD
- 45 Fully Fabricated, CD

APPENDIX A-10
DENTAC-SPECIFIC LABORATORY PROCEDURES

DENTAL LABORATORY STUDY - PART II
DENTAC - SPECIFIC LABORATORY PROCEDURES

- 18 Pour Cast Fixed
- 22 Set-Up Only, RPD
- 23 Set-Up and Process, RPD
- 24 Process Only, RPD
- 27 Repair, RPD
- 34 Impression Tray, Fixed or Removable
- 37 Pour Cast, Preliminary, Master, or Opposing
- 40 Impression Tray, Complete Denture (CD)
- 41 Record Base and Rim, CD
- 43 Set-Up and Wax-Up, CD
- 44 Process and Finish, CD
- 46 Reline/Rebase, CD
- 47 Repair, CD

APPENDIX A-11
CONSOLIDATED PRODUCTION ANALYSIS REPORT

PREPARED 05/09/80

POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 80 THRU 31 MAR 80
US ARMY HEALTH SERVICES COMMAND

PCN DLS-R204

BY WEIGHTED WORK UNITS

	PROCEDURES	* TOTAL *	PERCENT
FIXED PROSTHODONTICS	01 THRU 19	32,245	37.94
PARTIAL DENTURES	01 THRU 04	13,250	15.60
CROWNS	05 THRU 08	11,081	13.04
REMOVABLE PROSTHODONTICS	20 THRU 59	40,004	47.07
PARTIAL DENTURES	20 THRU 39	18,629	21.52
COMPLETE DENTURES	40 THRU 59	21,375	25.15
ORTHODONTICS	60 THRU 69	12,450	14.65
OTHER/MISC	70 THRU 75	285	0.34
OVERALL FOR THIS PERIOD		84,984	

BY MAJOR DENTAL PROSTHESES

	PROCEDURES	TOTAL UNITS/APPLIANCES
FIXED PROSTHODONTICS		
PARTIAL DENTURES	01 AND 04	276
CROWNS	05 AND 08	356 UNITS
REMOVABLE PROSTHODONTICS		
PARTIAL DENTURES	20 AND 32	0
COMPLETE DENTURES	43 AND 45	241
ORTHODONTICS	60 THRU 69	411
MAXILLOFACIAL PROSTHESES	74	0

CASES ON HAND LAST DAY OF MONTH

FIXED PROSTHESES/UNITS	0	REMOVABLE PROSTHESES	0	ORTHODONTICS	0	OTHER/MISC	0
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PREPARED 05/09/80

POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 80 THRU 31 MAR 80
US ARMY HEALTH SERVICES COMMAND

PCN DLS-804

CONSOLIDATED PRODUCTION ANALYSIS REPORT

MONTHLY AVERAGE OF TIME IN LAB

PROCEDURE	TITLE OF PROCEDURE	AVERAGE DAYS
01	FULLY FABRICATED FIXED PARTIAL DENTURE	14
05	FULLY FABRICATED CROWNS	13
20	CASTING ONLY REMOVABLE PARTIAL DENTURE	0
25	FULLY FABRICATED REMOVABLE PARTIAL DENTURE	0
43	SET-UP AND MAX-UP COMPLETE DENTURE	7

AVERAGE DAILY WEIGHTED WORK UNITS

TOTAL WEIGHTED WORK UNITS FOR THIS MONTH	TOTAL DAYS THIS MONTH	AVERAGE DAILY WEIGHTED WORK UNITS
84,984	31	2,741

78

BY WEIGHTED WORK UNITS BY SERVICE

* TOTAL *	PERCENT	* TOTAL *	PERCENT	* TOTAL *	PERCENT
ARMY	84,984	100.00	NAVY	0	0.00
			AIR FORCE	0	0.00
			US PHS	0	0.00

BY MAJOR DENTAL PROSTHESES BY SERVICE

PROCEDURES	TOTAL APPLIANCES/ OR UNITS ARMY	TOTAL APPLIANCES/ OR UNITS NAVY	TOTAL APPLIANCES/ OR UNITS AIR FORCE	TOTAL APPLIANCES/ OR UNITS US PHS
FIXED PROSTHOODONTICS				
PARTIAL DENTURES	13	0	0	0
CROWNS	356	0	0	0
REMOVABLE PROSTHOODONTICS				
PARTIAL DENTURES	0	0	0	0
COMPLETE DENTURES	241	0	0	0

PCN DLS-R04

PREPARED 05/09/80 CONSOLIDATED PRODUCTION ANALYSIS REPORT
POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 80 THRU 31 MAR 80
US ARMY HEALTH SERVICES COMMAND

AVERAGE DAILY STRENGTH AND PRODUCTIVITY DATA

AVERAGE DAILY TOTAL ASSIGNED STRENGTH	00
AVERAGE DAILY NUMBER OF TECHNICIANS ASSIGNED	44.09
AVERAGE DAILY TECHNICIAN HOURS PRESENT FOR DUTY	246.03
AVERAGE DAILY WEIGHTED WORK UNITS PER ASSIGNED INDIVIDUAL	00
AVERAGE DAILY WEIGHTED WORK UNITS PER ASSIGNED TECHNICIAN	62.17
AVERAGE WEIGHTED WORK UNITS PER TECHNICIAN HOUR	9.35

APPENDIX A-12

DENTAC PRODUCTION ANALYSIS REPORT

PCN 0LS-003

PRODUCTION ANALYSIS REPORT

PREPARED 05/09/00

POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 00 THRU 31 MAR 00
FORT HOOD

BY WEIGHTED WORK UNITS

	PROCEDURES	% TOTAL *	PERCENT
FIXED PROSTHODONTICS	01 THRU 19	6,964	33.11
PARTIAL DENTURES	01 THRU 04	2,172	10.33
CROWNS	05 THRU 08	2,576	12.72
REMOVABLE PROSTHODONTICS	20 THRU 59	8,453	40.19
PARTIAL DENTURES	20 THRU 39	4,338	20.63
COMPLETE DENTURES	40 THRU 59	4,115	19.56
ORTHODONTICS	60 THRU 69	5,590	26.50
OTHER/MISC	70 THRU 75	25	0.12
OVERALL FOR THIS PERIOD		21,032	

81

BY MAJOR DENTAL PROSTHESES

	PROCEDURES	TOTAL UNITS/APPLIANCES
FIXED PROSTHODONTICS		
PARTIAL DENTURES	01 AND 04	42
CROWNS	05 AND 08	57 UNITS
REMOVABLE PROSTHODONTICS		
PARTIAL DENTURES	20 AND 32	0
COMPLETE DENTURES	43 AND 45	42
ORTHODONTICS	60 THRU 69	155
MAXILLOFACIAL PROSTHESES	74	0

CASES ON HAND LAST DAY OF MONTH

FIXED PROSTHESES/UNITS	0	REMOVABLE PROSTHESES	0	ORTHODONTICS	0	OTHER/MISC	0

PREPARED 05/09/80

PRODUCTION ANALYSIS REPORT

PCN OLS-003

POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 80 THRU 31 MAR 80
FORT HOOD

MONTHLY AVERAGE OF TIME IN LAB

PROCEDURE	TITLE	OF	PROCEDURE	AVERAGE DAYS
01	FULLY FABRICATED FIXED PARTIAL DENTURE	12		
05	FULLY FABRICATED CROWNS	11		
20	CASTING ONLY REMOVABLE PARTIAL DENTURE	0		
25	FULLY FABRICATED REMOVABLE PARTIAL DENTURE	0		
43	SET-UP AND MAX-UP COMPLETE DENTURE	0		

AVERAGE DAILY WEIGHTED WORK UNITS

TOTAL WEIGHTED WORK UNITS FOR THIS MONTH	TOTAL DAYS THIS MONTH	AVERAGE DAILY WEIGHTED WORK UNITS
21,032	31	678

82

BY WEIGHTED WORK UNITS BY SERVICE

ARMY	NAVY	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT
21,032	100.00	0	0.00	AIR FORCE	0	0.00	US PHS	0
								0.00

BY MAJOR DENTAL PROSTHESES BY SERVICE

PROCEDURES	TOTAL APPLIANCES/ OR UNITS ARMY	TOTAL APPLIANCES/ OR UNITS NAVY	TOTAL APPLIANCES/ OR UNITS AIR FORCE	TOTAL APPLIANCES/ OR UNITS US PHS
FIXED PROSTHODONTICS				
PARTIAL DENTURES	2	0	0	0
CROWNS	57	0	0	0
REMOVABLE PROSTHODONTICS				
PARTIAL DENTURES	0	0	0	0
COMPLETE DENTURES	42	0	0	0

PCN DLS-283
PREPARED 05/09/88 POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 88 THRU 31 MAR 88
FORT MOOD

PRODUCTION ANALYSIS REPORT

AVERAGE DAILY STRENGTH AND PRODUCTIVITY DATA

AVERAGE DAILY TOTAL ASSIGNED STRENGTH .00
AVERAGE DAILY NUMBER OF TECHNICIANS ASSIGNED 14.38
AVERAGE DAILY TECHNICIAN HOURS PRESENT FOR DUTY 105.67
AVERAGE DAILY WEIGHTED WORK UNITS PER ASSIGNED INDIVIDUAL .00
AVERAGE DAILY WEIGHTED WORK UNITS PER ASSIGNED TECHNICIAN 67.15
AVERAGE WEIGHTED WORK UNITS PER TECHNICIAN HOUR 9.49

APPENDIX A-13
DENTAC PROCEDURE-SPECIFIC MONTHLY REPORT

PREPARED 05/09/80

PROCEDURE REPORT

POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 80 THRU 31 MAR 80
FORT BRAGG

PCV DLS-R35

PROCEDURE	TITLE OF PROCEDURE	TYPE OF MATERIAL	UNITS	APPLICATIONS	M.M.U.	DAYS
01	FULLY FAB FPD PORCELAIN/METAL	PORCELAIN	6	1	273	18
		TOTAL		1	273	18
	WHITE CERAMIC GOLD		2	1	90	2
			3	4	540	6
			4	2	360	13
			5	2	450	11
		TOTAL	6	2	540	27
				11	1,900	11
	NON PRECIOUS METAL		3	2	270	3
			4	1	180	35
		TOTAL		3	450	14
02	CAST ONLY FPD PORCELAIN/METAL	WHITE CERAMIC GOLD	5	1	150	1
			7	1	210	3
		TOTAL		2	360	2
	PROCEDURE TOTAL		2		360	2
03	VENEER ONLY FPD PORCEL/METAL		28		584	5
04	FULLY FAB FPD UNVENEERED		13		455	12
05	FULL FAB CROWN PORCELAIN/METAL	WHITE CERAMIC GOLD	14		630	14
		NON PRECIOUS METAL	1		45	2
		PROCEDURE TOTAL	15		675	12
06	CAST ONLY CROWN PORCEL/METAL	WHITE CERAMIC GOLD	2		60	5
		PROCEDURE TOTAL	2		60	5
07	VENEER ONLY CROWN PORCEL/METAL		6		108	4
08	FULL FAB CROWN UNVENEERED		35		1,225	8
09	SOLDER		19		190	1
10	GLAZE		83		415	1

AD-A096 730

ACADEMY OF HEALTH SCIENCES (ARMY) FORT SAM HOUSTON TX--ETC F/G 6/5
COMPARISON OF THE OUTPUT IN WEIGHTED WORK UNITS OF INSTALLATION--ETC(U)
JUL 80 R V MAYOTTE, W A PARKER
HCSD-80-005

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106-730

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PREPARED 05/09/80 POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 80 THRU 31 MAR 80 PCN OLS-805
 FORT BRAGG

PROCEDURE	TITLE OF PROCEDURE	TYPE OF MATERIAL	UNITS	APPLICATIONS	M.M.U.	DAYS
11	CHARACTER VENER (SPEC STAIN)	TOTAL	0		40	1
14	POST AND CORE	TOTAL	10		250	1
17	TEMPORARY BRIDGE FORMER	MATERIAL UNSPECIFIED TOTAL	0		40	3
	RESIN	TOTAL	117		585	1
18	POUR CAST FIXED	PROCEDURE TOTAL	125		625	3
		MATERIAL UNSPECIFIED TOTAL	360		360	1
		PROCEDURE TOTAL	360		360	1
22	SET-UP ONLY RPD	TOTAL	6		90	1
23	SET-UP AND PROCESS RPD	TOTAL	17		510	7
24	PROCESS ONLY RPD	TOTAL	7		105	2
26	TRANSITIONAL RPD	TOTAL	22		440	8
27	REPAIR RPD	TOTAL	46		552	1
28	RELINE AND REBASE RPD	TOTAL	4		60	4
33	SURGICAL SPLINT	TOTAL	1		50	2
34	IMPRESSION TRAY FIXED OR REM	TOTAL	209		1,045	9
35	ALTERED CAST TRAY	TOTAL	2		10	1
36	POUR ALTERED CAST	TOTAL	2		10	1
37	POUR CAST PRELIM MASTER/OPPOS	TOTAL	815		815	1
38	ARTICULATION SIMPLE	TOTAL	24		24	1
40	IMPRESSION TRAY COMPL DENT	TOTAL	40		200	6
41	RECORD BASE & RIM COMPL DENT	TOTAL	56		392	1
43	SET-UP & WAX-UP COMPL DENT	TOTAL	38		1,148	5

PREPARED 05/09/80 POST DENTAL LABORATORY REPORTING PERIOD 01 MAR 80 THRU 31 MAR 80 PCN DLS-R05
 FORT BRAGG

PROCEDURE	TITLE OF PROCEDURE	TYPE OF MATERIAL	UNITS	APPLICATIONS	M.W.U.	DAYS
44	PROCESS & FINISH COMPL DENT		TOTAL 43		1,290	4
45	FULLY FAB COMPL DENT		TOTAL 17		986	11
46	RELINE/REBASE COMPL DENT		TOTAL 7		148	1
47	REPAIR COMPLETE DENTURE		TOTAL 18		144	1
48	SURGICAL TEMPLATE		TOTAL 18		126	6
49	BOX & POUR IMPRESSION		TOTAL 42		210	1
50	ARTICULATION SEMI-ADJUSTABLE		TOTAL 31		62	1
63	ORTHODONTIC APPLIANCE		TOTAL 2		100	2
70	MOUTHGUARD FLEXIBLE		TOTAL 13		65	1
71	MOUTHGUARD RIGID		TOTAL 3		21	2
MISCELLANEOUS DATA TOTAL			GRAND TOTAL 2,191	17	16,558	

APPENDIX A-14
REPORTING ERRORS FOUND IN STUDY DATA

REPORTING ERRORS FOUND IN LABORATORY STUDY (PART 2)

1. Credit is taken for Orthodontic cast (62) when a working cast is made on which an ortho appliance will be made.
2. Credit is taken for Procedures 22 and 24 when what is actually done is to make a transitional RPD (26). Sometimes credit is taken for all three procedures when only a 26 is actually done.
3. Procedure 40 (Comp. Dent. tray) is sometimes used instead of Procedure 34 (Tray, Fixed or Removable).
4. Interchanging Procedures 43 and 22, also 44 and 24.
5. Overstating credits for C&B models (Procedure 18). In many instances it was noted that credit was taken for 3 and 4 Procedures 18 for a model on which to construct a one-unit post and core.
6. One laboratory takes two credits for Process & Finish (Procedure 44) when processing one complete denture and one RPD. It also usually takes credit for one Procedure 24 (Process RPD).
7. Some laboratories take credit for Procedure 23 (Process & Finish RPD) when they actually made a transitional RPD (Procedure 26). The difference is +10WWU.
8. Procedure Code 01 was used instead of 05 or 08 on several occasions.
9. Articulations (Procedures 38 and 50) are underreported.
10. One DENTAC reports one temporary bridge former (Procedure 17) for every fixed case. They also report them according to the number of teeth involved rather than as a single appliance.
11. One DENTAC still reports transitional RPDs (Procedure 26) according to the number of teeth on the denture. This obviously results in overreporting.
12. One DENTAC reports Procedure 45 (Fully Fabricated CD) in addition to Procedures 43 and 44!

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