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**Artificial Intelligence-  
Explosive Ordnance Disposal  
Information Search, Retrieval,  
and Delivery System**

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## **FOREWORD**

The Artificial Intelligence-Explosive Ordnance Disposal (AI-EOD) project was sponsored by the Deputy Under Secretary of Defense for Research and Engineering (Research and Advanced Technology) based on priorities set by the Joint Services Committee for Manpower and Training Technology Development and was administered by the Training Performance Data Analysis Center (Program Element 0604722A). The purpose of the AI-EOD project was to research, design, develop, and test and evaluate a prototype EOD knowledge-based computerized information search, retrieval, and delivery system utilizing artificial intelligence (i.e., a neural network).

This is the final report of the AI-EOD project. It presents information regarding the design and development of the prototype delivery system and the findings from the test and evaluation efforts conducted at operational EOD sites. Using both the conventional (microfiche and paper) and AI-EOD (computerized) delivery systems, EOD technicians were presented with ordnance devices to identify. They were required to determine the appropriate disposition procedures (i.e., render-safe procedures) for those devices. Recommendations focus on enhancing the effectiveness of the prototype AI-EOD delivery system and further application of concepts investigated during this project.

The AI-EOD project was a collaborative effort of the Navy Personnel Research and Development Center (NAVPERSRANDCEN), San Diego, California; the Los Alamos National Laboratory (LANL), Los Alamos, New Mexico; and the Naval Explosive Ordnance Disposal Technology Center (NEODTC), Indian Head, Maryland.

NAVPERSRANDCEN provided the project manager who defined the overall direction of the project, established the management procedures, assigned responsibilities, provided the instructional technology and human factors engineering expertise, and conducted the operational test and evaluation of the prototype AI-EOD search, retrieval, and delivery system.

LANL conducted the requirements analysis for the AI-EOD system and developed, produced, and accomplished the technical evaluation of the prototype AI-EOD search, retrieval, and delivery system.

NEODTC provided management of the EOD technical data used by the project; subject matter expertise and user guidance in the design and development of the AI-EOD prototype; and coordination with operational sites during the operational test and evaluation.

The results of the test and evaluation, and feedback from the user community, indicate the AI-EOD system is being seriously considered for implementation within the military EOD community. Prior to completion of this report, the NEODTC had submitted a Development Options Paper (DOP). The result of this DOP was the selection of immediate implementation of a number of the prototype capabilities with a long term effort planned to incorporate full AI capability.

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## SUMMARY

### Problem

The microfiche-and-paper-based information system used by the Explosive Ordnance Disposal (EOD) technicians is difficult and confusing to use. Difficulties in using this information system were identified as a major cause of attrition (25%) and setbacks (52%) in the EOD school and reduced performance in the field.

### Objectives

The objectives of the Artificial Intelligence-Explosive Ordnance Disposal (AI-EOD) project were (1) to develop an efficient, easy-to-use information delivery system for identifying ordnance and retrieving the appropriate render-safe-procedures (RSPs) and (2) to demonstrate the effectiveness of a prototype information system incorporating AI (neural networks) in improving performance of EOD technicians.

### Approach

The AI-EOD effort resulted in the development of a user-to-computer interface; a computer-to-neural-network interface; and a neural-network-to-EOD-database interface. In accomplishing the development effort, a computerized Identification Table Construction Query System was also developed to assist EOD technicians (i.e., subject matter experts [SMEs]), in the completion of the neural-network-to-database interface. Once the AI-EOD delivery system was developed and verified (desk-top evaluation by SMEs), the test and evaluation plan was designed to assess the effectiveness and utility of the system as a job performance aid for EOD technicians.

### AI-EOD System

The AI-EOD prototype is a multi-incident (EOD activity), identification, retrieval, recording, and tracking system featuring state-of-the-art image and text management. The system was written under the UNIX operating system using X-Windows in C and C++ programming languages. The foundation of the system, the "neural network," is modeled after neurological processes and represents an innovative implementation of artificial intelligence. The resulting system uses any combination of available criteria (value-attribute pairs) including incomplete, inaccurate, or negative data as well as phonetic (fuzzy-word) searches to access the EOD publications in the EOD database.

The system can record and track up to 10 incidents at a time and will assist in the identification of the specific ordnance based on features entered (characteristics), common name or alias, nomenclature, Series 60 publication number, or words in the title of the Series 60 publication (even with misspelled words--fuzzy word search). Also, the system will maintain an audit trail of the technicians choices during the incident, provide a list (in probability order) of most probable device described, and display for viewing (using windowing techniques) and print the Series 60 publication for each piece of ordnance.

## **Test and Evaluation**

### **Method**

Once the AI-EOD system was verified, the testing plan was determined, research subject groups were defined, and the specific research objectives were delineated. Six research areas and 43 hypotheses were identified.

The AI-EOD and conventional system were used by EOD technicians to identify eight ordnance devices (four using the AI-EOD system and four using the conventional system). Proof of proper identification consisted of providing the correct TO number (Series 60 publication) with page number for the unarmed RSP for each ordnance device. Demographic, performance data, and critique information were collected for 235 technicians, at 42 operational sites for the four services. The data were evaluated for completeness, descriptive statistics were inspected, and any deficiencies or anomalies were resolved. The data were analyzed to relate performance results to hypotheses in the six research areas: EOD performance, EOD knowledge, EOD experience/ability, AI-EOD system utility/usability, computer experience/qualification, and general factors.

### **Results**

1. EOD performance. Completion time was significantly shorter, errors were significantly less, and the number of ordnance devices identified was significantly greater using the AI-EOD system than the conventional microfiche-paper system.

2. EOD knowledge. There was no significant relationship between EOD training and performance for either system.

3. EOD experience/ability. There was no significant relationship between EOD experience/ability and performance for either system.

4. AI-EOD system utility/usability. There was a significant preference by the EOD technicians for the AI-EOD system over the conventional system.

5. Computer experience/qualification. There was no significant relationship between computer experience/qualification and performance.

6. General factors (demographics, e.g., age, gender, branch, paygrade). There was no significant relationship between the general factors and performance for either system.

### **Conclusions**

The AI-EOD system proved to be a reliable, valid, and user-friendly job-performance aid that significantly improved the performance of EOD technicians on all performance measures. This effect was found at all skill levels and across all four services. The technicians strongly preferred the AI-EOD system and want the system as soon as possible.

### **Future Efforts**

AI-EOD system should be investigated further, particularly in new occupational communities and database types. Also, the impact of this new "neural network" tool on manpower and personnel selection, training, evaluation, and on-the-job performance will need major investigation.

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## INTRODUCTION

### Problem

As the size and complexity the EOD mission continues to increase, the accuracy and efficiency of the EOD technicians are dependent on an improved information support system. The military EOD community consists of approximately 3000 joint-service military personnel from the United States Air Force, Army, Marine Corps, and Navy. EOD personnel from the Federal Bureau of Investigation (FBI); Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms (ATF); Secret Service; and other governmental agencies also use the same information support system.

The military EOD community is called on to respond to approximately 20,500 operational tasks each year. Each year, the increasing sophistication and complexity of munitions and their incorporated countermeasures further tax the skill and training of the EOD technicians. At the same time, acquisition of munitions by third world nations and terrorist groups is becoming easier as is the ability to fabricate and assemble munitions.

The Series 60 publications, often referred to as technical orders (TOs), that EOD technicians use contain over 117,000 pages in 28,000 separate documents and include 25,000 diagrams and photographs. The ordnance devices are separated into 13 categories. Each category has different identification features with which the EOD technician must be familiar. The supply of candidates for the EOD career field who possess the aptitude to master this material is decreasing, while the requirement for the number of EOD technicians in each of the services is increasing.

At the start of the effort, the joint-service EOD community was manned at 80 percent strength with an end-strength (number of personnel required) increase of 40 percent expected by 1991. This increase would require the Naval School, EOD (EOD school) to double the number of graduates. This would have been difficult with the 25 percent attrition rate and 52 percent setback rate it was experiencing at the time. This manpower problem is further compounded by the increasing retirement of experienced EOD technicians.

The three-drawer safe, microfiche-and-paper-based information system used in the school and the field is difficult and confusing to use. The microfiche delivery system tends to be an archival medium and does not lend itself well to operational use, particularly in the environments in which the EOD personnel must operate. Given the difficulty of retrieval of information in the field and the difficulties of transporting, searching, updating, and validating the microfiche and paper documents, it is little wonder that the system is frequently cited as a major cause of attrition and setbacks in the school as well as a significant contributor to reduced performance in the field. The Naval Explosive Ordnance Disposal Technology Center (NEODTC), Indian Head, Maryland issues about 200 revisions per year to each of the Series 60 publication holders. Keeping the publications up to date is an error prone, labor intensive chore for each of the EOD units.

The technology currently exists to automate the storage, search, retrieval, updating, and reproduction of the technical information that EOD technicians must use. With an improved, automated, field-portable system, less experienced EOD team members could improve their performance to the level of more experienced technicians. Also, the EOD school could take

advantage of the information system to enable candidates with a wider range of aptitude scores to enter the EOD career field and become successful EOD technicians.

## **Objective**

The objectives of the AI-EOD project were to (1) provide EOD technicians from each branch of the military services with an efficient, easy-to-use information delivery system for identifying ordnance and retrieving the appropriate render-safe procedures and (2) demonstrate the effectiveness of a prototype information system incorporating artificial intelligence in improving the performance of EOD technicians.

## **Background: Service Missions**

The general purpose of the Artificial Intelligence-Explosive Ordnance Disposal (AI-EOD) project was to develop and evaluate a computer-based information search and retrieval system that could be used to demonstrate its effectiveness in increasing the performance of EOD personnel. It was recognized that technology existed to automate (i.e., computerize) the storage, search, retrieval, updating, reproduction, and user delivery of EOD technical information. The use of Artificial Intelligence (i.e., a neural network) in the computerized delivery system was expected to enable less experienced EOD personnel to perform effectively as EOD team members. The improved delivery system was also expected to improve overall team effectiveness and significantly assist in resolving the problems of operational effectiveness. It would also reduce school attrition and school setbacks related to the current microfiche information system.

### **Air Force**

The primary Air Force EOD mission is Base Recovery After Attack (BRAAT). This is a time-critical mission because runways must be cleared and made operational as soon as possible after an attack. Air Force EOD personnel also gather and report intelligence information as appropriate. They do not generally exploit devices for intelligence. A few Air Force personnel are assigned to special and experimental recovery incidents. Air Force EOD training supports the primary BRAAT mission. As a result, the EOD technicians must maintain their familiarity with a wide range of ordnance, with the corresponding EOD tools and procedures for their use, and with the render-safe procedures.

### **Army**

The Army has essentially three EOD missions: To provide (1) combat support, (2) urban warfare support, and (3) training. The Army EOD combat support mission includes locating, identifying, clearing, and rendering safe unexploded ordnance. Requirements for information support for urban warfare are basically the same as for the combat support mission. EOD technicians on protective assignments generally do not attempt to render devices safe. Army EOD personnel conduct training whenever they are not responding to an incident. Therefore, any system provided would have to include a training component/capability.

## **Marine Corps**

The Marine Corps has three major EOD missions: (1) To clear beachheads in support of combat missions, (2) to render inert and strip ordnance for intelligence, and (3) to conduct BRAAT for forward air field and enemy bases. Also, Marine Corps EOD personnel perform routine clearance of hot or damaged ordnance from firing ranges.

The combat support mission is to clear a beachhead, for up to 25 km, of unexploded ordnance. Marine Corps teams are self-contained and mobile, similar to those of the Army, only lighter and, therefore, able to move faster. Speed is essential and many devices are exploded in place.

Disassembling a device to render it inert and certifying it for shipment or intelligence are missions unique to the Marine Corp. The other services rely on the Marine Corps to perform this certification. These tasks require the greatest information support, often exceeding the information currently available in the Series 60 publications.

The Marine Corps BRAAT mission is to clear captured airstrips and to make them available for landing friendly aircraft. This mission is similar to the Air Force mission but is more common for the Marine Corps. The need for the EOD team to travel light requires a comprehensive information system that is truly portable (can be carried by one man).

## **Navy**

The Navy's EOD mission is to protect its ships and shore stations. This mission involves the rendering safe of "friendly" jammed or inoperative armament, and disposal of enemy ordnance. Mine warfare is the special area of concern for the Navy. A mine is normally disabled by setting off an explosive charge near enough to the mine so that the shock wave destroys the internal electronics but does not explode the mine. The procedures for disposing of unexploded friendly ordnance are generally known. Disposing of unexploded enemy ordnance should benefit greatly from an information system that contains a complete set of ordnance publications. The Navy has no BRAAT mission as such.

## **AI-EOD SYSTEM FOUNDATION**

### **Previous Expert System Approaches**

Previous prototypes using expert system approaches have been able to extract the expertise for only a few identifications. The complexity level was high and growing quickly. Worse yet, the expertise had to be incorporated directly into the software code. Any missing, incorrect, new, or ambiguous information would invalidate the expert system. The effort of creating and then maintaining an expert system could not be sustained. A method had to be found that would deal with the problems of working with incorrect, incomplete, or ambiguous information.

The EOD technicians address these problems with varying degrees of intelligent reasoning coupled with experience. Reasoning enables the EOD technician to realize that if a device looks like a mortar but has a bullet trap (which mortars do not have), then the device is not a mortar, but

a type of rifle grenade. Experience is the recall of information connected with a given situation or data characteristic.

## **Neural Net Design**

The foundation of the AI-EOD system, the "neural net," is modeled after actual neurological processes and represents an innovative implementation of artificial intelligence. The result is a search and retrieval capability that uses any combination of available criteria including incomplete, inaccurate, or negative data as well as phonetic searches to access the EOD publications.

### **Basic Components**

The neural software is constructed in the C++ language. The object-oriented nature of C++ language serves to meet the needs of the logical design. The artificial neuron is based upon the basic biological model. The central cell body, the soma, is where the nerve impulses are received, processed, and sent out. The nerve inputs, as well as the outputs, can be excitatory or inhibitive. Input signals are not simply received and then sent out, but are processed by the soma. If the soma does not receive enough stimulation to exceed its excitation threshold, no output is generated. In addition to the varying degree of excitatory and inhibitive signal strengths, the stimulation level of the soma will decay with time.

The basic transmission nerves, the ganglia, are the electrical wires through which the signals are sent. As in the copper counterpart, there is resistance to the electrical signals, dampening the signals. The ganglia can send the signals in only one direction: The ganglia that send signals from soma are called axons; the ganglia that bring signals into a soma are called dendrites. In effect, one cell's axon is another cell's dendrite. At the end of the axon is a signal filter called a synapse, which further modifies the signal that the receiving soma finally receives.

This aggregate of soma and ganglia comprise a neuron. Individually, a neuron is relatively simple. Its true power comes from the diversity and complexity of the interconnection of neurons and the summation of the parallel processing of each neuron being greater than the sum of the parts.

### **Interactive Activation, Competition, and Associative Memory**

One capability that the neural net software has shown is called associative memory. Given a portion of a pattern, be it a picture of a dog or a description of a bomb, the neural net can reproduce the full pattern. This is the same as seeing only the side of someone's face but knowing who that person is. If that person wears sunglasses, it may be harder or take longer but recognition still comes. It is the same with the neural net. The major obstacle is that, like some humans, it takes hours, sometimes days, of training before the neural net can learn a new pattern. This is not acceptable for an EOD unit receiving 200 revisions a month.

Just as a person at a costume party can be recognized by height, weight, body shape, mannerism, and pattern of speech while the facial paint and body costume are discounted, the neural net needs to reinforce the pattern of items that fit together (interactive activation) while repressing (competition) the items that do not fit into that pattern. Interactive activation and

competition of the neurons, coupled with associative memory, are the bases for the AI-EOD neural net.

The interactive activation results when the relevant neurons send excitory signals to associated neurons to complete known patterns. Exciting the neurons for the EOD characteristic of propellers will cause them to send signals to other features of torpedoes but not to features of landmines. The competitive nature comes when the propeller is also described as having six blades. The neural net will further reinforce the features of torpedoes with six bladed propellers, while sending inhibitory signals to other torpedo patterns. This is much like playing King of the Hill.

### **Expert System Knowledge Acquisition**

Since there is no decision logic within the neuron to decide where the signal will be sent, how does it know where to send positive and negative signals? The answer is that individual neurons do not know. An expert system first has to be developed to collect the necessary information about each ordnance device.

Currently, each Series 60 publication contains a drawing of the device (called "Figure 1"). The text of the document usually includes a description of the device with information on any features not revealed in the drawing. However, a number of features are not available in the written description, but are available only from the drawing ("Figure 1"). Also, the amount and type of information in the description and/or "Figure 1" are often inconsistent, even for very similar ordnance devices. Since much of the important descriptive information is available only visually in the drawing and is so inconsistent, a system to extract this information was developed for the AI-EOD effort. This information was added as an Identification Table for each Series 60 publication used in the research. This table lists attributes such as length, width, number of fins, body casing material with specific values for each attribute or feature.

After identifying the type and category of the ordnance device, the expert system asks for information, based on previous answers. While gathering information for a landmine, no question will be asked about fins. Whereas, for other ordnance devices, questions will be asked about the presence of fins, their number, placement, composition, coloring, shape, and other appropriate fin-related questions.

Whether or not a question is asked depends on the ordnance category being described and the answers to previous questions. This expert system embodies the knowledge of experienced EOD technicians to determine what can be useful in the identification of an ordnance device.

Knowing which questions to ask represents the reasoning power of a jury of experts, experienced EOD technicians. The data produced from this program are the knowledge history of what distinguishes one ordnance from another; in other words, an EOD technician's experience.

With the reasoning and identification information available, the individual artificial intelligence neurons can now be configured to reproduce the abilities of an expert EOD technician in the identification of explosive ordnance. As part of the development of the expert system, 73 categories of identification attributes were identified. Each category may have many different attributes or a list of acceptable values for that attribute. For example, the Dimensions category has

over 40 ways of measuring the various ordnance device. Obviously, only some are appropriate for a particular device. Other categories such as Body Color list the more than 50 known body colors currently accepted as valid identification features. This basic information about the different categories, their names, attributes, and acceptable value range is collected in one file. The data collected by the expert system about each ordnance device, identifying attribute, and value are aggregated into another file. These two files are used (by the AI-EOD system) during the search routine.

### **Neural Net Creation**

The file containing the value/attribute data for each piece of ordnance (i.e., the Identification Table) is used to create the basic foundations of this artificial brain. It creates neurons to represent each of the individual values, except for numerical values. There is a neuron for "yes there are fins" and one for "plastic body casing." These neurons are clustered logically, via axons and dendrites, within attribute clusters. Neurons representing light metal, heavy metal, plastic, cast high explosives, would be clustered together to represent the body-material attribute. Each neuron is connected to the others in the cluster with an inhibitive axon. From each neuron, a positive axon would be connected to other neurons that share in the identification of a particular ordnance device. The plastic body-material neuron would be connected to the rubber pressure plate neuron and the ribbed body-texture neuron to describe a particular land mine. The set of neurons describing an ordnance device would be connected to a neuron representing the Series 60 publication number of the device.

The neural net software has no preconceived notions about how many attribute categories, values, or interconnections the neurons have. This is totally controlled by the data contained in the two files produced by the expert system. Previous work on neural nets has shown a requirement of hours or days to train the neural net. The AI-EOD program builds and establishes the trained neural net in seconds. Whenever an updated disk or CD-ROM is sent to the EOD unit, the neural net is also fully updated and ready to go.

### **Neural Net Operation**

The reasoning power used to collect the data from the Series 60 publication is now used to allow the EOD technician to enter what information is known to identify an ordnance. Depending on the answer to specific questions, the program will ask for additional information. When an answer is given, a neuron is stimulated. This external stimulation of the neuron will exceed its threshold value and cause it to send a signal through each of its axons. The axons connected to the neurons in the same cluster will be sent inhibitory signals. This will dampen the excitation of the other neurons in the same cluster since, if it is one thing, it cannot be the others at the same time.

The connection to the other neurons that describe ordnance devices that share this neuron's attribute will receive a positive signal; that is, this signal will be sent to all ordnance device patterns that share this neuron. Each of these neurons in turn, if their threshold limit has been exceeded, will send forth a wave of signals. Each of these signals contributes to the excitation or inhibition of other neurons. Eventually, the propagation of the signals through the interconnection of neurons will return signals to the originating neuron. These incoming signals may further excite the neuron causing stronger output signals or dampening the neuron to a quiescent state.

Because of their interconnection--when more than one neuron of a particular ordnance pattern is stimulated--their signals to each other start to reinforce and resonate, building their excitation level. This harmonic resonance will continue to gain strength pulling in other neurons that fit within patterns and share the characteristics entered by the EOD technician. Each neuron of these patterns will also be sending inhibitory signals to other members of its own cluster, thereby dampening them. These dampened neurons may be members of other resonating patterns, thereby dampening them as well. Each pattern will then have its own relative strength depending on how closely its characteristics match the characteristics entered by the EOD technician.

Since the neuron decides who receives a negative signal, the converse is also true; each neuron will be sending positive signals to neurons not shared by the other neuron. This ensures that other ordnances that share some, but not all, of the characteristics being described are also considered as possible devices. After all, the EOD technician may have entered an incorrect attribute or value. If the device is thought to be a dog with four legs but all other descriptive characteristics describe a duck, the inexperienced EOD technician could be in serious trouble.

When a set of incompatible or unknown characteristics is entered, the neural net begins to resonate in many small areas. Those areas with a closer match and more input to known patterns will gain in harmonic resonant strength, thus dominating the weaker pattern matches. The results of this "King of the Hill" competition will be presented to the EOD technician as a list of Series 60 publications from which to make the final identification decision.

If the EOD technician changes an input selection or value, the artificial neuron's excitation level will decay over time just as the biological neuron's would. Isolated neurons or neurons with weak interaction with other neurons will decay faster. Neurons in stronger resonant patterns will continue to be stimulated by the other members of the pattern. The loss of the outside stimulation will, over time, have an effect and lessen the pattern resonance strength.

Within the artificial neural net, time is created by computational cycles through the net. The net can be cycled whenever an attribute is entered or, as in the case for the AI-EOD system, it can wait until a set of attributes have been selected and then initiate the neural net cycle (or search). As each neuron is visited, the analysis of its inputs takes place. During the first cycle, few neurons have any interneuron signals since the other neurons have not yet been visited for processing. However, the presence of outside stimulus (the EOD technician selecting this attribute) will determine if any signal is sent from this neuron. On the second pass, many neurons will have interneuron signals. These will be processed and the resulting neuron stimulation level will determine if any signal is propagated. Depending on the quantity and quality (correctness) of the attribute's input, only a minority of the neurons will be stimulated and require some sort of processing. This selective processing, coupled with the independent (parallel) processing of each neuron makes the data search very fast. The time of search is not directly proportional to the size of the database.

At least three cycles are needed to establish any harmonic resonance. Five cycles will probably result in the final precedence list of most likely Series 60 publications with 10 cycles providing finer detail of their relative strengths.

## **Numeric Data**

The input of numeric data is handled differently than input for a list of possible values. While a neuron represents a specific value, such as plastic, it would not be possible (given the resulting number of neurons required) to have separate neurons for each possible numeric value.

Each axon modifies the value of the signal sent out by the soma; this weighted value is what the receiving neuron uses as input. The modification provides a means of weighing the relative importance of signal. For example, the diameter of a device is more important than is the color of paint that may or may not still be on the ordnance. At the end of each axon is the synapse filter. For most axons, this synapse is wide open and does not alter the signal strength. For axons transmitting measurement values, the synapse filter is individually configured to alter the strength of the signal. The closer the signal is to the specified measurement, the stronger the signal is that passes through to the receiving neuron, thereby influencing the strength of the resonance. The further the signal is from the specified measurement, the weaker the transmitted signal is, until it finally becomes negative, thereby dampening the resonance for a pattern. These synapse filters can be dynamically adjusted to give the ability to alter the range of closeness. When measuring the length of a guided missile, it is probably all right to be off by one or two feet, but measuring the length of a fuze requires a tolerance of a few millimeters.

## **Fuzzy Word Searches**

The same ability to ask the system for information about an ordnance when its input is imprecise or "fuzzy" is used as the foundation for finding relevant words. The Tomahawk cruise missile became known to millions of people during the Gulf War; however, nowhere in the Series 60 publication titles does the word Tomahawk appear. The same is true of a Canadian, British, and United States landmine nicknamed Elsie. The AI-EOD system uses the neural net to allow an EOD technician to use any word from the title or a commonly used nickname to find the appropriate Series 60 publication.

Word information is gathered by the expert system when it collects the technical specification about the ordnance (during Identification Table construction). The neural net will retrieve the Series 60 publications relevant to a device with a diameter of three inches and also those with a diameter of about three inches. It will also find publications that have a particular word such as missile or one similar to it such as missel or myssile in the title. Since the EOD technician may misspell the desired word, or words, or the information was incorrectly entered during the expert system data collection, the neural net should ignore the spelling of the word and use the sound of the word (phonetic spelling). When a word is entered, it is processed to get the essence of the sound (phonetic spelling). This approach also finds many acronyms or abbreviations such as mssl for missile. Now, when looking for missile the system will return entries for missile, missle, mssl, missel, and variations of missiles since the sound is close to missile.

## **User Interface**

The categorization of explosive ordnance into 13 groups does not mean that the boundaries between groups are clean and distinct. While the differences between a 500-pound bomb and a hand-thrown grenade are distinct and obvious, the same cannot be said for a large number of the

ordnance devices. The increasing sophistication and deadliness of modern devices has shown the gradual incorporation and sharing of features and appearances of diverse munitions. The variations from one category to another can be blurred and indistinct.

Analysis for the AI-EOD system prototype found at least 73 characteristics or features that can be used to identify an ordnance. These identifying features can range from the simple "Yes, it does" or "No, it does not" have the feature to "If there are fins, how many are there, and what is their position, shape and composition."

Recording this information is done by the traditional attribute-value pairing:

Number of fins (the attribute) = 8 (the value)

Casual observers may believe that, given this information, an ordinary database system can be used to store and retrieve the correct documents. With the ability to view the ordnance undamaged from many view points and with plenty of time, the information entered would be correct. If the information available is correct and unambiguous, there would be no reason for an artificially intelligent system.

Outside the classroom, the ordnance to be identified may be partially obscured, rusted, corroded, bent, broken, or modified. The current method of identification relies on obtaining the diameter and length. If the device is buried, bent, broken, obscured, or too dangerous to approach, the information available for entry in the traditional database is non-existent, unreliable, or does not meet the requirements of the conventional database approach. A normal database will not provide accurate answers if even one input parameter does not match the specifications of the known ordnances.

The role of the AI-EOD software is not to think for or replace the EOD technician but to provide the EOD technician with a useful tool, a job performance aid (JPA). To be useful, the software must be able to augment the lack of seasoned reasoning and experience of the new EOD technician while not slowing the pace of the experienced EOD technician.

A hierarchal or relational database by default assumes that a list of criteria given to it for document selection will logically add (AND) criteria to select a document. Suppose the EOD technician wants to find a document that describes a device that has six fins, a nose fuze well, and a light metal body casing. If all of the information is correct, the database system will find any matching documents by looking for a document that describes a device that has fins:

- AND has six of them,
- AND has a nose fuze,
- AND has a light metal body casing.

If no documents have these exact features, the database system will make no response.

The EOD technician could reformulate the request to look for a device that has fins:

- OR has six of them,
- OR has a nose fuze,
- OR has a light metal body casing.

Now, the database system would respond with far too much data. Bombs, grenades, mortars, torpedoes, and missiles have fins, and landmines have light metal body casings but no fins. The resulting list of Series 60 publications would not help the EOD technician.

One alternative would be for the EOD technician to reformulate the request looking for a device that has fins:

- AND has six of them,
- OR has a nose fuze,
- AND has a light metal body casing.

While this would narrow the response, the object was to aid EOD technicians, not to require that they master logic and database processing.

The situation becomes even more complicated if the device has a plastic body casing, instead of a light metal body casing. A knowledgeable and experienced EOD technician, upon hearing the description of a device, might know that the light metal body casing does not match a known device or respond that there is a device with light metal body casing that has eight, not six, fins.

It is the goal of the AI-EOD system to provide this ability to present information while not knowing which parts are correct, incorrect, or slightly wrong. The veteran EOD technician uses the knowledge and experience stored in his brain. The AI-EOD system uses the building block of the brain, the neuron, to base its artificial intelligence.

### **Neural Network Applications**

The AI-EOD neural network was designed and developed to ensure "portability" of this new technology. This was accomplished by ensuring that the hardware selected was common and "off the shelf." Also, and more importantly, the network programming was constructed to ensure easy transition to other occupational communities, task performance requirements, or databases. In that the neural network is based on the learning of the value-attribute pairs of a database and the database construction does not affect the operation of the neural network, there is a separation of the database and the network. This allows the database to change, be modified, or become a completely new database without affecting the neural network. For example, the neural network could be modified from an EOD database to one providing information on maintenance of sophisticated warfare systems, the supply system, or manpower and training.

The relevant information for an AI-system is a direct function of the construct of the information within the database (i.e., the value-attribute pairs) and the information that the user would supply given the search and retrieval requirements and information held by the user; that is,

the values or attributes that the user might input. This independence of the neural network from the user input and database components makes this technology well suited for implementation in other task areas.

## **AI-EOD SYSTEM PROTOTYPE DESCRIPTION AND OPERATION**

The AI-EOD prototype is an AI-based multiple-incident identification, recording, and tracking system featuring state-of-the-art image and text management. The prototype system was written under the UNIX operating system<sup>1</sup> using X-Windows. For the speed of development and to use available software tools, the prototype was developed on a Sun 4 SPARC workstation. The UNIX operating system is POSIX compliant. The X-Windows graphical user interface (GUI) uses the Open Look presentation style. Most of the software was written in the C language. To ensure portability, only standard library calls and conventional programming protocol were used. The artificial intelligence portion of the code, the neural net, was written in C++. The input data are expected to be straight ASCII files.

### **Software**

The software is divided into two major areas:

1. The operating system, which manages the logical and physical resources of the computer.
2. The application software, which uses the resources of the computer to achieve the user's goals.

### **Operating System**

The requirements of the AI-EOD system prototype were that the system be POSIX compliant and that X-Windows be used. The POSIX standard basically states that no nonstandard or machine-specific programming practices are to be used. The UNIX operating system meets and provides a medium for this standard.

X-Windows was developed at the Massachusetts Institute of Technology to solve the problem of presenting a consistent GUI without rewriting on different computers or different computer hardware configurations. X-Windows has attained its goal of machine independence and portability--but at the cost of tremendous memory requirements.

**UNIX Environment.** As a virtual memory operating system, UNIX accommodates the need for the increased memory. A virtual memory system transparently gives the user the illusion that the system is operating with more memory than it actually has. This is accomplished by keeping in memory only those portions of code that are currently being used. Code not currently being executed is transferred to temporary disk storage. When needed, the code from the disk is transferred to the main memory, and some other section of code from main memory that is not currently being executed is swapped out to disk. If the main memory area is small, the operating system will spend a relatively large amount of time swapping pieces of code in and out of memory.

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<sup>1</sup>Identification of software and specific equipment is for documentation only and does not imply endorsement.

The minimum memory for UNIX and X-Windows on a workstation is 8 megabytes. While the system can actually be loaded in less memory, a portion of the operating system and X-Windows always resides in the memory and is never swapped out. Swapping takes place in the remaining memory. If there is not sufficient memory, the computer will spend so much time swapping code that the user software performance will be degraded. Studies have shown that increasing delay by only a half second has a negative impact on user acceptance, use, trust, and frustration. These are unacceptable conditions to add to the high stress environment already faced by the EOD technician. The recommended minimum for the AI-EOD system is 16 megabytes for a UNIX-based machine.

**DOS Environment.** Presently, DOS cannot directly handle X-Windows. However, the same look and feel can be achieved by the use of Windows 3.0. The lack of virtual memory management by DOS is a limitation that can be overcome by the use of certain utilities incorporated during the design of the AI-EOD system. Building a DOS-based version of the AI-EOD system has the advantage of utilizing the many DOS computers currently in use by the EOD units. Adding memory is cheaper than obtaining new machines. A DOS computer will require at least 8 megabytes of memory with 16 megabytes being the recommended size. A DOS computer will also require Windows 3.0.

### **Application Software**

Thousands of lines of code are involved in creating the user interface. The interface is what the user "thinks" is the system. It is imperative that the AI-EOD system include a dynamic GUI; X-Windows provides a means to present a dynamic GUI. The user should not be forced to proceed with a rigid sequence of questions and answers. The EOD technician must have the ability to respond to the given situation with the information available. No attempt should be made to second guess the procedure necessary to solve the EOD technician's current situation; that is, do not construct the "best way" to proceed, rather provide as flexible and individual approach as possible. The GUI must present the user with a variety of options, none of which should be mandatory to answer. Choosing a particular option will cause the presentation of the next group of related options, gradually narrowing the area of interest and the possible answers.

The AI-EOD system prototype uses the Open Look style of window presentation. Open Look (or any of the other standards such as Motif) is merely a presentation standard. The size, shading, and placement are some of the characteristic that distinguish one standard from another.

X-Windows is the software on which these standards are built. X-Windows is an event-driven process, which means that multiple, active windows can be displayed concurrently on the screen. Each window is active and patiently waiting for a user response to that window's request or action. The user can respond to any window regardless of the order in which it was placed on the screen. The window will remain quiescent until the user takes an action (i.e., an event) in response to that window's request. This allows multiple processes to be in progress at the same time--each independently waiting for the user to respond.

**C Programming Language.** C is the computer language of choice because it provides the greatest portability capabilities if the system must be moved to different hardware platforms. To

remain POSIX compliant, nonstandard system calls and machine-specific capabilities cannot be used. All of the user interface code of the AI-EOD system prototype was written in the C language.

**C++ Programming Language.** The neural net is written in the C++ language. The appropriate compilers were not yet available to build the GUI using C++. It is desirable to build the GUI in C++ to make a seamless connection between the GUI software and the neural net software. The neural net was written in the C++ language to facilitate the capabilities of the object-oriented paradigm. The neural net grows and changes dynamically while learning the information about each piece of ordnance. The type, complexity, and quantity of ordnance has a corresponding effect in the complexity of the resulting neural net.

**Imaging.** Because the input by the EOD technician will result in the presentation of images of the selected publication, the following features are required.

1. The software that renders the images must be fast, nonmemory intensive, and machine independent; the CCITT group 4 data compression standard is widely known and used, and is recommended.
2. The software must provide for the ability to zoom in on selected portions of the image.
3. The area of interest to be enlarged (zoomed in on) must be selectable either by drawing a box around the area of interest or selecting the center point of zoom perspective.
4. The user should be able to modify the zoom ratio.
5. Zooming out should reduce the total image at least to 25 percent of its normal size.
6. Zooming in should continue until straight lines are stairstepped from pixel blow up.
7. The images must be window based.
8. The user must be able to adjust the size of the windows. Both horizontal and vertical scroll bars are necessary to facilitate the adjustment of the image within the window.
9. The user must be presented with multiple image windows, each identifying the publication and image number.
10. Each image window should allow rotating the image in increments of at least 90 degrees.
11. The option of providing a mirror image of the image is desirable.
12. The user must be able to return the image to its normalized view in a single step.
13. Each image must be capable of being printed.
14. The printing option must provide for printing just the portion shown in the window, the full image, or the entire document.

**Raster Format.** The AI-EOD prototype uses raster format, which stores the image as dots, called pixels. There are approximately 1 million pixels per image. The CCITT group 4 compression standard will reduce this to an average of from 20,000 to 40,000 kilobytes of storage. Making a raster image is as simple as making a copy. Instead of transferring the copy to another piece of paper, a computer file that contains the same information is created. The compression algorithm can then reduce the storage requirements, similar to keeping a piece of paper folded until the full page is needed. Raster scanning will save the entire page--words, drawings, and the white space.

**Vector Format.** Vector images are useful for the storage of drawings only. Vector images store the information about each line of a drawing, its location and end points. Vector image storage requirements are usually much less than those for raster images. The penalty for preparing the image for vector input is time. To reproduce an image requires that the information about relative line location and length must be calculated and drawn on the screen or paper. The resulting image, when produced at the normal size will not be any better than the raster image. Only when the images has been enlarged considerably and the raster image's straight lines become stairstepped will the vector storage become worthwhile. Considering the time and effort involved, and the quality of images possible, the raster format is preferred.

**Standard Generalized Markup Language (SGML).** The Standard Generalized Markup Language (SGML) was conceived as a flexible, yet definitive, method of storing text in a robust format. It consists of plain, unstructured ASCII text with structure information contained in a set of tags embedded within the text. The definitions of the tags are either in the document itself or in a different file. The aim of SGML is to establish a standard means of identifying and tagging parts of an electronic manuscript so that computers can differentiate between these parts and provide some logical way of representing special characters, symbols, and tabular material using only the ASCII character set. The types of data that can appear in the document are known as elements. Paragraphs, headings, tables, and titles are examples of elements. The ordering of these elements and the rules for how elements can be nested is what is known as a content model. Content models thus describe the document structure.

The use of SGML is important to the creation, maintenance, and reproduction of the documents by the NEODTC. It provides no aid to the software or the EOD technicians in searching for the appropriate publication. The mixing of multiple files (i.e., text and images) within one document is an unresolved issue within the SGML standard.

The AI-EOD system prototype does not incorporate the use of SGML documents. The production version of the AI-EOD system will require the development of additional code to handle the re-creation of the document in printed form once a publication has been selected for printing.

### **AI-EOD System Operation**

A prime consideration in the design of the AI-EOD system is that users should need little or no training to be able to use the system. Based on X-Windows, the system will accept data input from selections made from various menus. The keyboard is used only to input numeric data or search for specific words. This allows EOD technicians to wear protective clothing while using the AI-

EOD system. Since operation is restricted to the current menu options, no previous knowledge of computers or the design and philosophy of the system is necessary.

### **Category Search**

The program begins by presenting the main window to the user. All options are presented as buttons selected by a mouse. Drawing upon the EOD training, there are 13 buttons--each labeled for one of the ordnance categories. The EOD technician first tries to categorize the unknown ordnance. Selecting one of the buttons will invoke the expert system knowledge that will present a window with a list of identifying attributes relevant for that ordnance category. The EOD technician is not required to enter any information for any particular attribute. Depending on the situation, the EOD technician can enter as little or as much as is known or useful in identifying the ordnance.

Selecting a particular attribute for which information is provided may cause the system to ask additional questions. These additional questions will be in smaller windows that simply appear or "pop up" on the screen. Except when requesting numerical data, nicknames, or title words, all pop-ups or windows provide a restricted list of acceptable responses. These options reflect the terminology and training of experienced EOD technicians.

If the list of attributes presented does not seem appropriate for the device in question, the user can return to the main window, select another category, and begin again. Since many devices share attributes, the same attributes may appear on more than one option menu. For example, if the ordnance is a rifle grenade but the user selects the mortar category, many attributes will be listed that can be used to describe the rifle grenade. Obviously, the rifle grenade will have attributes such as the use of a bullet trap that are not available on the mortar options. If this occurs, the EOD technician will realize that, since this attribute cannot be described in this category, the category is wrong.

Internally, the neural net will not restrict itself to the category chosen. The attributes described will be used to search all ordnance categories to compensate for both the inexperienced EOD technician, and the sophistication and blurred distinction between categories.

When a window appears, the user is not compelled to respond to it or any other window. Each window will remain visible until dismissed or answered. Each category window includes a panel which displays all of the attributes and their values entered by the user. The main window also contains a subwindow that can be used by the EOD technician to record events relevant to the mission (incident). The system can maintain information for up to 10 different missions simultaneously.

At any point, the user can use the entered information as a basis for a search. The neural net will use all input information to produce a list of candidate Series 60 publications. A separate window will open and present this list of publications in descending order according to how closely the device matches entered characteristics. This window shows the title and relative strength of the ordnance to the input characteristics and the other publications.

Selecting any of the listed items will open a window, in which the contents of the publication will be displayed. This image can be manipulated to step forward or backward, page by page, through the publication or to jump directly to a particular image. The user can zoom in (enlarge) or zoom out (reduce) on the full image or any portion of it. The image selected can be rotated by 90 degree steps or presented as a mirror image. The window showing the image can be shrunk or enlarged. Additional image windows can be created by making additional selections from the candidate publications window. Each image window is independent and can be used to step through and compare images from the same or different publications.

### **Neural Net Reasoning**

Instead of viewing a particular Series 60 publication, the EOD technician can request that the neural net explain its reason for including that publication on the list. A window will open, show the publication or Technical Order (TO) number, title, and selection strength. Next, a list of the attributes that were used in the selection of this publication and a numeric value showing the relative influence factor of each attribute will be displayed. This section of the window shows the reason for placing this publication on the candidate list. The summation of the individual attributes determines the position on the candidate list.

The next section of the window shows the rest of the attributes that identify this ordnance. This section can be used to confirm the identification further or show that the publication does not agree with the target ordnance. This list can also be used to suggest additional attributes to put into the neural net to aid in further searching.

Once a publication is selected, it may be printed. The 300 dots-per-inch (dpi) printer produces copies that are indistinguishable from the original paper publication. The system can print the full document, the page being displayed, or only the zoomed portion of a page.

### **Publication Number Search Option**

In addition to the 13 ordnance categories in the main window, there are other options to aid the EOD technician. Many ordnance devices become well known to the EOD technician. Rather than force the EOD technician to enter descriptive attributes, there is an option to enter just the publication number. The Publication Number Search Option opens a window that allows the user to view a list of all Series 60 publication numbers and titles and to select one directly from this list. Alternately, there is a place to enter the publication number, or parts of the publication number. Entering a complete or incomplete publication number, moves the focus point to that portion of the list. Knowing the logic behind the publication numbering scheme allows the user to move quickly to the section of the list that is of specific interest. Selecting from this list presents the document in an image window.

### **Undefined Category Option**

When the EOD technician has no idea as to the classification of an ordnance or its category, he or she can select the Unknown Category Option, which presents several windows that contain all of the known questions and attributes that can be used in identifying an ordnance.

1. The Dimensions Suboption presents over 40 possible measurement methods. The technician can select the ones that make sense for the current ordnance.

2. The Quantities Suboption displays more than 20 items that can be counted (e.g., how many fins are there).

3. The Features Suboption displays more than 50 selections that can be made according to whether or not it HAS a feature (e.g., does the device have fins?).

Any question that can be used to identify any ordnance appears here. By using this main window option, Unknown Category, false starts created by inexperience or the blurry distinctions between categories can be avoided.

### **Fuzzy Word Search Options**

The Fuzzy Word Search Option (Nomenclature, Title, or Common Name) opens a window that allows the user to enter one or more words to look for in the title. Common names or aliases which were collected by the expert system during data collection are also searched. The neural net presents the same type of candidate list of publications as presented by an attribute search.

### **Foreign Language Terms Option**

The markings and terms printed or stamped on an ordnance can be used in fuzzy word searching if they are in English. The situation is compounded when the markings are in Cyrillic, Arabic, Chinese, Japanese, Korean, or any other nonalphabet-based language. Selecting the Foreign Language Terms Option causes a list of languages to be displayed. Selecting a language presents a window that displays foreign language terms and their English equivalents. The English equivalent is found by matching the appearance of the markings to the images. These terms can then be used in the fuzzy word search or to select a particular category.

## **Hardware**

### **Monitor Requirements**

Three factors are important in the choice of a hardware monitor: color, resolution, and screen size.

**Color.** The prototype system uses a 21-inch color monitor. The use of color is beneficial for presenting the options available to the user. Color can be used to highlight important messages, options, or other pertinent information. The images are currently only available in black and white.

**Resolution.** The screen must have at least VGA resolution quality. Less resolution may cause misrepresentation of the images on the screen, leading to an error in identification and (at the very least) a delayed conclusion of the incident. Text and graphics must be discernible without extensive enlargement.

**Screen Size.** Because the system may be used in adverse lighting conditions, the ability to read the small print on various option menus becomes more difficult on smaller screens. More

importantly, smaller screens make the management of image presentation more difficult. The screen must be large enough to present enough of any image to make correct identification of the unknown device possible. Also, to compare different images concurrently, which is often required, would be considerably more difficult on a small screen. Changing the size of the screen would not require any modification of the current image software, but would jeopardize the effectiveness of the EOD technicians. To deal with adverse lighting conditions, the monitor must have both contrast and intensity controls.

The size of the screen selected must be offset by the related considerations of portability. The current microfiche system is small, light weight, and portable (as compared to the previously-used paper documents). Similarly, a small, light-weight monitor may be portable, but fail in its usability as the microfiche system has.

### **Memory Requirements**

A minimum of 8 megabytes of memory is required to load the UNIX operating system and X-Windows. The recommended system size is 16 megabytes; using the minimum size will start the system, but its operations will be slow. Once the operating system is loaded, the AI-EOD software will make large demands for memory. The memory requirements of the execution software are stable but those for the neural net increase dramatically as the computer learns the information about each ordnance device.

The UNIX operating system uses virtual memory management. This technique accommodates memory requirements that exceed the available memory resources. The system keeps in memory only those portions of the code currently being used and temporarily stores unused code on disk. By using virtual memory, a computer with less than required memory can function, but the frequent swapping between memory and the disk degrades system performance. More memory will result in faster execution of programs.

To place the AI-EOD software on a DOS computer requires that the computer have sufficient memory for both current operations and the inevitable increase in data. Sending a monthly revision of the Series 60 publications to an EOD unit that can no longer start the program because of insufficient memory is not acceptable. A DOS-based version of the AI-EOD software can have the virtual memory features incorporated but this must be done at the system development stage.

The image manipulation routines in the prototype AI-EOD system do not require additional memory. However, some other image software routines will require at least 1 megabyte of additional main memory.

### **Disk Storage**

The prototype version of the AI-EOD system uses a hard disk as the repository for the Series 60 publications. As such, this disk size is much larger than the production version will need because the production version will store the Series 60 data on CD-ROM. The disk in the production system will then serve mainly as the storage medium for the program and the operating system. Depending on other uses that an EOD unit has, a UNIX machine with a 400 megabyte hard drive would be sufficient. A DOS-based machine with a 320 megabyte hard drive would also serve.

## **CD-ROM Technology**

The production version of the AI-EOD system will distribute the Series 60 publications via CD-ROM instead of the current microfiche and paper. Multiple CD-ROMs may be used for either administrative or security reasons. The files from which the neural net learns all it needs about the Series 60 publications must be on the first, or main, CD-ROM. The rest of the files, which contain the text and images for each publication, can be spread across multiple CD-ROMs if necessary. The use of the CD-ROMs will simplify the administrative and security work load for the EOD unit. The neural net will learn all of the revisions and current status of each known ordnance in the Series 60 publications from the CD-ROM.

The CD-ROM's greatest weakness is also its greatest strength. The very technology that allows the tremendous amounts of data to be stored on the small CD-ROM also prevents an EOD technician from accessing any information if the computer should become inoperative. Carrying a backup copy of the Series 60 publications in a three-drawer safe would diminish the arguments for using a small, light-weight computer and monitor for portability. The duality of maintaining the current media--paper and microfiche--and distributing CD-ROMs would not decrease the work load of updating the EOD unit's Series 60 publications and would increase the work load at NEODTC.

Another solution would be to carry additional computers for backup. Expense would then become the limiting factor, but the full long-term benefits of the AI-EOD system would be realized by the EOD teams and NEODTC. Each year, the cost/performance ratio of computers improves and the use of computers by the military increases. Having backup computers becomes less of a luxury and more of a necessity. Also, money saved by reducing the number of work-hours necessary to maintain the current information system seems to be more than sufficient to purchase the necessary backup computers.

## **Printer**

Once the EOD technician has selected one or more Series 60 publications for further review or study, the system needs to produce these documents. A printer capable of producing at least 300 dpi is necessary to produce images with sufficient detail to be of use to the EOD technician. A 300-dpi printer will render images indistinguishable from the original master paper publications. The printer should use standard typing or photocopy paper.

The printer will require sufficient memory to handle the images sent to it. Most printers assemble the bits of information from the computer in its internal memory prior to printing. An 8 1/2 by 11 inch page with a lot of detail may require a million bytes of memory in the printer. If the memory is not sufficient, the printer will print only a portion of the image, which may not be the portion needed by the technician.

The printer also should be capable of printing at least six pages per minute. Printer weight, size, and power considerations are also part of the portability issue. If the printer fails to function or simply runs out of paper, the size and clarity of the monitor to render the necessary image information is again emphasized.

## **Summary of System Capabilities**

A number of the special benefits and features associated with the AI-EOD prototype are summarized in Table 1.

### **Artificial Intelligence**

The neural net, which is the foundation of the AI-EOD system, is modeled after actual neurological processes and represents an innovative implementation of artificial intelligence. The prototype system is an information search, retrieval, and delivery system that uses a combination of criteria to access the EOD Series 60 publications.

### **Recording/Tracking**

For incident recording and tracking purposes, the system prompts the user for pertinent information. It also tracks the status of the incident.

### **Identifying Objects**

The AI-EOD system's unique search and retrieval capabilities assist the user in identifying objects. For example, the search can be by characteristics such as physical attributes, by common name or alias, by nomenclature, or by Series 60 publication TO number.

### **Audit Trail**

During a session, each characteristic, or lack of a characteristic, is recorded as the user enters it. This record serves as a type of audit trail to document the activities of the user.

### **Listing**

Based on information the user provides, the system displays and updates a list of relevant publications in real time. The system also evaluates and rates the Series 60 publications with the best "fit" at the top of the list.

### **Viewing**

At any time, the user can select one or more publications, consisting of text and images, for viewing to assist in confirming the identity of an object. Viewing features include multiple windows, zoom-in/out, rotate, and scroll.

### **Reporting**

For times when a hard copy of the publications would be useful, the user can select one or more Series 60 publications for printing on a laser quality printer. The audit notes can also be printed.

**Table 1**

**AI-EOD Prototype Features and Benefits**

<b>Feature</b>	<b>Benefits</b>		
<b>UNIX/X Windows</b>	>Consistent, intuitive graphical user interface (GUI)	>Can conduct parallel searches accessing the same documents or different documents	>Portable
	>Short learning curve		>Complies with DOD standards
<b>Artificial Intelligence/ Neural Net</b>	>Modeled after neurological processes	>Represents an innovative implementation of AI technology	>Combines phonetic and "fuzzy" searches
	>Can reach conclusions based on incomplete or inaccurate as well as negative data	>Evaluates and rates the publications, and places the publication with the best "fit" at the top of the list	>Displays and updates a list of relevant publications in real time
	>Suitable for other platforms (e.g., DOS/Windows) as well as other applications		
<b>Image and Text</b>	>Viewing features include multiple windows, zoom-in/out	>Select one or more publications for printing on a laser printer	>Records searches as a type of audit trail
<b>Object-oriented Programming</b>	>Models reflect aspects of the real world	>Creates a reliable, error-free system	>Short development time
	>Maintainable	>Flexible, adaptable	>Long life span
	>Reusable	>Capable of evolving	

## **TEST AND EVALUATION**

The test and evaluation effort was conducted to collect and analyze information on the reliability and validity of the AI-EOD delivery system to consistently result in improved identification performance as measured by time and accuracy (AI-EOD system vs. conventional system). As a practical matter, demographic, utility, and usability information about the delivery system was also collected from the users.

### **AI-EOD Testing Episodes**

Within the context of the AI-EOD effort, successful performance is measured in terms of how quickly and accurately an EOD technician can identify an ordnance test shape (an actual unarmed or representative model of an ordnance device). This process closely relates to the ordnance identification requirement a technician might encounter in the operational environment.

The AI-EOD testing format begins by presenting the technician with a piece of unknown ordnance (i.e., a test "shape"). The technician must identify the test shape and determine the appropriate render-safe procedure (RSP) using either the conventional approach or the AI-EOD delivery system. Evidence of successful completion is the reporting of the Technical Order (TO) number (i.e., the appropriate Series 60 publication) and the page number of the render-safe procedure for the "unarmed" condition within the correct TO. Appendix A contains the information and instructions that the EOD subjects received for the testing episodes.

### **Ordnance Shapes**

The ordnance devices, or shapes, provided for the identification episodes were selected utilizing the following criteria. First, the shapes were chosen by expert EOD technicians who understood the intent of the AI-EOD design effort, (i.e., members of the technical working group at the NEODTC). Second, the selected shapes must represent realistic and cross service ordnance identification requirements. Third, the shapes could reasonably be identified and, at the same time, were not so familiar that the technicians would not be tested. Also, the shapes had to be of a size and weight that could be transported from one test site to the next. A number of shapes were tried out and selected in the verification process. The test, practice, and rejected shapes are listed in Table 2.

### **Identification Evaluation Measures**

The AI-EOD test and evaluation episodes focused on the identification process. The measures utilized were the speed (time) and accuracy (number of errors) in identifying the ordnance device and determining its unarmed render-safe procedure.

**Table 2**  
**AI-EOD Practice and Test Shapes**

Shape No/ RSP Pg.	Country/Nomenclature/Model	Publication	ID Guide Page	Inert Sucker
<b>Set I Test Shapes</b>				
1/7,8 <sup>a</sup>	UK Bomb Unit, HEAT, No. 1 MK1	60B-3-2-11 <sup>b</sup>	11-27	NAVEODFAC 2801
2/4	US Projectile, 40mm, HEDP, M430	60D-2-2-23-10	3-593	USMC 10751
3/5	USSR Projectile, 82mm, HEAT, BK-881M	60D-35-2-2	3-297	NEODTC O55
4/6	French Landmine, APERS, Nonmetallic, 1951	60H-7-2-6	6-37	301987 Inscribed
<b>Set II Test Shapes</b>				
5/6	Italian Landmine, APERS, AUPS-BRIND	60H-9-2-16	6-66	NAVSCOEOD 601095
6/8	USSR Rocket, 64mm, HEAT, PG-18	60F-35-2-27	3-142.1	NEODTC 0967
7/3	Czech. Projectile Fuze, PD, MZ 3	60D-20-3-10	3-1167.2	USMC 15366
8/5	French Grenade, Rifle, HEAT, 65mm, M1961	60E-7-2-3-13	3-141	NAVEODSCL 301804
<b>Practice/Training Shapes</b>				
P1/14	US Bomb, HEAT/FRAG, MK 118 Mod 0	60T-2-2-6	11-14	NEODTC 0650
P2/8	US Bomb Unit, Training, BLU-26-(T1)/B	60T-2-2-11 <sup>b</sup>	11-22	Produced Inert
P3/5	Italian Landmine, APERS, VS 50AR	60H-9-2-11 <sup>b</sup>	6-54	Rubber Trng Aid
<b>Shapes Originally Included But Dropped As A Result Of Validation/Verification</b>				
-/5	USSR Projectile Fuze, PD,KTM-1U	60D-35-3-10 <sup>b</sup>	3-1171	USMC 1383
-/4,6	USSR Bomb Fuze, Nose, AM-A	60B-35-3-4 <sup>b</sup>	1-238	Rubber Trng AidAvg
<b>Shapes Provided But Not in Database</b>				
	USSR Bomb, Incendiary, ZAB-2.5	60B-35-1-1	11-19	Rubber Trng Aid
	USSR Bomb Fuze, Nose & Tail, AV-1 Mod.	60B-35-3-3-12 <sup>b</sup>	1-302	USMC 13869
	US Bomb Fuze, Tail, Electric, M990	60B-2-3-29	1-372	USN NASM-0074
	Czech. Projectile, 82mm, Mortar, HE, IKX-51	ID Guide Only	3-290	USMC 15388
	Vietnamese Grenade, Hand, Blast & Frag	60E36-2-8	4-87	NAVSCOLEOD 200618
	Vietnamese Landmine, APERS&AM, MDH Type	60H-36-2-4	6-118	USMC 10703

**Notes.** RSP = Render-safe procedure  
ID = Identification

<sup>a</sup>RSP on page 7 actually starts on page 8; therefore, 7 or 8 is correct.  
<sup>b</sup>Multiple Ordnance Publication.

## **Method**

### **Research Hypotheses**

The research hypotheses for the AI-EOD system test and evaluation are divided into six categories: (1) EOD performance (as defined by completion time and errors made during test episodes), (2) EOD knowledge (as defined by training time), (3) EOD experience/ability (as defined by years of EOD experience, pay grade, time in service, personal assessment of EOD skills, and whether currently working in EOD), (4) AI-EOD system utility/usability (as measured by responses to critique questions), (5) computer experience/qualification (as measured by personal responses) and, (6) general factors (age, time in pay grade, gender).

#### **1. EOD Performance.**

Subjects will complete test exercises significantly faster using the AI-EOD than using the conventional approach (AI-EOD time vs. conventional time).

Subjects will have significantly fewer errors when using the AI-EOD system than when using the conventional approach (AI-EOD errors vs. conventional errors).

Subjects will have a significantly higher identification rate when using the AI-EOD system than when using the conventional approach (AI-EOD identification rate vs. conventional identification rate).

These three hypotheses were tested using analyses of variance (ANOVAs).

#### **2. EOD Knowledge.**

Subjects with more training on EOD will perform better, as measured by AI-EOD time, AI-EOD errors, AI-EOD identification rate, conventional time, conventional errors, and conventional identification rate (training time vs. performance).

This hypothesis was tested using correlational analyses.

#### **3. EOD Experience/Ability.**

Subjects who have higher experience/ability, as measured by time in service, time EOD qualified, time working as EOD technician, EOD experience (self-report), and EOD qualification (self-report), will perform significantly better, as measured by AI-EOD time, AI-EOD errors, AI-EOD identification rate, conventional time, conventional errors, and conventional identification rate (EOD experience/ability vs. performance).

This hypothesis was tested using correlational analyses.

#### 4. AI-EOD System Utility/Usability.

A significantly larger number of subjects will prefer the AI-EOD delivery system to the conventional approach as measured by their responses to the following critique questions (see Appendix A for complete set of critique questions):

- a. I like the current microfiche system for identifying ordnance.
- b. I like the new AI-EOD computer system for identifying ordnance.

Responses ranged from 1 = strongly agree to 9 = strongly disagree. These two questions provided a hypothesis of "Like" conventional vs. "Like" AI-EOD system.

Two other critique questions of preference were:

- c. Given the choice, I would rather have the microfiche system than the AI-EOD.
- d. If both systems were available, I would use the AI-EOD system rather than microfiche.

The responses ranged from 1=strongly agree to 9 = strongly disagree. These two questions provided a hypothesis of "Use" conventional vs. "Use" AI-EOD system.

#### 5. Computer Experience/Qualification.

There will be no significant relationship between computer experience or qualification, as measured by self-reporting on computer knowledge/experience (scale ranges from 0=none to 9=expert) and "I consider myself fully qualified in the use of computer" (scale ranges from 1=strongly agree to 9=strongly disagree), and performance results, as measured by AI-EOD time, AI-EOD errors, AI-EOD identification rate, conventional time, conventional errors, and conventional identification rate (computer experience/qualification vs. performance).

#### 6. General Factors.

There will be no significant relationship between general factors, as measured by responses to questions addressing age, gender, branch of service, pay grade, and performance results measured by AI-EOD time, AI-EOD errors, AI-EOD identification rate, conventional time, conventional errors, and conventional identification rate (general factors vs. performance).

#### **Test Administration Procedure**

NAVPERSRANDCEN personnel administered the test in an office environment at the various operational sites. The conventional test was completed using the technical documentation normally used by EOD technicians. The AI-EOD test was accomplished using the AI-EOD delivery prototype system.

The subjects were given an instruction and information sheet, and a background questionnaire (see Appendix A), which they read and completed. Next, they watched a 1-hour demonstration of the AI-EOD delivery system and received instruction in its use. The subjects were then assigned to one of eight test sequences (see Table 3) to protect the AI-EOD test and evaluation study from test order effects. Each subject was administered three practice and eight test episodes.

**Table 3**  
**Test Sequences**

Sequence No.	Sequence of Tests
1	T1,T2,T3,T4; C5,C6,C7,C8
2	C5,C6,C7,C8; T1,T2,T3,T4
3	T4,T3,T2,T1; C8,C7,C6,C5
4	C8,C7,C6,C5; T4,T3,T2,T1
5	C1,C2,C3,C4; T5,T6,T7,T8
6	T5,T6,T7,T8; C1,C2,C3,C4
7	C4,C3,C2,C1 T8,T7,T6,T5
8	T8,T7,T6,T5 C4,C3,C2,C1

Notes.  
T = AI-EOD system  
C = Conventional system.

Each testing sequence took approximately 2 hours to complete, although there was no specific time limit. The subjects completed the first four episodes in the test sequence using one of the delivery systems and then used the alternate delivery system for the rest. The same number was assigned to each AI-EOD test episode (T), conventional test episode (C) and the unknown shape to be identified in each episode (i.e., shape 1 was used in T1 and C1). The test administrator was present throughout the testing sequence to issue the shapes and to record performance data (see Figure 1 for example of one of the eight recording documents, *Sequence 1*).

Once subjects completed the testing sequence they were asked to complete the critique sheets (see Appendix A). The data from the initial questionnaire, sequence performance data and critique sheets were transferred to a master data sheet for each subject (Figure 2).

### Subjects

The AI-EOD system was designed so that it could be utilized by every level of EOD personnel in all EOD environments. The delivery system was verified and validated, and the test and evaluation procedures were modified accordingly by expert EOD technicians assigned to the NEODTC.

The system was then used to gather baseline performance data from the expert (instructor) and novice (student) personnel at the EOD school. The research subjects were members of all four services at three skill levels (as normally defined by experience and paygrade): novices (school students and EOD assistants), journeymen (experienced on-the-job EOD technicians), and master/experts (personnel who have extensive experience or meet special qualifying requirements through assignments as technical experts; for example, instructors or "master blasters").

NAVPERSRANDCEN collected data for the master database for 242 subjects at 24 sites (Table 4) between March and August 1991. The database contained demographic data from the initial questionnaire, performance data for each completed testing sequence, and critique data each subject after testing.

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER  
 ARTIFICIAL INTELLIGENCE-EXPLOSIVE ORDNANCE DISPOSAL (AI-EOD)  
 IDENTIFY THE SHAPE & RSP AS FAST AND ACCURATELY AS POSSIBLE.

AI-EOD EPISODE TESTING SEQUENCE AND RECORDING

Test Sequence 1

Name \_\_\_\_\_ SSN \_\_\_\_\_

Episode	Time		Render Safes Selected	TO No.	RSP Page
	Start	Finish			
<b>Computer</b>					
T1	_____	_____	_____	_____	_____
T2	_____	_____	_____	_____	_____
T3	_____	_____	_____	_____	_____
T4	_____	_____	_____	_____	_____
<b>Conventional</b>					
T5	_____	_____	_____	_____	_____
T6	_____	_____	_____	_____	_____
T7	_____	_____	_____	_____	_____
T8	_____	_____	_____	_____	_____

**Figure 1. Test Sequence 1.**

NAME _____	(Name of subject)
SSN _____	(Social security number of subject)
AGE _____	(Age of subject, in months)
MALE/FEMALE _____	(Gender of subject 1 = male, 0 = female)
BRANCH _____	(Service AF = 1, AR = 2, MC = 3, NA = 4)
TIS _____	(Time in service, in months)
PAYGRADE _____	(Enlisted E1 = 1 - E9 = 9, Officers = 10)
TIME IN PAYGRADE _____	(Time of paygrade, in months)
FORMAL EOD TRAINING _____	(Amount of formal EOD training, in months)
TIME EOD QUALIFIED _____	(Time EOD qualified, in months)
TIME WORKING AS TECH _____	(Time working as an EOD tech, in months)
CURRENTLY WORKING AS TECH _____	(Currently working as EOD Tech 1 = yes, 0 = no)
EOD EXPERTISE _____	(Expertise 0-9, 0 = none & 9 = expert)
COMPUTER EXPERTISE _____	(Expertise 0-9, 0 = none & 9 = expert)
T1 TIME _____	(Time to complete 1st of AI-EOD sequence, in seconds)
T1 ERRORS _____	(Number of errors made during exercise)
T1 FOUND _____	(Identified the shape 1 = yes, 0 = no)
T2 TIME _____	(Time to complete 2nd of AI-EOD sequence, in seconds)
T2 ERRORS _____	(Number of errors made during exercise)
T2 FOUND _____	(Identified the shape 1 = yes, 0 = no)
T3 TIME _____	(Time to complete 3rd of AI-EOD sequence, in seconds)
T3 ERRORS _____	(Number of errors made during exercise)
T3 FOUND _____	(Identified the shape 1 = yes, 0 = no)
T4 TIME _____	(Time to complete 4th of AI-EOD sequence, in seconds)
T4 ERRORS _____	(Number of errors made during exercise)
T4 FOUND _____	(Identified the shape 1 = yes, 0 = no)
TALL TOTAL TIME _____	(Time to complete all of AI-EOD tests in min/sec)
TALL TOTAL ERRORS _____	(Number of errors made during exercise)
TALL TOTAL FOUND _____	(Number of 4 shapes identified)
C1 TIME _____	(Time to complete 1st of conventional sequence, in seconds)
C1 ERRORS _____	(Number of errors made during exercise)
C1 FOUND _____	(Identified the shape 1 = yes, 0 = no)
C2 TIME _____	(Time to complete 2nd of conventional sequence, in seconds)
C2 ERRORS _____	(Number of errors made during exercise)
C2 FOUND _____	(Identified the shape 1 = yes, 0 = no)
C3 TIME _____	(Time to complete 3rd of conventional sequence, in seconds)
C3 ERRORS _____	(Number of errors made during exercise)
C3 FOUND _____	(Identified the shape 1 = yes, 0 = no)
C4 TIME _____	(Time to complete 4th of conventional sequence, in seconds)
C4 ERRORS _____	(Number of errors made during exercise)
C4 FOUND _____	(Identified the shape 1 = yes, 0 = no)
CALL TOTAL TIME _____	(Time to complete all of conventional sequence, in seconds)
CALL TOTAL ERRORS _____	(Number of errors made during exercise)
CALL TOTAL FOUND _____	(Number of 4 shapes identified)
S1TT _____	(Shapes used in the testing AI-EOD & conventional. Time recorded for the actual shapes utilized, in seconds, for each test sequence.)
S2TT _____	
S3TT _____	
S4TT _____	
S5TT _____	
S6TT _____	
S7TT _____	
S8TT _____	
C1TT _____	
C2TT _____	
C3TT _____	
C4TT _____	
C5TT _____	
C6TT _____	
C7TT _____	
C8TT _____	
	1 = strongly agree ---- through ---- 9 = strongly disagree
CR1 _____	(I like the current microfiche system for identifying ordnance)
CR2 _____	(I like the new AI-EOD computer system for identifying ordnance)
CR3 _____	(Given the choice I would rather have the microfiche system than the AI-EOD)
CR4 _____	(If both systems were available I would use the AI-EOD rather than microfiche)
CR5 _____	(The AI-EOD delivery system was easy to use)
CR6 _____	(The AI-EOD system needs major modifications to be useful)
CR7 _____	(I consider myself fully qualified in EOD)
CR8 _____	(I consider myself fully qualified in the use of computers)

Figure 2. Data recording and data dictionary.

**Table 4**

**AI-EOD Test Sites**

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Data Collection Sites

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Luke Air Force Base, Phoenix, AZ
Nellis Air Force Base, Las Vegas, NV
George Air Force Base, Victorville, CA
Hickam Air Force Base, Honolulu, HI
Fort Rosecrans, San Diego, CA
Fort Irwin, Barstow, CA
Presidio, San Francisco, CA
Ford Ord, Monterey, CA
Schofield Barracks, HI
Marine Corps Air Station, Yuma, AZ
Marine Corps Base, 29 Palms, CA
Marine Corps Base, Pendleton, CA
Marine Corps Air Station, Kaneohe, HI
Naval Explosive Ordnance Disposal Technology Center, Indian Head, MD
Naval School, Explosive Ordnance Disposal, Indian Head, MD
Explosive Ordnance Disposal Group I, San Diego, CA
Explosive Ordnance Disposal Mobile Unit, San Diego, CA
Explosive Ordnance Disposal Mobile Units, Mare Island, CA
Explosive Ordnance Disposal Mobile Unit, Concord, CA
Explosive Ordnance Disposal Training and Evaluation Unit I, NAS Barbers Point, HI
Explosive Ordnance Disposal Mobil Unit, HI

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The data for each subject were transferred to the data recording form shown in Figure 2. Figure 2 also defines the variables. Next, the data were entered into a computerized statistical package, MICROSTAT (R), and descriptive statistics (mean, standard deviation, minimum, maximum) calculated.

After the data were checked for completeness, a preliminary evaluation was performed to inspect the data for various statistical anomalies. Based on this evaluation, data for seven subjects were dropped due to missing data. Thus, the final database contained data from 235 subjects. The resultant database was used to create files for testing the study hypotheses.

## **Results**

### **Demographic Data**

Demographic data for 235 --10 instructors and 11 students at the Navy EOD school, and 214 operational EOD personnel--were analyzed and are presented in Table 5. The demographic results reported here describe only the personnel who took part in the test and evaluation effort and not the entire EOD community.

**Table 5**  
**Demographic Results: Selected Variables**

Variable Number and Title (selected variables)	Test Group				
	All	Air Force	Army	Marine Corps	Navy
	(average responses)				
1. Age (in years)	29.5	27.7	28.9	29.9	30.9
2. Gender (percentage of males)	97.0	93.3	94.4	100.0	98.9
3. Branch of service (numbers)	235	60	36	52	87
4. Time in service (in years)	9.6	7.6	8.5	10.2	11.0
5. Paygrade	E- 5.8	4.7	6.1	5.9	6.3
6. Time in paygrade (years)	2.2	2.2	1.7	2.2	2.5
7. Amount of EOD training (months)	11.2	9.0	10.8	7.6	15.0
8. Time qualified as EOD tech (years)	4.9	6.1	4.9	4.3	4.4
9. Time working as EOD tech (years)	4.6	5.7	4.8	4.3	3.9
10. Currently working as EOD tech (% yes)	88.5	93.3	100.0	96.2	75.9
11. Self-evaluation, EOD expertise	4.7	5.2	5.3	4.5	4.4
	(for variable 11, from 0 = none to 9 = expert)				
12. Self-evaluation, computer experience	3.1	3.5	3.1	2.7	3.1
	(for variable 12 from 0 = none to 9 = expert)				
25. Average time, AI-EOD (min.)	5.0	4.9	4.7	4.6	5.9
26. Average error rate, AI-EOD	.04 (1%)	.03 (.75%)	.03 (.75%)	.06 (1.5%)	.04 (1%)
27. Average found, AI-EOD	4.0 (100%)	4.0	4.0	4.0	4.0
40. Average time, conventional (min.)	9.6	8.8	7.8	9.5	10.9
41. Average error rate, conventional	.46 (11.5%)	.60 (15%)	.42 (10.5%)	.33 (8.25%)	.46 (9.25%)
42. Average found-conventional	3.93 (98%)	3.92	3.92	3.92	3.97
	(for variables 59-66, from 1 = strongly agree to 9 = strongly disagree)				
59. I like the current system	5.9	6.0	5.6	5.1	6.5
60. I like the new AI-EOD system	1.9	1.7	2.1	2.1	1.9
61. I would rather have the current system than the AI-EOD	7.4	7.3	7.2	7.1	7.7
62. I would use the AI-EOD system rather than the current system	1.9	1.8	2.0	2.4	1.7
63. The AI-EOD was easy to use	1.9	1.8	1.9	2.3	1.8
64. The AI-EOD needs major modification to be useful	6.6	6.7	6.7	6.5	6.7
65. I am fully qualified in EOD	3.4	2.8	2.9	3.3	4.1
66. I am fully qualified in computers	5.7	5.5	5.3	5.9	5.9

Appendix A presents specific and expanded information for the questions the subjects were asked. Appendix B presents complete data lists and results for the complete database, and the results for each service.

For the entire population (ALL) (Table 5), the demographic results are summarized as follows:

The 235 EOD technicians who were tested had an average age of 29 1/2 years; 97 percent were male and 3 percent were female; had over 9 1/2 years in service (9.6); and an average paygrade of E-6 (5.8) with over 2 years (2.2) in paygrade. They had received almost a year (11.2 months) in training in their EOD specialty; had been qualified as EOD technicians for almost 5 years (4.9); and had been working as EOD technicians for over 4 1/2 years (4.6). Almost 89 percent (88.5) of the 235 subjects reported that they were currently working as EOD technicians.

In terms of their expertise or knowledge, they considered that they had from some-to-much expertise in EOD and they reported little-to-some knowledge and experience with computers.

The results of the testing on the eight test episodes (four AI-EOD, four conventional) show that:

Using the AI-EOD system, they took an average of 5 minutes to identify the unknown shape and determine the render-safe procedure for the four test episodes with identification errors of .04 per test exercise, which is an error rate of 1 percent; they correctly identified all four shapes of the test (100% solution rate).

Using the conventional approach (i.e., documents and microfiche), they took an average of over 9 1/2 minutes (9.6) to identify the shape and determine its render-safe procedure with an average of .46 errors per test sequence, which is an error rate of 11.5 percent; they correctly identified 3.92 of the four test shapes (98% solution rate).

When asked for their opinions upon completion of the testing sequence, they reported that they did not care for the current (conventional) system; liked the AI-EOD system very much and, if given a choice, they would rather use the AI-EOD system than the current system; and, if both systems were available, they would use the AI-EOD system. They considered the AI-EOD system easy to use and in need of no major modifications to be useful. In a second query about their EOD and computer qualifications, they considered that they were qualified in the area of EOD and moderately disagreed that they were qualified in the use of computers.

The results for each service could be reported in a similar fashion as was done for the entire population (ALL).

### **EOD Performance**

Table 6 shows that average completion times, for all test groups, were significantly shorter using the AI-EOD system than the conventional approach. Also, error rates were significantly less using the AI-EOD system for all groups. However, improved results were significant only for the ALL group using the AI-EOD system when comparing total test shapes identified (i.e., problems solved) for the two systems.

**Table 6**

**Comparison of Performance Using AI-EOD and Conventional Systems**

Service Group	Performance Comparisons			
	AI-EOD	Conventional	Number	F Ratio
Average Time of Completion (in minutes)				
ALL	5.043	9.594	235	232.692*
Air Force	4.482	8.840	60	169.715*
Army	4.586	7.835	36	42.712*
Marine Corps	4.630	9.453	52	47.906*
Navy	5.867	10.926	87	76.500*
Average Error Rate (number per test set)				
ALL	.038	.460	235	53.912*
Air Force	.033	.600	60	19.487*
Army	.028	.417	36	6.007*
Marine Corps	.058	.327	52	9.480*
Navy	.034	.460	87	19.754*
Average Number Found (per test set)				
ALL	4.000	3.936	235	6.992*
Air Force	4.000	3.917	60	1.482
Army	4.000	3.917	36	3.182
Marine Corps	4.000	3.962	52	1.619
Navy	4.000	3.966	87	3.071

\*p < .05.

**EOD Knowledge**

Table 7 shows no relationship between the level of training and the factors defining performance, which is somewhat surprising. While not significant, the trends for all the test groups except one, however, tended to be negative, as expected.

**EOD Experience/Ability**

Table 8 shows no general relationship between performance factors and experience when using the AI-EOD system (except for the two factors of self-reported EOD experience and qualification, and time, for the ALL group). There was, however, a general and consistent relationship between performance, and experience and ability (particularly with the performance factor of "number of errors") when the groups were using the conventional approach.

Table 7

## Correlation Matrix: Time of Training vs. Performance Factors

Factor & Service Group	AI-EOD		Conventional			N
	Time	Errors	Time	Errors	Found	
EOD Training						
ALL	-.02108	-.02933	.09454	-.08385	.03100	235
Air Force	-.09950	-.14727	-.11321	-.02468	-.06812	60
Army	-.11687	-.19335	.16545	-.07419	-.09076	36
Marine	.06861	.00498	.09159	-.01643	-.01290	52
Navy	-.19439	.00039	.05537	-.13834	.10084	87

Table 8

## Relationship of EOD Experience/Ability and Performance

Factor & Service Group	Performance Categories					N
	AI-EOD		Conventional			
	Time	Errors	Time	Errors	Found	
Time in Service						
ALL	.05379	.02922	.18244*	-.12623*	.07868	235
Air Force	.01671	.14082	.19868	-.02225	.01003	60
Army	-.06848	.05182	.25375	-.21364	.24965	36
Marine	.03567	.00412	.31185*	-.11880	.02405	52
Navy	-.04535	-.01848	.05547	-.14155	.16741	87
Time EOD Qualified						
ALL	-.08186	.06231	.03561	-.17106*	.05362	235
Air Force	-.05642	.09266	.04297	-.06681	.00357	20
Army	-.01472	.04003	.22972	-.32485*	.24851	36
Marine	-.05389	-.01629	.33187*	-.07707	-.00880	52
Navy	-.05620	.13529	-.13493	-.28929*	.18884*	87
Time as EOD Technician						
ALL	-.07804	.05747	.02910	-.14756*	.04384	235
Air Force	.03111	.11480	.20374	-.02188	-.00913	60
Army	-.03928	.04498	.22420	-.31634*	.24193	36
Marine	-.05690	-.01493	.33683*	-.07431	-.00996	52
Navy	-.03330	.10203	-.18710*	-.25383*	.17250	87
EOD Experience						
ALL	-.11296*	.02674	-.07629	-.19531*	.01034	235
Air Force	-.17145	.08039	-.06096	-.12502	-.15096	60
Army	-.26133	-.19099	.08752	-.44903*	.23974	36
Marine	.02079	-.05753	.16076	-.11451	.04142	52
Navy	-.00180	.14597	-.15124	-.21928*	.17966*	87
EOD Qualification						
ALL	.12820*	-.04092	.13730*	.22369*	-.11071*	235
Air Force	-.08825	-.07211	.11713	.31240*	-.33730*	60
Army	.11882	.13871	.07491	.29796*	-.12705	36
Marine	-.04112	.07184	-.00826	.09228	.02513	52
Navy	.12498	-.15874	.13769	.22789*	-.06152	87

\*p&lt;.05.

## AI-EOD System Utility/Usability

Table 9 shows a general and consistently significant preference for the AI-EOD delivery system and its use, as compared to the conventional system.

**Table 9**  
**Comparison of Preference of AI-EOD and Conventional Systems**

Service Group	Conventional	AI-EOD	N	F Ratio
Average Response to "Like"				
All	5.898	1.902	235	613.836*
Air Force	5.967	1.700	60	170.246*
Army	5.556	2.056	36	64.642*
Marine	5.135	2.058	52	88.756*
Navy	6.448	1.885	87	335.504*
Average Response to "Would Use"				
All	7.387	1.949	235	1020.830*
Air Force	7.300	1.833	60	242.121
Army	7.194	2.028	36	120.724*
Marine	7.058	2.365	52	139.397*
Navy	7.724	1.747	87	624.782*

Note. Responses range from 1 = Strongly Agree to 9 = Strongly Disagree.

\*p < .05.

## Computer Experience/Qualification

Table 10 shows that there was no general and consistent relationship between computer experience and performance. The trends were not, however, unexpected particularly in performance on the AI-EOD system. The trends and relationships indicated between computer capability and the conventional system do, however, present more questions than conclusions.

## General Factors

Table 11 shows that there was no general and consistently significant relationship between the general factors and performance using the AI-EOD or conventional systems. This was as expected for the AI-EOD performance measures vs. the general factor of Gender but not for the other general factors. The tendency, trends, and results for the general factors and performance by the various groups showed some degree of consistency in that a number of factors showed significant relationships to the conventional performance measures (particularly time and errors).

Table 10

Relationship of Computer Experience/Qualification and Performance

Factor & Service Group	Performance Categories					N
	AI-EOD		Conventional			
	Time	Errors	Time	Errors	Found	
Computer Experience						
ALL	-.08567	-.00235	-.14465*	-.16388*	-.01319	235
Air Force	-.27415*	-.06544	-.25093*	-.13600	-.09550	60
Army	-.04888	-.02367	-.13204	.12205	-.18295	36
Marine	-.08250	.04014	-.02018	-.24104*	.04155	52
Navy	-.02138	.02652	-.18233*	-.33953*	.14829	87
ALL	.05379	.02922	.18244*	-.12623*	.07868	235
Computer Qualification						
ALL	.15243*	-.00358	.09049	.18588*	.10214	235
Air Force	.26682*	.13938	.24759*	.14122	.22618*	60
Army	-.20101	-.18257	-.11750	-.23652	.46524*	3
Marine	.16515	-.02704	.07006	.31569*	-.00408	52
Navy	.19102*	-.01843	.06338	.38716*	-.15972	87

\*p < .05.

Table 11

## Relationship of General Factors and Performance

Factor/ Service Group	Performance Categories					N
	AI-EOD		Conventional			
	Time	Errors <sup>a</sup>	Time	Errors	Found	
Age						
ALL	.07967	.06158	.21366*	-.19861*	.06719	235
Air Force	-.03560	.14823	.16453	-.04435	.03759	60
Army	.08012	.21390	.38281*	-.19046	.25059	36
Marine	.05271	.01682	.37622*	-.16520	-.09982	52
Navy	-.02499	-.02102	.06028	-.30805*	.19214*	87
Gender						
ALL	-.01901	.03497	-.00869	-.08134	-.03029	235
Air Force	-.15487	.04963	-.09403	-.04135	-.04236	60
Army	-.20003	.04100	-.27281	-.28429*	-.07313	36
Marine <sup>b</sup>	---	---	---	---	---	---
Navy	.06786	.02038	.05326	.05709	-.02038	87
Paygrade						
All	.09592	.07578	.10506	-.10831*	.05946	235
Air Force	-.03483	.03476	.28238*	-.06517	-.00742	60
Army	.17023	.38389*	.10991	.21648	-.03913	36
Marine <sup>a</sup>	.01601	-.09968	.32000*	-.02239	.08160	52
Navy	-.05950	.11436	-.12833	-.25516*	.18044*	87
Time in Paygrade						
ALL	.00079	.09782	.10473	.04334	-.02905	235
Air Force	.05705	.23627*	-.09873	.13757	-.08985	60
Army	.23498	-.00247	.11600	-.16475	.18951	36
Marine	-.18664	.23409*	.01625	-.11750	-.05460	52
Navy	-.09986	-.02111	.13581	.08147	-.04723	87
Currently Working						
All	-.21611*	.00237	-.19320*	-.14944*	.04613	235
Air Force	-.09793	.04963	.13939	-.04135	-.04236	60
Army <sup>a</sup>	---	---	---	---	---	---
Marine	.05034	-.37940*	.20248	.11290	-.03563	52
Navy	-.17222	.10660	-.27288*	-.28905*	.33503*	87

<sup>a</sup>All tests successfully completed with AI-EOD system.

<sup>b</sup>Dropped; no variance in responses.

\*  $p < .05$ .

## **Conclusions**

### **EOD Performance**

The general and significant increase in all EOD performance measures when using the AI-EOD delivery system compared to the conventional system leads to the conclusion that the AI-EOD prototype system improved EOD technician performance. This indicates its validity from a job-performance-aid (JPA) perspective. The fact that the results were consistent across all the performance measures and all subjects/services provides a practical statement regarding the reliability of this JPA.

### **EOD Knowledge**

Although the trends were in the directions expected, there was no significant relationship between performance and training, which could lead to a number of conclusions that are not inviting from a practical standpoint. For example, training is not relevant to on-the-job performance or vice versa (at least in the task being measured); the task being accomplished is not a true representation of what an EOD technician must learn and do; the task being accomplished is being driven by the tools provided.

The most supportable conclusion seems to be that the approach of the conventional system is so restrictive that the EOD technicians cannot use the technical ordnance information learned at school. The Navy EOD school provides large amounts of information about ordnance characteristics and how to identify and deal with each type of ordnance given these characteristics. However, the conventional identification procedures restrict the EOD technicians to only two characteristics in the initial identification process, major body diameter, and overall length. They first select a major category of ordnance, then thumb through a series of pictures until the device is identified, using the diameter and length. If the device is not found in the first category of ordnance, another is selected and the thumbing continues until the device is identified and the TO for the identified device is pulled up and inspected. This approach limits technicians to performing three basic tasks, only one of which is moderately difficult; that is, measuring diameter, measuring length, and selecting category of ordnance.

The AI-EOD system requires more ordnance knowledge as technicians answer the questions asked about the unknown device. Training does not correlate with the AI-EOD delivery system because of the nature and design of the system. The neural net can accept a number of erroneous inputs and still assist the technician in correct identification of the device.

This aspect of training vs. performance, using a computerized approach (such as the AI-EOD system) provides a number of interesting questions for use of computers generally and artificial intelligence/neural nets specifically. For example, what impact will the use of artificial intelligence in the job environment have on the performance tasks, and subsequently on instructional system development?

### **EOD Experience/Ability**

There was no consistent significant relationship between the factors indicating experience and ability, and performance. This unexpected result could very well be associated with the task accomplishment restriction encountered with the EOD knowledge hypothesis; that is, the conventional system does not allow for special performance as a result of greater ability and/or experience and the AI-EOD system tends to support users with lesser skills and abilities (which it was designed to do). Consequently, even though there were strong trends in the direction expected, the final conclusion is that the relationship between experience/ability and performance is weak, at best.

### **AI-EOD System Utility/Usability**

The analysis of variance performed on the responses to the two preference questions revealed a very strong and consistent preference for the AI-EOD system over the conventional system. Inspection of the open-ended questionnaire and comments by subjects leaves little doubt that the subjects strongly preferred the AI-EOD system. It also appears that the computer literacy and acceptance of computers by the average EOD technician are significantly greater than the anecdotal inputs provided at the start of the project.

### **Computer Experience/Qualification**

The computer literacy, use, and acceptance by the EOD technicians who took part in this study were significantly greater than was expected at the start of the project. The lack of a significant relationship between reported computer capabilities and performance confirms that computer expertise is not necessary to utilize the AI-EOD delivery system.

### **General Factors**

There was no consistent or general relationship between the general factors and the performance measures. The design of the AI-EOD delivery system interface and search techniques successfully accommodate the differences presented in each of the general factors. Further, the lack of any relationships between any of the general factors and performance measurements appears to further confirm the limiting aspects of the conventional identification system as the knowledge hypothesis suggested. The conventional system does not provide, or allow, for any real variance of approach given differing abilities or abilities within the general factors.

## **GENERAL CONCLUSIONS**

The AI-EOD delivery system proved to be a reliable, valid, and user-friendly job performance aid (JPA) that significantly improved the performance of EOD technicians at all skill levels and across all services. EOD technicians participating in the test and evaluation study wanted to have this new tool at the earliest opportunity.

## **AI-EOD SYSTEM IMPROVEMENTS**

### **Related to Hypotheses**

#### **EOD Performance**

The best approach for utilizing this neural-net-based tool needs to be investigated further. This new tool will cause major modifications in the way we approach performance of a number of the EOD tasks. The change in how the EOD technicians do their job and the introduction of computers into the workplace will also have major impact on manpower, personnel, and training decisions. The evolution of the EOD community into the computerized approach should be planned, structured, and coordinated rather than left to happenstance.

#### **EOD Knowledge and Experience/Ability**

The apparent lack of relationship of knowledge (training) and experience or ability to job performance should be investigated to ensure that the cause is not one of relevance and that the AI-EOD system is a valid and reliable JPA.

#### **AI-EOD System Utility/Usability**

The high level of user acceptance and preference clearly indicates that the EOD operational and training communities would welcome the computerized approach. Given the advances in the hardware, relative to cost, implementation of the AI- EOD system with its artificial intelligence component should be accelerated.

#### **Computer Experience/Qualification**

Further investigation is needed to ensure that the computer experience vs. performance results and conclusions are valid; that is, the construct of the user interface of the AI-EOD system can accommodate personnel with little or no computer background. Failure to confirm the validity and reliability of the AI-EOD JPA as a replacement for the current system could result in dire consequences.

#### **General Factors**

The lack of relationship of the general factors and performance also needs further investigation to ensure the validity and reliability of the AI-EOD JPA. This would further support the accuracy of previous conclusions regarding the AI-EOD delivery system. Otherwise, some relevancy, reliability, and validity questions remain unanswered.

### **Related to System Design**

#### **General**

Prior to implementation, the AI-EOD system should be further tested to ensure the validity and reliability of the approach. Also, investigations into other occupational fields (e.g., maintenance, intelligence, accounting, supply, tactics) as well as other database types should be pursued to

develop the AI tool(s) further. This new type of tool (JPA) will require considerably more development and investigation to ensure optimum use.

### **Refinements**

The AI-EOD prototype system still requires some refinements before full implementation in the EOD community:

- The user interface improvements should include a method of presenting the "Figure 1" drawing of the Series 60 publications (TOs) resulting from a search rather than a listing of the publications by TO title and a way to exit each window without a response in case of an inadvertent selection (an "oops" choice).
- Expert system personnel should complete knowledge extraction of all ordnance categories.
- The attributes for each ordnance category should be reviewed further to verify their relevance and usefulness.
- Ways to use this new type of JPA more effectively should be investigated, once empirical use data are accumulated.
- A code should be developed to identify documents that have been stored in the SGML or other updated formats.
- The ordering and presentation of windows should be adjusted to reflect current and future feedback.

### **RECOMMENDED AI-EOD SYSTEM CONFIGURATION**

The configuration recommended for the AI-EOD information, search, retrieval, and delivery system is based on interim results from the test and evaluation phase, and user feedback.

- **Monitor.** Color monitor with intensity and contrast controls, and with at least VGA clarity.
- **CPU.** Minimum 386, or equivalent, CPU. A 486, or greater, CPU is recommended for greater power and speed. A math coprocessor is suggested, but not required for the 386 CPU. The math coprocessor is incorporated into the 486 CPU as a design feature.
- **Main Memory.** Minimum of 8 megabytes of main memory with 16 megabytes suggested.
- **Operating System.** UNIX Operating System with X-Windows or alternatively, DOS 5.0 and Windows 3.1. While the neural net code for the UNIX and DOS versions would be identical, the code for the user interface would not be compatible or transportable from one system to the other.
- **Application Software.** Consists of an expert system for database collection about each ordnance device (identification table construction query system), an X-Windows-based graphical

user interface using the knowledge from the expert system to direct the design, and the neural net-based retrieval engine.

- **Hard Disk Drive.** Minimum 400 megabyte hard disk drive, or at least 100 megabytes greater than required to store the operating system and X-Windows.
- **CD-ROM Player.** Standard CD-ROM player using ISO 9660 file format.
- **Image Storage.** CCITT group 4 raster image storage.
- **Printer.** Laser printer (or equivalent) capable of printing 300 dpi or better at a minimum rate of 6 pages per minute with an additional 1 megabyte of local printer memory for image printing.
- **Graphical User Interface (GUI).** Open Look, or similar, desktop screen environment to facilitate the use of the AI-EOD system with other software used by the EOD technician.
- **Input Device.** Mouse, trackball, or joystick.

The AI-EOD prototype system has proven itself by meeting the goals established for it. The AI-EOD system will overcome the inconsistencies, contradictions, and errors during the searching for a particular publication. Using the system augments the abilities of both the less experienced and seasoned technician. The AI-EOD system does not require any new training of veteran personnel and can be used in the training of new recruits. The maintenance ease and portability of the CD-ROM overcome the current problems with paper and microfiche.

It is recommended that the AI-EOD system advance from prototype to production. Also, investigation as to applicability of the neural net to other occupational areas/databases should be pursued.

## **NEURAL NETWORK TECHNOLOGY APPLICATIONS**

### **Neural Network Application Areas**

Given the utility of the prototype as evidenced by its user acceptance, it is appropriate to address the application of the neural network to other areas. Generally, the neural network is particularly suited for large and complex databases; that is, large in terms of the number of data points, number of variables, amount of data, or sorting or searching a large number of variables. This is particularly true if the information (values or attributes--data or variables) to be entered is distorted, ambiguous, negative or prone to error during entering of known (believed or estimated) information. These characteristics make the conventional linear-database-search approaches suspect and prone to error. Also of practical significance is being able to change one of the three modules--user, neural network, and database--without affecting the other two modules of the system; that is, updates to the database do not require changes to the user or neural network modules. To change the purpose of the user from operational use to training would require modification of the user module only.

Also, the AI/neural network component of the AI-EOD prototype was designed and developed so that it could be readily used in other application areas. Any technical information system that could be easily converted to an electronic database is a candidate for development of an AI-XXXX system, particularly given the capability of neural network to accomplish fuzzy word searches. The fact that most information system documentation is currently being produced in an electronic form and then published in book or microfiche form suggests that most of the DoD databases are candidates for neural network technology applications.

As an example, a high-technology combat warfare system (such as, a missile system) could develop an AI MISSILE (or possibly AI-MAINT) information search, retrieval, and delivery system. The neural network could be used, basically, as constructed. Knowledge and human factors engineering would be required to determine how and for what purposes the technicians interact with the current database to determine the user-to-computer-to-neural-network interface requirements; for example, inspect the database configuration to determine the attribute-value pairs, such as trouble-troubleshoot-radar-fault-tree-sequence a/b/c/, to identify recommended repair actions or trouble-repair-radar-transmitter-klystron-part-number-stock number, to print supply request and/or 3M reporting. Once the configuration and makeup of these pairs within the database are determined, the requirements of the neural-network-to-database interface could be established. Once these two interface requirements are determined, it would be a straightforward effort to produce the software for an AI-MISSILE delivery system.

A comparable approach could be utilized in areas such as supply, AI-SUPPLY; Manpower, Personnel and Training, AI-MPT; or administration of aviation maintenance administration, AI-AZ. Although the user approach and value-attribute pairs would probably be very different (as AI-MISSILE was from AI-EOD), the basic approach and the construct of the neural network, which is the heart of any AI-XXXX system would be the same.

### **Application Recommendation**

Since the AI-prototype proved to be successful, strong recommendation is hereby made to further apply the neural network technology developed during the AI-EOD effort.

**APPENDIX A**

**TEST AND EVALUATION DATA GATHERING PACKAGE**

## **TEST AND EVALUATION DATA GATHERING PACKAGE**

### **NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER ARTIFICIAL INTELLIGENCE EXPLOSIVE ORDNANCE DISPOSAL (AI-EOD)**

#### **INTRODUCTION**

The Office of the Secretary of Defense via the Joint Services Manpower and Training Systems Development Program has stated a requirement of developing a reliable and effective method for converting to, and delivering in an electronic form (i.e., via computer), technical databases. Also, an applied utilization of "Artificial Intelligence" methodology should be designed, developed, tested and evaluated using operational personnel. In that the EOD community had indicated an interest in the "computerization" of the EOD database at about the same time, the AI-EOD project was initiated. The design and development of the AI-EOD delivery system, has been completed through the efforts of the personnel of the Naval Explosive Ordnance Technology Center, Los Alamos National Laboratory and the Navy Personnel Research and Development Center. The system is now ready for "Test and Evaluation" to ensure the utility from the EOD technicians point of view.

You have been selected to participate in this effort because you are in the EOD community and will be able to provide valuable data in determining the utility of the AI-EOD vs. Conventional EOD technical information (i.e., TO-60 pubs) delivery systems. You will also be able to provide valuable feedback as to modifications and/or improvements needed.

#### **GENERAL INSTRUCTIONS**

1. Please read, date, provide SSN and sign the "Privacy Act Statement" provided below.
2. Please fill out the "AI-EOD DEMOGRAPHIC INFORMATION" sheet. When completed please return to the T&E administrator.
3. Please read the instructions which precede the testing episodes.
4. Complete the testing episodes as instructed by the administrator.
5. Upon completion of the testing episodes you will be asked to critique the delivery system and asked for recommendations as to use and improvement.

## AI-EOD PRIVACY ACT STATEMENT

You have been selected to participate in the Artificial Intelligence-Explosive Ordnance Disposal (AI-EOD) project. This project provides research data on the different levels of performance by EOD personnel in the ordnance identification and determination of render safe procedures when using the conventional (microfiche) or computerized (AI-EOD) data bases. The information provided by you will be used by the Navy Personnel Research and Development Center, San Diego, for research purposes only. It will not become a part of your official record, nor will it be used to make decisions about you which will affect your career in any way. Your name and SSN are necessary only to aid in processing the research data.

Print Name: \_\_\_\_\_ SSN: \_\_\_\_\_  
Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### INTRODUCTION/INFORMATION

The purpose of the AI-EOD data gathering effort is not to test you or your capability. Rather, the intent is to evaluate the efficiency and effectiveness of the electronic/computerized EOD technical information delivery system (AI-EOD) vs. the conventional way you get technical information (microfiche).

The primary measures that will be used in this evaluation will be the time taken to get to the proper render safe procedures for each of the shapes in the test and the number of render safe procedures selected in error. That is, the measures are time and number of errors in identification of the device/shape and/or render safe procedure.

### IDENTIFY THE SHAPE & RSP AS FAST AND ACCURATELY AS POSSIBLE

The way the testing will occur will be somewhat different for some of you. This is done for statistical reasons in an effort to try and make the results (as much as possible) a function of the two information systems (AI-EOD vs. microfiche). Some of you will start on microfiche and then go to the computer system; others will start with the computer then go to the microfiche. Also, the shapes you will be presented will be in different order. This is also done for statistical reasons. Prior to using the computer system all will be provided with practice problems so that you may learn how to use the AI-EOD system.

Please do not tell other EOD technicians what shapes were/were not used in the testing. We would like the differences in the testing (if any) to be the results of the different delivery systems rather than "inside" information. So, again, please keep the information on the shapes confidential. You are free, however, to discuss any other aspect of the testing and the AI-EOD delivery system.

**NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER  
ARTIFICIAL INTELLIGENCE-EXPLOSIVE ORDNANCE DISPOSAL (AI-EOD)**

**COMPUTER USE GUIDANCE**

As you proceed through the identification of the four ordnance types using the computer you should be aware that the use of "Artificial Intelligence" (AI) is a search technique that requires a different approach than you may have used before. It is important that you remember that on initial use you should provide only those inputs that you are "**certain**" are correct e.g., type of ordnance (if certain), dimensions (length, diameter), observable characteristics (special ordnance features and number of same if appropriate), etc. Once you have entered those features that you are "**certain of**" (usually in the order of three to five features) then go to the "**search**" function on the computer.

After the search function has been completed and the computer has provided you a list of "possible" ordnance, inspect the list. If it appears that there is an appropriate choice on the list (usually near the top of the list if you have limited your entries to certain/known features) select one on the list to inspect to determine if it is, in fact, the ordnance you are trying to identify. If it is the correct ordnance (Technical Order) determine the page of the "**unarmed**" render-safe-procedure (RSP).

**Performance Aid**

**Select Ordnance**

- Do you know what type of ordnance it is?
  - Yes, select on the computer and continue with questions related to features of the type
  - No, select "unknown ordnance" and answer questions that you know\are certain of

**Select/Enter Feature Information**

- Select the features from the provided list of questions/features that you are certain of e.g., diameter, length, and any other "without a doubt" features.

**Perform Search**

- Once you have entered the "known" information (probably no more than five features) activate the computer search.

**Review Ordnance List**

**Select Ordnance to be Viewed** (probably at or near the top)

**View Ordnance Selected**

**Determine Page of Unarmed RSP**

**Record TO-number and unarmed RSP page**

**Notify Administrator of Your Choice**

**AI-EOD DEMOGRAPHIC INFORMATION**

Name \_\_\_\_\_ SSN \_\_\_\_\_

Age (in years/months) \_\_\_\_\_ Gender (circle one) Male Female

Duty Station \_\_\_\_\_

Branch of Service (circle 1) Air Force Army Marine Navy

Time of Service (in months) \_\_\_\_\_

Pay grade (circle 1) E-1 E-2 E-3 E-4 E-5 E-6 E-7 E-8 E-9

Time in Pay grade (in months) \_\_\_\_\_

Rate (Navy) \_\_\_\_\_

Formal training for EOD specialty(s) (total, all courses -in months) \_\_\_\_\_

Length of time qualified as an EOD Technician (total in months) \_\_\_\_\_

Time actually working as an EOD Tech (in months) \_\_\_\_\_

Currently working as an EOD Tech (circle 1) Yes No

AFSC/MOS/PNEC \_\_\_\_\_

EOD Expertise (circle #) 0 1 2 3 4 5 6 7 8 9  
None Some Much Expert

Computer knowledge/experience (circle #) 0 1 2 3 4 5 6 7 8 9  
None Some Much Expert

When completed please return to the T&E administrator.

## EOD TECHNICIAN AI-EOD CRITIQUE/EVALUATION

NAME: \_\_\_\_\_ SSN: \_\_\_\_\_

For each of the statements below please circle the (one) response that most accurately corresponds to you level of agreement/disagreement:

Statement	Strongly Agree		Moderately Agree		Agree		Moderately Disagree		Strongly Disagree	
	1	2	3	4	5	6	7	8	9	
1. I like the current microfiche system for identifying ordnance:	1	2	3	4	5	6	7	8	9	
2. I like the new AI-EOD computer system for identifying ordnance:	1	2	3	4	5	6	7	8	9	
3. Given the choice I would rather have the microfiche system than the AI-EOD.	1	2	3	4	5	6	7	8	9	
4. If both systems were available I would use the AI-EOD system rather than microfiche.	1	2	3	4	5	6	7	8	9	
5. The AI-EOD delivery system was easy to use.	1	2	3	4	5	6	7	8	9	
6. The AI-EOD system needs major modifications to be useful.	1	2	3	4	5	6	7	8	9	
7. I consider myself fully qualified in EOD.	1	2	3	4	5	6	7	8	9	
8. I consider myself fully qualified in the use of computers.	1	2	3	4	5	6	7	8	9	

When completed please return to the T&E administrator.



**APPENDIX B**

**TEST AND EVALUATION DATA AND DATA ANALYSES**

## TEST AND EVALUATION DATA AND DATA ANALYSES

### DATA & RESULTS ALL CASES

HEADER DATA FOR: C:EODGEN8 LABEL:

NUMBER OF CASES: 235 NUMBER OF VARIABLES: 70

	AGE	GENDER	BRANCH	TIS	PAYGRADE	TIPAYGRA	EODTRAIN
1	339.00	1.00	1.00	118.00	5.00	62.00	10.00
2	288.00	1.00	1.00	51.00	4.00	22.00	6.00
3	411.00	1.00	1.00	186.00	6.00	21.00	8.00
4	462.00	1.00	1.00	163.00	6.00	28.00	10.00
5	396.00	1.00	1.00	120.00	5.00	65.00	9.00
6	328.00	1.00	1.00	96.00	5.00	42.00	6.00
7	307.00	1.00	1.00	90.00	4.00	64.00	8.00
8	303.00	1.00	1.00	59.00	4.00	30.00	7.00
9	252.00	1.00	1.00	28.00	3.00	26.00	6.00
10	254.00	1.00	1.00	22.00	3.00	20.00	8.00
11	356.00	1.00	1.00	101.00	5.00	24.00	9.00
12	347.00	1.00	1.00	121.00	6.00	6.00	9.00
13	288.00	1.00	1.00	66.00	4.00	38.00	6.00
14	380.00	1.00	1.00	146.00	5.00	82.00	6.00
15	263.00	1.00	1.00	16.00	3.00	13.00	11.00
16	265.00	1.00	1.00	19.00	3.00	19.00	8.00
17	223.00	1.00	1.00	7.00	3.00	7.00	4.00
18	323.00	1.00	1.00	87.00	5.00	24.00	14.00
19	323.00	1.00	1.00	62.00	4.00	36.00	7.00
20	345.00	1.00	1.00	100.00	5.00	41.00	9.00
21	332.00	1.00	1.00	111.00	5.00	28.00	8.00
22	293.00	1.00	1.00	74.00	5.00	24.00	7.00
23	339.00	1.00	1.00	59.00	4.00	34.00	6.00
24	394.00	1.00	1.00	112.00	5.00	46.00	10.00
25	318.00	1.00	1.00	108.00	6.00	18.00	11.00
26	314.00	1.00	1.00	60.00	4.00	25.00	7.00
27	242.00	1.00	1.00	22.00	3.00	20.00	8.00
28	402.00	1.00	1.00	168.00	7.00	30.00	8.00
29	276.00	1.00	1.00	39.00	4.00	2.00	10.00
30	338.00	1.00	1.00	78.00	5.00	14.00	8.00
31	374.00	.00	1.00	145.00	5.00	71.00	9.00
32	288.00	.00	1.00	29.00	3.00	12.00	10.00
33	261.00	1.00	1.00	12.00	3.00	12.00	4.00
34	433.00	.00	1.00	150.00	6.00	18.00	9.00
35	318.00	1.00	1.00	104.00	5.00	21.00	24.00
36	395.00	1.00	1.00	185.00	7.00	6.00	10.00
37	276.00	1.00	1.00	53.00	4.00	6.00	6.00
38	443.00	1.00	1.00	180.00	5.00	60.00	6.00
39	247.00	1.00	1.00	10.00	3.00	9.00	4.00
40	306.00	1.00	1.00	12.00	4.00	6.00	9.00
41	484.00	1.00	1.00	245.00	7.00	57.00	6.00
42	269.00	1.00	1.00	36.00	3.00	8.00	10.00
43	318.00	1.00	1.00	83.00	5.00	4.00	8.00
44	242.00	1.00	1.00	24.00	3.00	22.00	8.00
45	252.00	1.00	1.00	26.00	3.00	10.00	26.00
46	324.00	1.00	1.00	98.00	5.00	39.00	11.00
47	356.00	1.00	1.00	145.00	6.00	12.00	9.00
48	258.00	.00	1.00	23.00	3.00	21.00	8.00

49	484.00	1.00	1.00	192.00	6.00	37.00	12.00
50	436.00	1.00	1.00	220.00	10.00	27.00	8.00
51	348.00	1.00	1.00	55.00	5.00	13.00	18.00
52	248.00	1.00	1.00	18.00	3.00	16.00	9.00
53	407.00	1.00	1.00	144.00	6.00	14.00	9.00
54	350.00	1.00	1.00	107.00	5.00	6.00	8.00
55	257.00	1.00	1.00	33.00	4.00	4.00	8.00
56	432.00	1.00	1.00	216.00	8.00	22.00	10.00
57	438.00	1.00	1.00	186.00	7.00	18.00	12.00
58	288.00	1.00	1.00	46.00	4.00	32.00	9.00
59	343.00	1.00	1.00	115.00	5.00	56.00	7.00
60	376.00	1.00	1.00	108.00	5.00	60.00	8.00
61	270.00	1.00	2.00	22.00	4.00	2.00	6.00
62	314.00	1.00	2.00	90.00	5.00	30.00	8.00
63	348.00	1.00	2.00	76.00	10.00	23.00	6.00
64	330.00	1.00	2.00	42.00	5.00	2.00	12.00
65	242.00	1.00	2.00	22.00	4.00	6.00	14.00
66	569.00	1.00	2.00	206.00	8.00	20.00	15.00
67	320.00	1.00	2.00	112.00	6.00	6.00	15.00
68	276.00	1.00	2.00	76.00	5.00	5.00	7.00
69	488.00	1.00	2.00	262.00	7.00	8.00	8.00
70	286.00	1.00	2.00	68.00	5.00	39.00	6.00
71	361.00	1.00	2.00	96.00	6.00	42.00	8.00
72	443.00	1.00	2.00	252.00	7.00	24.00	24.00
73	353.00	1.00	2.00	94.00	5.00	36.00	10.00
74	279.00	1.00	2.00	55.00	4.00	5.00	14.00
75	396.00	1.00	2.00	14.00	7.00	10.00	10.00
76	292.00	1.00	2.00	56.00	4.00	32.00	8.00
77	288.00	1.00	2.00	66.00	5.00	19.00	8.00
78	253.00	1.00	2.00	48.00	4.00	7.00	12.00
79	284.00	1.00	2.00	49.00	4.00	36.00	9.00
80	431.00	1.00	2.00	127.00	6.00	11.00	7.00
81	359.00	1.00	2.00	72.00	5.00	24.00	11.00
82	346.00	1.00	2.00	105.00	6.00	39.00	8.00
83	363.00	.00	2.00	134.00	6.00	59.00	10.00
84	287.00	1.00	2.00	72.00	10.00	23.00	12.00
85	336.00	1.00	2.00	91.00	10.00	12.00	11.00
86	384.00	1.00	2.00	125.00	6.00	60.00	21.00
87	307.00	1.00	2.00	91.00	6.00	17.00	6.00
88	434.00	1.00	2.00	120.00	10.00	20.00	6.00
89	390.00	1.00	2.00	160.00	6.00	17.00	14.00
90	383.00	1.00	2.00	168.00	7.00	20.00	10.00
91	320.00	1.00	2.00	77.00	6.00	5.00	18.00
92	379.00	1.00	2.00	169.00	7.00	16.00	10.00
93	372.00	1.00	2.00	155.00	6.00	36.00	12.00
94	280.00	1.00	2.00	76.00	6.00	5.00	14.00
95	318.00	.00	2.00	74.00	5.00	4.00	9.00
96	414.00	1.00	2.00	156.00	7.00	8.00	8.00
97	321.00	1.00	3.00	95.00	5.00	35.00	8.00
98	372.00	1.00	3.00	156.00	6.00	36.00	6.00
99	352.00	1.00	3.00	144.00	6.00	21.00	8.00
100	328.00	1.00	3.00	83.00	5.00	42.00	7.00
101	336.00	1.00	3.00	122.00	5.00	38.00	7.00
102	330.00	1.00	3.00	117.00	6.00	25.00	6.00
103	338.00	1.00	3.00	96.00	6.00	14.00	7.00

104	421.00	1.00	3.00	199.00	7.00	42.00	6.00
105	308.00	1.00	3.00	96.00	5.00	12.00	6.00
106	337.00	1.00	3.00	99.00	5.00	32.00	7.00
107	300.00	1.00	3.00	62.00	5.00	19.00	7.00
108	346.00	1.00	3.00	110.00	10.00	13.00	7.00
109	516.00	1.00	3.00	288.00	9.00	36.00	8.00
110	298.00	1.00	3.00	81.00	5.00	10.00	8.00
111	264.00	1.00	3.00	49.00	4.00	13.00	7.00
112	350.00	1.00	3.00	133.00	6.00	36.00	8.00
113	384.00	1.00	3.00	132.00	6.00	2.00	10.00
114	364.00	1.00	3.00	102.00	6.00	10.00	6.00
115	270.00	1.00	3.00	58.00	5.00	5.00	8.00
116	410.00	1.00	3.00	120.00	5.00	36.00	8.00
117	307.00	1.00	3.00	50.00	5.00	15.00	8.00
118	380.00	1.00	3.00	159.00	6.00	18.00	6.00
119	361.00	1.00	3.00	103.00	5.00	5.00	7.00
120	564.00	1.00	3.00	356.00	9.00	54.00	9.00
121	345.00	1.00	3.00	120.00	5.00	36.00	8.00
122	445.00	1.00	3.00	237.00	8.00	25.00	8.00
123	396.00	1.00	3.00	189.00	7.00	36.00	8.00
124	362.00	1.00	3.00	147.00	6.00	37.00	9.00
125	355.00	1.00	3.00	96.00	6.00	10.00	7.00
126	501.00	1.00	3.00	273.00	10.00	33.00	12.00
127	331.00	1.00	3.00	82.00	5.00	32.00	7.00
128	411.00	1.00	3.00	118.00	6.00	24.00	7.00
129	387.00	1.00	3.00	131.00	5.00	37.00	6.00
130	325.00	1.00	3.00	108.00	6.00	3.00	8.00
131	393.00	1.00	3.00	111.00	5.00	39.00	8.00
132	447.00	1.00	3.00	100.00	5.00	23.00	7.00
133	284.00	1.00	3.00	60.00	5.00	10.00	6.00
134	353.00	1.00	3.00	130.00	6.00	25.00	8.00
135	336.00	1.00	3.00	115.00	5.00	61.00	5.00
136	18.00	1.00	3.00	48.00	5.00	7.00	6.00
137	335.00	1.00	3.00	60.00	5.00	20.00	8.00
138	296.00	1.00	3.00	62.00	5.00	22.00	7.00
139	418.00	1.00	3.00	150.00	6.00	26.00	7.00
140	427.00	1.00	3.00	216.00	10.00	9.00	15.00
141	343.00	1.00	3.00	128.00	6.00	29.00	10.00
142	325.00	1.00	3.00	120.00	5.00	60.00	7.00
143	288.00	1.00	3.00	66.00	5.00	6.00	8.00
144	372.00	1.00	3.00	120.00	10.00	4.00	7.00
145	324.00	1.00	3.00	109.00	5.00	58.00	8.00
146	335.00	1.00	3.00	119.00	5.00	50.00	9.00
147	331.00	1.00	3.00	83.00	5.00	32.00	7.00
148	308.00	1.00	3.00	52.00	5.00	18.00	9.00
149	492.00	1.00	4.00	180.00	10.00	24.00	13.00
150	363.00	1.00	4.00	128.00	7.00	5.00	13.00
151	273.00	1.00	4.00	29.00	5.00	6.00	5.00
152	360.00	.00	4.00	96.00	6.00	30.00	6.00
153	350.00	1.00	4.00	144.00	7.00	11.00	13.00
154	466.00	1.00	4.00	120.00	5.00	88.00	12.00
155	296.00	1.00	4.00	70.00	5.00	44.00	17.00
156	364.00	1.00	4.00	123.00	6.00	5.00	9.00
157	346.00	1.00	4.00	108.00	6.00	12.00	36.00
158	324.00	1.00	4.00	76.00	5.00	44.00	12.00

159	432.00	1.00	4.00	108.00	6.00	36.00	12.00
160	262.00	1.00	4.00	36.00	4.00	29.00	3.00
161	318.00	1.00	4.00	66.00	5.00	26.00	4.00
162	267.00	1.00	4.00	39.00	5.00	14.00	6.00
163	324.00	1.00	4.00	39.00	4.00	24.00	3.00
164	315.00	1.00	4.00	48.00	5.00	12.00	6.00
165	386.00	1.00	4.00	132.00	7.00	34.00	14.00
166	384.00	1.00	4.00	156.00	7.00	36.00	16.00
167	407.00	1.00	4.00	199.00	9.00	12.00	14.00
168	448.00	1.00	4.00	184.00	10.00	36.00	13.00
169	402.00	1.00	4.00	166.00	6.00	10.00	12.00
170	320.00	1.00	4.00	91.00	6.00	28.00	12.00
171	305.00	1.00	4.00	96.00	6.00	36.00	13.00
172	395.00	1.00	4.00	173.00	7.00	44.00	14.00
173	368.00	1.00	4.00	96.00	5.00	24.00	24.00
174	375.00	1.00	4.00	168.00	7.00	19.00	12.00
175	279.00	1.00	4.00	55.00	5.00	30.00	6.00
176	455.00	1.00	4.00	216.00	6.00	48.00	13.00
177	312.00	1.00	4.00	5.00	5.00	36.00	12.00
178	328.00	1.00	4.00	90.00	6.00	36.00	15.00
179	413.00	1.00	4.00	176.00	7.00	7.00	17.00
180	528.00	1.00	4.00	288.00	7.00	13.00	14.00
181	300.00	1.00	4.00	74.00	4.00	10.00	3.00
182	444.00	1.00	4.00	222.00	7.00	8.00	36.00
183	278.00	1.00	4.00	59.00	5.00	24.00	13.00
184	312.00	1.00	4.00	52.00	5.00	27.00	7.00
185	319.00	1.00	4.00	98.00	5.00	60.00	8.00
186	288.00	1.00	4.00	72.00	5.00	11.00	2.00
187	324.00	1.00	4.00	28.00	4.00	15.00	3.00
188	410.00	1.00	4.00	162.00	7.00	30.00	15.00
189	331.00	1.00	4.00	72.00	4.00	24.00	6.00
190	329.00	1.00	4.00	82.00	6.00	24.00	54.00
191	339.00	1.00	4.00	49.00	10.00	1.00	11.00
192	339.00	1.00	4.00	96.00	5.00	30.00	12.00
193	428.00	1.00	4.00	210.00	7.00	28.00	9.00
194	324.00	1.00	4.00	90.00	6.00	36.00	15.00
195	472.00	1.00	4.00	216.00	7.00	84.00	13.00
196	432.00	1.00	4.00	215.00	7.00	3.00	15.00
197	458.00	1.00	4.00	164.00	7.00	24.00	24.00
198	417.00	1.00	4.00	157.00	6.00	24.00	84.00
199	311.00	1.00	4.00	68.00	5.00	32.00	7.00
200	377.00	1.00	4.00	123.00	7.00	1.00	8.00
201	464.00	1.00	4.00	227.00	10.00	24.00	28.00
202	312.00	1.00	4.00	180.00	4.00	6.00	3.00
203	496.00	1.00	4.00	177.00	7.00	6.00	9.00
204	398.00	1.00	4.00	180.00	6.00	72.00	15.00
205	478.00	1.00	4.00	266.00	10.00	64.00	20.00
206	349.00	1.00	4.00	105.00	6.00	36.00	9.00
207	308.00	1.00	4.00	68.00	4.00	24.00	4.00
208	408.00	1.00	4.00	120.00	6.00	36.00	9.00
209	335.00	1.00	4.00	108.00	6.00	36.00	12.00
210	312.00	1.00	4.00	746.00	7.00	14.00	20.00
211	251.00	1.00	4.00	53.00	5.00	17.00	8.00
212	408.00	1.00	4.00	144.00	10.00	1.00	12.00
213	374.00	1.00	4.00	126.00	6.00	72.00	14.00

214	506.00	1.00	4.00	271.00	10.00	12.00	12.00
215	254.00	1.00	4.00	24.00	4.00	10.00	3.00
216	228.00	1.00	4.00	24.00	3.00	8.00	5.00
217	420.00	1.00	4.00	184.00	6.00	88.00	12.00
218	419.00	1.00	4.00	126.00	6.00	28.00	20.00
219	443.00	1.00	4.00	212.00	10.00	25.00	26.00
220	405.00	1.00	4.00	128.00	6.00	60.00	9.00
221	399.00	1.00	4.00	164.00	7.00	48.00	14.00
222	312.00	1.00	4.00	73.00	5.00	73.00	8.00
223	443.00	1.00	4.00	218.00	7.00	96.00	13.00
224	411.00	1.00	4.00	207.00	8.00	1.00	12.00
225	435.00	1.00	4.00	195.00	9.00	17.00	27.00
226	495.00	1.00	4.00	191.00	8.00	4.00	132.00
227	270.00	1.00	4.00	37.00	4.00	18.00	5.00
228	270.00	1.00	4.00	42.00	5.00	20.00	6.00
229	336.00	1.00	4.00	131.00	6.00	12.00	10.00
230	316.00	1.00	4.00	36.00	4.00	12.00	4.00
231	458.00	1.00	4.00	113.00	6.00	36.00	12.00
232	500.00	1.00	4.00	168.00	10.00	60.00	16.00
233	357.00	1.00	4.00	132.00	6.00	65.00	14.00
234	356.00	1.00	4.00	140.00	7.00	48.00	19.00
235	414.00	1.00	4.00	192.00	8.00	60.00	24.00

	TIEODQUA	TIAS TECH	CURWKING	EODEXPER	COMEXPER	TITIME	TIERRORS
1	108.00	108.00	1.00	6.00	5.00	350.00	.00
2	42.00	42.00	1.00	4.00	4.00	362.00	.00
3	139.00	139.00	1.00	8.00	3.00	343.00	.00
4	155.00	155.00	1.00	8.00	4.00	109.00	.00
5	108.00	108.00	1.00	6.00	7.00	236.00	.00
6	90.00	90.00	1.00	6.00	3.00	238.00	.00
7	83.00	83.00	1.00	6.00	3.00	258.00	.00
8	51.00	51.00	1.00	6.00	5.00	187.00	.00
9	23.00	23.00	1.00	4.00	4.00	648.00	.00
10	13.00	13.00	1.00	6.00	3.00	190.00	.00
11	89.00	89.00	1.00	6.00	4.00	150.00	.00
12	77.00	77.00	1.00	7.00	3.00	255.00	.00
13	59.00	59.00	1.00	4.00	5.00	342.00	.00
14	146.00	146.00	1.00	7.00	3.00	168.00	.00
15	2.00	2.00	1.00	3.00	3.00	195.00	.00
16	10.00	10.00	1.00	2.00	4.00	196.00	.00
17	.00	.00	.00	.00	3.00	300.00	.00
18	66.00	66.00	1.00	5.00	3.00	295.00	.00
19	54.00	54.00	1.00	4.00	3.00	231.00	.00
20	77.00	77.00	1.00	6.00	6.00	190.00	.00
21	102.00	102.00	1.00	6.00	4.00	343.00	.00
22	77.00	77.00	1.00	6.00	4.00	200.00	.00
23	49.00	49.00	1.00	4.00	3.00	344.00	.00
24	103.00	103.00	1.00	7.00	3.00	138.00	.00
25	96.00	96.00	1.00	7.00	6.00	237.00	.00
26	52.00	52.00	1.00	4.00	1.00	230.00	.00
27	13.00	12.00	1.00	2.00	4.00	341.00	.00
28	126.00	126.00	1.00	7.00	3.00	220.00	.00
29	40.00	40.00	1.00	4.00	3.00	361.00	.00
30	66.00	66.00	1.00	6.00	1.00	300.00	.00
31	136.00	136.00	1.00	6.00	4.00	339.00	.00

32	17.00	17.00	1.00	3.00	3.00	250.00	.00
33	.00	.00	.00	5.00	3.00	330.00	.00
34	141.00	141.00	1.00	6.00	2.00	228.00	.00
35	96.00	96.00	1.00	7.00	5.00	141.00	.00
36	109.00	109.00	1.00	7.00	1.00	310.00	.00
37	9.00	8.00	1.00	3.00	5.00	276.00	.00
38	108.00	108.00	1.00	6.00	3.00	338.00	.00
39	.00	.00	.00	1.00	3.00	240.00	.00
40	.00	.00	.00	5.00	3.00	180.00	.00
41	237.00	1.00	1.00	8.00	7.00	270.00	1.00
42	20.00	20.00	1.00	3.00	3.00	347.00	.00
43	74.00	74.00	1.00	6.00	7.00	245.00	.00
44	14.00	13.00	1.00	3.00	5.00	218.00	.00
45	17.00	17.00	1.00	4.00	3.00	354.00	.00
46	87.00	87.00	1.00	8.00	4.00	87.00	.00
47	134.00	134.00	1.00	8.00	2.00	352.00	.00
48	13.00	13.00	1.00	2.00	2.00	472.00	.00
49	169.00	169.00	1.00	7.00	3.00	337.00	.00
50	76.00	76.00	1.00	5.00	4.00	364.00	.00
51	48.00	48.00	1.00	5.00	4.00	264.00	.00
52	8.00	7.00	1.00	1.00	1.00	202.00	.00
53	122.00	122.00	1.00	6.00	5.00	129.00	.00
54	98.00	98.00	1.00	6.00	.00	263.00	.00
55	24.00	24.00	1.00	4.00	2.00	220.00	.00
56	150.00	150.00	1.00	7.00	3.00	205.00	.00
57	122.00	122.00	1.00	7.00	3.00	135.00	.00
58	10.00	10.00	1.00	3.00	6.00	174.00	.00
59	112.00	112.00	1.00	7.00	3.00	351.00	.00
60	100.00	100.00	1.00	4.00	2.00	553.00	.00
61	10.00	10.00	1.00	3.00	2.00	212.00	.00
62	4.00	4.00	1.00	3.00	2.00	244.00	.00
63	1.00	.00	1.00	1.00	5.00	332.00	.00
64	16.00	16.00	1.00	5.00	5.00	220.00	.00
65	10.00	10.00	1.00	6.00	3.00	393.00	.00
66	170.00	170.00	1.00	9.00	3.00	250.00	.00
67	44.00	44.00	1.00	5.00	3.00	223.00	.00
68	3.00	1.00	1.00	4.00	7.00	250.00	.00
69	132.00	132.00	1.00	6.00	3.00	414.00	.00
70	48.00	48.00	1.00	5.00	3.00	284.00	.00
71	86.00	68.00	1.00	7.00	5.00	220.00	.00
72	132.00	132.00	1.00	7.00	4.00	256.00	.00
73	36.00	36.00	1.00	7.00	3.00	770.00	.00
74	48.00	48.00	1.00	5.00	6.00	237.00	.00
75	156.00	156.00	1.00	7.00	3.00	368.00	.00
76	8.00	8.00	1.00	3.00	3.00	95.00	.00
77	7.00	7.00	1.00	5.00	3.00	358.00	.00
78	14.00	14.00	1.00	2.00	1.00	380.00	.00
79	1.00	.00	1.00	3.00	4.00	308.00	.00
80	4.00	4.00	1.00	5.00	.00	345.00	.00
81	36.00	36.00	1.00	5.00	1.00	716.00	.00
82	76.00	76.00	1.00	8.00	5.00	220.00	.00
83	120.00	102.00	1.00	6.00	.00	482.00	.00
84	12.00	12.00	1.00	4.00	7.00	328.00	.00
85	5.00	4.00	1.00	2.00	6.00	221.00	.00
86	120.00	120.00	1.00	6.00	3.00	88.00	.00

87	43.00	43.00	1.00	6.00	3.00	221.00	.00
88	72.00	72.00	1.00	3.00	3.00	347.00	.00
89	48.00	36.00	1.00	7.00	.00	281.00	.00
90	144.00	144.00	1.00	8.00	4.00	297.00	.00
91	43.00	43.00	1.00	5.00	1.00	390.00	.00
92	157.00	157.00	1.00	8.00	2.00	180.00	.00
93	126.00	126.00	1.00	7.00	4.00	352.00	.00
94	60.00	60.00	1.00	7.00	5.00	554.00	.00
95	4.00	3.00	1.00	2.00	3.00	228.00	.00
96	130.00	130.00	1.00	7.00	2.00	145.00	.00
97	6.00	6.00	1.00	3.00	3.00	161.00	.00
98	104.00	104.00	1.00	5.00	1.00	200.00	.00
99	32.00	32.00	1.00	4.00	2.00	358.00	.00
100	55.00	55.00	1.00	5.00	3.00	160.00	.00
101	22.00	22.00	1.00	3.00	1.00	260.00	.00
102	72.00	72.00	1.00	7.00	4.00	183.00	.00
103	54.00	54.00	1.00	4.00	.00	230.00	.00
104	66.00	66.00	1.00	4.00	2.00	180.00	.00
105	4.00	4.00	1.00	3.00	3.00	301.00	.00
106	10.00	10.00	1.00	3.00	3.00	105.00	.00
107	16.00	16.00	1.00	4.00	4.00	443.00	.00
108	60.00	60.00	1.00	6.00	6.00	255.00	.00
109	246.00	246.00	1.00	3.00	3.00	310.00	.00
110	2.00	2.00	1.00	9.00	3.00	268.00	.00
111	8.00	8.00	1.00	5.00	5.00	315.00	.00
112	86.00	86.00	1.00	5.00	3.00	305.00	.00
113	3.00	3.00	1.00	6.00	2.00	561.00	.00
114	44.00	44.00	1.00	3.00	2.00	338.00	.00
115	1.00	1.00	1.00	1.00	1.00	715.00	.00
116	54.00	54.00	1.00	4.00	3.00	396.00	.00
117	15.00	15.00	1.00	3.00	2.00	90.00	.00
118	20.00	20.00	1.00	4.00	3.00	401.00	.00
119	27.00	27.00	1.00	6.00	3.00	231.00	.00
120	252.00	242.00	1.00	8.00	4.00	215.00	.00
121	27.00	27.00	1.00	6.00	4.00	352.00	.00
122	132.00	132.00	1.00	5.00	6.00	370.00	.00
123	141.00	141.00	1.00	4.00	7.00	179.00	.00
124	73.00	73.00	1.00	5.00	2.00	400.00	.00
125	60.00	60.00	1.00	5.00	3.00	398.00	.00
126	216.00	216.00	1.00	4.00	.00	165.00	.00
127	33.00	33.00	1.00	4.00	.00	165.00	.00
128	73.00	73.00	1.00	6.00	4.00	449.00	.00
129	2.00	2.00	1.00	2.00	.00	155.00	.00
130	24.00	18.00	1.00	5.00	6.00	166.00	.00
131	60.00	60.00	1.00	4.00	3.00	122.00	.00
132	24.00	24.00	1.00	5.00	.00	222.00	.00
133	7.00	4.00	1.00	5.00	1.00	365.00	.00
134	87.00	87.00	1.00	7.00	6.00	345.00	.00
135	.00	.00	.00	1.00	3.00	180.00	.00
136	21.00	21.00	1.00	4.00	5.00	207.00	.00
137	1.00	1.00	1.00	2.00	2.00	233.00	.00
138	14.00	14.00	1.00	7.00	8.00	206.00	.00
139	74.00	74.00	1.00	4.00	2.00	261.00	.00
140	180.00	180.00	1.00	9.00	.00	410.00	.00
141	30.00	30.00	1.00	4.00	2.00	250.00	.00

142	.00	.00	.00	1.00	.00	245.00	.00
143	6.00	6.00	1.00	2.00	.00	701.00	.00
144	72.00	72.00	1.00	9.00	1.00	281.00	.00
145	1.00	1.00	1.00	2.00	2.00	200.00	.00
146	11.00	11.00	1.00	5.00	2.00	331.00	.00
147	2.00	2.00	1.00	2.00	3.00	80.00	.00
148	22.00	22.00	1.00	2.00	1.00	137.00	.00
149	132.00	96.00	1.00	6.00	4.00	307.00	.00
150	7.00	6.00	1.00	1.00	2.00	284.00	.00
151	.00	.00	.00	3.00	5.00	692.00	.00
152	36.00	24.00	1.00	5.00	5.00	187.00	.00
153	49.00	73.00	1.00	6.00	4.00	205.00	.00
154	.00	.00	.00	3.00	2.00	847.00	.00
155	8.00	8.00	1.00	3.00	3.00	403.00	.00
156	72.00	72.00	1.00	6.00	4.00	1020.00	.00
157	24.00	1.00	1.00	5.00	5.00	521.00	.00
158	7.00	7.00	1.00	3.00	1.00	443.00	.00
159	36.00	24.00	1.00	3.00	2.00	720.00	.00
160	.00	.00	.00	2.00	.00	478.00	.00
161	.00	.00	.00	3.00	3.00	300.00	.00
162	.00	.00	.00	3.00	1.00	434.00	.00
163	.00	.00	.00	3.00	.00	601.00	.00
164	30.00	30.00	1.00	5.00	2.00	330.00	.00
165	109.00	108.00	1.00	5.00	2.00	425.00	.00
166	138.00	138.00	1.00	9.00	5.00	307.00	.00
167	120.00	120.00	1.00	7.00	5.00	356.00	.00
168	108.00	70.00	1.00	5.00	2.00	389.00	.00
169	37.00	37.00	1.00	3.00	3.00	267.00	.00
170	32.00	20.00	1.00	3.00	2.00	559.00	.00
171	9.00	9.00	1.00	3.00	3.00	224.00	.00
172	104.00	104.00	1.00	5.00	4.00	156.00	.00
173	36.00	36.00	1.00	5.00	2.00	466.00	.00
174	41.00	37.00	1.00	3.00	1.00	182.00	.00
175	27.00	27.00	1.00	3.00	5.00	207.00	.00
176	36.00	36.00	1.00	3.00	1.00	435.00	.00
177	2.00	2.00	1.00	4.00	3.00	448.00	.00
178	36.00	24.00	1.00	4.00	3.00	390.00	.00
179	37.00	37.00	1.00	5.00	.00	277.00	.00
180	84.00	84.00	1.00	6.00	6.00	348.00	.00
181	.00	.00	.00	5.00	3.00	1039.00	.00
182	192.00	192.00	1.00	7.00	7.00	725.00	.00
183	16.00	16.00	1.00	5.00	5.00	407.00	.00
184	.00	.00	.00	4.00	5.00	240.00	.00
185	.00	.00	.00	.00	3.00	315.00	.00
186	.00	.00	.00	3.00	1.00	392.00	.00
187	.00	.00	.00	1.00	3.00	319.00	.00
188	72.00	72.00	1.00	5.00	2.00	229.00	.00
189	40.00	40.00	1.00	4.00	5.00	322.00	.00
190	20.00	20.00	1.00	5.00	3.00	271.00	.00
191	5.00	5.00	1.00	3.00	6.00	221.00	.00
192	36.00	36.00	1.00	6.00	7.00	205.00	.00
193	72.00	72.00	1.00	9.00	3.00	330.00	.00
194	30.00	30.00	1.00	4.00	2.00	446.00	.00
195	84.00	84.00	1.00	6.00	3.00	340.00	.00
196	100.00	92.00	1.00	7.00	7.00	451.00	.00

197	54.00	54.00	1.00	4.00	5.00	351.00	.00
198	84.00	1.00	1.00	5.00	4.00	194.00	.00
199	20.00	20.00	1.00	5.00	3.00	282.00	.00
200	72.00	72.00	1.00	6.00	3.00	444.00	.00
201	180.00	180.00	.00	6.00	4.00	318.00	.00
202	.00	.00	.00	.00	7.00	230.00	.00
203	89.00	89.00	1.00	7.00	3.00	240.00	.00
204	84.00	84.00	1.00	6.00	2.00	281.00	.00
205	248.00	236.00	1.00	8.00	5.00	281.00	.00
206	33.00	33.00	1.00	4.00	2.00	360.00	.00
207	.00	.00	.00	3.00	.00	180.00	.00
208	4.00	.00	1.00	1.00	1.00	384.00	.00
209	36.00	36.00	1.00	6.00	3.00	550.00	.00
210	19.00	1.00	1.00	4.00	2.00	528.00	.00
211	.00	.00	.00	.00	.00	240.00	.00
212	123.00	75.00	1.00	6.00	2.00	326.00	.00
213	39.00	39.00	1.00	3.00	2.00	428.00	.00
214	60.00	60.00	1.00	4.00	3.00	471.00	.00
215	.00	.00	.00	4.00	2.00	404.00	.00
216	10.00	10.00	1.00	1.00	.00	320.00	.00
217	52.00	48.00	1.00	3.00	3.00	321.00	.00
218	90.00	90.00	1.00	6.00	3.00	303.00	.00
219	156.00	156.00	1.00	9.00	5.00	420.00	.00
220	58.00	58.00	1.00	4.00	6.00	92.00	.00
221	48.00	48.00	1.00	5.00	3.00	450.00	.00
222	.00	.00	.00	.00	.00	240.00	.00
223	72.00	1.00	.00	.00	2.00	486.00	.00
224	120.00	120.00	1.00	6.00	6.00	188.00	.00
225	84.00	72.00	1.00	6.00	3.00	580.00	.00
226	132.00	1.00	1.00	9.00	3.00	449.00	.00
227	.00	.00	.00	.00	4.00	376.00	.00
228	.00	.00	.00	4.00	4.00	547.00	.00
229	63.00	63.00	1.00	8.00	1.00	600.00	.00
230	.00	.00	.00	3.00	1.00	270.00	.00
231	96.00	96.00	1.00	6.00	2.00	338.00	.00
232	48.00	48.00	1.00	4.00	1.00	306.00	.00
233	63.00	63.00	1.00	5.00	3.00	424.00	.00
234	140.00	140.00	1.00	6.00	6.00	344.00	.00
235	144.00	144.00	1.00	5.00	4.00	255.00	.00

	T1FOUND	T2TIME	T2ERRORS	T2FOUND	T3TIME	T3ERRORS	T3FOUND
1	1.00	370.00	.00	1.00	224.00	.00	1.00
2	1.00	298.00	.00	1.00	164.00	.00	1.00
3	1.00	686.00	.00	1.00	134.00	.00	1.00
4	1.00	65.00	.00	1.00	255.00	.00	1.00
5	1.00	410.00	.00	1.00	220.00	.00	1.00
6	1.00	189.00	1.00	1.00	460.00	.00	1.00
7	1.00	260.00	.00	1.00	159.00	.00	1.00
8	1.00	182.00	.00	1.00	201.00	.00	1.00
9	1.00	227.00	.00	1.00	82.00	.00	1.00
10	1.00	216.00	.00	1.00	502.00	.00	1.00
11	1.00	261.00	.00	1.00	200.00	.00	1.00
12	1.00	304.00	.00	1.00	281.00	.00	1.00
13	1.00	147.00	.00	1.00	264.00	.00	1.00
14	1.00	50.00	.00	1.00	180.00	.00	1.00

15	1.00	183.00	.00	1.00	164.00	.00	1.00
16	1.00	194.00	.00	1.00	275.00	.00	1.00
17	1.00	120.00	.00	1.00	300.00	.00	1.00
18	1.00	411.00	.00	1.00	280.00	.00	1.00
19	1.00	160.00	.00	1.00	164.00	.00	1.00
20	1.00	163.00	.00	1.00	274.00	.00	1.00
21	1.00	142.00	.00	1.00	493.00	.00	1.00
22	1.00	60.00	.00	1.00	120.00	.00	1.00
23	1.00	365.00	.00	1.00	101.00	.00	1.00
24	1.00	496.00	.00	1.00	154.00	.00	1.00
25	1.00	495.00	.00	1.00	270.00	.00	1.00
26	1.00	463.00	.00	1.00	200.00	.00	1.00
27	1.00	466.00	.00	1.00	84.00	.00	1.00
28	1.00	180.00	.00	1.00	476.00	.00	1.00
29	1.00	103.00	.00	1.00	151.00	.00	1.00
30	1.00	403.00	.00	1.00	185.00	.00	1.00
31	1.00	254.00	.00	1.00	305.00	.00	1.00
32	1.00	127.00	.00	1.00	222.00	.00	1.00
33	1.00	315.00	.00	1.00	270.00	.00	1.00
34	1.00	288.00	.00	1.00	265.00	.00	1.00
35	1.00	240.00	.00	1.00	180.00	.00	1.00
36	1.00	235.00	.00	1.00	411.00	.00	1.00
37	1.00	293.00	.00	1.00	492.00	.00	1.00
38	1.00	307.00	1.00	1.00	300.00	.00	1.00
39	1.00	240.00	.00	1.00	660.00	.00	1.00
40	1.00	360.00	.00	1.00	240.00	.00	1.00
41	1.00	120.00	.00	1.00	210.00	.00	1.00
42	1.00	155.00	.00	1.00	117.00	.00	1.00
43	1.00	97.00	.00	1.00	220.00	.00	1.00
44	1.00	350.00	.00	1.00	287.00	.00	1.00
45	1.00	214.00	.00	1.00	340.00	.00	1.00
46	1.00	202.00	.00	1.00	314.00	.00	1.00
47	1.00	365.00	.00	1.00	376.00	.00	1.00
48	1.00	349.00	.00	1.00	370.00	.00	1.00
49	1.00	270.00	.00	1.00	160.00	.00	1.00
50	1.00	78.00	.00	1.00	364.00	.00	1.00
51	1.00	93.00	.00	1.00	361.00	.00	1.00
52	1.00	389.00	.00	1.00	469.00	.00	1.00
53	1.00	473.00	.00	1.00	60.00	.00	1.00
54	1.00	467.00	.00	1.00	394.00	.00	1.00
55	1.00	288.00	.00	1.00	180.00	.00	1.00
56	1.00	350.00	.00	1.00	242.00	.00	1.00
57	1.00	212.00	.00	1.00	347.00	.00	1.00
58	1.00	490.00	.00	1.00	398.00	.00	1.00
59	1.00	105.00	.00	1.00	470.00	.00	1.00
60	1.00	293.00	.00	1.00	588.00	.00	1.00
61	1.00	323.00	.00	1.00	367.00	.00	1.00
62	1.00	423.00	.00	1.00	278.00	.00	1.00
63	1.00	650.00	.00	1.00	330.00	.00	1.00
64	1.00	358.00	.00	1.00	75.00	.00	1.00
65	1.00	171.00	.00	1.00	273.00	.00	1.00
66	1.00	120.00	.00	1.00	230.00	.00	1.00
67	1.00	95.00	.00	1.00	117.00	.00	1.00
68	1.00	148.00	.00	1.00	360.00	.00	1.00
69	1.00	201.00	.00	1.00	489.00	.00	1.00

70	1.00	164.00	.00	1.00	336.00	.00	1.00
71	1.00	454.00	.00	1.00	595.00	.00	1.00
73	1.00	240.00	.00	1.00	275.00	.00	1.00
74	1.00	464.00	.00	1.00	143.00	.00	1.00
75	1.00	450.00	.00	1.00	364.00	.00	1.00
76	1.00	158.00	.00	1.00	173.00	.00	1.00
77	1.00	370.00	.00	1.00	128.00	.00	1.00
78	1.00	415.00	.00	1.00	350.00	.00	1.00
79	1.00	200.00	.00	1.00	314.00	.00	1.00
80	1.00	208.00	.00	1.00	411.00	.00	1.00
81	1.00	241.00	.00	1.00	313.00	.00	1.00
82	1.00	181.00	.00	1.00	93.00	.00	1.00
83	1.00	316.00	.00	1.00	109.00	.00	1.00
84	1.00	227.00	.00	1.00	380.00	.00	1.00
85	1.00	294.00	.00	1.00	264.00	.00	1.00
86	1.00	354.00	.00	1.00	296.00	.00	1.00
87	1.00	99.00	.00	1.00	200.00	.00	1.00
88	1.00	643.00	1.00	1.00	247.00	.00	1.00
89	1.00	287.00	.00	1.00	231.00	.00	1.00
90	1.00	38.00	.00	1.00	104.00	.00	1.00
91	1.00	137.00	.00	1.00	160.00	.00	1.00
92	1.00	240.00	.00	1.00	180.00	.00	1.00
93	1.00	393.00	.00	1.00	233.00	.00	1.00
95	1.00	348.00	.00	1.00	210.00	.00	1.00
96	1.00	268.00	.00	1.00	232.00	.00	1.00
97	1.00	173.00	.00	1.00	88.00	.00	1.00
98	1.00	225.00	.00	1.00	125.00	.00	1.00
99	1.00	163.00	.00	1.00	85.00	.00	1.00
100	1.00	155.00	.00	1.00	105.00	.00	1.00
101	1.00	335.00	.00	1.00	254.00	.00	1.00
102	1.00	334.00	.00	1.00	332.00	.00	1.00
103	1.00	201.00	.00	1.00	94.00	.00	1.00
104	1.00	321.00	.00	1.00	225.00	.00	1.00
105	1.00	100.00	.00	1.00	506.00	.00	1.00
106	1.00	76.00	.00	1.00	148.00	.00	1.00
107	1.00	199.00	.00	1.00	345.00	.00	1.00
108	1.00	250.00	.00	1.00	330.00	.00	1.00
109	1.00	192.00	.00	1.00	250.00	.00	1.00
110	1.00	118.00	.00	1.00	212.00	.00	1.00
111	1.00	138.00	.00	1.00	314.00	.00	1.00
112	1.00	382.00	.00	1.00	279.00	.00	1.00
113	1.00	610.00	.00	1.00	264.00	.00	1.00
114	1.00	135.00	.00	1.00	153.00	.00	1.00
115	1.00	880.00	.00	1.00	505.00	.00	1.00
116	1.00	574.00	.00	1.00	110.00	1.00	1.00
117	1.00	219.00	.00	1.00	160.00	.00	1.00
118	1.00	636.00	.00	1.00	421.00	.00	1.00
119	1.00	226.00	.00	1.00	167.00	.00	1.00
120	1.00	175.00	.00	1.00	940.00	.00	1.00
121	1.00	327.00	.00	1.00	240.00	.00	1.00
122	1.00	56.00	.00	1.00	152.00	.00	1.00
123	1.00	465.00	.00	1.00	290.00	.00	1.00
124	1.00	176.00	.00	1.00	326.00	.00	1.00

125	1.00	145.00	.00	1.00	206.00	.00	1.00
126	1.00	332.00	.00	1.00	251.00	.00	1.00
127	1.00	245.00	.00	1.00	250.00	.00	1.00
128	1.00	255.00	.00	1.00	208.00	.00	1.00
129	1.00	503.00	.00	1.00	257.00	.00	1.00
130	1.00	484.00	.00	1.00	115.00	.00	1.00
131	1.00	315.00	.00	1.00	336.00	.00	1.00
132	1.00	526.00	.00	1.00	710.00	.00	1.00
133	1.00	145.00	.00	1.00	256.00	.00	1.00
134	1.00	232.00	.00	1.00	397.00	1.00	1.00
135	1.00	300.00	.00	1.00	300.00	.00	1.00
136	1.00	397.00	.00	1.00	136.00	.00	1.00
137	1.00	283.00	.00	1.00	319.00	.00	1.00
138	1.00	470.00	.00	1.00	362.00	.00	1.00
139	1.00	326.00	.00	1.00	229.00	.00	1.00
140	1.00	65.00	.00	1.00	185.00	.00	1.00
141	1.00	840.00	.00	1.00	380.00	.00	1.00
142	1.00	465.00	1.00	1.00	210.00	.00	1.00
143	1.00	355.00	.00	1.00	332.00	.00	1.00
144	1.00	376.00	.00	1.00	298.00	.00	1.00
145	1.00	299.00	.00	1.00	492.00	.00	1.00
146	1.00	65.00	.00	1.00	229.00	.00	1.00
147	1.00	325.00	.00	1.00	272.00	.00	1.00
148	1.00	205.00	.00	1.00	105.00	.00	1.00
149	1.00	261.00	.00	1.00	390.00	.00	1.00
150	1.00	359.00	.00	1.00	122.00	.00	1.00
151	1.00	810.00	.00	1.00	992.00	.00	1.00
152	1.00	105.00	.00	1.00	545.00	.00	1.00
153	1.00	98.00	.00	1.00	172.00	.00	1.00
154	1.00	85.00	.00	1.00	363.00	.00	1.00
155	1.00	209.00	1.00	1.00	231.00	.00	1.00
156	1.00	540.00	.00	1.00	240.00	.00	1.00
157	1.00	510.00	.00	1.00	57.00	.00	1.00
158	1.00	372.00	.00	1.00	229.00	.00	1.00
159	1.00	512.00	.00	1.00	899.00	.00	1.00
160	1.00	250.00	.00	1.00	491.00	.00	1.00
161	1.00	420.00	.00	1.00	120.00	.00	1.00
162	1.00	287.00	.00	1.00	296.00	.00	1.00
163	1.00	786.00	.00	1.00	212.00	.00	1.00
164	1.00	518.00	.00	1.00	205.00	.00	1.00
165	1.00	360.00	.00	1.00	252.00	.00	1.00
166	1.00	288.00	1.00	1.00	665.00	.00	1.00
167	1.00	175.00	.00	1.00	206.00	.00	1.00
168	1.00	500.00	.00	1.00	487.00	.00	1.00
169	1.00	470.00	.00	1.00	96.00	.00	1.00
170	1.00	124.00	.00	1.00	467.00	.00	1.00
171	1.00	294.00	.00	1.00	282.00	.00	1.00
172	1.00	75.00	.00	1.00	482.00	.00	1.00
173	1.00	162.00	.00	1.00	433.00	.00	1.00
174	1.00	550.00	.00	1.00	110.00	.00	1.00
175	1.00	440.00	.00	1.00	240.00	.00	1.00
176	1.00	209.00	.00	1.00	400.00	.00	1.00
177	1.00	358.00	.00	1.00	320.00	.00	1.00
178	1.00	411.00	1.00	1.00	275.00	1.00	1.00
179	1.00	175.00	.00	1.00	280.00	.00	1.00

180	1.00	252.00	.00	1.00	505.00	.00	1.00
181	1.00	320.00	.00	1.00	216.00	.00	1.00
182	1.00	318.00	.00	1.00	385.00	.00	1.00
183	1.00	290.00	.00	1.00	105.00	.00	1.00
184	1.00	360.00	.00	1.00	120.00	.00	1.00
185	1.00	249.00	.00	1.00	600.00	.00	1.00
186	1.00	185.00	.00	1.00	328.00	.00	1.00
187	1.00	356.00	.00	1.00	332.00	.00	1.00
188	1.00	181.00	.00	1.00	445.00	.00	1.00
189	1.00	300.00	.00	1.00	720.00	.00	1.00
190	1.00	292.00	.00	1.00	453.00	.00	1.00
191	1.00	412.00	.00	1.00	356.00	.00	1.00
192	1.00	188.00	.00	1.00	550.00	.00	1.00
193	1.00	265.00	.00	1.00	675.00	.00	1.00
194	1.00	190.00	.00	1.00	388.00	.00	1.00
195	1.00	370.00	.00	1.00	251.00	.00	1.00
196	1.00	409.00	.00	1.00	298.00	.00	1.00
197	1.00	274.00	.00	1.00	315.00	.00	1.00
198	1.00	408.00	.00	1.00	252.00	.00	1.00
199	1.00	262.00	.00	1.00	437.00	.00	1.00
200	1.00	582.00	.00	1.00	210.00	.00	1.00
201	1.00	134.00	.00	1.00	522.00	.00	1.00
202	1.00	151.00	.00	1.00	324.00	.00	1.00
203	1.00	900.00	.00	1.00	360.00	.00	1.00
204	1.00	485.00	.00	1.00	195.00	.00	1.00
205	1.00	346.00	.00	1.00	481.00	.00	1.00
206	1.00	660.00	.00	1.00	300.00	.00	1.00
207	1.00	240.00	.00	1.00	180.00	.00	1.00
208	1.00	132.00	.00	1.00	370.00	.00	1.00
209	1.00	526.00	.00	1.00	75.00	.00	1.00
210	1.00	368.00	.00	1.00	347.00	.00	1.00
211	1.00	640.00	.00	1.00	120.00	.00	1.00
212	1.00	520.00	.00	1.00	296.00	1.00	1.00
213	1.00	426.00	.00	1.00	425.00	.00	1.00
214	1.00	427.00	.00	1.00	565.00	.00	1.00
215	1.00	359.00	.00	1.00	679.00	.00	1.00
216	1.00	525.00	.00	1.00	410.00	.00	1.00
217	1.00	34.00	.00	1.00	241.00	.00	1.00
218	1.00	372.00	.00	1.00	165.00	.00	1.00
219	1.00	210.00	.00	1.00	480.00	.00	1.00
220	1.00	292.00	.00	1.00	250.00	.00	1.00
221	1.00	369.00	.00	1.00	310.00	.00	1.00
222	1.00	480.00	.00	1.00	240.00	.00	1.00
223	1.00	361.00	.00	1.00	155.00	.00	1.00
224	1.00	175.00	.00	1.00	244.00	.00	1.00
225	1.00	584.00	.00	1.00	330.00	.00	1.00
226	1.00	45.00	.00	1.00	142.00	.00	1.00
227	1.00	290.00	.00	1.00	650.00	.00	1.00
228	1.00	665.00	.00	1.00	440.00	.00	1.00
229	1.00	300.00	.00	1.00	480.00	.00	1.00
230	1.00	355.00	.00	1.00	275.00	.00	1.00
231	1.00	192.00	.00	1.00	122.00	.00	1.00
232	1.00	459.00	.00	1.00	565.00	.00	1.00
233	1.00	351.00	.00	1.00	487.00	.00	1.00
234	1.00	437.00	.00	1.00	345.00	.00	1.00
235	1.00	484.00	.00	1.00	907.00	.00	1.00

	T4TIME	T4ERRORS	T4FOUND	TAVGTIME	TAVGERRO	TAVGFOUN	CITIME
1	64.00	.00	1.00	4.20	.00	4.00	541.00
2	98.00	.00	1.00	3.84	.00	4.00	1300.00
3	302.00	.00	1.00	6.10	.00	4.00	513.00
4	300.00	.00	1.00	3.04	.00	4.00	515.00
5	304.00	.00	1.00	4.88	.00	4.00	245.00
6	279.00	.00	1.00	4.86	1.00	4.00	467.00
7	246.00	.00	1.00	3.85	.00	4.00	260.00
8	121.00	.00	1.00	2.88	.00	4.00	798.00
9	137.00	.00	1.00	4.56	.00	4.00	726.00
10	315.00	.00	1.00	5.10	.00	4.00	437.00
11	481.00	.00	1.00	4.55	.00	4.00	470.00
12	170.00	.00	1.00	4.21	.00	4.00	510.00
13	491.00	.00	1.00	5.14	.00	4.00	397.00
14	319.00	.00	1.00	2.99	.00	4.00	347.00
15	205.00	.00	1.00	3.11	.00	4.00	459.00
16	176.00	.00	1.00	3.50	.00	4.00	823.00
17	360.00	.00	1.00	4.50	.00	4.00	480.00
18	227.00	.00	1.00	5.05	.00	4.00	340.00
19	175.00	.00	1.00	3.04	.00	4.00	376.00
20	453.00	.00	1.00	4.25	.00	4.00	334.00
21	332.00	.00	1.00	5.46	.00	4.00	388.00
22	140.00	.00	1.00	2.17	.00	4.00	473.00
23	4.23	.00	1.00	4.23	.00	4.00	434.00
24	309.00	.00	1.00	4.57	.00	4.00	353.00
25	210.00	.00	1.00	5.05	.00	4.00	420.00
26	215.00	.00	1.00	4.62	.00	4.00	980.00
27	270.00	.00	1.00	4.84	.00	4.00	351.00
28	274.00	.00	1.00	4.79	.00	4.00	421.00
29	162.00	.00	1.00	3.19	.00	4.00	345.00
30	361.00	.00	1.00	4.83	.00	4.00	852.00
31	679.00	.00	1.00	6.57	.00	4.00	395.00
32	321.00	.00	1.00	3.83	.00	4.00	261.00
33	270.00	.00	1.00	4.94	.00	4.00	294.00
34	123.00	.00	1.00	3.77	.00	4.00	687.00
35	360.00	.00	1.00	3.84	.00	4.00	355.00
36	360.00	.00	1.00	5.48	.00	4.00	885.00
37	240.00	.00	1.00	5.42	.00	4.00	404.00
38	343.00	.00	1.00	5.37	1.00	4.00	638.00
39	240.00	.00	1.00	5.75	.00	4.00	240.00
40	240.00	.00	1.00	4.25	.00	4.00	240.00
41	190.00	.00	1.00	3.29	.00	4.00	165.00
42	73.00	.00	1.00	2.88	.00	4.00	415.00
43	242.00	.00	1.00	3.35	.00	4.00	228.00
44	278.00	.00	1.00	4.72	.00	4.00	488.00
45	226.00	.00	1.00	4.73	.00	4.00	352.00
46	115.00	.00	1.00	2.99	.00	4.00	269.00
47	226.00	.00	1.00	5.50	.00	4.00	547.00
48	285.00	.00	1.00	6.15	.00	4.00	542.00
49	435.00	.00	1.00	5.01	.00	4.00	865.00
50	242.00	.00	1.00	4.37	.00	4.00	853.00
51	150.00	.00	1.00	3.62	.00	4.00	243.00
52	455.00	.00	1.00	6.31	.00	4.00	776.00

53	157.00	.00	1.00	3.41	.00	4.00	300.00
54	279.00	.00	1.00	5.85	.00	4.00	629.00
55	305.00	.00	1.00	4.40	.00	4.00	490.00
56	280.00	.00	1.00	4.49	.00	4.00	400.00
57	199.00	.00	1.00	3.72	.00	4.00	438.00
58	190.00	.00	1.00	6.05	.00	4.00	346.00
59	144.00	.00	1.00	4.46	.00	4.00	270.00
60	240.00	.00	1.00	6.98	.00	4.00	202.00
61	264.00	.00	1.00	4.86	.00	4.00	236.00
62	328.00	.00	1.00	5.30	.00	4.00	500.00
63	195.00	.00	1.00	6.28	.00	4.00	300.00
64	233.00	.00	1.00	3.86	.00	4.00	284.00
65	140.00	.00	1.00	4.08	.00	4.00	263.00
66	233.00	.00	1.00	3.47	.00	4.00	304.00
67	367.00	.00	1.00	3.34	.00	4.00	484.00
68	184.00	.00	1.00	3.93	.00	4.00	278.00
69	401.00	.00	1.00	6.27	.00	4.00	716.00
70	550.00	.00	1.00	5.56	.00	4.00	283.00
71	225.00	.00	1.00	6.23	.00	4.00	175.00
72	251.00	.00	1.00	4.79	.00	4.00	440.00
73	165.00	.00	1.00	4.25	.00	4.00	404.00
75	182.00	.00	1.00	6.10	.00	4.00	320.00
76	174.00	.00	1.00	2.08	.00	4.00	325.00
77	50.00	.00	1.00	2.94	.00	4.00	899.00
78	320.00	.00	1.00	6.10	.00	4.00	647.00
79	367.00	.00	1.00	4.95	.00	4.00	386.00
80	73.00	.00	1.00	4.32	.00	4.00	310.00
81	262.00	.00	1.00	6.38	.00	4.00	385.00
82	150.00	.00	1.00	2.68	.00	4.00	478.00
83	758.00	.00	1.00	6.94	.00	4.00	1111.00
84	209.00	.00	1.00	5.18	.00	4.00	516.00
85	326.00	.00	1.00	4.60	.00	4.00	481.00
86	359.00	.00	1.00	4.57	.00	4.00	266.00
87	173.00	.00	1.00	2.89	.00	4.00	147.00
88	260.00	.00	1.00	6.65	1.00	4.00	1228.00
89	130.00	.00	1.00	3.87	.00	4.00	401.00
90	222.00	.00	1.00	2.75	.00	4.00	336.00
91	58.00	.00	1.00	3.10	.00	4.00	257.00
92	120.00	.00	1.00	1.95	.00	4.00	400.00
93	279.00	.00	1.00	5.03	.00	4.00	292.00
94	250.00	.00	1.00	5.48	.00	4.00	800.00
95	280.00	.00	1.00	4.44	.00	4.00	435.00
96	276.00	.00	1.00	3.84	.00	4.00	420.00
97	116.00	.00	1.00	2.24	.00	4.00	530.00
98	237.00	.00	1.00	3.28	.00	4.00	285.00
99	260.00	.00	1.00	3.61	.00	4.00	1701.00
100	110.00	.00	1.00	2.21	.00	4.00	377.00
101	130.00	.00	1.00	4.08	.00	4.00	500.00
102	350.00	.00	1.00	5.04	.00	4.00	472.00
103	200.00	.00	1.00	3.02	.00	4.00	520.00
104	322.00	.00	1.00	4.38	.00	4.00	231.00
105	221.00	.00	1.00	4.70	.00	4.00	683.00
106	236.00	.00	1.00	2.35	.00	4.00	222.00
107	186.00	.00	1.00	4.89	.00	4.00	541.00

108	195.00	.00	1.00	4.29	.00	4.00	960.00
109	216.00	.00	1.00	4.03	.00	4.00	1850.00
110	529.00	.00	1.00	4.70	.00	4.00	588.00
111	276.00	.00	1.00	4.35	.00	4.00	328.00
112	376.00	.00	1.00	5.59	.00	4.00	380.00
113	339.00	.00	1.00	7.37	.00	4.00	220.00
114	413.00	.00	1.00	4.33	.00	4.00	295.00
115	405.00	.00	1.00	10.52	.00	4.00	293.00
116	384.00	.00	1.00	6.10	1.00	4.00	3610.00
117	429.00	.00	1.00	3.37	.00	4.00	193.00
118	349.00	.00	1.00	7.53	.00	4.00	925.00
119	187.00	.00	1.00	3.38	.00	4.00	1379.00
120	265.00	.00	1.00	6.65	.00	4.00	770.00
121	140.00	.00	1.00	4.41	.00	4.00	415.00
122	190.00	.00	1.00	4.69	.00	4.00	420.00
124	232.00	.00	1.00	4.73	.00	4.00	1568.00
125	226.00	.00	1.00	4.06	.00	4.00	639.00
127	325.00	.00	1.00	4.10	.00	4.00	275.00
128	343.00	.00	1.00	5.23	.00	4.00	1051.00
129	245.00	.00	1.00	4.83	.00	4.00	582.00
130	111.00	.00	1.00	3.65	.00	4.00	301.00
131	136.00	.00	1.00	3.79	.00	4.00	445.00
132	284.00	.00	1.00	7.26	.00	4.00	331.00
133	182.00	.00	1.00	3.95	.00	4.00	216.00
134	263.00	.00	1.00	5.15	1.00	4.00	252.00
135	120.00	.00	1.00	3.75	.00	4.00	240.00
136	207.00	.00	1.00	3.95	.00	4.00	450.00
137	298.00	.00	1.00	4.72	.00	4.00	430.00
138	362.00	.00	1.00	5.83	.00	4.00	990.00
139	310.00	.00	1.00	4.69	.00	4.00	490.00
140	330.00	.00	1.00	4.13	.00	4.00	440.00
141	190.00	.00	1.00	6.92	.00	4.00	465.00
142	215.00	.00	1.00	4.73	1.00	4.00	190.00
143	427.00	.00	1.00	7.56	.00	4.00	809.00
144	370.00	.00	1.00	5.52	.00	4.00	475.00
145	277.00	.00	1.00	5.28	.00	4.00	990.00
146	191.00	.00	1.00	3.23	.00	4.00	279.00
147	128.00	.00	1.00	3.35	.00	4.00	300.00
148	97.00	.00	1.00	2.27	.00	4.00	350.00
149	186.00	.00	1.00	4.77	.00	4.00	522.00
150	307.00	.00	1.00	4.47	.00	4.00	591.00
151	928.00	.00	1.00	14.26	.00	4.00	1324.00
152	318.00	.00	1.00	4.81	.00	4.00	672.00
153	320.00	.00	1.00	3.31	.00	4.00	262.00
154	302.00	.00	1.00	6.65	.00	4.00	1934.00
155	335.00	.00	1.00	4.91	1.00	4.00	395.00
156	120.00	.00	1.00	8.00	.00	4.00	270.00
157	269.00	.00	1.00	5.65	.00	4.00	770.00
158	224.00	.00	1.00	5.28	.00	4.00	310.00
159	497.00	.00	1.00	10.95	.00	4.00	1268.00
160	307.00	.00	1.00	6.36	.00	4.00	392.00
161	300.00	.00	1.00	4.75	.00	4.00	420.00
162	439.00	.00	1.00	6.07	.00	4.00	599.00

163	695.00	.00	1.00	9.56	.00	4.00	933.00
164	437.00	.00	1.00	6.21	.00	4.00	809.00
165	377.00	.00	1.00	5.89	.00	4.00	672.00
166	326.00	.00	1.00	6.61	1.00	4.00	290.00
167	350.00	.00	1.00	4.53	.00	4.00	260.00
168	475.00	.00	1.00	7.71	.00	4.00	645.00
169	355.00	.00	1.00	4.95	.00	4.00	394.00
170	602.00	.00	1.00	7.30	.00	4.00	302.00
171	120.00	.00	1.00	3.83	.00	4.00	220.00
172	242.00	.00	1.00	3.98	.00	4.00	403.00
173	284.00	.00	1.00	5.60	.00	4.00	1465.00
174	456.00	.00	1.00	5.41	.00	4.00	586.00
175	109.00	.00	1.00	4.15	.00	4.00	821.00
176	375.00	.00	1.00	5.91	.00	4.00	255.00
177	205.00	.00	1.00	5.55	.00	4.00	605.00
178	277.00	.00	1.00	5.64	.00	4.00	411.00
179	302.00	.00	1.00	4.31	.00	4.00	272.00
180	769.00	.00	1.00	7.81	.00	4.00	391.00
181	849.00	.00	1.00	10.10	.00	4.00	582.00
182	275.00	.00	1.00	7.10	.00	4.00	209.00
183	309.00	.00	1.00	4.63	.00	4.00	318.00
184	180.00	.00	1.00	3.75	.00	4.00	300.00
185	250.00	.00	1.00	5.89	.00	4.00	240.00
186	210.00	.00	1.00	4.65	.00	4.00	1055.00
187	237.00	.00	1.00	5.14	.00	4.00	696.00
188	76.00	.00	1.00	3.88	.00	4.00	605.00
189	313.00	.00	1.00	6.90	.00	4.00	345.00
190	96.00	.00	1.00	4.63	.00	4.00	286.00
191	326.00	.00	1.00	5.52	.00	4.00	322.00
192	326.00	.00	1.00	5.29	.00	4.00	427.00
193	312.00	.00	1.00	6.59	.00	4.00	330.00
194	222.00	.00	1.00	5.19	.00	4.00	632.00
195	293.00	.00	1.00	5.23	.00	4.00	1375.00
196	275.00	.00	1.00	5.97	.00	4.00	949.00
197	243.00	.00	1.00	4.93	.00	4.00	964.00
198	275.00	.00	1.00	4.70	.00	4.00	444.00
199	234.00	.00	1.00	5.06	.00	4.00	5.31
200	280.00	.00	1.00	6.32	.00	4.00	422.00
201	167.00	.00	1.00	4.34	.00	4.00	941.00
202	230.00	.00	1.00	5.68	.00	4.00	1470.00
203	360.00	.00	1.00	7.75	.00	4.00	491.00
204	250.00	.00	1.00	5.05	.00	4.00	545.00
205	241.00	.00	1.00	5.62	.00	4.00	838.00
206	120.00	.00	1.00	6.00	.00	4.00	240.00
207	300.00	.00	1.00	3.75	.00	4.00	360.00
208	339.00	.00	1.00	5.10	.00	4.00	805.00
209	390.00	.00	1.00	6.42	.00	4.00	1283.00
210	246.00	.00	1.00	6.20	.00	4.00	745.00
211	180.00	.00	1.00	4.92	.00	4.00	300.00
212	401.00	.00	1.00	6.43	1.00	4.00	468.00
213	229.00	.00	1.00	6.28	.00	4.00	436.00
214	289.00	.00	1.00	7.30	.00	4.00	1519.00
215	252.00	.00	1.00	7.06	.00	4.00	566.00
216	255.00	.00	1.00	6.29	.00	4.00	500.00
217	380.00	.00	1.00	4.07	.00	4.00	207.00

218	427.00	.00	1.00	5.28	.00	4.00	1480.00
219	370.00	.00	1.00	6.17	.00	4.00	248.00
220	278.00	.00	1.00	3.80	.00	4.00	515.00
221	226.00	.00	1.00	5.65	.00	4.00	415.00
222	300.00	.00	1.00	5.25	.00	4.00	335.00
223	437.00	.00	1.00	6.00	.00	4.00	690.00
224	247.00	.00	1.00	3.56	.00	4.00	199.00
225	295.00	.00	1.00	7.45	.00	4.00	252.00
226	256.00	.00	1.00	3.72	.00	4.00	1100.00
227	235.00	.00	1.00	6.46	.00	4.00	485.00
228	305.00	.00	1.00	8.15	.00	4.00	1745.00
229	180.00	.00	1.00	6.50	.00	4.00	230.00
230	346.00	.00	1.00	5.19	.00	4.00	349.00
231	562.00	.00	1.00	5.06	.00	4.00	1282.00
232	495.00	.00	1.00	7.19	.00	4.00	237.00
233	244.00	.00	1.00	6.28	.00	4.00	787.00
234	257.00	.00	1.00	5.76	.00	4.00	282.00
235	287.00	.00	1.00	8.05	.00	4.00	1077.00

	C1ERRORS	C1FOUND	C2TIME	C2ERRORS	C2FOUND	C3TIME	C3ERRORS
1	.00	1.00	333.00	.00	1.00	479.00	.00
2	.00	1.00	919.00	1.00	1.00	271.00	.00
3	.00	1.00	845.00	.00	1.00	684.00	2.00
4	.00	1.00	222.00	.00	1.00	565.00	.00
5	.00	1.00	887.00	2.00	1.00	949.00	.00
6	.00	1.00	690.00	.00	1.00	431.00	.00
7	.00	1.00	520.00	1.00	1.00	645.00	.00
8	.00	1.00	240.00	.00	1.00	289.00	.00
9	.00	1.00	562.00	.00	1.00	378.00	.00
10	.00	1.00	316.00	.00	1.00	365.00	.00
11	.00	1.00	835.00	.00	1.00	720.00	.00
12	.00	1.00	890.00	1.00	1.00	595.00	.00
13	.00	1.00	848.00	.00	1.00	522.00	.00
14	.00	1.00	870.00	.00	1.00	321.00	.00
15	.00	1.00	300.00	.00	1.00	625.00	.00
16	.00	1.00	249.00	.00	1.00	428.00	.00
17	.00	1.00	480.00	1.00	1.00	540.00	1.00
18	.00	1.00	1052.00	1.00	1.00	680.00	.00
19	.00	1.00	893.00	.00	1.00	554.00	.00
20	.00	1.00	612.00	.00	1.00	564.00	.00
21	.00	1.00	842.00	.00	1.00	498.00	1.00
22	.00	1.00	575.00	.00	1.00	635.00	.00
23	.00	1.00	535.00	.00	1.00	458.00	.00
24	.00	1.00	1101.00	1.00	1.00	637.00	.00
25	.00	1.00	840.00	.00	1.00	360.00	.00
26	.00	1.00	410.00	.00	1.00	386.00	.00
27	.00	1.00	289.00	.00	1.00	289.00	.00
28	.00	1.00	653.00	1.00	1.00	671.00	.00
29	.00	1.00	261.00	.00	1.00	209.00	.00
30	.00	1.00	334.00	.00	1.00	755.00	.00
31	.00	1.00	429.00	.00	1.00	737.00	.00
32	.00	1.00	432.00	.00	1.00	501.00	.00
33	.00	1.00	288.00	1.00	1.00	505.00	.00
34	.00	1.00	990.00	.00	1.00	560.00	.00
35	.00	1.00	268.00	.00	1.00	375.00	.00

36	.00	1.00	610.00	1.00	1.00	660.00	.00
37	.00	1.00	1708.00	.00	1.00	880.00	.00
38	.00	1.00	384.00	1.00	1.00	780.00	1.00
39	.00	1.00	540.00	.00	1.00	1080.00	1.00
40	.00	1.00	720.00	.00	1.00	240.00	.00
41	.00	1.00	215.00	.00	1.00	250.00	.00
42	.00	1.00	428.00	.00	1.00	923.00	.00
43	.00	1.00	412.00	.00	1.00	475.00	.00
44	.00	1.00	612.00	.00	1.00	274.00	.00
45	.00	1.00	600.00	1.00	1.00	662.00	.00
46	.00	1.00	508.00	.00	1.00	658.00	.00
47	.00	1.00	1720.00	.00	1.00	627.00	.00
48	.00	1.00	888.00	1.00	1.00	790.00	2.00
49	.00	1.00	939.00	.00	1.00	324.00	.00
50	.00	1.00	544.00	.00	1.00	1690.00	.00
51	.00	1.00	538.00	.00	1.00	543.00	.00
52	.00	1.00	1168.00	1.00	1.00	840.00	1.00
53	.00	1.00	561.00	.00	1.00	576.00	.00
54	.00	1.00	1329.00	1.00	1.00	748.00	.00
55	.00	1.00	466.00	.00	1.00	521.00	1.00
56	.00	1.00	542.00	.00	1.00	804.00	.00
57	.00	1.00	367.00	.00	1.00	562.00	.00
58	.00	1.00	233.00	1.00	1.00	1070.00	2.00
59	.00	1.00	228.00	.00	1.00	275.00	.00
60	.00	1.00	1075.00	2.00	1.00	812.00	1.00
61	.00	1.00	336.00	.00	1.00	56.00	1.00
62	.00	1.00	1230.00	1.00	1.00	425.00	1.00
63	.00	1.00	441.00	.00	1.00	379.00	.00
64	.00	1.00	914.00	1.00	.00	356.00	.00
65	.00	1.00	361.00	.00	1.00	673.00	.00
66	.00	1.00	1118.00	.00	1.00	240.00	.00
67	.00	1.00	540.00	.00	1.00	792.00	.00
69	.00	1.00	837.00	.00	1.00	419.00	.00
70	.00	1.00	1095.00	.00	1.00	437.00	.00
71	.00	1.00	380.00	.00	1.00	452.00	.00
72	.00	1.00	776.00	.00	1.00	352.00	.00
73	.00	1.00	373.00	.00	1.00	716.00	.00
74	.00	1.00	251.00	.00	1.00	212.00	.00
75	.00	1.00	415.00	.00	1.00	545.00	.00
76	.00	1.00	264.00	.00	1.00	465.00	.00
78	.00	1.00	900.00	1.00	.00	558.00	.00
79	.00	1.00	437.00	.00	1.00	695.00	.00
80	.00	1.00	325.00	.00	1.00	370.00	.00
81	.00	1.00	245.00	.00	1.00	800.00	.00
82	.00	1.00	501.00	.00	1.00	166.00	.00
83	.00	1.00	382.00	.00	1.00	675.00	.00
84	.00	1.00	517.00	.00	1.00	720.00	4.00
85	.00	1.00	317.00	.00	1.00	258.00	.00
86	.00	1.00	670.00	.00	1.00	875.00	1.00
87	.00	1.00	233.00	.00	1.00	245.00	.00
88	.00	1.00	1040.00	1.00	1.00	280.00	1.00
89	.00	1.00	780.00	.00	1.00	553.00	.00
90	.00	1.00	1006.00	.00	1.00	180.00	.00

91	.00	1.00	428.00	1.00	1.00	379.00	.00
92	.00	1.00	330.00	.00	1.00	425.00	.00
93	.00	1.00	334.00	.00	1.00	408.00	.00
94	.00	1.00	465.00	.00	1.00	915.00	.00
95	1.00	1.00	485.00	.00	1.00	1131.00	2.00
96	.00	1.00	335.00	.00	1.00	218.00	.00
97	.00	1.00	262.00	.00	1.00	227.00	.00
98	.00	1.00	435.00	.00	1.00	300.00	.00
99	1.00	1.00	407.00	.00	1.00	346.00	.00
100	.00	1.00	308.00	.00	1.00	329.00	.00
101	.00	1.00	446.00	.00	1.00	1084.00	.00
102	.00	1.00	575.00	.00	1.00	685.00	.00
103	.00	1.00	1117.00	2.00	.00	956.00	.00
104	.00	1.00	110.00	.00	1.00	199.00	.00
105	.00	1.00	546.00	.00	1.00	631.00	.00
106	.00	1.00	200.00	.00	1.00	886.00	.00
107	.00	1.00	280.00	.00	1.00	757.00	.00
108	.00	1.00	235.00	.00	1.00	470.00	.00
109	.00	1.00	3554.00	.00	1.00	1208.00	.00
110	.00	1.00	584.00	.00	1.00	744.00	.00
111	.00	1.00	348.00	.00	1.00	622.00	1.00
112	.00	1.00	377.00	.00	1.00	648.00	1.00
113	.00	1.00	540.00	.00	1.00	400.00	.00
114	.00	1.00	995.00	.00	1.00	300.00	.00
115	.00	1.00	280.00	.00	1.00	580.00	1.00
116	.00	1.00	464.00	.00	1.00	370.00	.00
117	.00	1.00	249.00	.00	1.00	338.00	.00
118	.00	1.00	1777.00	.00	1.00	654.00	.00
119	.00	1.00	275.00	.00	1.00	193.00	.00
120	.00	1.00	560.00	.00	1.00	1140.00	.00
121	.00	1.00	307.00	.00	1.00	455.00	.00
122	.00	1.00	1042.00	1.00	1.00	620.00	.00
123	.00	1.00	499.00	.00	1.00	330.00	.00
24	.00	1.00	667.00	.00	1.00	557.00	.00
125	1.00	1.00	450.00	.00	1.00	711.00	.00
126	.00	1.00	463.00	.00	1.00	341.00	.00
127	.00	1.00	445.00	2.00	1.00	515.00	.00
128	.00	1.00	1205.00	.00	1.00	941.00	.00
129	.00	1.00	321.00	.00	1.00	181.00	.00
130	.00	1.00	200.00	.00	1.00	258.00	.00
131	.00	1.00	885.00	.00	1.00	391.00	.00
132	.00	1.00	590.00	.00	1.00	125.00	.00
133	.00	1.00	358.00	.00	1.00	535.00	.00
134	.00	1.00	462.00	.00	1.00	505.00	.00
135	.00	1.00	240.00	.00	1.00	360.00	.00
136	.00	1.00	225.00	.00	1.00	250.00	.00
137	.00	1.00	864.00	.00	1.00	395.00	.00
138	.00	1.00	647.00	.00	1.00	1030.00	.00
139	.00	1.00	1605.00	.00	1.00	2971.00	1.00
140	.00	1.00	230.00	.00	1.00	420.00	.00
141	.00	1.00	1365.00	.00	1.00	1145.00	1.00
142	.00	1.00	475.00	.00	1.00	180.00	.00
143	.00	1.00	456.00	.00	1.00	252.00	.00
144	.00	1.00	2426.00	.00	1.00	2042.00	1.00
145	.00	1.00	621.00	.00	1.00	605.00	1.00

146	.00	1.00	730.00	1.00	1.00	485.00	.00
148	.00	1.00	632.00	.00	1.00	437.00	.00
149	.00	1.00	635.00	.00	1.00	405.00	.00
150	.00	1.00	622.00	.00	1.00	788.00	.00
151	.00	1.00	548.00	.00	1.00	424.00	.00
152	.00	1.00	210.00	.00	1.00	534.00	.00
153	.00	1.00	739.00	.00	1.00	680.00	.00
154	.00	1.00	1359.00	.00	1.00	1322.00	.00
155	.00	1.00	642.00	1.00	1.00	731.00	1.00
156	.00	1.00	740.00	.00	1.00	556.00	.00
157	.00	1.00	361.00	.00	1.00	749.00	.00
158	.00	1.00	227.00	.00	1.00	582.00	.00
159	.00	1.00	2687.00	.00	1.00	1715.00	.00
160	.00	1.00	488.00	.00	1.00	1600.00	.00
161	.00	1.00	360.00	1.00	.00	480.00	.00
162	.00	1.00	729.00	1.00	1.00	717.00	1.00
163	.00	1.00	1314.00	.00	1.00	2001.00	.00
164	.00	1.00	655.00	.00	1.00	351.00	.00
165	.00	1.00	726.00	.00	1.00	900.00	.00
166	.00	1.00	425.00	.00	1.00	393.00	.00
167	.00	1.00	400.00	.00	1.00	462.00	.00
168	.00	1.00	1973.00	1.00	1.00	2158.00	.00
169	.00	1.00	664.00	.00	1.00	325.00	.00
170	.00	1.00	687.00	.00	1.00	384.00	.00
171	.00	1.00	617.00	.00	1.00	495.00	.00
172	.00	1.00	1260.00	.00	1.00	443.00	.00
173	.00	1.00	264.00	.00	1.00	786.00	.00
174	.00	1.00	548.00	.00	1.00	391.00	.00
175	.00	1.00	980.00	.00	1.00	549.00	.00
176	.00	1.00	440.00	.00	1.00	777.00	.00
177	.00	1.00	1269.00	.00	1.00	1189.00	.00
178	.00	1.00	358.00	.00	1.00	1198.00	1.00
179	.00	1.00	494.00	.00	1.00	695.00	1.00
180	.00	1.00	715.00	1.00	1.00	423.00	.00
181	.00	1.00	1209.00	.00	1.00	1464.00	.00
182	.00	1.00	266.00	.00	1.00	282.00	.00
183	.00	1.00	579.00	.00	1.00	179.00	.00
184	.00	1.00	900.00	.00	1.00	240.00	.00
185	1.00	1.00	530.00	.00	1.00	310.00	.00
186	.00	1.00	678.00	.00	1.00	1204.00	1.00
187	.00	1.00	409.00	.00	1.00	1861.00	.00
188	.00	1.00	545.00	.00	1.00	559.00	.00
189	.00	1.00	663.00	.00	1.00	372.00	.00
190	.00	1.00	180.00	1.00	1.00	834.00	.00
191	.00	1.00	475.00	.00	1.00	168.00	.00
192	.00	1.00	287.00	.00	1.00	165.00	.00
193	.00	1.00	740.00	.00	1.00	3400.00	.00
194	.00	1.00	733.00	.00	1.00	1014.00	.00
195	.00	1.00	697.00	.00	1.00	540.00	.00
196	.00	1.00	434.00	.00	1.00	352.00	.00
197	.00	1.00	946.00	.00	1.00	1252.00	.00
198	.00	1.00	923.00	.00	1.00	1004.00	.00
199	.00	1.00	1017.00	1.00	1.00	1881.00	2.00
200	.00	1.00	287.00	.00	1.00	618.00	.00

201	.00	1.00	679.00	.00	1.00	999.00	.00
202	.00	1.00	801.00	.00	1.00	1007.00	.00
203	.00	1.00	439.00	.00	1.00	329.00	.00
204	.00	1.00	431.00	1.00	1.00	718.00	1.00
205	.00	1.00	744.00	.00	1.00	853.00	.00
206	.00	1.00	360.00	.00	1.00	1055.00	2.00
207	.00	1.00	420.00	1.00	1.00	600.00	1.00
208	.00	1.00	1032.00	1.00	1.00	426.00	.00
209	.00	1.00	576.00	.00	1.00	285.00	.00
210	.00	1.00	1045.00	.00	1.00	1640.00	1.00
211	.00	1.00	840.00	3.00	1.00	240.00	.00
212	.00	1.00	880.00	.00	1.00	331.00	.00
213	.00	1.00	591.00	1.00	1.00	738.00	1.00
214	.00	1.00	1059.00	.00	1.00	1226.00	.00
215	.00	1.00	763.00	.00	1.00	403.00	.00
216	.00	1.00	593.00	.00	1.00	919.00	.00
217	.00	1.00	410.00	.00	1.00	674.00	.00
218	.00	1.00	411.00	.00	1.00	535.00	.00
219	.00	1.00	604.00	.00	1.00	287.00	.00
220	.00	1.00	648.00	.00	1.00	1070.00	.00
221	.00	1.00	507.00	.00	1.00	1204.00	2.00
222	.00	1.00	441.00	.00	1.00	1345.00	3.00
223	.00	1.00	258.00	.00	1.00	446.00	.00
224	.00	1.00	415.00	.00	1.00	611.00	.00
225	.00	1.00	972.00	.00	1.00	312.00	.00
226	.00	1.00	689.00	.00	1.00	1047.00	.00
227	.00	1.00	672.00	1.00	1.00	683.00	.00
228	.00	1.00	828.00	1.00	.00	765.00	2.00
229	.00	1.00	465.00	.00	1.00	390.00	.00
230	.00	1.00	481.00	.00	1.00	510.00	1.00
231	1.00	1.00	1295.00	.00	1.00	486.00	.00
232	.00	1.00	714.00	.00	1.00	425.00	.00
233	.00	1.00	1711.00	.00	1.00	862.00	.00
234	.00	1.00	308.00	.00	1.00	297.00	.00
235	.00	1.00	1445.00	.00	1.00	388.00	.00

	C3FOUND	C4TIME	C4ERRORS	C4FOUND	CAVGTIME	CAVGERRO	CAVGFOUN
1	1.00	355.00	.00	1.00	7.12	.00	4.00
2	1.00	413.00	.00	1.00	12.10	1.00	4.00
3	1.00	221.00	.00	1.00	9.43	2.00	4.00
4	1.00	862.00	.00	1.00	9.02	.00	4.00
5	1.00	445.00	.00	1.00	10.53	2.00	4.00
6	1.00	488.00	.00	1.00	8.73	.00	4.00
7	1.00	148.00	.00	1.00	6.55	1.00	4.00
8	1.00	266.00	.00	1.00	6.64	.00	4.00
9	1.00	259.00	.00	1.00	8.02	.00	4.00
10	1.00	258.00	.00	1.00	5.73	.00	4.00
11	1.00	358.00	.00	1.00	9.93	.00	4.00
12	1.00	550.00	.00	1.00	10.60	1.00	4.00
13	1.00	719.00	.00	1.00	10.36	.00	4.00
14	1.00	202.00	.00	1.00	7.25	.00	4.00
15	1.00	388.00	.00	1.00	7.38	.00	4.00
16	1.00	338.00	.00	1.00	7.66	.00	4.00
17	1.00	180.00	.00	1.00	7.00	2.00	4.00
18	1.00	190.00	.00	1.00	10.68	1.00	4.00

19	1.00	401.00	.00	1.00	9.27	.00	4.00
20	1.00	467.00	.00	1.00	8.24	.00	4.00
21	1.00	700.00	.00	1.00	10.12	1.00	4.00
22	1.00	512.00	.00	1.00	9.15	.00	4.00
23	1.00	307.00	.00	1.00	6.81	.00	4.00
24	1.00	223.00	.00	1.00	9.64	1.00	4.00
25	1.00	300.00	.00	1.00	8.00	.00	4.00
26	1.00	282.00	.00	1.00	8.58	.00	4.00
27	1.00	562.00	.00	1.00	6.63	.00	4.00
28	1.00	1290.00	1.00	1.00	12.65	2.00	4.00
29	1.00	166.00	.00	1.00	4.09	.00	4.00
30	1.00	190.00	.00	1.00	8.88	.00	4.00
31	1.00	687.00	.00	1.00	9.37	.00	4.00
32	1.00	610.00	.00	1.00	7.52	.00	4.00
33	1.00	480.00	.00	1.00	6.53	.00	4.00
34	1.00	483.00	.00	1.00	11.33	.00	4.00
35	1.00	370.00	.00	1.00	5.70	.00	4.00
36	1.00	486.00	.00	1.00	11.00	1.00	4.00
37	1.00	270.00	.00	1.00	13.59	.00	4.00
38	1.00	191.00	.00	1.00	8.30	2.00	4.00
39	1.00	540.00	.00	1.00	10.00	1.00	4.00
40	1.00	420.00	.00	1.00	6.92	.00	4.00
41	1.00	380.00	.00	1.00	4.21	.00	4.00
42	1.00	567.00	.00	1.00	9.72	.00	4.00
43	1.00	371.00	.00	1.00	6.19	.00	4.00
44	1.00	269.00	.00	1.00	6.85	.00	4.00
45	1.00	225.00	.00	1.00	7.66	1.00	4.00
46	1.00	544.00	.00	1.00	8.25	4.00	.00
47	1.00	376.00	.00	1.00	13.63	.00	4.00
48	1.00	288.00	.00	1.00	10.45	3.00	4.00
49	1.00	440.00	.00	1.00	10.70	.00	4.00
50	1.00	406.00	.00	1.00	14.55	.00	4.00
51	1.00	302.00	.00	1.00	6.78	.00	4.00
52	1.00	500.00	.00	1.00	13.68	2.00	4.00
53	1.00	232.00	.00	1.00	6.95	.00	4.00
54	1.00	272.00	.00	1.00	12.39	1.00	4.00
55	1.00	240.00	.00	1.00	7.15	1.00	4.00
56	1.00	210.00	.00	1.00	8.50	.00	4.00
57	1.00	543.00	.00	1.00	7.96	.00	4.00
58	.00	246.00	.00	1.00	12.48	3.00	3.00
59	1.00	536.00	.00	1.00	5.45	.00	4.00
60	1.00	259.00	.00	1.00	9.78	3.00	4.00
61	1.00	374.00	.00	1.00	6.30	1.00	4.00
62	1.00	195.00	.00	1.00	9.79	2.00	4.00
63	1.00	317.00	.00	1.00	5.99	.00	4.00
64	1.00	299.00	.00	1.00	7.72	1.00	3.00
65	1.00	174.00	.00	1.00	6.13	.00	4.00
66	1.00	189.00	.00	1.00	18.13	.00	4.00
67	1.00	439.00	.00	1.00	7.68	.00	4.00
68	1.00	333.00	.00	1.00	7.71	.00	4.00
69	1.00	334.00	.00	1.00	9.61	.00	4.00
70	1.00	670.00	.00	1.00	10.35	.00	4.00
71	1.00	665.00	.00	1.00	6.97	.00	4.00
72	1.00	370.00	.00	1.00	8.08	.00	4.00
73	1.00	457.00	.00	1.00	8.03	.00	4.00

74	1.00	312.00	.00	1.00	4.91	.00	4.00
75	1.00	418.00	.00	1.00	7.16	.00	4.00
76	1.00	193.00	.00	1.00	4.66	.00	4.00
77	1.00	429.00	.00	1.00	8.57	.00	4.00
78	1.00	340.00	.00	1.00	10.19	1.00	3.00
79	1.00	457.00	.00	1.00	8.23	.00	4.00
80	1.00	249.00	.00	1.00	5.22	.00	4.00
81	1.00	450.00	.00	1.00	7.75	.00	4.00
82	1.00	202.00	.00	1.00	5.61	.00	4.00
83	1.00	758.00	.00	1.00	10.55	.00	4.00
84	.00	187.00	.00	1.00	8.08	4.00	3.00
85	1.00	162.00	.00	1.00	5.08	.00	4.00
86	1.00	264.00	.00	1.00	8.65	.00	4.00
87	1.00	275.00	.00	1.00	3.75	.00	4.00
88	1.00	165.00	.00	1.00	11.30	2.00	4.00
89	1.00	237.00	.00	1.00	8.21	.00	4.00
90	1.00	288.00	.00	1.00	7.54	.00	4.00
91	1.00	532.00	.00	1.00	6.65	1.00	4.00
92	1.00	200.00	.00	1.00	5.65	.00	4.00
93	1.00	344.00	.00	1.00	5.74	.00	4.00
94	1.00	293.00	.00	1.00	10.30	.00	4.00
95	1.00	591.00	.00	1.00	11.01	3.00	4.00
96	1.00	166.00	.00	1.00	4.75	.00	4.00
97	1.00	177.00	.00	1.00	4.98	.00	4.00
98	1.00	100.00	.00	1.00	4.67	.00	4.00
99	1.00	550.00	.00	1.00	12.54	1.00	4.00
100	1.00	311.00	.00	1.00	4.27	.00	4.00
101	1.00	1060.00	.00	1.00	12.88	.00	4.00
102	1.00	283.00	.00	1.00	8.40	.00	4.00
103	1.00	424.00	.00	1.00	12.57	2.00	3.00
104	1.00	409.00	.00	1.00	3.95	.00	4.00
105	1.00	280.00	.00	1.00	8.92	.00	4.00
106	1.00	1897.00	.00	1.00	13.35	.00	4.00
107	1.00	137.00	.00	1.00	7.14	.00	4.00
108	1.00	115.00	.00	1.00	7.42	.00	4.00
109	1.00	1222.00	.00	1.00	24.72	.00	4.00
110	1.00	605.00	.00	1.00	10.50	.00	4.00
111	1.00	329.00	.00	1.00	6.78	1.00	4.00
112	1.00	282.00	.00	1.00	7.01	1.00	4.00
113	1.00	289.00	.00	1.00	6.04	.00	4.00
114	1.00	300.00	.00	1.00	7.88	1.00	4.00
115	1.00	495.00	1.00	1.00	6.87	2.00	4.00
116	1.00	186.00	.00	1.00	19.29	.00	1.00
117	1.00	370.00	.00	1.00	4.79	.00	4.00
118	1.00	611.00	.00	1.00	12.36	.00	4.00
119	1.00	315.00	.00	1.00	8.18	.00	4.00
120	1.00	285.00	.00	1.00	10.65	.00	4.00
121	1.00	159.00	.00	1.00	5.57	.00	4.00
122	1.00	288.00	.00	1.00	11.53	1.00	4.00
123	1.00	395.00	.00	1.00	6.85	.00	4.00
124	1.00	309.00	.00	1.00	12.92	.00	4.00
125	1.00	1244.00	.00	1.00	12.68	1.00	4.00
126	1.00	195.00	.00	1.00	10.46	.00	4.00
127	1.00	495.00	.00	1.00	7.21	2.00	4.00
128	1.00	389.00	.00	1.00	14.94	.00	4.00

129	1.00	159.00	.00	1.00	5.18	.00	4.00
130	1.00	139.00	.00	1.00	4.16	.00	4.00
131	1.00	533.00	.00	1.00	9.39	.00	4.00
132	1.00	344.00	.00	1.00	5.79	.00	4.00
133	1.00	290.00	.00	1.00	5.83	.00	4.00
134	1.00	331.00	.00	1.00	6.46	.00	4.00
135	1.00	360.00	.00	1.00	5.00	.00	4.00
136	1.00	331.00	.00	4.00	5.23	.00	4.00
137	1.00	348.00	.00	1.00	8.49	.00	4.00
138	1.00	160.00	.00	1.00	11.78	.00	4.00
139	1.00	955.00	.00	1.00	22.42	1.00	4.00
140	1.00	645.00	.00	1.00	7.23	.00	4.00
141	1.00	285.00	.00	4.00	13.56	1.00	4.00
142	1.00	195.00	.00	1.00	4.33	.00	4.00
143	1.00	399.00	.00	1.00	7.98	.00	4.00
144	1.00	197.00	.00	1.00	21.42	1.00	4.00
145	1.00	259.00	.00	1.00	10.31	1.00	4.00
146	1.00	1957.00	.00	1.00	14.38	1.00	4.00
147	1.00	190.00	.00	1.00	7.30	.00	4.00
148	1.00	259.00	.00	1.00	6.99	.00	4.00
149	1.00	457.00	.00	1.00	8.37	.00	4.00
150	1.00	260.00	.00	1.00	9.42	.00	4.00
151	1.00	496.00	.00	1.00	11.63	.00	4.00
152	1.00	602.00	.00	1.00	8.41	.00	4.00
153	1.00	382.00	.00	1.00	8.60	.00	4.00
154	1.00	3077.00	.00	1.00	32.04	.00	4.00
155	1.00	805.00	.00	1.00	10.68	2.00	4.00
156	1.00	432.00	.00	1.00	8.33	.00	4.00
157	1.00	728.00	.00	1.00	10.87	.00	4.00
158	1.00	219.00	.00	1.00	5.58	.00	4.00
159	1.00	596.00	.00	1.00	26.11	.00	4.00
160	1.00	3600.00	.00	1.00	25.29	.00	4.00
161	1.00	360.00	.00	1.00	6.75	1.00	4.00
162	1.00	190.00	.00	1.00	9.31	2.00	4.00
163	1.00	930.00	.00	1.00	21.75	.00	4.00
164	1.00	280.00	.00	1.00	8.73	.00	4.00
165	1.00	440.00	.00	1.00	11.41	.00	4.00
166	1.00	397.00	.00	1.00	6.27	.00	4.00
167	1.00	195.00	.00	1.00	5.49	.00	4.00
168	1.00	370.00	.00	1.00	21.44	1.00	4.00
169	1.00	196.00	.00	1.00	6.58	.00	4.00
170	1.00	120.00	.00	1.00	6.22	.00	4.00
171	1.00	367.00	.00	1.00	7.08	.00	4.00
172	1.00	370.00	.00	1.00	10.32	.00	4.00
173	1.00	267.00	.00	1.00	11.59	.00	4.00
174	1.00	175.00	.00	1.00	7.08	.00	4.00
175	1.00	599.00	.00	1.00	12.29	.00	4.00
176	1.00	627.00	.00	1.00	8.76	.00	4.00
177	1.00	344.00	.00	1.00	14.20	.00	4.00
178	1.00	222.00	.00	1.00	9.54	1.00	4.00
179	1.00	154.00	.00	1.00	6.73	1.00	4.00
180	1.00	735.00	.00	1.00	9.43	1.00	4.00
181	1.00	1298.00	.00	1.00	18.97	.00	4.00
182	1.00	284.00	.00	1.00	4.34	.00	4.00
183	1.00	262.00	.00	1.00	5.58	.00	4.00

184	1.00	600.00	.00	1.00	8.50	.00	4.00
185	1.00	540.00	.00	1.00	6.75	.00	4.00
186	1.00	810.00	.00	1.00	15.61	1.00	4.00
187	1.00	1855.00	.00	1.00	20.09	.00	4.00
188	1.00	628.00	.00	1.00	9.74	.00	4.00
189	1.00	738.00	.00	1.00	8.83	.00	4.00
190	1.00	363.00	.00	1.00	11.10	1.00	4.00
191	1.00	127.00	.00	1.00	4.51	.00	4.00
192	1.00	169.00	.00	1.00	4.37	.00	4.00
193	1.00	355.00	.00	1.00	7.35	.00	4.00
194	1.00	298.00	.00	1.00	11.15	.00	4.00
195	1.00	1128.00	.00	1.00	15.63	.00	4.00
196	1.00	1052.00	.00	1.00	11.61	.00	4.00
197	1.00	282.00	.00	1.00	14.35	.00	4.00
198	1.00	387.00	.00	1.00	11.37	.00	4.00
199	1.00	217.00	.00	1.00	15.19	3.00	4.00
200	1.00	234.00	.00	1.00	6.50	.00	4.00
201	1.00	460.00	.00	1.00	12.03	.00	4.00
202	1.00	890.00	.00	1.00	17.37	.00	4.00
203	1.00	366.00	.00	1.00	6.77	.00	4.00
204	1.00	318.00	.00	1.00	8.38	2.00	4.00
205	1.00	377.00	.00	1.00	11.72	.00	4.00
206	1.00	195.00	.00	1.00	7.71	2.00	4.00
207	1.00	240.00	.00	1.00	6.75	2.00	4.00
208	1.00	335.00	.00	1.00	10.83	.00	4.00
209	1.00	265.00	.00	1.00	10.04	.00	4.00
210	1.00	995.00	.00	1.00	18.44	1.00	4.00
211	1.00	540.00	.00	1.00	8.17	3.00	4.00
212	1.00	630.00	.00	1.00	9.62	.00	4.00
213	1.00	287.00	.00	1.00	8.55	2.00	4.00
214	1.00	425.00	.00	1.00	17.62	.00	4.00
215	1.00	347.00	.00	1.00	8.66	.00	4.00
216	1.00	341.00	.00	1.00	9.80	.00	4.00
217	1.00	262.00	.00	1.00	6.47	.00	4.00
218	1.00	183.00	.00	1.00	10.87	.00	4.00
219	1.00	783.00	.00	1.00	8.01	.00	4.00
220	1.00	312.00	.00	1.00	10.60	.00	4.00
221	1.00	592.00	.00	1.00	11.33	2.00	4.00
222	.00	250.00	.00	1.00	9.88	3.00	3.00
223	1.00	385.00	.00	1.00	7.41	.00	4.00
224	1.00	295.00	.00	1.00	6.33	.00	4.00
225	1.00	1040.00	.00	1.00	10.73	.00	4.00
226	1.00	1251.00	.00	1.00	17.03	.00	4.00
227	1.00	335.00	.00	1.00	9.06	1.00	4.00
228	1.00	230.00	.00	1.00	14.45	3.00	3.00
229	1.00	465.00	1.00	1.00	6.46	1.00	4.00
230	1.00	1231.00	2.00	.00	10.71	3.00	3.00
231	1.00	145.00	.00	1.00	13.38	1.00	4.00
232	1.00	313.00	.00	1.00	7.03	.00	4.00
233	1.00	355.00	.00	1.00	15.48	.00	4.00
234	1.00	788.00	.00	1.00	6.98	.00	4.00
235	1.00	1412.00	.00	1.00	18.01	.00	4.00

	S1TT	S2TT	S3TT	S4TT	S5TT	S6TT	S7TT
1	64.00	224.00	370.00	350.00	.00	.00	.00
2	98.00	164.00	298.00	362.00	.00	.00	.00
3	.00	.00	.00	.00	302.00	134.00	686.00
4	109.00	65.00	255.00	300.00	.00	.00	.00
5	.00	.00	.00	.00	236.00	410.00	220.00
6	238.00	189.00	460.00	279.00	.00	.00	.00
7	.00	.00	.00	.00	258.00	260.00	159.00
8	121.00	201.00	182.00	187.00	.00	.00	.00
9	137.00	82.00	227.00	648.00	.00	.00	.00
10	315.00	502.00	216.00	190.00	.00	.00	.00
11	150.00	261.00	200.00	481.00	.00	.00	.00
12	.00	.00	.00	.00	255.00	304.00	281.00
13	.00	.00	.00	.00	342.00	147.00	264.00
14	168.00	50.00	180.00	319.00	.00	.00	.00
15	.00	.00	.00	.00	205.00	164.00	183.00
16	176.00	275.00	194.00	196.00	.00	.00	.00
17	300.00	120.00	300.00	360.00	.00	.00	.00
18	.00	.00	.00	.00	227.00	280.00	411.00
19	231.00	160.00	164.00	175.00	.00	.00	.00
20	.00	.00	.00	.00	190.00	163.00	274.00
21	343.00	142.00	493.00	332.00	.00	.00	.00
22	200.00	60.00	120.00	140.00	.00	.00	.00
23	204.00	101.00	365.00	344.00	.00	.00	.00
24	.00	.00	.00	.00	309.00	154.00	496.00
25	210.00	270.00	495.00	237.00	.00	.00	.00
26	215.00	200.00	463.00	230.00	.00	.00	.00
27	270.00	84.00	466.00	341.00	.00	.00	.00
28	220.00	180.00	476.00	274.00	.00	.00	.00
29	361.00	151.00	103.00	361.00	.00	.00	.00
30	361.00	185.00	403.00	300.00	.00	.00	.00
31	.00	.00	.00	.00	339.00	254.00	305.00
32	250.00	127.00	222.00	321.00	.00	.00	.00
33	.00	.00	.00	.00	270.00	270.00	315.00
34	.00	.00	.00	.00	228.00	288.00	265.00
35	.00	.00	.00	.00	141.00	240.00	180.00
36	.00	.00	.00	.00	310.00	235.00	411.00
37	240.00	492.00	293.00	276.00	.00	.00	.00
38	.00	.00	.00	.00	343.00	300.00	307.00
39	240.00	660.00	240.00	240.00	.00	.00	.00
40	240.00	240.00	360.00	180.00	.00	.00	.00
41	270.00	120.00	210.00	190.00	.00	.00	.00
42	.00	.00	.00	.00	73.00	117.00	155.00
43	245.00	97.00	220.00	242.00	.00	.00	.00
44	.00	.00	.00	.00	278.00	287.00	350.00
45	.00	.00	.00	.00	354.00	214.00	340.00
46	.00	.00	.00	.00	87.00	202.00	314.00
47	352.00	365.00	376.00	226.00	.00	.00	.00
48	.00	.00	.00	.00	285.00	370.00	349.00
49	337.00	270.00	160.00	435.00	.00	.00	.00
50	.00	.00	.00	.00	364.00	78.00	364.00
51	.00	.00	.00	.00	264.00	93.00	361.00
52	.00	.00	.00	.00	202.00	389.00	469.00
53	.00	.00	.00	.00	157.00	60.00	473.00
54	.00	.00	.00	.00	263.00	467.00	394.00
55	.00	.00	.00	.00	305.00	180.00	288.00
56	.00	.00	.00	.00	280.00	242.00	350.00

57	.00	.00	.00	.00	199.00	347.00	212.00
58	.00	.00	.00	.00	190.00	398.00	490.00
59	351.00	105.00	470.00	194.00	.00	.00	.00
60	.00	.00	.00	.00	553.00	293.00	588.00
61	264.00	367.00	323.00	212.00	.00	.00	.00
62	.00	.00	.00	.00	328.00	278.00	423.00
63	.00	.00	.00	.00	332.00	650.00	330.00
64	.00	.00	.00	.00	220.00	398.00	75.00
65	396.00	171.00	273.00	140.00	.00	.00	.00
66	.00	.00	.00	.00	250.00	120.00	230.00
67	223.00	95.00	117.00	367.00	.00	.00	.00
68	250.00	148.00	360.00	184.00	.00	.00	.00
69	.00	.00	.00	.00	414.00	201.00	489.00
70	284.00	164.00	336.00	550.00	.00	.00	.00
71	220.00	454.00	595.00	225.00	.00	.00	.00
72	.00	.00	.00	.00	256.00	285.00	358.00
73	770.00	240.00	275.00	165.00	.00	.00	.00
74	175.00	143.00	464.00	237.00	.00	.00	.00
75	368.00	450.00	364.00	182.00	.00	.00	.00
76	.00	.00	.00	.00	95.00	158.00	173.00
77	358.00	370.00	128.00	50.00	.00	.00	.00
78	.00	.00	.00	.00	380.00	415.00	350.00
79	.00	.00	.00	.00	308.00	200.00	314.00
80	345.00	208.00	411.00	73.00	.00	.00	.00
81	716.00	241.00	313.00	262.00	.00	.00	.00
82	150.00	93.00	181.00	220.00	.00	.00	.00
83	758.00	109.00	316.00	482.00	.00	.00	.00
84	.00	.00	.00	.00	209.00	380.00	227.00
85	326.00	264.00	294.00	221.00	.00	.00	.00
86	359.00	296.00	354.00	88.00	.00	.00	.00
87	221.00	99.00	200.00	173.00	.00	.00	.00
88	.00	.00	.00	.00	260.00	247.00	643.00
89	281.00	287.00	231.00	130.00	.00	.00	.00
90	.00	.00	.00	.00	297.00	38.00	104.00
91	390.00	137.00	160.00	58.00	.00	.00	.00
92	.00	.00	.00	.00	120.00	180.00	240.00
93	.00	.00	.00	.00	352.00	393.00	233.00
94	.00	.00	.00	.00	250.00	257.00	255.00
95	.00	.00	.00	.00	280.00	210.00	348.00
96	276.00	232.00	268.00	145.00	.00	.00	.00
97	116.00	88.00	173.00	161.00	.00	.00	.00
98	237.00	125.00	225.00	200.00	.00	.00	.00
99	260.00	85.00	163.00	358.00	.00	.00	.00
100	110.00	105.00	155.00	160.00	.00	.00	.00
101	260.00	335.00	254.00	130.00	.00	.00	.00
102	.00	.00	.00	.00	350.00	332.00	334.00
103	200.00	94.00	201.00	230.00	.00	.00	.00
104	180.00	324.00	225.00	322.00	.00	.00	.00
105	301.00	100.00	506.00	221.00	.00	.00	.00
106	105.00	76.00	148.00	236.00	.00	.00	.00
107	443.00	199.00	345.00	186.00	.00	.00	.00
108	195.00	330.00	250.00	255.00	.00	.00	.00
109	.00	.00	.00	.00	216.00	250.00	192.00
110	268.00	118.00	212.00	529.00	.00	.00	.00
111	315.00	138.00	314.00	435.00	.00	.00	.00

112	.00	.00	.00	.00	305.00	382.00	279.00
113	561.00	610.00	264.00	334.00	.00	.00	.00
114	413.00	153.00	135.00	338.00	.00	.00	.00
115	.00	.00	.00	.00	405.00	505.00	880.00
116	384.00	110.00	574.00	396.00	.00	.00	.00
117	429.00	160.00	219.00	90.00	.00	.00	.00
118	.00	.00	.00	.00	349.00	421.00	636.00
119	.00	.00	.00	.00	231.00	226.00	167.00
120	.00	.00	.00	.00	215.00	175.00	940.00
121	.00	.00	.00	.00	140.00	240.00	327.00
122	190.00	152.00	56.00	370.00	.00	.00	.00
123	.00	.00	.00	.00	179.00	465.00	290.00
124	.00	.00	.00	.00	400.00	176.00	326.00
125	398.00	145.00	206.00	226.00	.00	.00	.00
126	.00	.00	.00	.00	190.00	251.00	332.00
127	.00	.00	.00	.00	165.00	245.00	250.00
128	.00	.00	.00	.00	343.00	208.00	255.00
129	245.00	257.00	503.00	155.00	.00	.00	.00
130	166.00	484.00	115.00	111.00	.00	.00	.00
131	.00	.00	.00	.00	122.00	315.00	336.00
132	222.00	526.00	710.00	284.00	.00	.00	.00
133	.00	.00	.00	.00	365.00	145.00	256.00
134	.00	.00	.00	.00	345.00	232.00	397.00
135	120.00	300.00	300.00	180.00	.00	.00	.00
136	.00	.00	.00	.00	207.00	397.00	136.00
137	.00	.00	.00	.00	233.00	283.00	319.00
138	.00	.00	.00	.00	362.00	362.00	470.00
139	261.00	326.00	229.00	310.00	.00	.00	.00
140	410.00	65.00	185.00	330.00	.00	.00	.00
141	250.00	840.00	380.00	190.00	.00	.00	.00
142	245.00	465.00	210.00	215.00	.00	.00	.00
143	427.00	332.00	355.00	701.00	.00	.00	.00
144	.00	.00	.00	.00	281.00	298.00	376.00
145	.00	.00	.00	.00	200.00	299.00	492.00
146	331.00	65.00	229.00	191.00	.00	.00	.00
147	.00	.00	.00	.00	128.00	272.00	325.00
148	.00	.00	.00	.00	97.00	105.00	205.00
149	307.00	261.00	390.00	186.00	.00	.00	.00
150	307.00	122.00	359.00	284.00	.00	.00	.00
151	928.00	992.00	810.00	692.00	.00	.00	.00
152	187.00	105.00	545.00	318.00	.00	.00	.00
153	205.00	98.00	172.00	320.00	.00	.00	.00
154	847.00	85.00	363.00	302.00	.00	.00	.00
155	403.00	209.00	231.00	335.00	.00	.00	.00
156	1020.00	540.00	240.00	120.00	.00	.00	.00
157	269.00	57.00	510.00	521.00	.00	.00	.00
158	443.00	372.00	229.00	224.00	.00	.00	.00
159	.00	.00	.00	.00	720.00	512.00	899.00
160	.00	.00	.00	.00	307.00	491.00	250.00
161	300.00	120.00	420.00	300.00	.00	.00	.00
162	.00	.00	.00	.00	439.00	296.00	287.00
163	.00	.00	.00	.00	601.00	786.00	212.00
164	437.00	205.00	518.00	330.00	.00	.00	.00
165	.00	.00	.00	.00	377.00	252.00	360.00
166	307.00	288.00	665.00	326.00	.00	.00	.00

167	356.00	175.00	206.00	350.00	.00	.00	.00
168	475.00	487.00	500.00	389.00	.00	.00	.00
169	267.00	96.00	470.00	267.00	.00	.00	.00
170	559.00	124.00	467.00	602.00	.00	.00	.00
171	.00	.00	.00	.00	224.00	294.00	282.00
172	156.00	75.00	482.00	242.00	.00	.00	.00
173	.00	.00	.00	.00	466.00	162.00	433.00
174	456.00	110.00	550.00	182.00	.00	.00	.00
175	.00	.00	.00	.00	207.00	440.00	240.00
176	435.00	209.00	400.00	375.00	.00	.00	.00
177	.00	.00	.00	.00	205.00	320.00	358.00
178	.00	.00	.00	.00	277.00	275.00	411.00
179	.00	.00	.00	.00	302.00	280.00	175.00
180	.00	.00	.00	.00	348.00	252.00	505.00
181	1039.00	320.00	216.00	849.00	.00	.00	.00
182	.00	.00	.00	.00	275.00	385.00	318.00
183	309.00	105.00	290.00	407.00	.00	.00	.00
184	240.00	360.00	120.00	180.00	.00	.00	.00
185	315.00	249.00	600.00	250.00	.00	.00	.00
186	.00	.00	.00	.00	210.00	328.00	185.00
187	.00	.00	.00	.00	237.00	332.00	356.00
188	229.00	181.00	445.00	76.00	.00	.00	.00
189	322.00	300.00	720.00	313.00	.00	.00	.00
190	.00	.00	.00	.00	271.00	292.00	453.00
191	326.00	356.00	412.00	221.00	.00	.00	.00
192	326.00	550.00	188.00	205.00	.00	.00	.00
193	330.00	265.00	675.00	312.00	.00	.00	.00
194	.00	.00	.00	.00	222.00	388.00	190.00
195	.00	.00	.00	.00	293.00	251.00	370.00
196	.00	.00	.00	.00	275.00	298.00	409.00
197	.00	.00	.00	.00	243.00	315.00	274.00
198	.00	.00	.00	.00	275.00	252.00	408.00
199	.00	.00	.00	.00	234.00	437.00	262.00
200	.00	.00	.00	.00	444.00	582.00	210.00
201	318.00	134.00	522.00	167.00	.00	.00	.00
202	657.00	151.00	324.00	230.00	.00	.00	.00
203	360.00	360.00	900.00	240.00	.00	.00	.00
204	.00	.00	.00	.00	281.00	485.00	195.00
205	.00	.00	.00	.00	241.00	481.00	346.00
206	.00	.00	.00	.00	120.00	300.00	660.00
207	.00	.00	.00	.00	300.00	180.00	240.00
208	384.00	132.00	370.00	339.00	.00	.00	.00
209	390.00	75.00	526.00	550.00	.00	.00	.00
210	.00	.00	.00	.00	246.00	347.00	368.00
211	240.00	640.00	120.00	180.00	.00	.00	.00
212	401.00	296.00	520.00	326.00	.00	.00	.00
213	.00	.00	.00	.00	229.00	425.00	426.00
214	.00	.00	.00	.00	471.00	427.00	565.00
215	404.00	359.00	679.00	252.00	.00	.00	.00
216	.00	.00	.00	.00	255.00	410.00	525.00
217	321.00	34.00	241.00	380.00	.00	.00	.00
218	427.00	165.00	372.00	303.00	.00	.00	.00
219	.00	.00	.00	.00	420.00	210.00	480.00
220	.00	.00	.00	.00	278.00	250.00	292.00
221	.00	.00	.00	.00	226.00	310.00	369.00

222	.00	.00	.00	.00	300.00	240.00	480.00
223	437.00	155.00	361.00	486.00	.00	.00	.00
224	.00	.00	.00	.00	188.00	175.00	244.00
225	.00	.00	.00	.00	295.00	330.00	584.00
226	449.00	45.00	142.00	256.00	.00	.00	.00
227	.00	.00	.00	.00	235.00	650.00	290.00
228	.00	.00	.00	.00	305.00	440.00	665.00
229	600.00	300.00	480.00	180.00	.00	.00	.00
230	.00	.00	.00	.00	346.00	275.00	355.00
231	562.00	122.00	192.00	338.00	.00	.00	.00
232	.00	.00	.00	.00	495.00	565.00	459.00
233	.00	.00	.00	.00	244.00	487.00	351.00
234	.00	.00	.00	.00	344.00	437.00	345.00
235	255.00	484.00	907.00	287.00	.00	.00	.00

	S8TT	C1TT	C2TT	C3TT	C4TT	C5TT	C6TT
1	.00	.00	.00	.00	.00	355.00	479.00
2	.00	.00	.00	.00	.00	413.00	271.00
3	343.00	221.00	684.00	845.00	513.00	.00	.00
4	.00	.00	.00	.00	.00	515.00	222.00
5	304.00	245.00	887.00	949.00	445.00	.00	.00
6	.00	.00	.00	.00	.00	467.00	690.00
7	246.00	148.00	645.00	520.00	260.00	.00	.00
8	.00	.00	.00	.00	.00	266.00	289.00
9	.00	.00	.00	.00	.00	259.00	378.00
10	.00	.00	.00	.00	.00	258.00	365.00
11	.00	.00	.00	.00	.00	470.00	835.00
12	170.00	510.00	890.00	595.00	550.00	.00	.00
13	491.00	397.00	848.00	522.00	719.00	.00	.00
14	.00	.00	.00	.00	.00	347.00	870.00
15	195.00	388.00	625.00	300.00	459.00	.00	.00
16	.00	.00	.00	.00	.00	338.00	428.00
17	.00	.00	.00	.00	.00	480.00	480.00
18	295.00	190.00	680.00	1052.00	340.00	.00	.00
19	.00	.00	.00	.00	.00	376.00	893.00
20	453.00	334.00	612.00	564.00	467.00	.00	.00
21	.00	.00	.00	.00	.00	388.00	842.00
22	.00	.00	.00	.00	.00	473.00	575.00
23	.00	.00	.00	.00	.00	307.00	458.00
24	138.00	223.00	637.00	1101.00	353.00	.00	.00
25	.00	.00	.00	.00	.00	300.00	360.00
26	.00	.00	.00	.00	.00	282.00	386.00
27	.00	.00	.00	.00	.00	562.00	289.00
28	.00	.00	.00	.00	.00	421.00	653.00
29	.00	.00	.00	.00	.00	166.00	209.00
30	.00	.00	.00	.00	.00	190.00	755.00
31	679.00	395.00	429.00	437.00	687.00	.00	.00
32	.00	.00	.00	.00	.00	261.00	432.00
33	330.00	480.00	505.00	288.00	294.00	.00	.00
34	123.00	687.00	990.00	560.00	483.00	.00	.00
35	360.00	355.00	268.00	375.00	370.00	.00	.00
36	360.00	885.00	610.00	660.00	486.00	.00	.00
37	.00	.00	.00	.00	.00	270.00	880.00
38	338.00	191.00	780.00	384.00	638.00	.00	.00
39	.00	.00	.00	.00	.00	540.00	1080.00

40	.00	.00	.00	.00	.00	420.00	240.00
41	.00	.00	.00	.00	.00	165.00	215.00
42	347.00	567.00	923.00	428.00	415.00	.00	.00
43	.00	.00	.00	.00	.00	228.00	412.00
44	218.00	269.00	274.00	612.00	488.00	.00	.00
45	226.00	352.00	600.00	662.00	225.00	.00	.00
46	115.00	269.00	508.00	658.00	544.00	.00	.00
47	.00	.00	.00	.00	.00	547.00	1720.00
48	472.00	288.00	790.00	888.00	542.00	.00	.00
49	.00	.00	.00	.00	.00	440.00	324.00
50	242.00	853.00	544.00	1690.00	406.00	.00	.00
51	150.00	243.00	538.00	543.00	302.00	.00	.00
52	455.00	776.00	1168.00	840.00	500.00	.00	.00
53	129.00	232.00	576.00	561.00	300.00	.00	.00
54	279.00	625.00	1329.00	748.00	272.00	.00	.00
55	220.00	240.00	521.00	466.00	490.00	.00	.00
56	205.00	210.00	804.00	542.00	400.00	.00	.00
57	135.00	543.00	562.00	367.00	438.00	.00	.00
58	174.00	246.00	1070.00	833.00	346.00	.00	.00
59	.00	.00	.00	.00	.00	270.00	228.00
60	240.00	202.00	1075.00	812.00	259.00	.00	.00
61	.00	.00	.00	.00	.00	374.00	565.00
62	244.00	195.00	425.00	1230.00	500.00	.00	.00
63	195.00	300.00	441.00	379.00	317.00	.00	.00
64	233.00	284.00	914.00	356.00	299.00	.00	.00
65	.00	.00	.00	.00	.00	263.00	361.00
66	233.00	304.00	1118.00	240.00	189.00	.00	.00
67	.00	.00	.00	.00	.00	484.00	540.00
68	.00	.00	.00	.00	.00	278.00	447.00
69	401.00	716.00	837.00	419.00	334.00	.00	.00
70	.00	.00	.00	.00	.00	283.00	1095.00
71	.00	.00	.00	.00	.00	175.00	380.00
72	251.00	440.00	776.00	352.00	370.00	.00	.00
73	.00	.00	.00	.00	.00	380.00	373.00
74	.00	.00	.00	.00	.00	312.00	212.00
75	.00	.00	.00	.00	.00	320.00	415.00
76	174.00	325.00	365.00	236.00	193.00	.00	.00
77	.00	.00	.00	.00	.00	899.00	264.00
78	320.00	647.00	900.00	558.00	340.00	.00	.00
79	367.00	386.00	437.00	695.00	457.00	.00	.00
80	.00	.00	.00	.00	.00	310.00	325.00
81	.00	.00	.00	.00	.00	385.00	245.00
82	.00	.00	.00	.00	.00	202.00	166.00
83	.00	.00	.00	.00	.00	365.00	675.00
84	328.00	187.00	720.00	517.00	516.00	.00	.00
85	.00	.00	.00	.00	.00	162.00	258.00
86	.00	.00	.00	.00	.00	264.00	875.00
87	.00	.00	.00	.00	.00	147.00	233.00
88	347.00	165.00	280.00	1040.00	1228.00	.00	.00
89	.00	.00	.00	.00	.00	401.00	780.00
90	222.00	336.00	1006.00	180.00	288.00	.00	.00
91	.00	.00	.00	.00	.00	257.00	428.00
92	180.00	200.00	425.00	330.00	400.00	.00	.00
93	279.00	344.00	408.00	334.00	292.00	.00	.00
94	554.00	293.00	915.00	465.00	800.00	.00	.00

95	228.00	591.00	1131.00	485.00	435.00	.00	.00
96	.00	.00	.00	.00	.00	166.00	218.00
97	.00	.00	.00	.00	.00	177.00	227.00
98	.00	.00	.00	.00	.00	100.00	300.00
99	.00	.00	.00	.00	.00	550.00	346.00
100	.00	.00	.00	.00	.00	311.00	329.00
101	.00	.00	.00	.00	.00	500.00	446.00
102	183.00	283.00	685.00	575.00	472.00	.00	.00
103	.00	.00	.00	.00	.00	424.00	956.00
104	.00	.00	.00	.00	.00	231.00	110.00
105	.00	.00	.00	.00	.00	683.00	546.00
106	.00	.00	.00	.00	.00	222.00	200.00
107	.00	.00	.00	.00	.00	541.00	280.00
108	.00	.00	.00	.00	.00	115.00	470.00
109	310.00	1222.00	1208.00	3554.00	1850.00	.00	.00
110	.00	.00	.00	.00	.00	588.00	584.00
111	.00	.00	.00	.00	.00	328.00	348.00
112	376.00	380.00	377.00	648.00	282.00	.00	.00
113	.00	.00	.00	.00	.00	220.00	540.00
114	.00	.00	.00	.00	.00	300.00	300.00
115	715.00	495.00	580.00	280.00	293.00	.00	.00
116	.00	.00	.00	.00	.00	186.00	370.00
117	.00	.00	.00	.00	.00	370.00	338.00
118	401.00	611.00	654.00	1777.00	925.00	.00	.00
119	187.00	1379.00	275.00	193.00	315.00	.00	.00
120	265.00	770.00	560.00	1140.00	285.00	.00	.00
121	352.00	159.00	455.00	307.00	415.00	.00	.00
122	.00	.00	.00	.00	.00	288.00	620.00
123	192.00	420.00	499.00	330.00	395.00	.00	.00
124	232.00	1568.00	667.00	557.00	309.00	.00	.00
125	.00	.00	.00	.00	.00	639.00	450.00
126	130.00	195.00	341.00	463.00	1512.00	.00	.00
127	325.00	275.00	445.00	515.00	495.00	.00	.00
128	449.00	389.00	941.00	1205.00	1051.00	.00	.00
129	.00	.00	.00	.00	.00	159.00	181.00
130	.00	.00	.00	.00	.00	139.0	258.00
131	136.00	445.00	885.00	391.00	533.00	.00	.00
132	.00	.00	.00	.00	.00	331.00	590.00
133	182.00	216.00	358.00	535.00	290.00	.00	.00
134	263.00	252.00	462.00	505.00	331.00	.00	.00
135	.00	.00	.00	.00	.00	360.00	360.00
136	207.00	450.00	225.00	250.00	331.00	.00	.00
137	298.00	430.00	864.00	395.00	348.00	.00	.00
138	206.00	160.00	1030.00	647.00	990.00	.00	.00
139	.00	.00	.00	.00	.00	490.00	1605.00
140	.00	.00	.00	.00	.00	440.00	230.00
141	.00	.00	.00	.00	.00	465.00	1365.00
142	.00	.00	.00	.00	.00	190.00	475.00
143	.00	.00	.00	.00	.00	399.00	252.00
144	281.00	197.00	2042.00	2426.00	475.00	.00	.00
145	277.00	990.00	621.00	605.00	259.00	.00	.00
146	.00	.00	.00	.00	.00	279.00	730.00
147	80.00	190.00	524.00	737.00	300.00	.00	.00
148	137.00	259.00	437.00	632.00	350.00	.00	.00
149	.00	.00	.00	.00	.00	522.00	635.00

150	.00	.00	.00	.00	.00	260.00	788.00
151	.00	.00	.00	.00	.00	496.00	424.00
152	.00	.00	.00	.00	.00	672.00	210.00
153	.00	.00	.00	.00	.00	262.00	739.00
154	.00	.00	.00	.00	.00	1934.00	1359.00
155	.00	.00	.00	.00	.00	395.00	642.00
156	.00	.00	.00	.00	.00	270.00	740.00
157	.00	.00	.00	.00	.00	728.00	749.00
158	.00	.00	.00	.00	.00	310.00	227.00
159	497.00	1268.00	2687.00	1715.00	596.00	.00	.00
160	478.00	3600.00	1600.00	488.00	392.00	.00	.00
161	.00	.00	.00	.00	.00	360.00	480.00
162	434.00	190.00	717.00	729.00	599.00	.00	.00
163	695.00	933.00	1314.00	2001.00	930.00	.00	.00
164	.00	.00	.00	.00	.00	280.00	351.00
165	425.00	440.00	900.00	726.00	672.00	.00	.00
166	.00	.00	.00	.00	.00	290.00	425.00
167	.00	.00	.00	.00	.00	260.00	406.00
168	.00	.00	.00	.00	.00	645.00	1973.00
169	.00	.00	.00	.00	.00	196.00	325.00
170	.00	.00	.00	.00	.00	302.00	687.00
171	120.00	220.00	617.00	495.00	367.00	.00	.00
172	.00	.00	.00	.00	.00	403.00	1260.00
173	284.00	1465.00	264.00	786.00	267.00	.00	.00
174	.00	.00	.00	.00	.00	175.00	391.00
175	109.00	821.00	980.00	549.00	599.00	.00	.00
176	.00	.00	.00	.00	.00	255.00	440.00
177	448.00	344.00	1189.00	1269.00	605.00	.00	.00
178	390.00	222.00	1198.00	358.00	411.00	.00	.00
179	277.00	272.00	695.00	494.00	272.00	.00	.00
180	769.00	391.00	715.00	423.00	735.00	.00	.00
181	.00	.00	.00	.00	.00	582.00	1209.00
182	725.00	284.00	282.00	266.00	209.00	.00	.00
183	.00	.00	.00	.00	.00	262.00	179.00
184	.00	.00	.00	.00	.00	300.00	900.00
185	.00	.00	.00	.00	.00	240.00	530.00
186	392.00	810.00	1204.00	678.00	1055.00	.00	.00
187	319.00	1855.00	1861.00	409.00	696.00	.00	.00
188	.00	.00	.00	.00	.00	605.00	545.00
189	.00	.00	.00	.00	.00	345.00	663.00
190	96.00	286.00	1180.00	834.00	363.00	.00	.00
191	.00	.00	.00	.00	.00	127.00	168.00
192	.00	.00	.00	.00	.00	169.00	165.00
193	.00	.00	.00	.00	.00	330.00	740.00
194	446.00	298.00	1014.00	733.00	632.00	.00	.00
195	340.00	1128.00	540.00	697.00	1375.00	.00	.00
196	451.00	1052.00	352.00	434.00	949.00	.00	.00
197	351.00	282.00	1252.00	946.00	964.00	.00	.00
198	194.00	387.00	1004.00	923.00	444.00	.00	.00
199	282.00	217.00	1881.00	1017.00	531.00	.00	.00
200	280.00	422.00	287.00	618.00	234.00	.00	.00
201	.00	.00	.00	.00	.00	941.00	679.00
202	.00	.00	.00	.00	.00	890.00	1007.00
203	.00	.00	.00	.00	.00	366.00	329.00
204	250.00	545.00	431.00	718.00	318.00	.00	.00

205	281.00	377.00	853.00	744.00	838.00	.00	.00
206	360.00	240.00	1055.00	360.00	240.00	.00	.00
207	180.00	240.00	600.00	420.00	360.00	.00	.00
208	.00	.00	.00	.00	.00	805.00	1032.00
209	.00	.00	.00	.00	.00	265.00	285.00
210	528.00	995.00	1640.00	1045.00	745.00	.00	.00
211	.00	.00	.00	.00	.00	300.00	840.00
212	.00	.00	.00	.00	.00	630.00	331.00
213	428.00	287.00	738.00	591.00	436.00	.00	.00
214	289.00	1519.00	1059.00	1226.00	425.00	.00	.00
215	.00	.00	.00	.00	.00	566.00	763.00
216	320.00	341.00	919.00	593.00	500.00	.00	.00
217	.00	.00	.00	.00	.00	207.00	410.00
218	.00	.00	.00	.00	.00	183.00	535.00
219	370.00	248.00	604.00	287.00	783.00	.00	.00
220	92.00	319.00	1020.00	648.00	515.00	.00	.00
221	450.00	415.00	1204.00	507.00	415.00	.00	.00
222	240.00	250.00	1345.00	441.00	335.00	.00	.00
223	.00	.00	.00	.00	.00	385.0	446.00
224	247.00	199.00	415.00	611.00	295.00	.00	.00
225	580.00	1040.00	312.00	972.00	252.00	.00	.00
226	.00	.00	.00	.00	.00	1100.00	689.00
227	376.00	335.00	683.00	672.00	485.00	.00	.00
228	547.00	230.00	765.00	828.00	1745.00	.00	.00
229	.00	.00	.00	.00	.00	230.00	465.00
230	270.00	1231.00	510.00	481.00	349.00	.00	.00
231	.00	.00	.00	.00	.00	147.00	486.00
232	306.00	313.00	425.00	714.00	237.00	.00	.00
233	424.00	355.00	862.00	1711.00	787.00	.00	.00
234	257.00	282.00	308.00	297.00	788.00	.00	.00
235	.00	.00	.00	.00	.00	1077.00	1445.00

	C7TT	C8TT	CR1	CR2	CR3	CR4	CR5
1	333.00	541.00	3.00	1.00	6.00	1.00	2.00
2	919.00	1300.00	9.00	1.00	9.00	1.00	1.00
3	.00	.00	9.00	1.00	9.00	1.00	1.00
4	565.00	862.00	9.00	1.00	9.00	1.00	1.00
5	.00	.00	5.00	8.00	3.00	8.00	8.00
6	431.00	488.00	6.00	1.00	9.00	1.00	2.00
7	.00	.00	3.00	1.00	7.00	2.00	1.00
8	240.00	798.00	5.00	1.00	7.00	2.00	1.00
9	562.00	726.00	5.00	2.00	6.00	2.00	2.00
10	316.00	437.00	4.00	2.00	1.00	2.00	2.00
11	720.00	358.00	9.00	1.00	9.00	1.00	1.00
12	.00	.00	9.00	1.00	9.00	1.00	1.00
13	.00	.00	5.00	1.00	7.00	2.00	1.00
14	321.00	202.00	7.00	2.00	9.00	1.00	2.00
15	.00	.00	3.00	1.00	3.00	5.00	2.00
16	249.00	823.00	1.00	1.00	5.00	3.00	1.00
17	540.00	180.00	6.00	3.00	9.00	1.00	3.00
18	.00	.00	3.00	3.00	4.00	3.00	2.00
19	554.00	401.00	9.00	1.00	9.00	1.00	1.00
20	.00	.00	5.00	3.00	7.00	3.00	3.00
21	498.00	700.00	7.00	2.00	9.00	1.00	2.00
22	635.00	512.00	6.00	1.00	1.00	1.00	2.00

23	535.00	434.00	6.00	2.00	9.00	1.00	1.00
24	.00	.00	5.00	1.00	9.00	1.00	1.00
25	840.00	420.00	6.00	2.00	8.00	2.00	2.00
26	410.00	980.00	2.00	4.00	2.00	6.00	3.00
27	289.00	351.00	5.00	6.00	6.00	6.00	6.00
28	671.00	1290.00	9.00	1.00	9.00	1.00	1.00
29	261.00	345.00	1.00	1.00	7.00	1.00	3.00
30	334.00	852.00	5.00	1.00	9.00	1.00	1.00
31	.00	.00	4.00	2.00	6.00	3.00	2.00
32	501.00	610.00	5.00	3.00	8.00	1.00	1.00
33	.00	.00	3.00	2.00	5.00	3.00	1.00
34	.00	.00	8.00	1.00	9.00	1.00	2.00
35	.00	.00	7.00	1.00	9.00	1.00	1.00
36	.00	.00	6.00	1.00	8.00	2.00	1.00
37	1708.00	404.00	7.00	2.00	6.00	1.00	2.00
38	.00	.00	9.00	1.00	9.00	1.00	2.00
39	540.00	240.00	5.00	1.00	8.00	1.00	1.00
40	720.00	240.00	3.00	2.00	5.00	3.00	1.00
41	250.00	380.00	9.00	1.00	9.00	1.00	3.00
42	.00	.00	7.00	2.00	9.00	2.00	2.00
43	475.00	371.00	8.00	1.00	9.00	1.00	1.00
44	.00	.00	5.00	2.00	7.00	1.00	1.00
45	.00	.00	6.00	2.00	7.00	2.00	3.00
46	.00	.00	5.00	5.00	2.00	7.00	3.00
47	627.00	376.00	7.00	2.00	7.00	2.00	3.00
48	.00	.00	7.00	1.00	9.00	1.00	2.00
49	939.00	865.00	3.00	1.00	7.00	1.00	1.00
50	.00	.00	6.00	1.00	9.00	1.00	2.00
51	.00	.00	6.00	1.00	8.00	1.00	1.00
52	.00	.00	8.00	1.00	9.00	1.00	1.00
53	.00	.00	6.00	2.00	7.00	2.00	2.00
54	.00	.00	5.00	1.00	9.00	1.00	1.00
55	.00	.00	8.00	1.00	8.00	1.00	1.00
56	.00	.00	9.00	1.00	9.00	1.00	1.00
57	.00	.00	8.00	1.00	9.00	1.00	1.00
58	.00	.00	5.00	1.00	7.00	1.00	1.00
59	275.00	536.00	9.00	1.00	9.00	1.00	1.00
60	.00	.00	7.00	1.00	9.00	1.00	2.00
61	336.00	236.00	3.00	1.00	8.00	1.00	1.0
62	.00	.00	7.00	1.00	9.00	1.00	1.00
63	.00	.00	4.00	2.00	8.00	1.00	2.00
64	.00	.00	9.00	1.00	9.00	1.00	1.00
65	673.00	174.00	6.00	1.00	9.00	1.00	2.00
66	.00	.00	9.00	1.00	9.00	1.00	1.00
67	381.00	439.00	4.00	3.00	7.00	5.00	3.00
68	792.00	333.00	5.00	1.00	5.00	1.00	3.00
69	.00	.00	7.00	3.00	7.00	3.00	1.00
70	437.00	670.00	5.00	2.00	7.00	2.00	2.00
71	452.00	665.00	2.00	1.00	9.00	1.00	2.00
72	.00	.00	9.00	1.00	9.00	1.00	1.00
73	716.00	457.00	5.00	2.00	7.00	2.00	3.0
74	251.00	404.00	5.00	5.00	9.00	1.00	3.00
75	545.00	418.00	5.00	1.00	9.00	1.00	1.00
76	.00	.00	9.00	5.00	6.00	5.00	5.00
77	465.00	429.00	3.00	1.00	2.00	1.00	2.00

78	.00	.00	9.00	2.00	9.00	1.00	1.00
79	.00	.00	7.00	1.00	9.00	1.00	1.00
80	370.00	249.00	2.00	1.00	3.00	1.00	1.00
81	800.00	450.00	7.00	4.00	7.00	1.00	3.00
82	501.00	428.00	3.00	2.00	7.00	2.00	2.00
83	382.00	1111.00	5.00	1.00	9.00	1.00	1.00
84	.00	.00	7.00	1.00	9.00	1.00	1.00
85	317.00	481.00	2.00	2.00	4.00	4.00	2.00
86	670.00	266.00	7.00	1.00	9.00	1.00	1.00
87	245.00	275.00	5.00	2.00	7.00	7.00	2.00
88	.00	.00	7.00	1.00	7.00	2.00	2.00
89	553.00	237.00	2.00	2.00	3.00	3.00	1.00
90	.00	.00	4.00	2.00	8.00	2.00	2.00
91	379.00	532.00	7.00	1.00	9.00	1.00	1.00
92	.00	.00	5.00	6.00	3.00	7.00	3.00
93	.00	.00	8.00	1.00	9.00	1.00	1.00
94	.00	.00	7.00	3.00	7.00	1.00	6.00
95	.00	.00	4.00	4.00	8.00	1.00	2.00
96	335.00	420.00	5.00	5.00	3.00	6.00	2.00
97	262.00	530.00	5.00	1.00	9.00	1.00	3.00
98	435.00	285.00	7.00	3.00	7.00	1.00	1.00
99	407.00	1701.00	5.00	2.00	2.00	3.00	4.00
100	308.00	377.00	7.00	1.00	9.00	1.00	1.00
101	1084.00	1060.00	5.00	1.00	7.00	1.00	1.00
102	.00	.00	6.00	2.00	9.00	1.00	1.00
103	1117.00	520.00	3.00	1.00	7.00	3.00	1.00
104	199.00	409.00	7.00	5.00	5.00	5.00	3.00
105	631.00	280.00	7.00	1.00	9.00	1.00	1.00
106	886.00	1897.00	5.00	8.00	3.00	8.00	9.00
107	757.00	137.00	4.00	3.00	5.00	6.00	6.00
108	235.00	960.00	3.00	2.00	7.00	1.00	2.00
109	.00	.00	9.00	1.00	9.00	1.00	1.00
110	744.00	605.00	5.00	2.00	7.00	2.00	2.00
111	622.00	329.00	5.00	3.00	7.00	5.00	5.00
112	.00	.00	6.00	2.00	9.00	1.00	2.00
113	400.00	289.00	3.00	3.00	3.00	2.00	3.00
114	995.00	295.00	4.00	4.00	5.00	5.00	2.00
115	.00	.00	5.00	4.00	6.00	6.00	5.00
116	464.00	3610.00	6.00	1.00	9.00	1.00	2.00
117	249.00	193.00	7.00	2.00	8.00	1.00	2.00
118	.00	.00	6.00	3.00	7.00	1.00	2.00
119	.00	.00	8.00	1.00	9.00	1.00	1.00
120	.00	.00	5.00	1.00	7.00	1.00	1.00
121	.00	.00	3.00	1.00	6.00	2.00	.00
122	1042.00	918.00	7.00	1.00	9.00	1.00	2.00
123	.00	.00	8.00	1.00	8.00	1.00	1.00
124	.00	.00	5.00	2.00	7.00	2.00	2.00
125	711.00	1244.00	5.00	2.00	7.00	1.00	3.00
126	.00	.00	3.00	1.00	7.00	2.00	1.00
127	.00	.00	2.00	2.00	5.00	5.00	1.00
128	.00	.00	5.00	1.00	9.00	11.00	7.00
129	321.00	582.00	3.00	3.00	7.00	5.00	1.00
130	200.00	301.00	4.00	2.00	6.00	1.00	4.00
131	.00	.00	5.00	1.00	9.00	1.00	1.00
132	125.00	344.00	7.00	5.00	7.00	5.00	7.00

133	.00	.00	9.00	3.00	9.00	1.00	3.00
134	.00	.00	4.00	1.00	9.00	1.00	1.00
135	240.00	240.00	6.00	2.00	9.00	1.00	1.00
136	.00	.00	3.00	1.00	9.00	1.00	1.00
137	.00	.00	1.00	3.00	7.00	1.00	1.00
138	.00	.00	5.00	1.00	9.00	1.00	1.00
139	2971.00	955.00	5.00	2.00	7.00	4.00	4.00
140	420.00	645.00	3.00	3.00	1.00	3.00	2.00
141	1145.00	285.00	2.00	2.00	7.00	2.00	2.00
142	180.00	195.00	5.00	1.00	8.00	1.00	1.00
143	456.00	809.00	7.00	1.00	7.00	1.00	1.00
144	.00	.00	1.00	1.00	5.00	3.00	4.00
145	.00	.00	5.00	2.00	6.00	1.00	1.00
146	485.00	1957.00	5.00	2.00	7.00	3.00	1.00
147	.00	.00	8.00	2.00	7.00	2.00	3.00
148	.00	.00	8.00	1.00	8.00	1.00	1.00
149	405.00	457.00	8.00	3.00	7.00	2.00	3.00
150	622.00	591.00	1.00	1.00	9.00	1.00	2.00
151	548.00	1324.00	7.00	2.00	9.00	1.00	1.00
152	534.00	602.00	5.00	1.00	9.00	1.00	1.00
153	680.00	382.00	7.00	3.00	8.00	1.00	1.00
154	1322.00	3075.00	7.00	1.00	9.00	1.00	1.00
155	731.00	805.00	9.00	1.00	9.00	1.00	1.00
156	556.00	432.00	4.00	3.00	7.00	2.00	3.00
157	361.00	770.00	5.00	1.00	9.00	1.00	1.00
158	582.00	219.00	6.00	2.00	7.00	2.00	1.00
159	.00	.00	7.00	1.00	9.00	1.00	2.00
160	.00	.00	2.00	4.00	3.00	6.00	3.00
161	360.00	420.00	5.00	1.00	7.00	4.00	4.00
162	.00	.00	6.00	1.00	8.00	1.00	1.00
163	.00	.00	5.00	1.00	9.00	1.00	1.00
164	655.00	809.00	7.00	3.00	9.00	3.00	4.00
165	.00	.00	7.00	2.00	9.00	1.00	3.00
166	393.00	397.00	5.00	2.00	7.00	1.00	1.00
167	462.00	195.00	5.00	2.00	7.00	2.00	3.00
168	2158.00	370.00	9.00	1.00	9.00	1.00	1.00
169	664.00	394.00	9.00	2.00	9.00	2.00	2.00
170	384.00	120.00	7.00	3.00	9.00	2.00	2.00
171	.00	.00	7.00	2.00	7.00	1.00	1.00
172	443.00	370.00	7.00	2.00	8.00	1.00	3.00
173	.00	.00	7.00	1.00	7.00	1.00	1.00
174	548.00	586.00	7.00	2.00	8.00	2.00	1.00
175	.00	.00	7.00	2.00	7.00	2.00	3.00
176	777.00	627.00	8.00	1.00	9.00	1.00	2.00
177	.00	.00	9.00	1.00	9.00	1.00	1.00
178	.00	.00	9.00	2.00	9.00	1.00	1.00
179	.00	.00	9.00	1.00	9.00	1.00	1.00
180	.00	.00	5.00	3.00	3.00	3.00	2.00
181	1464.00	1298.00	5.00	3.00	7.00	2.00	2.00
182	.00	.00	9.00	2.00	9.00	1.00	2.00
183	579.00	318.00	5.00	1.00	9.00	1.00	1.00
184	240.00	600.00	9.00	3.00	9.00	1.00	1.00
185	310.00	540.00	7.00	3.00	9.00	2.00	3.00
186	.00	.00	9.00	1.00	9.00	1.00	1.00
187	.00	.00	8.00	2.00	7.00	2.00	3.00

188	559.00	628.00	6.00	1.00	9.00	1.00	1.00
189	372.00	738.00	6.00	1.00	9.00	1.00	2.00
190	.00	.00	5.00	1.00	7.00	1.00	1.00
191	475.00	322.00	9.00	1.00	9.00	1.00	1.00
192	287.00	427.00	7.00	1.00	7.00	3.00	1.00
193	340.00	355.00	6.00	3.00	5.00	5.00	2.00
194	.00	.00	9.00	1.00	9.00	1.00	1.00
195	.00	.00	9.00	2.00	9.00	1.00	1.00
196	.00	.00	7.00	1.00	9.00	1.00	1.00
197	.00	.00	9.00	1.00	9.00	1.00	1.00
198	.00	.00	7.00	1.00	9.00	1.00	1.00
199	.00	.00	6.00	1.00	9.00	1.00	1.00
200	.00	.00	7.00	1.00	9.00	1.00	1.00
201	999.00	460.00	3.00	1.00	9.00	1.00	1.00
202	801.00	1470.00	5.00	1.00	7.00	1.00	1.00
203	439.00	491.00	9.00	2.00	8.00	2.00	1.00
204	.00	.00	4.00	2.00	7.00	2.00	4.00
205	.00	.00	7.00	2.00	8.00	2.00	1.00
206	.00	.00	7.00	1.00	9.00	1.00	2.00
207	.00	.00	9.00	1.00	9.00	1.00	1.00
208	426.00	335.00	5.00	1.00	7.00	1.00	1.00
209	576.00	1283.00	5.00	8.00	2.00	2.00	2.00
210	.00	.00	5.00	1.00	9.00	1.00	1.00
211	240.00	540.00	3.00	2.00	6.00	1.00	2.0
212	880.00	468.00	5.00	5.00	7.00	3.00	3.00
213	.00	.00	5.00	3.00	6.00	3.00	3.00
214	.00	.00	7.00	2.00	7.00	1.00	1.00
215	403.00	347.00	6.00	2.00	7.00	1.00	4.00
216	.00	.00	5.00	2.00	7.00	2.00	1.00
217	674.00	262.00	8.00	1.00	9.00	1.00	1.00
218	411.00	1480.00	5.00	2.00	3.00	1.00	1.00
219	.00	.00	5.00	2.00	8.00	2.00	3.00
220	.00	.00	9.00	3.00	7.00	3.00	6.00
221	.00	.00	3.00	1.00	8.00	1.00	1.00
222	.00	.00	1.00	6.00	5.00	5.00	6.00
223	258.00	690.00	7.00	1.00	7.00	1.00	1.00
224	.00	.00	7.00	1.00	9.00	1.00	1.00
225	.00	.00	9.00	2.00	9.00	3.00	5.00
226	1047.00	1251.00	9.00	1.00	9.00	1.00	1.00
227	.00	.00	1.00	5.00	1.00	9.00	5.00
228	.00	.00	7.00	1.00	8.00	1.00	1.00
229	390.00	465.00	6.00	2.00	7.00	4.00	2.00
230	.00	.00	7.00	3.00	3.00	3.00	2.00
231	1295.00	1282.00	7.00	1.00	9.00	1.00	1.00
232	.00	.00	6.00	2.00	7.00	2.00	2.00
233	.00	.00	6.00	1.00	9.00	1.00	1.00
234	.00	.00	7.00	3.00	8.00	5.00	3.00
235	388.00	1412.00	8.00	1.00	9.00	1.00	1.00
	<b>CR6</b>	<b>CR7</b>	<b>CR8</b>				
1	6.00	3.00	4.00	.00	.00	.00	.00
2	9.00	5.00	9.00	.00	.00	.00	.00
3	9.00	1.00	7.00	.00	.00	.00	.00
4	8.00	1.00	7.00	.00	.00	.00	.00
5	4.00	8.00	8.00	.00	.00	.00	.00

6	8.00	1.00	7.00	.00	.00	.00	.00
7	8.00	5.00	7.00	.00	.00	.00	.00
8	3.00	1.00	1.00	.00	.00	.00	.00
9	7.00	5.00	8.00	.00	.00	.00	.00
10	9.00	2.00	7.00	.00	.00	.00	.00
11	7.00	2.00	6.00	.00	.00	.00	.00
12	9.00	1.00	3.00	.00	.00	.00	.00
13	7.00	1.00	3.00	.00	.00	.00	.00
14	8.00	3.00	6.00	.00	.00	.00	.00
15	8.00	6.00	7.00	.00	.00	.00	.00
16	3.00	5.00	5.00	.00	.00	.00	.00
17	5.00	7.00	8.00	.00	.00	.00	.00
18	6.00	5.00	6.00	.00	.00	.00	.00
19	8.00	2.00	7.00	.00	.00	.00	.00
20	8.00	1.00	3.00	.00	.00	.00	.00
21	8.00	1.00	3.00	.00	.00	.00	.00
22	7.00	2.00	5.00	.00	.00	.00	.00
23	9.00	1.00	7.00	.00	.00	.00	.00
24	8.00	1.00	5.00	.00	.00	.00	.00
25	8.00	2.00	3.00	.00	.00	.00	.00
26	3.00	1.00	7.00	.00	.00	.00	.00
27	5.00	1.00	3.00	.00	.00	.00	.00
28	9.00	1.00	3.00	.00	.00	.00	.00
29	8.00	1.00	5.00	.00	.00	.00	.00
30	7.00	1.00	8.00	.00	.00	.00	.00
31	3.00	2.00	6.00	.00	.00	.00	.00
32	3.00	5.00	6.00	.00	.00	.00	.00
33	8.00	2.00	6.00	.00	.00	.00	.00
34	8.00	2.00	7.00	.00	.00	.00	.00
35	7.00	1.00	5.00	.00	.00	.00	.00
36	7.00	1.00	8.00	.00	.00	.00	.00
37	5.00	7.00	6.00	.00	.00	.00	.00
38	6.00	3.00	7.00	.00	.00	.00	.00
39	7.00	2.00	7.00	.00	.00	.00	.00
40	7.00	2.00	6.00	.00	.00	.00	.00
41	8.00	1.00	2.00	.00	.00	.00	.00
42	4.00	5.00	5.00	.00	.00	.00	.00
43	2.00	1.00	1.00	.00	.00	.00	.00
44	7.00	7.00	3.00	.00	.00	.00	.00
45	8.00	5.00	7.00	.00	.00	.00	.00
46	1.00	9.00	2.00	.00	.00	.00	.00
47	7.00	3.00	7.00	.00	.00	.00	.00
48	9.00	5.00	6.00	.00	.00	.00	.00
49	9.00	1.00	2.00	.00	.00	.00	.00
50	4.00	4.00	5.00	.00	.00	.00	.00
51	7.00	2.00	5.00	.00	.00	.00	.00
52	7.00	5.00	7.00	.00	.00	.00	.00
53	6.00	5.00	5.00	.00	.00	.00	.00
54	3.00	3.00	9.00	.00	.00	.00	.00
55	7.00	5.00	8.00	.00	.00	.00	.00
56	9.00	1.00	3.00	.00	.00	.00	.00
57	3.00	1.00	5.00	.00	.00	.00	.00
58	9.00	1.00	5.00	.00	.00	.00	.00
59	9.00	1.00	3.00	.00	.00	.00	.00
60	7.00	1.00	7.00	.00	.00	.00	.00

61	7.00	2.00	7.00	.00	.00	.00	.00
62	9.00	7.00	7.00	.00	.00	.00	.00
63	7.00	3.00	3.00	.00	.00	.00	.00
64	7.00	1.00	3.00	.00	.00	.00	.00
65	8.00	7.00	7.00	.00	.00	.00	.00
66	5.00	1.00	5.00	.00	.00	.00	.00
67	7.00	2.00	6.00	.00	.00	.00	.00
68	2.00	5.00	3.00	.00	.00	.00	.00
69	7.00	1.00	6.00	.00	.00	.00	.00
70	9.00	1.00	3.00	.00	.00	.00	.00
71	4.00	2.00	5.00	.00	.00	.00	.00
72	9.00	1.00	7.00	.00	.00	.00	.00
73	7.00	2.00	7.00	.00	.00	.00	.00
74	8.00	4.00	2.00	.00	.00	.00	.00
75	8.00	1.00	5.00	.00	.00	.00	.00
76	7.00	9.00	9.00	.00	.00	.00	.00
77	7.00	2.00	6.00	.00	.00	.00	.00
78	9.00	9.00	2.00	.00	.00	.00	.00
79	8.00	7.00	4.00	.00	.00	.00	.00
80	9.00	3.00	9.00	.00	.00	.00	.00
81	7.00	3.00	7.00	.00	.00	.00	.00
82	3.00	1.00	3.00	.00	.00	.00	.00
83	8.00	5.00	9.00	.00	.00	.00	.00
84	8.00	2.00	1.00	.00	.00	.00	.00
85	7.00	2.00	3.00	.00	.00	.00	.00
86	9.00	1.00	4.00	.00	.00	.00	.00
87	7.00	2.00	6.00	.00	.00	.00	.00
88	3.00	5.00	3.00	.00	.00	.00	.00
89	2.00	1.00	5.00	.00	.00	.00	.00
90	6.00	1.00	5.00	.00	.00	.00	.00
91	9.00	1.00	9.00	.00	.00	.00	.00
92	2.00	1.00	8.00	.00	.00	.00	.00
93	7.00	1.00	4.00	.00	.00	.00	.00
94	4.00	1.00	6.00	.00	.00	.00	.00
95	8.00	8.00	6.00	.00	.00	.00	.00
96	8.00	1.00	7.00	.00	.00	.00	.00
97	7.00	5.00	1.00	.00	.00	.00	.00
98	3.00	3.00	3.00	.00	.00	.00	.00
99	7.00	8.00	9.00	.00	.00	.00	.00
100	5.00	3.00	7.00	.00	.00	.00	.00
101	7.00	1.00	9.00	.00	.00	.00	.00
102	8.00	1.00	3.00	.00	.00	.00	.00
103	5.00	3.00	9.00	.00	.00	.00	.00
104	7.00	2.00	8.00	.00	.00	.00	.00
105	9.00	1.00	5.00	.00	.00	.00	.00
106	2.00	9.00	4.00	.00	.00	.00	.00
107	7.00	3.00	6.00	.00	.00	.00	.00
108	8.00	1.00	1.00	.00	.00	.00	.00
109	8.00	5.00	4.00	.00	.00	.00	.00
110	7.00	1.00	7.00	.00	.00	.00	.00
111	6.00	5.00	7.00	.00	.00	.00	.00
112	8.00	1.00	5.00	.00	.00	.00	.00
113	2.00	3.00	9.00	.00	.00	.00	.00
114	8.00	5.00	6.00	.00	.00	.00	.00
115	7.00	5.00	7.00	.00	.00	.00	.00

116	7.00	3.00	5.00	.00	.00	.00	.00
117	6.00	5.00	4.00	.00	.00	.00	.00
118	4.00	2.00	6.00	.00	.00	.00	.00
119	6.00	2.00	8.00	.00	.00	.00	.00
120	3.00	1.00	5.00	.00	.00	.00	.00
121	9.00	4.00	6.00	.00	.00	.00	.00
122	9.00	1.00	3.00	.00	.00	.00	.00
123	7.00	2.00	2.00	.00	.00	.00	.00
124	7.00	2.00	6.00	.00	.00	.00	.00
125	7.00	4.00	7.00	.00	.00	.00	.00
126	9.00	2.00	8.00	.00	.00	.00	.00
127	8.00	3.00	8.00	.00	.00	.00	.00
128	4.00	6.00	.00	.00	.00	.00	.00
129	5.00	6.00	9.00	.00	.00	.00	.00
130	6.00	2.00	2.00	.00	.00	.00	.00
131	9.00	1.00	4.00	.00	.00	.00	.00
132	6.00	5.00	9.00	.00	.00	.00	.00
133	7.00	1.00	8.00	.00	.00	.00	.00
134	8.00	1.00	3.00	.00	.00	.00	.00
135	7.00	9.00	5.00	.00	.00	.00	.00
136	9.00	1.00	4.00	.00	.00	.00	.00
137	7.00	6.00	7.00	.00	.00	.00	.00
138	3.00	1.00	1.00	.00	.00	.00	.00
139	8.00	5.00	9.00	.00	.00	.00	.00
140	7.00	1.00	8.00	.00	.00	.00	.00
141	7.00	2.00	7.00	.00	.00	.00	.00
142	8.00	8.00	9.00	.00	.00	.00	.00
143	7.00	5.00	9.00	.00	.00	.00	.00
144	1.00	1.00	9.00	.00	.00	.00	.00
145	3.00	7.00	7.00	.00	.00	.00	.00
146	6.00	2.00	8.00	.00	.00	.00	.00
147	6.00	6.00	7.00	.00	.00	.00	.00
148	9.00	1.00	6.00	.00	.00	.00	.00
149	4.00	2.00	4.00	.00	.00	.00	.00
150	8.00	8.00	9.00	.00	.00	.00	.00
151	3.00	7.00	7.00	.00	.00	.00	.00
152	9.00	5.00	5.00	.00	.00	.00	.00
153	8.00	1.00	3.00	.00	.00	.00	.00
154	8.00	8.00	7.00	.00	.00	.00	.00
155	9.00	1.00	7.00	.00	.00	.00	.00
156	4.00	1.00	5.00	.00	.00	.00	.00
157	9.00	9.00	5.00	.00	.00	.00	.00
158	5.00	5.00	8.00	.00	.00	.00	.00
159	8.00	8.00	8.00	.00	.00	.00	.00
160	5.00	2.00	7.00	.00	.00	.00	.00
161	7.00	6.00	8.00	.00	.00	.00	.00
162	7.00	7.00	7.00	.00	.00	.00	.00
163	9.00	9.00	9.00	.00	.00	.00	.00
164	6.00	5.00	8.00	.00	.00	.00	.00
165	7.00	1.00	6.00	.00	.00	.00	.00
166	9.00	1.00	3.00	.00	.00	.00	.00
167	8.00	1.00	3.00	.00	.00	.00	.00
168	9.00	4.00	7.00	.00	.00	.00	.00
169	7.00	5.00	6.00	.00	.00	.00	.00
170	6.00	3.00	7.00	.00	.00	.00	.00

171	2.00	6.00	6.00	.00	.00	.00	.00
172	8.00	2.00	4.00	.00	.00	.00	.00
173	9.00	1.00	6.00	.00	.00	.00	.00
174	8.00	4.00	8.00	.00	.00	.00	.00
175	7.00	7.00	3.00	.00	.00	.00	.00
176	9.00	9.00	4.00	.00	.00	.00	.00
177	8.00	4.00	6.00	.00	.00	.00	.00
178	3.00	2.00	4.00	.00	.00	.00	.00
179	9.00	8.00	9.00	.00	.00	.00	.00
180	4.00	2.00	2.00	.00	.00	.00	.00
181	7.00	7.00	7.00	.00	.00	.00	.00
182	9.00	2.00	2.00	.00	.00	.00	.00
183	8.00	1.00	4.00	.00	.00	.00	.00
184	7.00	3.00	3.00	.00	.00	.00	.00
185	5.00	7.00	7.00	.00	.00	.00	.00
186	7.00	9.00	8.00	.00	.00	.00	.00
187	7.00	7.00	2.00	.00	.00	.00	.00
188	9.00	5.00	7.00	.00	.00	.00	.00
189	7.00	2.00	2.00	.00	.00	.00	.00
190	9.00	1.00	7.00	.00	.00	.00	.00
191	8.00	3.00	3.00	.00	.00	.00	.00
192	8.00	1.00	3.00	.00	.00	.00	.00
193	7.00	1.00	4.00	.00	.00	.00	.00
194	9.00	1.00	7.00	.00	.00	.00	.00
195	7.00	1.00	5.00	.00	.00	.00	.00
196	8.00	1.00	3.00	.00	.00	.00	.00
197	8.00	3.00	5.00	.00	.00	.00	.00
198	7.00	3.00	5.00	.00	.00	.00	.00
199	7.00	3.00	6.00	.00	.00	.00	.00
200	8.00	3.00	6.00	.00	.00	.00	.00
201	8.00	1.00	3.00	.00	.00	.00	.00
202	8.00	7.00	1.00	.00	.00	.00	.00
203	6.00	2.00	8.00	.00	.00	.00	.00
204	7.00	3.00	7.00	.00	.00	.00	.00
205	8.00	1.00	6.00	.00	.00	.00	.00
206	7.00	9.00	9.00	.00	.00	.00	.00
207	7.00	9.00	9.00	.00	.00	.00	.00
208	7.00	7.00	7.00	.00	.00	.00	.00
209	7.00	2.00	5.00	.00	.00	.00	.00
210	8.00	1.00	7.00	.00	.00	.00	.00
211	5.00	9.00	9.00	.00	.00	.00	.00
212	7.00	3.00	7.00	.00	.00	.00	.00
213	8.00	9.00	9.00	.00	.00	.00	.00
214	7.00	7.00	7.00	.00	.00	.00	.00
215	9.00	5.00	9.00	.00	.00	.00	.00
216	6.00	6.00	6.00	.00	.00	.00	.00
217	7.00	4.00	6.00	.00	.00	.00	.00
218	2.00	1.00	5.00	.00	.00	.00	.00
219	1.00	1.00	5.00	.00	.00	.00	.00
220	2.00	1.00	2.00	.00	.00	.00	.00
221	1.00	5.00	6.00	.00	.00	.00	.00
222	6.00	9.00	9.00	.00	.00	.00	.00
223	8.00	8.00	8.00	.00	.00	.00	.00
224	7.00	2.00	3.00	.00	.00	.00	.00
225	6.00	1.00	7.00	.00	.00	.00	.00

226	3.00	1.00	5.00	.00	.00	.00	.00
227	1.00	9.00	8.00	.00	.00	.00	.00
228	7.00	1.00	5.00	.00	.00	.00	.00
229	9.00	1.00	9.00	.00	.00	.00	.00
230	7.00	5.00	9.00	.00	.00	.00	.00
231	2.00	2.00	6.00	.00	.00	.00	.00
232	6.00	5.00	8.00	.00	.00	.00	.00
233	7.00	3.00	4.00	.00	.00	.00	.00
234	1.00	5.00	5.00	.00	.00	.00	.00
235	9.00	1.00	5.00	.00	.00	.00	.00

## DESCRIPTIVE STATISTICS

HFADER DATA FOR: C:EODGEN8 LABEL:  
 NUMBER OF CASES: 235 NUMBER OF VARIABLES: 70

Descriptive results all variables, all cases, all services.

NO.	NAME	N	MEAN	STD. DEV.	MINIMUM	MAXIMUM
1	AGE	235	354.5702	68.5075	223.0000	569.0000
2	GENDER	235	.9702	.1704	.0000	1.0000
3	BRANCH	235	2.7064	1.2102	1.0000	4.0000
4	TIS	235	115.0851	76.2183	5.0000	746.0000
5	PAYGRADE	235	5.7915	1.7231	3.0000	10.0000
6	TIPAYGRA	235	26.5660	19.2873	1.0000	96.0000
7	EODTRAIN	235	11.1702	11.0092	2.0000	132.0000
8	TIEODQUA	235	58.2553	55.5270	.0000	252.0000
9	TIAS TECH	235	54.7191	53.9461	.0000	246.0000
10	CURWKING	235	.8851	.3196	.0000	1.0000
11	EODEXPER	235	4.7234	2.0683	.0000	9.0000
12	COMEXPER	235	3.1319	1.7698	.0000	8.0000
13	T1TIME	235	319.6681	151.3425	80.0000	1039.0000
14	T1ERRORS	235	.0043	.0652	.0000	1.0000
15	T1FOUND	235	1.0000	.0000	1.0000	1.0000
16	T2TIME	235	308.8085	164.4699	34.0000	900.0000
17	T2ERRORS	235	.0298	.1704	.0000	1.0000
18	T2FOUND	235	1.0000	.0000	1.0000	1.0000
19	T3TIME	235	303.5574	162.9703	57.0000	992.0000
20	T3ERRORS	235	.0170	.1296	.0000	1.0000
21	T3FOUND	235	1.0000	.0000	1.0000	1.0000
22	T4TIME	235	277.6733	131.0939	4.2300	928.0000
23	T4ERRORS	235	.0000	.0000	.0000	.0000
24	T4FOUND	235	1.0000	.0000	1.0000	1.0000
25	TAVGTIME	235	5.0434	1.5920	1.9500	14.2600
26	TAVGERRO	235	.0383	.1923	.0000	1.0000
27	TAVGFOUN	235	4.0000	.0000	4.0000	4.0000
28	C1TIME	235	559.6864	403.3220	5.3100	3610.0000
29	C1ERRORS	235	.0213	.1446	.0000	1.0000
30	C1FOUND	235	1.0000	.0000	1.0000	1.0000
31	C2TIME	235	652.1277	426.1603	110.0000	3554.0000
32	C2ERRORS	235	.1957	.4668	.0000	3.0000
33	C2FOUND	235	.9787	.1446	.0000	1.0000
34	C3TIME	235	641.9915	438.0128	56.0000	3400.0000
35	C3ERRORS	235	.2170	.5621	.0000	4.0000
36	C3FOUND	235	.9872	.1125	.0000	1.0000
37	C4TIME	235	456.2128	402.2118	100.0000	3600.0000
38	C4ERRORS	235	.0213	.1716	.0000	2.0000
39	C4FOUND	235	1.0213	.2842	.0000	4.0000
40	CAVGTIME	235	9.5936	4.2867	3.7500	32.0400
41	CAVGERRO	235	.4596	.8583	.0000	4.0000
42	CAVGFOUN	235	3.9362	.3700	.0000	4.0000
43	S1TT	235	172.3106	207.4205	.0000	1039.0000
44	S2TT	235	122.0638	167.7819	.0000	992.0000
45	S3TT	235	177.1660	209.7787	.0000	907.0000
46	S4TT	235	147.7021	171.7913	.0000	849.0000

47	S5TT	235	133.0170	156.6377	.0000	720.0000
48	S6TT	235	144.5872	176.2060	.0000	786.0000
49	S7TT	235	168.7319	206.8328	.0000	940.0000
50	S8TT	235	147.9532	184.1371	.0000	769.0000
51	C1TT	235	238.1277	403.4793	.0000	3600.0000
52	C2TT	235	370.5787	480.4881	.0000	2687.0000
53	C3TT	235	330.8043	475.5622	.0000	3554.0000
54	C4TT	235	244.6809	331.0157	.0000	1850.0000
55	C5TT	235	201.2468	258.1011	.0000	1934.0000
56	C6TT	235	285.1277	368.2786	.0000	1973.0000
57	C7TT	235	302.0723	399.6900	.0000	2971.0000
58	C8TT	235	332.1489	489.0162	.0000	3610.0000
59	CR1	235	5.8979	2.0996	1.0000	9.0000
60	CR2	235	1.9021	1.3054	1.0000	8.0000
61	CR3	235	7.3872	1.9955	1.0000	9.0000
62	CR4	235	1.9489	1.6812	1.0000	11.0000
63	CR5	235	1.9319	1.3851	.0000	9.0000
64	CR6	235	6.6298	2.1271	1.0000	9.0000
65	CR7	235	3.4170	2.5813	1.0000	9.0000
66	CR8	235	5.7064	2.2157	.0000	9.0000
67		235	.0000	.0000	.0000	.0000
68		235	.0000	.0000	.0000	.0000
69		235	.0000	.0000	.0000	.0000
70		235	.0000	.0000	.0000	.0000

ANALYSIS OF VARIANCE

HEADER DATA FOR: C:EODGEN8 LABEL:

NUMBER OF CASES: 235 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Comparison of completion times all cases, all services

	GROUP	MEAN	N		
	1	5.043	235		
	2	9.594	235		
	GRAND MEAN	7.318	470		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	2432.817	1	2432.817	232.692	1.800E-13
WITHIN	4892.986	468	10.455		
TOTAL	7325.802	469			

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODGEN8 LABEL:

NUMBER OF CASES: 235 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Comparison of error rates, all services

	GROUP	MEAN	N		
	1	.038	235		
	2	.460	235		
	GRAND MEAN	.249	470		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	20.853	1	20.853	53.912	8.800E-13
WITHIN	181.021	468	.387		
TOTAL	201.874	469			

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODGEN8 LABEL:

NUMBER OF CASES: 235 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Comparison of number of tests shapes found, all services

	GROUP	MEAN	N		
	1	4.000	235		
	2	3.936	235		
	GRAND MEAN	3.968	470		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	.479	1	.479	6.992	8.462E-03
WITHIN	32.043 468	.068			
TOTAL	32.521	469			

### CORRELATION MATRIX

HEADER DATA FOR: C:EODGEN8 LABEL:  
 NUMBER OF CASES: 235 NUMBER OF VARIABLES: 70

#### Correlational results all cases and selected variables

	TAVGTIME	TAVGERRO	TAVGFOUN	CAVGTIME	CAVGERRO	CAVGFOUN	AGE	GENDER
TAVGTIME	1.00000							
TAVGERRO	.07564	1.00000						
TAVGFOUN	.999999	.999999	1.00000					
CAVGTIME	.33265	-.00706	.999999	1.00000				
CAVGERRO	.08969	.04825	.999999	.10088	1.00000			
CAVGFOUN	.01879	-.14565	.999999	-.08903	-.39165	1.00000		
AGE	.07967	.06158	.999999	.21366	-.19861	.06719	1.00000	
GENDER	-.01901	.03497	.999999	-.00869	-.08134	-.03029	.03222	1.00000
BRANCH	.34496	.01180	.999999	.22214	-.06290	.05340	.22140	.14394
TIS	.05379	.02922	.999999	.18244	-.12623	.07868	.71754	.05088
PAYGRADE	.09592	.07578	.999999	.10506	-.10831	.05946	.70655	.09521
TIPAYGRA	.00079	.09782	.999999	.10473	.04334	-.02905	.27040	-.03777
EODTRAIN	-.02108	-.02933	.999999	.09454	-.08385	.03100	.27292	.03917
TIEODQUA	-.08186	.06231	.999999	.03561	-.17106	.05362	.70230	-.02675
TIAS TECH	-.07804	.05747	.999999	.02910	-.14756	.04384	.63473	-.02463
CURWKING	-.21611	.00237	.999999	-.19320	-.14944	.04613	.23861	-.06313
EODEXPER	-.11296	.02674	.999999	-.07629	-.19531	.01034	.45068	.03716
COMEXPER	-.08567	-.00235	.999999	-.14465	-.16388	-.01319	.02084	.04144
CR7	.12820	-.04092	.999999	.13730	.22369	-.11071	-.23168	-.07853
CR8	.15243	-.00358	.999999	.09049	.18588	.10214	-.06911	-.05723

	BRANCH	TIS	PAYGRADE	TIPAYGRA	EODTRAIN	TIEODQUA	TIAS TECH	CURWKING
BRANCH	1.00000							
TIS	.22251	1.00000						
PAYGRADE	.32708	.62541	1.00000					
TIPAYGRA	.08221	.20071	.03456	1.00000				
EODTRAIN	.19493	.22736	.24202	-.03554	1.00000			
TIEODQUA	-.14597	.59613	.55980	.21079	.21862	1.00000		
TIAS TECH	-.16517	.53712	.51455	.17927	.06784	.93604	1.00000	
CURWKING	-.23124	.21410	.23569	-.03309	.15863	.31811	.32136	1.00000
EODEXPER	-.17770	.36956	.37825	-.04030	.23592	.67818	.65210	.41723
COMEXPER	-.10953	.05244	.11696	-.03287	.07934	.19887	.16784	.14781
CR7	.19668	-.23538	-.26957	.09318	-.14492	-.45165	-.44781	-.37684
CR8	.08724	-.07789	-.14707	.02131	-.06014	-.21822	-.19920	-.17459

EODEXPER 1.00000  
 COMEXPER .24117 1.00000  
 CR7 -.60906 -.25158 1.00000  
 CR8 -.19591 -.70502 .30245 1.00000  
 CRITICAL VALUE (1-TAIL, .05) = + Or - .10760  
 CRITICAL VALUE (2-tail, .05) = +/- .12800  
 N = 235

## AIR FORCE RESULTS

## DESCRIPTIVE STATISTICS

HEADER DATA FOR: A: AIR FORCE DESCRIPTIVE RESULTS

NUMBER OF CASES: 60 NUMBER OF VARIABLES: 66

## Descriptive Results -- Air Force

NO.	NAME	N	MEAN	STD. DEV.	MINIMUM	MAXIMUM
1	AGE	60	332.5333	66.9132	223.0000	484.0000
2	GENDER	60	.9333	.2515	.0000	1.0000
3	BRANCH	60	1.0000	.0000	1.0000	1.0000
4	TIS	60	91.4833	61.8586	7.0000	245.0000
5	PAYGRADE	60	4.7333	1.4364	3.0000	10.0000
6	TIPAYGRA	60	26.8333	19.1543	2.0000	82.0000
7	EODTRAIN	60	8.9833	3.7934	4.0000	26.0000
8	TIEODQUA	60	72.7833	52.9832	.0000	237.0000
9	TIAS TECH	60	68.7833	49.2916	.0000	169.0000
10	CURWKING	60	.9333	.2515	.0000	1.0000
11	EODEXPER	60	5.1667	1.9412	.0000	8.0000
12	COMEXPER	60	3.5167	1.4786	.0000	7.0000
13	T1TIME	60	268.8500	101.3736	87.0000	648.0000
14	T1ERRORS	60	.0167	.1291	.0000	1.0000
15	T1FOUND	60	1.0000	.0000	1.0000	1.0000
16	T2TIME	60	268.1333	135.8458	50.0000	686.0000
17	T2ERRORS	60	.0333	.1810	.0000	1.0000
18	T2FOUND	60	1.0000	.0000	1.0000	1.0000
19	T3TIME	60	277.1500	131.5677	60.0000	660.0000
20	T3ERRORS	60	.0000	.0000	.0000	.0000
21	T3FOUND	60	1.0000	.0000	1.0000	1.0000
22	T4TIME	60	256.4538	116.9064	4.2300	679.0000
23	T4ERRORS	60	.0000	.0000	.0000	.0000
24	T4FOUND	60	1.0000	.0000	1.0000	1.0000
25	TAVGTIME	60	4.4817	1.0412	2.1700	6.9800
26	TAVGERRO	60	.0333	.1810	.0000	1.0000
27	TAVGFOUN	60	4.0000	.0000	4.0000	4.0000
28	C1TIME	60	476.2000	222.6634	165.0000	1300.0000
29	C1ERRORS	60	.0000	.0000	.0000	.0000
30	C1FOUND	60	1.0000	.0000	1.0000	1.0000
31	C2TIME	60	635.7500	342.3064	215.0000	1720.0000
32	C2ERRORS	60	.3167	.5365	.0000	2.0000
33	C2FOUND	60	1.0000	.0000	1.0000	1.0000
34	C3TIME	60	587.4167	252.3731	209.0000	1690.0000
35	C3ERRORS	60	.2167	.5237	.0000	2.0000
36	C3FOUND	60	.9833	.1291	.0000	1.0000
37	C4TIME	60	396.3833	196.4739	148.0000	1290.0000
38	C4ERRORS	60	.0167	.1291	.0000	1.0000
39	C4FOUND	60	1.0000	.0000	1.0000	1.0000
40	CAVGTIME	60	8.8397	2.3728	4.0900	14.5500
41	CAVGERRO	60	.6000	.9777	.0000	4.0000
42	CAVGFOUN	60	3.9167	.5302	.0000	4.0000
43	S1TT	60	116.9333	131.4810	.0000	361.0000
44	S2TT	60	102.3667	143.1697	.0000	660.0000
45	S3TT	60	149.6833	173.9760	.0000	495.0000
46	S4TT	60	145.1667	164.1849	.0000	648.0000
47	S5TT	60	130.1500	146.3774	.0000	553.0000
48	S6TT	60	122.3333	143.2934	.0000	467.0000
49	S7TT	60	170.9000	193.2141	.0000	686.0000

50	S8TT	60	140.5333	169.6216	.0000	679.0000
51	C1TT	60	192.7333	242.7238	.0000	885.0000
52	C2TT	60	355.2000	399.6819	.0000	1329.0000
53	C3TT	60	330.0333	389.7306	.0000	1690.0000
54	C4TT	60	216.5167	235.6297	.0000	719.0000
55	C5TT	60	179.5667	198.5418	.0000	562.0000
56	C6TT	60	270.9667	359.2746	.0000	1720.0000
57	C7TT	60	270.9667	343.2590	.0000	1708.0000
58	C8TT	60	283.7000	352.9070	.0000	1300.0000
59	CR1	60	5.9667	2.1704	1.0000	9.0000
60	CR2	60	1.7000	1.3058	1.0000	8.0000
61	CR3	60	7.3000	2.2270	1.0000	9.0000
62	CR4	60	1.8333	1.5641	1.0000	8.0000
63	CR5	60	1.7833	1.2226	1.0000	8.0000
64	CR6	60	6.6500	2.1299	1.0000	9.0000
65	CR7	60	2.8333	2.1642	1.0000	9.0000
66	CR8	60	5.4833	2.0377	1.0000	9.0000

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODAF LABEL:

NUMBER OF CASES: 60 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Comparison of average times to complete

	GROUP	MEAN	N		
	1	4.482	60		
	2	8.840	60		
	GRAND MEAN	6.661	120		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	569.765	1	569.765	169.715	1.000E-13
WITHIN	396.148	118	3.357		
TOTAL	965.913	119			

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODAF LABEL:

NUMBER OF CASES: 60 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Airforce comparison of error rates

	GROUP	MEAN	N		
	1	.033	60		
	2	.600	60		
	GRAND MEAN	.317	120		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	9.633	1	9.633	19.487	2.256E-05
WITHIN	58.333	118	.494		
TOTAL	67.967	119			

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODAF LABEL:

NUMBER OF CASES: 60 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Air Force comparison of number of tests found

	GROUP	MEAN	N		
	1	4.000	60		
	2	3.917	60		
	GRAND MEAN	3.958	120		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	.208	1	.208	1.482	.2258
WITHIN	16.583	118	.141		
TOTAL	16.792	119			

**CORRELATION MATRIX**

HEADER DATA FOR: A:EODAF LABEL:

NUMBER OF CASES: 60 NUMBER OF VARIABLES: 70

**Air Force Correlations**

	TAVGTIME	TAVGERRO	TAVGFOUN	CAVGTIME	CAVGERRO	CAVGFOUN	AGE	GENDER
TAVGTIME	1.00000							
TAVGERRO	.11390	1.00000						
TAVGFOUN	99.99999	99.99999	1.00000					
CAVGTIME	.46150	-.02562	99.99999	1.00000				
CAVGERRO	.42038	.07661	99.99999	.32125	1.00000			
CAVGFOUN	.13504	.02943	99.99999	-.01727	-.52317	1.00000		
AGE	-.03560	.14823	99.99999	.16453	-.04435	.03759	1.00000	
GENDER	-.15487	.04963	99.99999	-.09403	-.04135	-.04236	-.02303	1.00000
BRANCH	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999
TIS	.01671	.14082	99.99999	.19868	-.02225	.01003	.93665	.02062
PAYGRADE	-.03483	.03476	99.99999	.28238	-.06517	-.00742	.83931	.09069
TIPAYGRA	.05705	.23627	99.99999	-.09873	.13757	-.08985	.40024	-.05159
EODTRAIN	-.09950	-.14727	99.99999	-.11321	-.02468	-.06812	.04912	-.00118
TIEODQUA	-.05642	.09266	99.99999	.04297	-.06681	.00357	.89269	-.02018
TIAS TECH	.03111	.11480	99.99999	.20374	-.02188	-.00913	.77751	-.04356
CURWKIN	G -.09793	.04963	99.99999	.13939	-.04135	-.04236	.29517	-.07143
EODEXPER	-.17145	.08039	99.99999	-.06096	-.12502	-.15096	.73028	.12727
COMEXPER	-.27415	-.06544	99.99999	-.25093	-.13600	-.09550	.05730	.13975
CR7	-.08825	-.07211	99.99999	.11713	.31240	-.33730	-.37930	-.08302
CR8	.26682	.13938	99.99999	.24759	.14122	.22618	-.15606	-.10140
	BRANCH	TIS	PAYGRADE	TIPAYGRA	EODTRAIN	TIEODQUA	TIAS TECH	CURWKIN
BRANCH	1.00000							
TIS	99.99999	1.00000						
PAYGRADE	99.99999	.91079	1.00000					
TIPAYGRA	99.99999	.39713	.17085	1.00000				
EODTRAIN	99.99999	.03962	.08005	-.16403	1.00000			
TIEODQUA	99.99999	.92336	.76667	.50014	.04864	1.00000		
TIAS TECH	99.99999	.79250	.69745	.41057	.11655	.82498	1.00000	
CURWKIN	99.99999	.35393	.27832	.25797	.26525	.37024	.37609	1.00000
EODEXPER	99.99999	.76236	.69700	.32622	.17531	.81393	.75851	.33553
COMEXPER	99.99999	.08877	.08193	.24966	.04387	.12305	-.05914	.09418
CR7	99.99999	-.34389	-.34713	-.07101	.02237	-.37784	-.33877	-.05189
CR8	99.99999	-.22469	-.24475	-.11515	-.07788	-.24078	-.11959	-.16754
	EODEXPER	COMEXPER	CR7	CR8				
EODEXPER	1.00000							
COMEXPER	.12893	1.00000						
CR7	-.39268	.06444	1.00000					
CR8	-.27351	-.54558	.26071	1.00000				

CRITICAL VALUE (1-TAIL, .05) = + Or - .21453

CRITICAL VALUE (2-tail, .05) = +/- .25398

N = 60

## ARMY

## DESCRIPTIVE STATISTICS

HEADER DATA FOR: C:EODAR LABEL:

NUMBER OF CASES: 36 NUMBER OF VARIABLES: 70

Descriptive results all data--Army

NO.	NAME	N	MEAN	STD. DEV.	MINIMUM	MAXIMUM
1	AGE	36	347.0833	69.6585	242.0000	569.0000
2	GENDER	36	.9444	.2323	.0000	1.0000
3	BRANCH	36	2.0000	.0000	2.0000	2.0000
4	TIS	36	102.1667	58.9985	14.0000	262.0000
5	PAYGRADE	36	6.1111	1.7366	4.0000	10.0000
6	TIPAYGRA	36	20.2222	15.4182	2.0000	60.0000
7	EODTRAIN	36	10.7500	4.2114	6.0000	24.0000
8	TIEODQUA	36	59.0556	55.4411	1.0000	170.0000
9	TIAS TECH	36	57.5556	55.0519	.0000	170.0000
10	CURWKING	36	1.0000	.0000	1.0000	1.0000
11	EODEXPER	36	5.2500	2.0195	1.0000	9.0000
12	COMEXPER	36	3.2500	1.8107	.0000	7.0000
13	T1TIME	36	311.3611	144.4687	88.0000	770.0000
14	T1ERRORS	36	.0000	.0000	.0000	.0000
15	T1FOUND	36	1.0000	.0000	1.0000	1.0000
16	T2TIME	36	283.8333	141.9741	38.0000	650.0000
17	T2ERRORS	36	.0278	.1667	.0000	1.0000
18	T2FOUND	36	1.0000	.0000	1.0000	1.0000
19	T3TIME	36	263.1944	115.1662	75.0000	595.0000
20	T3ERRORS	36	.0000	.0000	.0000	.0000
21	T3FOUND	36	1.0000	.0000	1.0000	1.0000
22	T4TIME	36	249.6944	134.3300	50.0000	758.0000
23	T4ERRORS	36	.0000	.0000	.0000	.0000
24	T4FOUND	36	1.0000	.0000	1.0000	1.0000
25	TAVGTIME	36	4.5861	1.3575	1.9500	6.9400
26	TAVGERRO	36	.0278	.1667	.0000	1.0000
27	TAVGFOUN	36	4.0000	.0000	4.0000	4.0000
28	C1TIME	36	441.3056	241.5784	147.0000	1228.0000
29	C1ERRORS	36	.0278	.1667	.0000	1.0000
30	C1FOUND	36	1.0000	.0000	1.0000	1.0000
31	C2TIME	36	552.0278	287.0633	233.0000	1230.0000
32	C2ERRORS	36	.1389	.3507	.0000	1.0000
33	C2FOUND	36	.9444	.2323	.0000	1.0000
34	C3TIME	36	471.8611	243.7331	56.0000	1131.0000
35	C3ERRORS	36	.2778	.7787	.0000	4.0000
36	C3FOUND	36	.9722	.1667	.0000	1.0000
37	C4TIME	36	342.4444	154.8056	162.0000	758.0000
38	C4ERRORS	36	.0000	.0000	.0000	.0000
39	C4FOUND	36	1.0000	.0000	1.0000	1.0000
40	CAVGTIME	36	7.8347	2.6556	3.7500	18.1300
41	CAVGERRO	36	.4167	.9373	.0000	4.0000
42	CAVGFOUN	36	3.9167	.2803	3.0000	4.0000
43	S1TT	36	198.0556	224.4201	.0000	770.0000
44	S2TT	36	126.8889	142.3920	.0000	454.0000
45	S3TT	36	165.6389	172.6440	.0000	595.0000
46	S4TT	36	115.6667	142.0358	.0000	550.0000
47	S5TT	36	120.8611	148.0112	.0000	414.0000

48	S6TT	36	122.5000	168.6102	.0000	650.0000
49	S7TT	36	133.1111	177.3300	.0000	643.0000
50	S8TT	36	126.5556	157.4018	.0000	554.0000
51	C1TT	36	158.6944	209.9332	.0000	716.0000
52	C2TT	36	308.2778	398.1532	.0000	1131.0000
53	C3TT	36	217.1111	309.2240	.0000	1230.0000
54	C4TT	36	193.2778	276.3337	.0000	1228.0000
55	C5TT	36	178.5278	201.8879	.0000	899.0000
56	C6TT	36	245.9722	288.1818	.0000	1095.0000
57	C7TT	36	266.6667	272.9387	.0000	800.0000
58	C8TT	36	240.9444	267.0969	.0000	1111.0000
59	CR1	36	5.5556	2.1836	2.0000	9.0000
60	CR2	36	2.0556	1.4332	1.0000	6.0000
61	CR3	36	7.1944	2.1754	2.0000	9.0000
62	CR4	36	2.0278	1.7966	1.0000	7.0000
63	CR5	36	1.9167	1.1557	1.0000	6.0000
64	CR6	36	6.7222	2.1595	2.0000	9.0000
65	CR7	36	2.9444	2.5405	1.0000	9.0000
66	CR8	36	5.3333	2.1909	1.0000	9.0000
67		36	.0000	.0000	.0000	.0000
68		36	.0000	.0000	.0000	.0000
69		36	.0000	.0000	.0000	.0000
70		36	.0000	.0000	.0000	.0000

ANALYSIS OF VARIANCE

HEADER DATA FOR: C:EODAR LABEL:

NUMBER OF CASES: 36 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Comparison of completion times -- Army

	GROUP	MEAN	N			
	1	4.586	36			
	2	7.835	36			
	GRAND MEAN	6.210	72			
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.	
BETWEEN	189.963	1	189.963	42.712	8.682E-09	
WITHIN	311.325	70	4.448			
TOTAL	501.288	71				

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODAR LABEL:

NUMBER OF CASES: 36 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Army comparison of error rates

	GROUP	MEAN	N			
	1	.028	36			
	2	.417	36			
	GRAND MEAN	.222	72			
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.	
BETWEEN	2.722	1	2.722	6.007	.0167	
WITHIN	31.722	70	.453			
TOTAL	34.444	71				

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODAR LABEL:

NUMBER OF CASES: 36 NUMBER OF VARIABLES: 70

ONE-WAY ANOVA

Army comparison of shapes found

	GROUP	MEAN	N			
	1	4.000	36			
	2	3.917	36			
	GRAND MEAN	.958	72			
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.	
BETWEEN	.125	1	.125	3.182	.0788	
WITHIN	2.750	70	.039			
TOTAL	2.875	71				

### CORRELATION MATRIX

HEADER DATA FOR: C:EODAR LABEL:

NUMBER OF CASES: 36 NUMBER OF VARIABLES: 70

#### Correlation of selected variables -- Army

	TAVGTIME	TAVGERRO	TAVGFOUN	CAVGTIME	CAVGERRO	CAVGFOUN	AGE	GENDER
TAVGTIME	1.00000							
TAVGERRO	.26064	1.00000						
TAVGFOUN	99.99999	99.99999	1.00000					
CAVGTIME	.30595	.22370	99.99999	1.00000				
CAVGERRO	.15872	.28958	99.99999	.23954	.00000			
CAVGFOUN	-.10375	.05096	99.99999	-.09541	-.51654	1.00000		
AGE	.08012	.21390	99.99999	.38281	-.19046	.25059	1.00000	
GENDER	-.20003	.04100	99.99999	-.27281	-.28429	-.07313	.02325	1.00000
BRANCH	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999
TIS	-.06848	.05182	99.99999	.25375	-.21364	.24965	.79033	-.00764
PAYGRADE	.17023	.38389	99.99999	.10991	.21648	-.03913	.49803	.08656
TPAYGRA	.23498	-.00247	99.99999	.11600	-.16475	.18951	.13236	-.17992
EODTRAIN	-.11687	-.19335	99.99999	.16545	-.07419	-.09076	.16496	.07301
TIEODQUA	-.01472	.04003	99.99999	.22972	-.32485	.24851	.70667	-.01306
TIASTECH	-.03928	.04498	99.99999	.22420	-.31634	.24193	.70565	.02259
CURWKING	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999
EODEXPER	-.26133	-.19099	99.99999	.08752	-.44903	.23974	.49033	.15225
COMEXPER	-.04888	-.02367	99.99999	-.13204	.12205	-.18295	-.22828	.23773
CR7	.11882	.13871	99.99999	.07491	.29796	-.12705	-.44284	-.34426
CR8	-.20101	-.18257	99.99999	-.11750	-.23652	.46524	.16681	-.24326
	BRANCH	TIS	PAYGRADE	IPAYGRA	EODTRAIN	TIEODQUA	TIASTECH	CURWKING
BRANCH	1.00000							
TIS	99.99999	1.00000						
PAYGRADE	99.99999	.38324	1.00000					
TPAYGRA	99.99999	.16552	.02359	1.00000				
EODTRAIN	99.99999	.28719	.00000	.03344	1.00000			
TIEODQUA	99.99999	.66507	.29045	.24208	.29620	1.00000		
TIASTECH	99.99999	.66110	.29340	.20963	.30316	.99666	1.00000	
CURWKING	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	1.00000
EODEXPER	99.99999	.50488	.00000	.18352	.31326	.75903	.75142	99.99999
COMEXPER	99.99999	-.15231	.27259	-.07164	-.00656	-.12367	-.10920	99.99999
CR7	99.99999	-.41111	-.39360	-.01426	-.22833	-.52558	-.53113	99.99999
CR8	99.99999	.19275	-.28035	.01043	.04645	.12827	.11828	99.99999
	EODEXPER	COMEXPER	CR7	CR8				
EODEXPER	1.00000							
COMEXPER	-.09571	1.00000						
CR7	-.63206	-.11491	1.00000					
CR8	.22601	-.65541	.04962	1.00000				

CRITICAL VALUE (1-TAIL, .05) = + Or - .27881

CRITICAL VALUE (2-TAIL, .05) = +/- .32860

N = 36

## MARINE CORPS

## DESCRIPTIVE STATISTICS

HEADER DATA FOR: A:DESCRIPTIVE RESULTS MARINE CORPS

NUMBER OF CASES: 52 NUMBER OF VARIABLES: 66

Descriptive Results Marine Corps						
NO.	NAME	N	MEAN	STD. DEV.	MINIMUM	MAXIMUM
1	AGE	52	358.6154	60.1688	264.0000	564.0000
2	GENDER	52	1.0000	.0000	1.0000	1.0000
3	BRANCH	52	3.0000	.0000	3.0000	3.0000
4	TIS	52	122.3077	62.1534	48.0000	356.0000
5	PAYGRADE	52	5.9423	1.5264	4.0000	10.0000
6	TIPAYGRA	52	25.7885	15.5240	2.0000	61.0000
7	EODTRAIN	52	7.6346	1.6092	5.0000	15.0000
8	TIEODQUA	52	51.0000	61.3438	.0000	252.0000
9	TIASTECH	52	50.6346	60.8151	.0000	246.0000
10	CURWKING	52	.9615	.1942	.0000	1.0000
11	EODEXPER	52	4.4615	2.0045	1.0000	9.0000
12	COMEXPER	52	2.6923	1.9152	.0000	8.0000
13	T1TIME	52	279.2500	135.7938	80.0000	715.0000
14	T1ERRORS	52	.0000	.0000	.0000	.0000
15	T1FOUND	52	1.0000	.0000	1.0000	1.0000
16	T2TIME	52	303.7308	182.8114	56.0000	880.0000
17	T2ERRORS	52	.0192	.1387	.0000	1.0000
18	T2FOUND	52	1.0000	.0000	1.0000	1.0000
19	T3TIME	52	274.1346	155.2381	85.0000	940.0000
20	T3ERRORS	52	.0385	.1942	.0000	1.0000
21	T3FOUND	52	1.0000	.0000	1.0000	1.0000
22	T4TIME	52	256.0000	99.7088	97.0000	529.0000
23	T4ERRORS	52	.0000	.0000	.0000	.0000
24	T4FOUND	52	1.0000	.0000	1.0000	1.0000
25	TAVGTIME	52	4.6298	1.5640	2.2100	10.5200
26	TAVGERRRO	52	.0577	.2354	.0000	1.0000
27	TAVGFOUN	52	4.0000	.0000	4.0000	4.0000
28	C1TIME	52	647.6154	584.2639	190.0000	3610.0000
29	C1ERRORS	52	.0385	.1942	.0000	1.0000
30	C1FOUND	52	1.0000	.0000	1.0000	1.0000
31	C2TIME	52	655.2115	600.2886	110.0000	3554.0000
32	C2ERRORS	52	.1154	.4272	.0000	2.0000
33	C2FOUND	52	.9808	.1387	.0000	1.0000
34	C3TIME	52	608.2308	480.5410	125.0000	2971.0000
35	C3ERRORS	52	.1346	.3446	.0000	1.0000
36	C3FOUND	52	1.0000	.0000	1.0000	1.0000
37	C4TIME	52	439.2692	392.8531	100.0000	1957.0000
38	C4ERRORS	52	.0192	.1387	.0000	1.0000
39	C4FOUND	52	1.1154	.5826	1.0000	4.0000
40	CAVGTIME	52	9.4529	4.7754	3.9500	24.7200
41	CAVGERRRO	52	.3269	.5848	.0000	2.0000
42	CAVGFOUN	52	3.9231	.4359	1.0000	4.0000
43	S1TT	52	154.6538	163.6435	.0000	561.0000
44	S2TT	52	136.6731	187.0650	.0000	840.0000
45	S3TT	52	150.7885	173.3329	.0000	710.0000
46	S4TT	52	150.8462	167.2416	.0000	701.0000
47	S5TT	52	112.0769	141.9123	.0000	405.0000
48	S6TT	52	126.6154	158.1821	.0000	505.0000
49	S7TT	52	163.8462	228.5512	.0000	940.0000

50	S8TT	52	118.9231	161.3193	.0000	715.0000
51	C1TT	52	225.6731	369.1787	.0000	1568.0000
52	C2TT	52	291.0577	418.2903	.0000	2042.0000
53	C3TT	52	358.9808	660.1204	.0000	3554.0000
54	C4TT	52	246.2692	394.7258	.0000	1850.0000
55	C5TT	52	192.7885	211.1584	.0000	683.0000
56	C6TT	52	265.5000	344.1206	.0000	1605.0000
57	C7TT	52	347.9038	513.7969	.0000	2971.0000
58	C8TT	52	422.1538	670.8278	.0000	3610.0000
59	CR1	52	5.1346	1.9304	1.0000	9.0000
60	CR2	52	2.0577	1.3491	1.0000	8.0000
61	CR3	52	7.0577	1.9037	1.0000	9.0000
62	CR4	52	2.3654	2.1423	1.0000	11.0000
63	CR5	52	2.2885	1.8717	.0000	9.0000
64	CR6	52	6.4615	2.0240	1.0000	9.0000
65	CR7	52	3.3269	2.3408	1.0000	9.0000
66	CR8	52	5.9423	2.5469	.0000	9.0000

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODMC LABEL:  
 NUMBER OF CASES: 52 NUMBER OF VARIABLES: 70  
 ONE-WAY ANOVA

Marine Corps comparison of average completion times

	GROUP	MEAN	N		
	1	4.630	52		
	2	9.453	52		
	GRAND MEAN	7.041	104		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	604.814	1	604.814	47.906	4.053E-10
WITHIN	1287.754	102	12.625		
TOTAL	1892.568	103			

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODMC LABEL:  
 NUMBER OF CASES: 52 NUMBER OF VARIABLES: 70  
 ONE-WAY ANOVA

Marine Corps comparison of error rates

	GROUP	MEAN	N		
	1	.058	52		
	2	.327	52		
	GRAND MEAN	.192	104		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	1.885	1	1.885	9.484	2.664E-03
WITHIN	20.269	102	.199		
TOTAL	22.154	103			

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODMC LABEL:  
 NUMBER OF CASES: 52 NUMBER OF VARIABLES: 70  
 ONE-WAY ANOVA

Marine corps comparison of average found

	GROUP	MEAN	N		
	1	4.000	52		
	2	3.923	52		
	GRAND MEAN	3.962	104		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	.154	1	.154	1.619	.2061
WITHIN	9.692	102	.095		
TOTAL	9.846	103			

**CORRELATION MATRIX**

HEADER DATA FOR: A:EODMC LABEL:

NUMBER OF CASES: 52 NUMBER OF VARIABLES: 70

**Marine Corps Correlations**

TAVGTIME	TAVGERRO	TAVGFOUN	CAVGTIME	CAVGGERRO	CAVGFOUN	AGE	GENDER		
TAVGTIME	1.0000								
TAVGERRO	.1113	1.0000							
TAVGFOUN	99.9999	99.9999	1.0000						
CAVGTIME	.08949	.03002	99.9999	1.0000					
CAVGGERRO	.15764	-.13967	99.9999	.23248	1.0000				
CAVGFOUN	-.08055	-.52904	99.9999	-.30732	-.05325	1.0000			
AGE	.05271	.01682	99.9999	.37622	-.16520	-.09982	1.0000		
GENDER	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	1.0000	
BRANCH	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	1.0000
TIS	.03567	.00412	99.9999	.31185	-.11880	.02405	.89494	99.9999	99.9999
PAYGRADE	.01601	-.09968	99.9999	.32000	-.02239	.08160	.66607	99.9999	99.9999
TIPAYGRA	-.18664	.23409	99.9999	.01625	-.11750	-.05460	.29600	99.9999	99.9999
EODTRAIN	.06861	.00498	99.9999	.09159	-.01643	-.01290	.32356	99.9999	99.9999
TIEODQUA	-.05389	-.01629	99.9999	.33187	-.07707	-.00880	.82428	99.9999	99.9999
TIAS TECH	-.05690	-.01493	99.9999	.33683	-.07431	-.00996	.82272	99.9999	99.9999
CURWKING	.05034	-.37940	99.9999	.20248	.11290	-.03563	.09437	99.9999	99.9999
EODEXPER	.02079	-.05753	99.9999	.16076	-.11451	.04142	.31006	99.9999	99.9999
COMEXPER	-.08250	.04014	99.9999	-.02018	-.24104	.04155	-.02334	99.9999	99.9999
CR7	-.04112	.07184	99.9999	-.00826	.09228	.02513	-.10796	99.9999	99.9999
CR8	.16515	-.02704	99.9999	.07006	.31569	-.00408	-.02433	99.9999	99.9999
BRANCH	1.0000	TIS	PAYGRADE	TIPAYGRA	EODTRAIN	TIEODQUA	TIAS TECH	CURWKING	
TIS	99.9999	1.0000							
PAYGRADE	99.9999	.72997	1.0000						
TIPAYGRA	99.9999	.37492	-.06176	1.0000					
EODTRAIN	99.9999	.38933	.45426	-.06281	1.0000				
TIEODQUA	99.9999	.87324	.78967	.18755	.44356	1.0000			
TIAS TECH	99.9999	.87012	.79060	.18715	.44522	.99967	1.0000		
CURWKING	99.9999	.01562	.12467	-.45156	.20515	.16790	.16814	1.0000	
EODEXPER	99.9999	.32116	.51513	-.26838	.36333	.44122	.43859	.34874	
COMEXPER	99.9999	.04776	.06088	-.05169	-.15808	.12050	.11686	.12572	
CR7	99.9999	-.16958	-.32937	.28739	-.22274	-.30970	-.30713	-.44631	
CR8	99.9999	-.04980	-.09670	-.04396	.13828	-.19114	-.18939	-.08387	
EODEXPER	1.0000	COMEXPER	CR7	CR8					
COMEXPER	.27265	1.0000							
CR7	-.60111	-.26141	1.0000						
CR8	-.11758	-.74735	.15780	1.0000					

CRITICAL VALUE (1-TAIL, .05) = + Or - .23080

CRITICAL VALUE (2-tail, .05) = +/- .27296

N = 52

NAVY

DESCRIPTIVE STATISTICS

HEADER DATA FOR: A:DESCRIPTIVE RESULTS NAVY

NUMBER OF CASES: 87 NUMBER OF VARIABLES: 66

Descriptive Results--Navy

NO.	NAME	N	MEAN	STD. DEV.	MINIMUM	MAXIMUM
1	AGE	87	370.4483	70.3527	228.0000	528.0000
2	GENDER	87	.9885	.1072	.0000	1.0000
3	BRANCH	87	4.0000	.0000	4.0000	4.0000
4	TIS	87	132.3908	93.1711	5.0000	746.0000
5	PAYGRADE	87	6.2989	1.7193	3.0000	10.0000
6	TIPAYGRA	87	29.4713	22.2490	1.0000	96.0000
7	EODTRAIN	87	14.9655	16.9002	2.0000	132.0000
8	TIEODQUA	87	52.2414	52.5830	.0000	248.0000
9	TIASTECH	87	46.2874	51.0043	.0000	236.0000
10	CURWKING	87	.7586	.4304	.0000	1.0000
11	EODEXPER	87	4.3563	2.1403	.0000	9.0000
12	COMEXPER	87	3.0805	1.8122	.0000	7.0000
13	T1TIME	87	382.3103	170.4523	92.0000	1039.0000
14	T1ERRORS	87	.0000	.0000	.0000	.0000
15	T1FOUND	87	1.0000	.0000	1.0000	1.0000
16	T2TIME	87	350.2299	172.4904	34.0000	900.0000
17	T2ERRORS	87	.0345	.1835	.0000	1.0000
18	T2FOUND	87	1.0000	.0000	1.0000	1.0000
19	T3TIME	87	356.0575	190.3188	57.0000	992.0000
20	T3ERRORS	87	.0230	.1507	.0000	1.0000
21	T3FOUND	87	1.0000	.0000	1.0000	1.0000
22	T4TIME	87	316.8391	147.1986	76.0000	928.0000
23	T4ERRORS	87	.0000	.0000	.0000	.0000
24	T4FOUND	87	1.0000	.0000	1.0000	1.0000
25	TAVGTIME	87	5.8671	1.6896	3.3100	14.2600
26	TAVGERRO	87	.0345	.1835	.0000	1.0000
27	TAVGFOUN	87	4.0000	.0000	4.0000	4.0000
28	C1TIME	87	613.6932	405.0353	5.3100	1934.0000
29	C1ERRORS	87	.0230	.1507	.0000	1.0000
30	C1FOUND	87	1.0000	.0000	1.0000	1.0000
31	C2TIME	87	703.0000	399.4152	180.0000	2687.0000
32	C2ERRORS	87	.1839	.4707	.0000	3.0000
33	C2FOUND	87	.9770	.1507	.0000	1.0000
34	C3TIME	87	770.2069	534.5070	165.0000	3400.0000
35	C3ERRORS	87	.2414	.5899	.0000	3.0000
36	C3FOUND	87	.9885	.1072	.0000	1.0000
37	C4TIME	87	554.6782	542.6971	120.0000	3600.0000
38	C4ERRORS	87	.0345	.2386	.0000	2.0000
39	C4FOUND	87	.9885	.1072	.0000	1.0000
40	CAVGTIME	87	10.9255	5.1229	4.3400	32.0400
41	CAVGERRO	87	.4598	.8734	.0000	3.0000
42	CAVGFOUN	87	3.9655	.1835	3.0000	4.0000
43	S1TT	87	210.4023	254.4647	.0000	1039.0000
44	S2TT	87	124.9195	181.9690	.0000	992.0000
45	S3TT	87	216.6552	257.7736	.0000	907.0000
46	S4TT	87	160.8276	190.7768	.0000	849.0000
47	S5TT	87	152.5402	174.5925	.0000	720.0000
48	S6TT	87	179.8161	204.9032	.0000	786.0000
49	S7TT	87	184.8966	214.9456	.0000	899.0000

50	S8TT	87	179.2759	212.7690	.0000	769.0000
51	C1TT	87	309.7471	542.5995	.0000	3600.0000
52	C2TT	87	453.8046	581.1278	.0000	2687.0000
53	C3TT	87	361.5402	454.9541	.0000	2001.0000
54	C4TT	87	284.4253	365.1191	.0000	1745.0000
55	C5TT	87	230.6552	331.2449	.0000	1934.0000
56	C6TT	87	322.8276	417.1417	.0000	1973.0000
57	C7TT	87	310.7816	405.4931	.0000	2158.0000
58	C8TT	87	349.5057	508.9294	.0000	3075.0000
59	CR1	87	6.4483	1.9752	1.0000	9.0000
60	CR2	87	1.8851	1.2240	1.0000	8.0000
61	CR3	87	7.7241	1.7764	1.0000	9.0000
62	CR4	87	1.7471	1.3487	1.0000	9.0000
63	CR5	87	1.8276	1.2124	1.0000	6.0000
64	CR6	87	6.6782	2.2020	1.0000	9.0000
65	CR7	87	4.0690	2.8765	1.0000	9.0000
66	CR8	87	5.8736	2.1339	1.0000	9.0000

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODNA LABEL:  
 NUMBER OF CASES: 87 NUMBER OF VARIABLES: 70  
 ONE-WAY ANOVA

Navy comparison of average completion times

	GROUP	MEAN	N		
	1	5.867	87		
	2	10.926	87		
	GRAND MEAN	8.396	174		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	1113.048	1	1113.048	76.50C	1.000E-13
WITHIN	2502.527	172	14.550		
TOTAL	3615.575	173			

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODNA LABEL:  
 NUMBER OF CASES: 87 NUMBER OF VARIABLES: 70  
 ONE-WAY ANOVA

Navy comparison of error rates

	GROUP	MEAN	N		
	1	.034	87		
	2	.460	87		
	GRAND MEAN	.247	174		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	7.868	1	7.868	19.754	1.574E-05
WITHIN	68.506	172	.398		
TOTAL	76.374	173			

ANALYSIS OF VARIANCE

HEADER DATA FOR: A:EODNA LABEL:  
 NUMBER OF CASES: 87 NUMBER OF VARIABLES: 70  
 ONE-WAY ANOVA

Navy comparison of average found

	GROUP	MEAN	N		
	1	4.000	87		
	2	3.966	87		
	GRAND MEAN	3.983	174		
SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROB.
BETWEEN	.052	.1	.052	3.071	.0815
WITHIN	2.897	172	.017		
TOTAL	2.948	173			

### CORRELATION MATRIX

HEADER DATA FOR: A:EODNA LABEL:

NUMBER OF CASES: 87 NUMBER OF VARIABLES: 70

#### Navy Correlations

	TAVGTIME	TAVGERRO	TAVGFOUN	CAVGTIME	CAVGERRO	CAVGFOUN	AGE	GENDER
TAVGTIME	1.00000							
TAVGERRO	.01307	1.00000						
TAVGFOUN	99.99999	99.99999	1.00000					
CAVGTIME	.32030	-.07676	99.99999	1.00000				
CAVGERRO	-.07749	.04502	99.99999	-.02199	1.00000			
CAVGFOUN	-.03707	.03571	99.99999	-.02799	-.55280	1.00000		
AGE	-.02499	-.02102	99.99999	.06028	-.30805	.19214	1.00000	
GENDER	.06786	.02038	99.99999	.05326	.05709	-.02038	.01611	1.00000
BRANCH	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999	99.99999
TIS	-.04535	-.01848	99.99999	.05547	-.14155	.16741	.53838	.04236
PAYGRADE	-.05950	.11436	99.99999	-.12833	-.25516	.18044	.71937	.01885
TIPAYGRA	-.09986	-.02111	99.99999	.13581	.08147	-.04723	.21587	-.00258
EODTRAIN	-.19439	.00039	99.99999	.05537	-.13834	.10084	.35829	.05754
TIEODQUA	-.05620	.13529	99.99999	-.13493	-.29229	.18884	.68207	.03350
TIAS TECH	-.03330	.10203	99.99999	-.18710	-.25383	.17250	.58729	.04739
CURWKING	-.17222	.10660	99.99999	-.27288	-.28905	.33503	.43256	-.06083
EODEXPER	-.00180	.14597	99.99999	-.15124	-.21928	.17966	.48767	-.03262
COMEXPER	-.02138	.02652	99.99999	-.18233	-.33953	.14829	.19206	-.11488
CR7	.12498	-.15874	99.99999	.13769	.22789	-.06152	-.26481	-.03510
CR8	.19102	-.01843	99.99999	.06338	.38716	-.15972	-.19953	.04440
BRANCH	1.00000	TIS	PAYGRADE	TIPAYGRA	EODTRAIN	TIEODQUA	TIAS TECH	CURWKING
TIS	99.99999	1.00000						
PAYGRADE	99.99999	.53488	1.00000					
TIPAYGRA	99.99999	.06119	.00357	1.00000				
EODTRAIN	99.99999	.23580	.28728	-.06870	1.00000			
TIEODQUA	99.99999	.47136	.71725	.07655	.37439	1.00000		
TIAS TECH	99.99999	.40811	.63892	.08121	.09957	.92793	1.00000	
CURWKING	99.99999	.33903	.46002	.01080	.28179	.43419	.41900	1.00000
EODEXPER	99.99999	.32706	.50790	-.16375	.37518	.70800	.67533	.52363
COMEXPER	99.99999	.15827	.23476	-.14861	.13753	.38868	.40545	.21899
CR7	99.99999	-.29066	-.36629	.08706	-.27789	-.53071	-.52544	-.46540
CR8	99.99999	-.15830	-.16389	.10781	-.12845	-.35123	.37038	-.23618
EODEXPER	1.00000	COMEXPER	CR7	CR8				
COMEXPER	.37026	1.00000						
CR7	-.68397	-.41597	1.00000					
CR8	-.32863	-.78213	.48639	1.00000				

CRITICAL VALUE (1-TAIL, .05) = + Or - .17760  
 CRITICAL VALUE (2-tail, .05) = +/- .21969  
 N = 87

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