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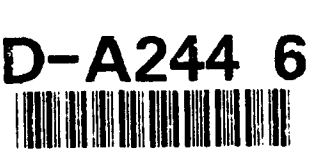

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BASE CLOSURE AND HEALTH COVERAGE; THE CASE
OF
SILAS B. HAYS ARMY COMMUNITY HOSPITAL AND FORT ORD

by

YOLANDA E. MCCARDEN

December 1991

Thesis Advisor: Professor L. R. Jones

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SILAS B. HAYS ARMY COMMUNITY HOSPITAL AND FORT ORD

by

Yolanda E. McCarden

Lieutenant, United States Navy
B.B.A, Savannah State College , 1985

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Author: Yolanda E. McCarden

Approved by: L.R. Jones, Thesis Advisor

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ABSTRACT

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I. INTRODUCTION

As the Soviets forces pull back, the phenomenal changes in eastern Europe have reduced demands and need for federal spending on defense. Secretary of Defense Dick Cheney stated during a October 1990 news conference that the changes in the nature of the threat and the realities of the budget simply means that our defense budgets are going to be leaner in the years ahead (FY 90 DoD budget totalled $293.0 billion expected to decrease to $277.9 billion by FY 95). Repercussions from the easing of Soviet relations in Europe and the growing national deficit have placed considerable pressure on the Department of Defense (DoD) to trim its personnel missions and weapons systems. Another facet of this changing environment is the cold, hard reality that extensive base closing will be a fact of life in the coming years [Ref. 1]. This has resulted in the proposed closure and realignment of more domestic military bases. In support of the Fiscal Year 1992-93 President Budget the DoD submitted a plan to eliminate or close a total of 86 domestic bases and 139 oversees sites [Ref. 2]. This is described as one U.S. largest military reduction programs ever undertaken. The commission estimated that the savings projected to be incurred from this evolution would total $693.6 million a year in operating costs and $5.6 billion over 20 years. "We cannot responsibly reduce the defense budget without looking at bases...," Secretary of Defense Dick Cheney said at a 29 January defense budget briefing [Ref. 1]. The President and Congress called for the closing of seven major army posts (Fort McClennan, Fort Benjamin Harrison, Fort Devens, Fort Dix, Fort Chafee, Fort Smith, Sacramento Army Depot and Fort Ord) and the realignment or reduction of forces at ten other installations.

Fort Ord, located outside Monterey, California, was included on this latest list of bases proposed for closure or realignment. The base closure proposals will be approved by Congress prior to their implementation during the 1992-97 time-frame. During this same period, the active duty Army will be reduced from 18 to 12 divisions (FY 95), and total manpower cut by almost 30 percent (FY 87-95 net reduction of 245,000 Army personnel; total DoD military net reduction of 521,000 personnel) [Ref. 3]. The number of Army and Air Force personnel would be reduced in 1991 to its lowest level in 40 years. The closure of Fort Ord closure has been expected because of the Force Realignment Plan announced in 1990. According to this plan the 199th Brigade will relocate to Fort Polk to support the light infantry training operations. This will allow space for the 7th Infantry Division "Light" to relocate at Fort Lewis [Ref. 4]. The total economic effect the closure of Fort Ord will have on the Monterey Peninsula and surrounding areas is beyond the scope of this thesis research. This research will focus on one sector of the closure of Fort Ord, the potential loss of Silas B. Hays Army Community Hospital and the potential impact to military personnel, dependents and retired personnel remaining in the area.

A. OBJECTIVES

The focus of this thesis is the closure of Silas B. Hays Army Community Hospital located on Fort Ord Army Base in Monterey, California. The objectives are as follows:

1. Study the medical services provided by Silas B. Hays Army Community and the primary users of these services.

2. Examine the local area hospitals (Natividad Medical Center, Salinas Valley Memorial Hospital and Community Hospital of the Monterey Peninsula) and compare their services to that of Silas B. Hays Army Community Hospital.

3. Determine whether the Monterey Peninsula can handle the increased medical requirements expected if Silas B. Hays Army Community Hospital is closed.

4. Provide alternatives to Silas B. Hays Army Community Hospital closure.

B. THE RESEARCH QUESTION

This thesis will address two primary questions:

1. If Silas B. Hays Army Community Hospital is closed, does the Monterey Peninsula have the medical capability and/or facilities to service the remaining armed forces, dependents and retired personnel residing in the area?

2. What alternatives for obtaining medical care are available to the remaining armed forces, dependents and retired personnel if Silas B. Hays Army Community Hospital is closed?

C. SCOPE, LIMITATIONS AND ASSUMPTIONS

The basic area of impact for Silas B. Hays Army Community Hospital is limited to Monterey County and the medical service responsibility (catchment) area of the hospital. The impacted military installations in the county include the Naval Postgraduate School and tenant commands, the Presidio of Monterey and Fort Hunter Liggett Military Reservation.

Inpatient/Outpatient data were supplied by Silas B. Hays Army Community Hospital Patient Administration Office. Assumptions involved in individual calculations are described with relevant calculations in Chapter III.

Silas B. Hays Army Community Hospital 1990 inpatient/outpatient statistics (Table I) and the six clinics used in generating the 1990 outpatient data (Table II) are listed below:

TABLE I
SILAS B. HAYS ARMY COMMUNITY HOSPITAL 1990
INPATIENT OUTPATIENT STATISTICS

Branch of Svc	Inpatient Monthly Avg (Range)	Outpatient Monthly Avg (Range)
Army	1,450 (1,030 - 2,013)	37,471 (25,243 - 45,794)
Navy	68 (23 - 122)	3,053 (1,593 - 3,732)
Marine Corps	36 (0 - 119)	573 (253 - 1,352)
Air Force	53 (20 - 158)	1.448 (764 - 1,805)
Coast Guard	2 (0 - 13)	145 (69 - 204)
Other	7 (0 - 35)	471 (0 - 495)
TOTAL	1,616	43,161

TABLE II
OUTPATIENT CLINICS 1990 STATISTICS

NAME	AVG. OUTPATIENT MONTHLY USAGE
Troop Med. Confinement	33.4
Occupational Health	318.0
Presidio of Monterey	229.1
Combined Troop Medical	6272.5
Primus (Salinas)	2584.3
Primus (Presidio)	4563.5
TOTAL	14,000.80

D. LITERATURE REVIEW AND METHODOLOGY

Two basic research methodologies were used: data collection and literature review. The literature review was conducted in three phases. First, sources cataloged by the Defense Logistics Studies Information Exchange were examined for relevant studies on base closures and economic impact. The bibliographic sources identified were next obtained along with recent articles in the field. Finally, local and federal government agencies were surveyed to obtain any relevant studies and current basic data. Primary data collection was made from the Association of Monterey Bay Area Governments, Defense Manpower Data Center and Silas B. Hays Army Community Hospital. Data on Fort Ord was also obtained through the Fort Ord Public Affairs Office.

II BACKGROUND

A. BASE CLOSURE PROCESS

The Defense Budget submitted for fiscal year 1991 was based on assumptions regarding troop reductions in Europe, which require a change in the United States' defense structure. Some forces will be removed from Europe and deactivated to reduce costs, and some will be restationed in the United States. The military bases located in the continental United States have been examined for full closure, partial closure or reduction/realignment. Fort Ord is currently earmarked for full closure. The Pentagon publicly assessed that only 312 of the domestic bases are truly essential [Ref. 5]. The resulting shutdowns will be the first large scale U.S. base closings since earlier in this decade, when Frankfort Arsenal in Philadelphia and Fort MacArthur in California were closed.

The base closure process is somewhat complicated. In the peaceful days, when the Department of Defense (DoD) Budget was ever increasing, closing an obsolete military base was rather a simple operation. Between 1961-77 the Pentagon disposed of hundreds of military installations by executive fiat. Today the Pentagon must submit costly, time consuming, environmental impact studies before any base can be closed. Such reviews, which include evaluating the local economic effect, became law in 1977. Obsolete bases exist in the military structure, where the mission is duplicated or efficient consolidation of resources have been accomplished. Military bases provide close to a million civilian jobs and millions of dollars in business for nearby areas. In the past, closing them has been a highly charged partisan issue with the political party in power targeting opponents' bases. This has led to the

establishment of a rigid, open and mutually accepted base closure process by Congress. The new procedure was agreed upon by all to preclude the "games" of previous base closure efforts. Under this procedure neither the Congress nor the President would have any ability to amend the list, although the Congress could pass a resolution rejecting the entire list.

The scenario was set when the House voted to clear a plan that should result in the closure of 86 military installations by 1995. The plan will affect 145 military installations. Of these, 86 will be fully closed, five partially closed and 54 would be either decreased or increased in units and activities. Only about 20 percent of the affected civilian and military jobs are anticipated to be lost, with 55,000 personnel being transferred from one base to another [Ref. 6].

In the 100th Congress, Rep. Armey introduced a bill (H.R.-4481) that would establish a commission to identify unneeded military bases and make recommendations. The commission and the established time frame for implementation were designed to make the base closure process a non-political issue. The bill was passed as part of the FY 89 Defense Authorization Bill.

The Defense Authorization Bill created a new base closure process involving an independent, outside commission, to permit base closures to go forward in a prompt and rational manner. Four areas will be briefly addressed: 1) Closure criteria, 2) DOD Proposed closure list, 3) Commission report and 4) Congressional Review.

Closure Criteria. On 31 December 1990, the Secretary of Defense published in the Federal Register and transmitted to Congress a list of criteria that served as the basis for analysis for closure and realignment decisions. The proposed list of criteria was subject to public comment. To select the bases to be closed, the 12-member commission visited dozens of

bases and pored over thousands of economic data. Basically the criteria for closing bases focused on bases that were no longer required for national defense. The data supporting this process were provided to the Commission by the Services. Installations with similar missions were grouped together to facilitate consistent analysis. The bases were then screened to determine whether the installations were appropriately sized to support current or future requirements and whether their physical attributes were appropriate to accomplish assigned mission. When it was determined that an installation's mission was impaired, the Commission looked at relocation alternatives. The review focuses on the ability of a receiving installation to accommodate and enhance the mission of the units or activities being relocated and whether the costs of the closure and realignment package could be paid back with savings in six years. On 15 February 1991, the Secretary submitted to Congress the final list of criteria, which was deemed effective unless Congress passed a joint resolution of disapproval by 15 March 1991.

DOD Proposed Closure List. The cutoff date for the Secretary of Defense to transmit to Congress and the Commission a proposed list of closure realignments was 15 April 1991. This list was also publicly released. The Commission held public hearings on the bases proposed list of closure or realignment. The Commission can only delete bases from the list if:

a. the Commission determines that the criteria were departed from (in a substantial way) in selecting a base for inclusion; or

b. the Commission determines that a base was selected for inclusion on the list based on improper factors (partisan politics).

Commission Report. On 1 July 1991 the Commission reported to the President its findings. The Commission report went to the President who had until 20 August 1991 to approve it.

Congressional Review. The base closures and realignments contained in the Presidentially approved Commission report can be implemented beginning 45 days after the day on which the list is submitted to Congress.

The base closure and realignment agreement also includes two key provisions: 1) DOD must ensure that property made excess will be environmentally restored as promptly as possible, 2) DOD must ensure that bases not formally recommended for closure would not suffer a reduction in mission, personnel, or resources.

As the work of the commission comes to an end, the task of the Pentagons Office of Economic Adjustment (OEA) is just beginning. In 1961, Secretary of Defense Robert McNamara, created the OEA to address the local economic effects of base closings involving the loss of 220,000 military/civilian positions from 1961-1968. The Defense Economic Adjustment Program was later strengthened by creating the President's Economic Adjustment Committee (EAC). The EAC process permits the federal government to speak with one coordinated voice for the benefit of the affected community without creating a new bureaucracy. The community adjustment program does not focus solely on the base but on a broad range of community improvements, retraining programs, small business & industrial financing programs, affordable housing, transportation access, and water-sewage capacity to make the community more attractive and competitive [Ref. 7].

To assist the communities effected by base closures three bills were introduced by the House of Representatives in 1988 (H.R.- 2852, H.R.- 101 and H.R.-699). The House proposed this legislation to assist in the economic stability and community development of municipalities affected by such closures.

H.R.- 2852, "Economic Diversification and Defense Adjustment Act", established an Economic Diversification and Defense Adjustment Council. The council will allocate financial resources to communities that would be severely economically affected by base closures/reductions in military contracts. It places a $200 million spending limit on its programs and would be financed by general revenues.

H.R.- 101, "Defense Adjustment Economic Act," requires any defense facility with 100 or more workers to set up an alternative use committee. This committee would be responsible for coming up with plans to convert defense facilities into non-defense use facilities.

H.R.- 699, "Economic Conversion Act of 1989," focuses on dealing with unemployment provisions after contracts for defense workers had been lost [Ref. 8].

Base closures inevitably save the government money when accompanied by job reductions, deactivation of military activities, and to a lesser extent reduced purchases of goods and services.

B. FORT ORD ARMY BASE

Fort Ord is located on 28,057 acres of plains/hills in central California's Monterey County. Total population is approximately 38,895 which represents 11 percent of Monterey County (1990 population of 367,590). Fort Ord is the largest single community on the Monterey peninsula. It provides employment for approximately 19,581 civilian and 15,792 military personnel. The annual payroll of Fort Ord is approximately $500 million dollars and 65 percent of the retail customers in the Monterey and Seaside area are associated with the military. Ten to twenty percent of the Monterey County real estate home buyer market is from the Fort Ord military/civilian population [Ref. 9].

The major missions of Fort Ord are:

1. Train the 7th Division and associated non-division troop units for wartime missions.

2. Provide support and services on the installation to accomplish the above.

3. Command, plan, budget and support all activities at Presidio of Monterey and Fort Hunter Liggett.

4. Support all Army activities in California south of San Jose to include support for U.S. Army Reserve Centers.

5. Support National Guard and Army Reserve units in the area as required.

6. Upon mobilization, process, train and deploy reserve component units, and transform Fort Ord into a training center.

7. Support other services and retirees as required.

Fort Ord supports two subposts which are located near the base. The Presidio of Monterey located a few miles away on the knoll in the city of Monterey, and about 80 miles away is Fort Hunter Liggett, in a rural and isolated inland training area. The Presidio is the home of the Defense Language Institute, Foreign Language Center whose mission is to provide foreign language instruction in support of national security requirements. Fort Hunter Liggett is a major maneuver area for the 7th Infantry Division (Light) and other active and reserve component elements and is the site of a field laboratory for the U.S. Army TEXCOM Experimentation Center whose mission is to provide decision makers with scientifically valid data to help decide how the Army of the future should be organized, equipped and trained to fight.

Fort Ord became the new home of the 7th Infantry Division on 6 December 1972. Two years later, on 21 October 1974, the division was reactivated at Fort Ord as part of the Army plan

to increase its strength to sixteen combat units. Then early in 1984, as part of a plan to increase the strategic flexibility of the armed forces, the 7th Infantry Division was converted to a "Light" division. "Light" meaning a highly mobile, rapidly deployable, wholly air transportable, and a combat ready division when it reached the battle zone.

Several reasons have been offered for closing Fort Ord. One explanation is that the base is categorized as a single-use base (too small to accommodate anything but a light fighter infantry division). As defense spending and military manpower is decreased it is essential that the number of installations be reduced to get the greatest return from a declining Defense Budget. In an effort to reduce costs, the military is in favor of newer and larger installations that can serve a variety of roles. The range and training facilities at Fort Ord are restricted. The base is located in a high cost area. Closure of Fort Ord and movement of the 7th Infantry Division to Fort Lewis would reduce the costs of off-post housing and operations. Another reason offered for closing Fort Ord is its distance from a major airfield. The soldiers ride an average of four hours in convoy to commercial airports or a military airfield in San Francisco. By transferring the 7th Infantry Division "Light" to Fort Lewis, Washington this problem would be rectified since the existing airfields (McChord Air Force Base, Washington) can handle the expected airlift capacity. A deployment from Fort Lewis would make travel faster and logistically easier. A major financial reason for the Fort Ord closing is the estimated $70 million dollars in savings expected to be realized [Ref. 10]. The total full base closure program is expected to have an annual savings of $700 million [Ref. 11].

C. **SILAS BEACH HAYS ARMY COMMUNITY HOSPITAL**

Silas B. Hays Army Community Hospital is the largest medical facility on the Monterey Peninsula. Built in 1972 the hospital has 440 beds and includes 32 specialty clinics and full patient facilities. The primary mission of the hospital is to provide personalized care to active duty personnel, their dependents and retired personnel. Table III provides a list Silas B. Hays Army Community Hospital's patrons:

TABLE III
SILAS B. HAYS ARMY COMMUNITY HOSPITAL 1990 PATRON CHART

NAME	MILITARY/CIVILIAN
Fort Ord	14,994/22,217
Presidio of Monterey	3,723/ 1,913
Naval Postgraduate School	2,173/957
Fort Hunter Liggett	392/624
Active duty family members	0/30,837
Retired personnel	0/19,491
Retired personnel fam. mbrs.	0/29,236
TOTAL	21,282/105,275

The current medical staff of Silas B. Hays consist of 75 physicians and 75 nurses. The total number of personnel assigned to Silas B. Hays is 1,148 (includes doctors, nurses, dental technicians, enlisted and civilian personnel).

Silas B. Hays Army Community Hospital uses the Defense Enrollment Eligibility Reporting System (DEERS) to determine who is eligible for direct health care and who qualifies for the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS - the government shares with service families the cost of health care from civilian hospitals and

doctors). DEERS establishes a means of getting immediate confirmation of those eligible for health care.

CHAMPUS cost coverage reported for Silas B. Hays Army Community Hospital from January 1990 through December 1990 was $12,160,630 (this includes both government and patient cost). The total cost to the government during this period was $9,567,472. This cost is not totally inclusive because claims for CHAMPUS are accepted after December 1990. The cost of CHAMPUS is expected to rise if the hospital closes, due to the simple fact that more service members will have to seek medical support from civilian hospital facilities vice using a government facility.

Silas B. Hays Army Community Hospital has extensive programs which provide professional assistance for psychological, emotional and social problems. In addition to the main hospital and troop medical facilities, Silas B. Hays Army Community Hospital has two Primary Care of Uniformed Services (PRIMUS) clinics (Presidio of Monterey & Salinas) that provide outpatient care free of charge to eligible personnel.

The following medical services are not provided by Silas B. Hays Army Community Hospital: Blood Transfusion Center, Area Veterinary Lab, Physiatry, Adolescent Psychiatry, Electroneuromyography, Child Neurology, Padiation Therapy, Health Physics, Magnetic Resonance Imaging, Laser, Ocular Prosthesis, Blind Rehabilitation, Aural Rehabilitation, Fitting of Hearing Aids, Speech Pathology, Neurosurgery, Thoracic Surgery, Cardiovas (Open Heart & Not Open Heart), Plastic Surgery, Intervertebral Disc, Hand Surgery, Organ Transplant, Head & Neck, and Corneal Transplant. All of the above medical services are provided by Lettermen Army Hospital except Ocular Prosthesis and Blind Rehabilitation which are provided by the local area hospitals. The Adolescent

Psychiatry medical service can be found at both MEDDAC Lettermen and Irwin.

Silas B. Hays Army Community Hospitals General 1990 Utilization Statistics (Consolidated Information) are as follows:

A. **Admissions:**

Army		9,031
Navy		938
Marine Corps		144
Air Force		330
Coast Guard		53
Other		157
	TOTAL	10,653

B. **Patient Days:**

Army		31,264
Navy		2,762
Marine Corps		468
Air Force		1,294
Coast Guard		145
Other		479
	TOTAL	36,412

C. **Outpatient Visits:**

Silas B. Hays Army Community Hospital:

Army		449,654
Navy		36,641
Marine Corps		6,872
Air Force		17,379
Coast Guard		1,735
Other		5,658
	TOTAL	517,939

Fort Hunter Liggett:		
Army		6,886
Navy		138
Marine Corps		119
Air Force		122
Coast Guard		9
Other		125
	TOTAL	7,399
Occupational Health Clinic:		
Army		410
Other		2,874
	TOTAL	3,284
Troop Medical Confinement:		
Army		497
	TOTAL	497
Combined Troop Medical Clinic:		
Army		78,476
Navy		221
Marine Corps		18
Air Force		25
Coast Guard		54
Other		12
	TOTAL	78,806
Clinic Presidio of Monterey:		
Army		1,335
Navy		628
Marine Corps		108
Air Force		403
	TOTAL	2,474

Primus Clinic of Salinas:		
Army		29,723
Navy		2,525
Marine Corps		311
Air Force		1,264
Coast Guard		237
Other		99
	TOTAL	34,159
Primus Clinic of Monterey:		
Army		38,478
Navy		16,002
Marine Corps		3,661
Air Force		7,976
Coast Guard		706
Other		817
	TOTAL	67,640
	GRAND TOTAL	711,969

D. **Surgeries:**

Admissions - 2,157	Inpatient Visits - 710
Bed Days - 5,682	Outpatient Visits - 18,834

E. **Births**	1,465
F. **Emergency Room Visits**	33,682

The 1990 occupancy rate for Silas B. Hays Army Community Hospital was computed to be 22.7 percent. This calculation includes active duty Army and their dependents. However, if dependents were excluded the occupancy rate for Silas would drop to 7.28 percent. The primary reason behind the low occupancy rate is attributable to the large number of beds available versus the amount of beds used per year. The number of bed authorized at Silas B. Hays is 400, but it can expand to 630 on an emergency basis. See Appendix A for detailed occupancy rate calculations.

III. ANALYSIS

The data and information was collected and analyzed. The population of the remaining personnel was determined. The utilization statistics of three local hospitals (Community Hospital of the Monterey Peninsula, Natividad Medical Center, and Salinas Valley Memorial Hospital) are compared with Silas B. Hays Army Community Hospital to determine if their facilities can handle the increased patient load expected with the closure of Fort Ord. A forecasting model is derived to project the new utilization statistics of Silas B. Hays Army Community Hospital when the active duty Army personnel and their dependents are subtracted. A new occupancy rate is calculated. More pertinent utilization statistics are generated for the outpatient clinics (Fort Hunter Liggett, Occupational Health Clinic, Troop Medical Clinic, Clinic Presidio of Monterey, Primus Clinic of Salinas, and Primus Clinic of Monterey) and are displayed in various forms.

A. PROBLEM

The personnel at Fort Ord Army base currently totals approximately 55,000 military personnel, civilian employees and dependents, which represents 15 percent of the total population of Monterey County. The Silas B. Hays Army Community Hospital mission is to provide quality health care for the active duty military, dependents, retirees, and their families. The 7th Infantry Division (Light) is scheduled to relocate to Fort Lewis in 1995. The basic question this research will attempt to answer is "Where will the active duty military, dependents and retirees remaining in the area after the closure of Fort Ord receive medical support?" Table IV

lists the active duty military breakdown of personnel remaining in the area.

TABLE IV
ACTIVE DUTY PERSONNEL REMAINING IN MONTEREY AREA
(SILAS B. HAYS ARMY COMMUNITY HOSPITAL CATCHMENT AREA)

ARMED SERVICE	# REMAINING IN MONTEREY
Army	4,204
Navy	2,048
Air Force	850
Marine Corps	321
Coast Guard	132
TOTAL	7,555

The above data were derived by using the Silas B. Hays catchment area report (based upon the 40 mile radius rule) and DEERS.

The reservist breakdown of personnel remaining in the area are listed in Table V.

TABLE V
RESERVIST REMAINING IN MONTEREY AREA
(SILAS B. HAYS ARMY COMMUNITY HOSPITAL CATCHMENT AREA)

ARMED SERVICE	# REMAINING IN MONTEREY
Army	2,325
Navy	423
Air Force	264
Marine Corps	96
Coast Guard	26
TOTAL	3,134

Table V does not account for the reservists who travel to the area for drill duty.

The number of dependents, retirees and the retirees families remaining in the Monterey area are 13,799; 19,491 and 29,236 respectively. For these three categories the cumulative number of people remaining in the area is 62,526 (these calculations include family members residing at Presidio of Monterey, Fort Hunter Liggett and Off-Post as of 30 September 1990) [Ref. 12].

B. COMPARISON OF MONTEREY HOSPITALS

Civilian medical support in the Monterey area is handled primarily by three main hospitals: Community Hospital of the Monterey Peninsula (CHOMP), Salinas Valley Memorial Hospital and Natividad Medical Center. Each were evaluated as a potential source of medical support if Silas is recommended for full closure.

CHOMP began in 1927 as a hospital primarily for research into metabolic disorders and treatment of patients who suffer from them. It was later converted into a general community hospital in 1934 after experiencing financial difficulties. It was the first community hospital in the county to offer all private rooms, each with a window opening to the sylvan landscape of the Monterey Peninsula. The hospital expanded to 174 beds in 1971 which is where it remains today (there are an additional 26 beds, but they are a part of the Adult Chemical Dependency Department). The CHOMP medical staff consists of 199 people (77 medical specialists, 76 surgical specialists, and 46 other specialists). The hospital staff consists of 529 nursing personnel, 345 clinical personnel, and 519 support personnel (this represents full/part time personnel). The average total occupancy rate for CHOMP in 1989 was 83.7 percent.

CHOMP General 1990 Utilization Statistics are as follows:

A.	**Admissions:**	
	Community Hospital	11,186
	Recovery Center (chemical dependency)	269
	TOTAL	11,455
B.	**Patient Days:**	
	Community Hospital	51,729
	Recovery Center	5,807
	TOTAL	57,536
C.	**Outpatient Visits:**	
	Community Hospital	129,406
	Recovery Center	1,530
	TOTAL	130,936
D.	**Surgeries:**	
	Community Hospital	3,817
	Recovery Center	3,249
	TOTAL	7,066
E.	**Births**	1,641
F.	**Emergency Room Visits**	32,260

The 1990 occupancy rate for CHOMP was computed to be 81.5 percent a decline of 2.2 percent from the previous year. See Appendix B for calculations.

The average charge and expense per stay at CHOMP in 1990 were $7,356 and $5,170 respectively (average stay 4.7) [Ref. 13].

The Natividad Medical Center is strategically located in the northeast section of Salinas, has been serving the health care needs of the Monterey County for over 100 years. Founded 7 June 1886 as a 69 bed hospital, It has grown into a 211 bed full service hospital. Average total occupancy rate was 49.6 percent in 1989. The medical staff consists of 160

physicians, 300 nurses and a technical staff of 73 representing some 30 specialties.

The Natividad Medical Center General 1990 Utilization Statistics are as follows:

A.	**Admissions/Discharges:**	
	Data includes the Extended Care Unit (newborns are excluded)	6,012
B.	**Patient Days:**	
	Natividad and the Extended Care Unit	40,638
C.	**Outpatient Visits/Emergency Room Visits:**	
	Natividad Medical Center	99,387

The 1990 occupancy rate for Natividad Medical Center was computed to be 52.8 percent, an increase of 3.2 percent from the previous year. See Appendix B for calculations.

The average charge and expense per stay at Natividad Medical Center in 1990 were $6,460 and $4,982 respectively (average stay 6.5 days) [Ref. 14].

The Salinas Valley Memorial Hospital was founded in 1953 as a dedication to World War II. It is a 229 bed comprehensive medical center. The average total occupancy rate was 62.8 percent in 1989. The current medical staff consist of 240 Physicians, Nurses, Clinical Personnel, Podiatrists, Dentists, and Psychologists.

Salinas Valley Memorial Hospital General 1990 Utilization Statistics are as follows:

A.	**Admissions:**	
	Adults and Pediatrics (newborns are excluded)	10,659
B.	**Patient Days:**	
	Adults and Pediatrics (newborns are excluded)	50,064

C. **Outpatient Visits:**

Salinas Memorial Hospital	76,049

(This data includes the following areas: Lab, Cat Neurology, EKG, Echo, Radiology, Ultra-Sound, Cat Scan, Respiratory, Physical Therapy, MRI, and Occupational Therapy).

D. **Surgeries:**

Includes Outpatient Surgery	7,787

E. **Births**	1,973
F. **Emergency Room Visits**	27,756

The 1990 occupancy rate for Salinas Valley Memorial Hospital was computed to be 59.9 percent a decline of 2.9 percent from the previous year. See Appendix B for calculations.

The average charge and expense per stay at Salinas Valley Memorial Hospital in 1990 were $9,314 and $5,579 respectively (average stay 5.1) [Ref. 15].

The goal of this thesis is to compare the services at the above hospitals with Silas B. Hays Army Community Hospital in an attempt to systematically distribute the required medical services to maintain the medical support military members are accustomed to receiving.

The clinical/medical services provided by CHOMP, Natividad Medical Center and Salinas Valley Memorial Hospital directly comparable to the ones at Silas B. Hays Army Community Hospital. Therefore, personnel remaining in the local area will be able to receive the same clinical treatment provided by Silas B. Hays.

C. FORECASTING MODEL

This research and data collection were conducted based upon the assumption that current usage of the Silas B. Hays

Army Community Hospital would remain stable. Therefore, seasonal demand trends have already been taken into consideration (excluded are the Army active duty personnel and their dependents transferring when Fort Ord Army Base closes). The data collected and the forecasts performed exclude the above members and are based on recorded hospital utilization statistics (calendar year 1988 through September 1991 statistics were used). The utilization statistics were used to forecast calendar year 1992 Admissions and Bed Days by service.

The basic operation of exponential smoothing is used in forecasting Silas B. Hays Army Community Hospital calendar year 1992 Admissions and Bed Days. The New Estimate formula used is equal to the Old Estimate + A Fraction of the Error where:

> The New Estimate represents the revised estimate of a forecasting model component after a new observation has been obtained and incorporated (the new estimate is derived from data collected in years 1987 through September 1991 with a predetermined error factor)[Ref. 16].

> The Old Estimate represents the most recent value of the component before the new observation became available.

> The Error is equal to the latest value of the component, as indicated by the most recent observation, minus the forecasted value for it made one period earlier (the old estimate).

> The Fraction is equal to a value between zero and one which is termed the exponential smoothing constant; it determines the responsiveness of the revision system to new observations.

Only short-term forecasting is being performed in this thesis (calendar year 1992). The only question remaining is whether trend and/or seasonality exists. The possible answers

are neither exists, one or the other is present, or both occur. This results in four possible models:

1. **Level Model**
2. **Level and Trend Model**
3. **Level and Seasonal Model**
4. **Level, Trend and Seasonal Model**

When only short-term forecasting is being performed, the components of a time series requiring consideration are:

> Level which represents the long-run average or level component of a time series; it is the base component with reference to which the other components are defined. If the forecasting model fits into this category, it has been determined that the data collected can be averaged out to the projected year (in this case 1992).

> Trend which represents the per period change in the level which may be linear (constant) or nonlinear; in keeping with popular practice, we consider only a linear trend.

> Seasonal which is a recurring pattern about the level component or level and trend components, which may occur in response to natural or artificial forces; the seasons of the year are illustrative of natural forces, while regular sales promotions may induce an artificial seasonality into a time series.

> Random which is an unexplained period-to-period fluctuations in demand not due to any of the above effects.

Appendix C describes the input data used in the models forecasting the Bed Days and Admissions for 1992.

Two data items were required: a) the number of independent series investigated and 2) the largest number of observations to be entered. These two numbers were six (Army, Navy, Marine, Air Force, Coast Guard, and Other) and thirty-three (Jan 1989 through Sep 1991) respectively. The category

"Other" in this thesis includes personnel and dependents of personnel assigned to Public Health Service, National Oceanic & Atmospheric Administration, Civilian Employees, Other Beneficiaries and Foreign Nationals.

Below is a general description of the calculations performed with each of the data groups (Army, Navy, Marine, Air Force, Coast Guard, and Other):

> Initial Conditions - The earliest data are used to calculate initial values for the components of the forecasting model. In this case, January 1989 is the earliest data used because it is the most current data set where the active duty services usage in Bed Days and Admissions are separated. A minimum of m+3 periods (m being the length of the seasonal pattern) are used to make these initial estimates. A back-smoothing procedure is later applied to further improve the accuracy of the estimates. Back smoothing initially backs the model components to time 0 (zero), and then walks them through the data one period at a time, revising them by exponential smoothing.

> Model Fitting - The data from the next set of periods are used to test the forecasting ability of each of the four models using various smoothing constants. This will assist in the choosing of smoothing constants. The most effective model is then chosen. One smoothing constant, 0.2, was used for Trend, Level and Seasonal. The results for the extended forecasts for periods beyond September 1991 are listed in Appendices D & E.

> Model Validation - The observation used for initial conditions and model fitting are called estimation data. All other remaining data, referred to as prediction data, is used for validating the selected model. The validation model is used to forecast the observations, period by period (period 33 through 44). The smoothing constants are held fixed in this phase, and the estimates of the components are updated at

regular intervals to the planning horizon. The results are the output shown pictorially in Appendices D & E.

D. RESULTS OF FORECASTING MODEL

The Admission Model forecast results are summarized in Table VI. The number of personnel forecasted to be admitted into Silas B. Hays Army Community Hospital monthly in 1992 is broken down by service. The model selected for each service is listed below:

Army - "Level Model" because the model fitting error statistics were calculated to be the lowest (Root Mean Square Error = 19.59). The lowest error gives the more realistic forecast (highest 34.48.

Navy - "Level Model," Root Mean Square Error of calculated to be 10.80 (highest 15.21).

Marine Corps - "Level Model," Root Mean Square Error calculated to be 5.09 (highest 6.57).

Air Force - "Seasonal Model," Root Mean Square Error calculated to be 7.50 (highest 9.23).

Coast Guard - "Trend Model," Root Mean Square Error calculated to be 2.81 (highest 4.45).

Other - "Level Model," Root Mean Square Error calculated to be 6.49 (highest 7.08).

TABLE VI
SILAS B. HAYS ARMY COMMUNITY HOSPITAL 1992
ADMISSION FORECASTING MODEL RESULTS

Period	Army	Navy	Marine Corps	Air Force	Coast Guard	Other
Jan'92 P-33	124	66	11	52	3	12
Feb'92 P-34	124	66	11	24	3	12
Mar'92 P-35	124	66	11	48	2	12
Apr'92 P-36	124	66	11	32	2	12
May'92 P-37	124	66	11	37	2	12
Jun'92 P-38	124	66	11	34	2	12
Jul'92 P-39	124	66	11	33	2	12
Aug'92 P-40	124	66	11	39	2	12
Sep'92 P-41	124	66	11	38	2	12
Oct'92 P-42	124	66	11	23	1	12
Nov'92 P-43	124	66	11	21	1	12
Dec'92 P-44	124	66	11	34	1	12
TOTAL	1,488	792	132	415	23	144

The total admissions projected in Table VI is 2,994. The population breakdown of this number reflects that 49.7 percent of the remaining personnel requiring medical assistance will be Army, 26.5 percent Navy, 4.4 percent Marine Corps, 13.9

percent Air Force, 0.76 percent Coast Guard and 4.8 percent Other.

It should be noted that the actual number of Army personnel requiring medical services in 1992 would be slightly higher, due to the fact that the Defense Language Institute Army personnel were not identified separately from Fort Ord Army personnel in the utilization statistics.

The admission levels data was collected to forecast the number of personnel that requiring hospitalization in 1992. By evaluating the admissions data and forecasting the bed days required it was determined that the personnel remaining in Monterey would need 11,402 beds in 1992.

The Bed Days Future Forecasting Model (calendar year 1992) Results are summarized in Table VII. The model selected by service are identified below:

Army - "Seasonal Model," Root Mean Square Error 51.70 (highest 60.88).

Navy - "Trend-Seasonal Model," Root Mean Square Error 36.93 (highest 40.48).

Marine Corps - "Level Model," Root Mean Square Error 16.64 (highest 21.72).

Air Force - "Level Model," Root Mean Square Error 31.99 (highest 39.62).

Coast Guard - "Trend Model," Root Mean Square Error 6.67 (highest 12.60).

Other - "Level Model," Root Mean Square Error 18.76 (highest 25.01).

TABLE VII
SILAS B. HAYS ARMY COMMUNITY HOSPITAL 1992
BED DAYS FORECASTING MODEL RESULTS

Period	Army	Navy	Marine Corp	Air Force	Coast Guard	Other
Jan'92 P-33	521	210	38	97	7	32
Feb'92 P-34	611	175	38	97	7	32
Mar'92 P-35	586	184	38	97	6	32
Apr'92 P-36	501	178	38	97	6	32
May'92 P-37	698	182	38	97	6	32
Jun'92 P-38	521	196	38	97	5	32
Jul'92 P-39	623	175	38	97	5	32
Aug'92 P-40	563	213	38	97	4	32
Sep'92 P-41	647	190	38	97	4	32
Oct'92 P-42	555	227	38	97	4	32
Nov'92 P-43	555	241	38	97	3	32
Dec'92 P-44	551	235	38	97	3	32
TOTAL	6,932	2,406	456	1164	60	384

The total number of bed days required for 1992 is projected to be 11,402 days. The population breakdown of this number reflects that 61.0 percent of the beds needed will be used by Army personnel, 21.1 percent Navy, 3.9 percent Marine

Corps, 10.2 percent by Air Force, .53 percent Coast Guard and 3.4 percent Other.

There are approximately 81,679 bed days available in the Monterey area, per 1990 data (see Appendix F for calculations). CHOMP has a projected 11,781 excess bed days available (excluding the Recovery Center), Natividad Medical Center has an excess of 36,377 bed days (this figure includes the Extended Care Unit) and Salinas Valley Memorial Hospital has 33,521 bed days available. The 11,402 beds required by the remaining armed services can be easily accommodated by the current Monterey area hospitals. The distribution would be determined based on the medical requirements of the individual.

The Monterey Peninsula hospitals (CHOMP, Natividad, and Salinas Valley) have the resources and the facilities to accommodate the remaining military, however, none of these hospitals currently have a Champus contract. Since the Fort Ord Silas B. Hays Army Community Hospital and their Outpatient Clinics have been readily available, this has not been a problem. Negotiations would have to be made to enable the military and retirees access (government financed) to the local hospitals.

E. SILAS B. HAYS ARMY COMMUNITY HOSPITAL UTILIZATION STATISTICS

Silas B. Hays Army Community Hospital has seven outpatient clinics. Their current utilization statistics from 1989 thorough September 1991 were broken down by clinic and listed below [Ref. 17].

Outpatient Clinics:

Fort Hunter Liggett (F.H.L.)
Occupational Health Clinic (O.H.C.)
Troop Medical Confinement (T.M.C.)
Combined Troop Medical Clinic (C.T.M.C.)
Clinic Presidio of Monterey (P.O.M.)
Primus Clinic of Salinas (P.C.S.)
Primus Clinic of Monterey (P.C.M.)

TOTAL OUTPATIENT USAGE PER CLINIC:

	F.H.L.	O.H.L.	T.M.C.	C.T.M.C.	P.O.M.	P.C.S.	P.C.M.
'89	6,746	3,531	448	74,454	3,644	28,950	62,015
'90	7,385	3,284	497	78,796	2,514	28,576	67,031
'91*	6,491	2,807	277	53,074	2,232	22,454	48,129
	20,622	9,622	2,222	206,324	8,390	79,980	177,175

The closure of Fort Ord will cause a decline in the utilization statistics due primarily to the Active Duty Army military members and their dependents leaving the area. The Outpatient Clinics statistics are reported again below minus the Active Duty Army/their dependents.

TOTAL OUTPATIENT CLINICS:

	F.H.L.	O.H.C.	C.T.M.C.	P.O.M.	P.C.S.	P.C.M.
'89	1,446	3,431	2,923	1,517	12,797	27,611
'90	834	2,773	1,267	1,179	13,157	31,718
'91*	1,059	2,290	1,696	998	10,177	23,622
	3,339	8,494	5,886	3,694	36,131	82,951

The Troop Medical Confinement Clinic usage is primarily active duty army personnel only, therefore there no statistics are reported in this area.

The retirees and their dependents use the outpatient clinics often. Below are statistics showing their use.

First, their total outpatient usage is reported by clinics. Second, the clinical reports are broken down by service.

TOTAL OUTPATIENT CLINICS:

	F.H.L.	O.H.C.	C.T.M.C.	P.O.M.	P.C.S.	P.C.M.
'89	1,135	-0-	1,668	-0-	10,053	4,532
'90	1,127	3	1,003	-0-	10,646	4,871
'91*	820	-0-	1,440	-0-	8,817	3,659
	3,082	3	4,111	-0-	29,516	13,062

RETIREES/THEIR DEPENDENTS CLINICAL BREAKDOWN:

Fort Hunter Liggett Outpatient Usage:

	Army	Navy	Marine Corps	Air Force	Coast Guard
'89	780	136	71	139	9
'90	763	99	73	184	8
'91*	645	53	43	75	4
	2,188	288	187	398	21

Combined Troop Medical Confinement Outpatient Usage:

	Army	Navy	Marine Corps	Air Force	Coast Guard
'89	1,531	79	9	43	6
'90	907	66	2	9	19
'91*	1,333	69	5	30	3
	3,771	214	16	82	28

Primus Clinic of Salinas Outpatient Usage:

	Army	Navy	Marine Corps	Air Force	Coast Guard
'89	8,242	892	128	682	109
'90	8,730	981	146	654	135
'91*	7,320	801	136	469	91
	24,292	2,674	410	1,805	335

Primus Clinic of Monterey Outpatient Usage:

	Army	Navy	Marine Corps	Air Force	Coast Guard
'89	2,974	1,038	119	369	32
'90	3,165	1,115	160	357	74
'91*	2,302	935	111	268	43
	8,441	3,088	390	994	149

SILAS B. HAYS ARMY COMMUNITY HOSPITAL:

Below are the retirees/their dependents data listing their admission, bed days, inpatient visits, and outpatient visits for 1989-September 1991 at Silas B. Hays Army Community Hospital.

Retirees and Their Dependents Total Usage (at Silas B. Hays Army Community Hospital):

	Admission	Bed Days	Inpatient	Outpatient
'89	2,159	7,799	8,017	81,154
'90	2,098	14,985	9,059	94,551
'91*	1,328	6,205	9,169	65,628
	5,585	28,989	26,245	241,333

The total personnel usage at Silas B. Hays Army Community Hospital (including the Active Duty Army/Their Dependents and the Retirees/Their Dependents) are listed below broken down by admission, bed days, inpatient visits and outpatient visits.

TOTAL PERSONNEL USAGE:

	Admission	Bed Days	Inpatient	Outpatient
'87	9,385	37,679	N/A	N/A
'88	10,572	37,357	N/A	N/A
'89	11,160	35,304	16,574	342,534
'90	10,653	36,472	17,573	360,872
'91*	7,396	25,764	16,120	373,955
	49,166	172,576	50,267	1,077,361

The information below **exclude the Active Duty Army/Their Dependents:**

	Admission	Bed Days	Inpatient	Outpatient
'89	3,294	11,141	8,694	102,968
'90	3,356	12,053	9,952	148,542
'91*	2,157	9,113	9,701	105,325
	8,807	32,307	28,347	356,835

The retirees and their dependents utilization statistics reported from Silas B. Hays Army Community Hospital. The first set of data represents the total admission, bed days, inpatient visits, and outpatient visits (from 1989- September 1991). The latter information is reported again broken down by service (Army, Navy, Marine Corps, Air Force, Coast Guard).

Retirees/Their Dependents Usage:

	Admission	Bed Days	Inpatient	Outpatient
'89	2,145	7,903	7,453	82,221
'90	2,074	8,322	8,476	96,620
'91*	1,320	6,073	9,167	64,764
	5,539	22,298	25,096	243,605

Retirees/Their Dependents Usage Broken down by Service:

ADMISSION:

	Army	Navy	Marine Corps	Air Force	Coast Guard	Total
'89	1,737	229	20	148	11	2,145
'90	1,697	212	24	137	4	2,074
'91*	1,113	99	12	87	9	1,320
	4,547	540	56	372	24	5,539

BED DAYS:

	Army	Navy	Marine Corps	Air Force	Coast Guard	Total
'89	6,467	711	87	603	35	7,903
'90	6,877	779	67	598	1	8,322
'91*	5,220	396	49	384	24	6,073
	18,564	1,886	203	1,585	60	22,298

INPATIENT VISITS:

	Army	Navy	Marine Corps	Air Force	Coast Guard	Total
'89	6,495	576	63	313	6	7,453
'90	7,433	441	250	350	2	8,476
'91*	8,266	531	117	241	12	9,167
	22,194	1,548	430	904	20	25,096

OUTPATIENT VISITS:

	Army	Navy	Marine Corps	Air Force	Coast Guard	Total
'89	67,773	7,916	715	5,523	294	82,221
'90	78,938	10,906	1,109	5,304	363	96,620
'91*	55,334	4,782	690	3,683	275	64,764
	202,045	23,604	2,514	14,510	932	243,605

* 1991 Data collected through September 1991.

F. MONTEREY COUNTY POPULATION GROWTH

The population growth rate for Monterey County is an estimated two percent increase per year. Therefore, the projected 1992 population in the county is 382,440. The local hospital increase in outpatient/inpatient statistics were adjusted (increased by two percent) to accommodate this factor. The 1992 adjustments are listed below:

CHOMP:	1992	1995	2000
A. Admissions	11,410	12,095	13,305
B. Patient Days	52,764	55,930	61,523
C. Outpatient Visits	131,994	139,914	153,905
D. Emergency Room Visits	32,905	34,879	38,367

Natividad Medical Center:	1992	1995	2000
A. Admissions	6,132	6,500	7,150
B. Patient Days	41,451	43,938	48,332
C. Outpatient/ER Visits	101,375	107,458	118,204

Salinas Valley Memorial:	1992	1995	2000
A. Admissions	10,872	11,524	12,676
B. Patient Days	51,065	54,129	59,542
C. Outpatient Visits	77,570	82,224	90,446
D. Emergency Room Visits	28,311	30,010	33,011

The two percent growth rate (per year) increases the excess beds available at the three hospitals for calendar years 1992, 1995 and 2000. The calculations are computed below:

CHOMP:

1992

Total bed days available per year	=	63,510
Total beds projected in 1992	=	52,764
		10,746 Excess

1995

Total bed days available per year	=	63,510
Total beds projected in 1995	=	55,930
		7,580 Excess

2000

Total bed days available per year	= 63,510
Total beds projected in 2000	= 61,523
	1,987 Excess

Natividad Medical Center:

1992

Total bed days available per year	= 77,015
Total beds projected in 1992	= 41,451
	35,564 Excess

1995

Total bed days available per year	= 77,015
Total beds projected in 1995	= 43,938
	33,077 Excess

2000

Total bed days available per year	= 77,015
Total beds projected in 2000	= 48,332
	28,683 Excess

Salinas Valley Memorial:

1992

Total bed days available per year	= 83,585
Total beds projected in 1992	= 51,065
	32,520 Excess

1995

Total bed days available per year	= 83,585
Total beds projected in 1995	= 54,129
	29,456 Excess

2000

Total bed days available per year	= 83,585
Total beds projected in 2000	= 59,542
	24,043 Excess

The total excess beds computed to be available in 1992, 1995 and 2000 are 78,830, 70,113 and 54,713 beds respectively. Even with a two percent population increase per year the Monterey County can still accommodate the additional patients from Silas B. Hays Army Community Hospital requiring hospitalization. A summary of the growth rates are listed below:

	1990	1992	1995	2000
Total excess beds available=	81,679	78,830	70,113	54,713
Beds required by Silas =	12,198	11,402	12,086	13,295
(2% growth rate per year)				
Remaining Beds =	69,481	67,428	58,027	41,418

The 1990 excess bed days calculations were computed earlier and are described in detail in Appendix F. The 1990 Beds required by Silas B. Hays Army Community Hospitals are the actual recorded amount minus the Active Duty Army personnel and their dependents. The remaining data are forecasts taking into consideration a normal two percent (yearly) growth rate.

V. CONCLUSIONS

This chapter presents the conclusions and results from the research and answers two questions:

1. Does the Monterey Peninsula have the medical facilities and capability to service the remaining active duty members, dependents and retired personnel if Silas B. Hays Army Community Hospital is recommended for full closure?

2. What alternatives for obtaining medical care are available to the remaining armed forces?

This chapter begins by first reviewing the forecasting models selected for calculating future admission and bed days. Second, the historical data for Silas B. Hays Army Community Hospital and seven outpatient clinics, including and excluding the active duty Army personnel and their dependents are summarized. The occupancy rates are recomputed showing their decreases. Third, the seven outpatient clinics are evaluated separately and conclusions are made concerning their future use (redistribution of outpatient care responsibility). Finally, the costs associated with inpatient care and CHAMPUS are mentioned.

Areas for additional research are suggested at the end of the chapter.

A. CONCLUSIONS

A forecasting model projecting Silas B. Hays Army Community Hospital 1992 admissions and bed day requirements was designed and applied, results of the analysis were examined and evaluated in Chapter III. Four models were examined: Level, Trend, Seasonal and Trend-Seasonal. A "best model" forecast was selected on the basis of highest forecast accuracy assumptions relative to historical trend data. The forecasting model composition is shown below:

Armed Service	Model Selected
Army (Admission)	Level
" (Bed Days)	Seasonal
Navy (Admission)	Level
" (Bed Days)	Trend-Seasonal
Marine Corps (Admission)	Level
" " (Bed Days)	Level
Air Force (Admission)	Seasonal
" " (Bed Days)	Level
Coast Guard (Admission)	Trend
" " (Bed Days)	Trend
Other (Admission)	Level
" (Bed Days)	Level

The total bed days forecasted to be needed in 1992 by Silas B. Hays Army Community Hospital using this composite model was calculated as 11,402. The excess bed days estimated to be available on the Monterey Peninsula in 1990 was 81,679 (Appendix VI). There are more than enough bed days available to service the remaining personnel and their families.

Silas B. Hays Army Community Hospital was originally authorized to be a 440 bed hospital. However, it currently uses 400 beds. The maximum amount of bed days available per year is 146,000 (See Appendix A). The hospital utilization data with the active duty Army personnel and their dependents included in 1989, made the hospital an average 3.163 bed days per patient. This figure equates to 35,304 total patient days/11,160 admissions. In 1990, the hospital average rose to 3.414 bed days per patient. This equates to 36,373 total patient days/10,653 admissions. The active duty Army and their dependents account for more than 85 percent of the hospital total customer population. They account for approximately 86 percent of Silas B. Hays Army Community Hospital total patient days, 84 percent of the total

admissions and 87 percent of the total outpatient visits for calendar year 1990.

The overall occupancy rate for Silas B. Hays Army Community Hospital in 1987, 1988, 1989 and 1990, with the active duty Army with their dependents included, was 25.8, 25.6, 24.2 and 24.9 percent respectively. Using the same historical data, but excluding the active duty army personnel and their dependents, the overall occupancy rate for 1989 and 1990 drops to 7.81 and 8.25 percent respectively (Statistics in Chapter III). Compared with the civilian hospitals on the Monterey peninsula, the occupancy rate for Silas B. Hays Army Community Hospital is exceptionally low. The local area hospitals average between 59 to 85 percent occupancy rate per year.

In evaluating the hospital outpatient statistics, it is clear that Silas B. Hays Army Community Hospital far exceeds the capacity at local hospitals in this area. The number of the hospital outpatient visits for 1990 was extremely high compared to the three local area hospitals. The hospital outpatient visits in 1990 totaled 360,872. The 1990 data for CHOMP represents only 36.8 percent of Silas B. Hays total outpatient visits, Natividad 27.5 percent and Salinas Valley 21.1 percent.

The outpatient visits data minus the active duty Army and their dependents would reduce the 1990 figure of 360,872 to 148,542 (a decline of 58.84 percent).

Unlike the three local hospitals, Silas B. Hays Army Community Hospital has seven additional outpatient clinics as tenant commands. The breakdown of outpatient visits per clinic are listed in Chapter III. The data for 1989 and 1990 (all seven clinic included) are 179,788 and 188,083 visits respectively. This data includes the active duty Army personnel and their dependents.

If the active duty Army and their dependents are subtracted from the seven outpatient clinics the total for 1989 and 1990 decrease to 49,725 (a decline of 72.34 percent) and 50,928 (a decline of 72.92 percent).

The Monterey Peninsula can support the outpatient visits if Primus Clinic Salinas and Primus Clinic of Monterey are maintained/kept open. These clinics are able to handle the overload of outpatient customers serviced by Silas B. Hays Army Community Hospital.

The Primus Clinic of Salinas averages approximately 28,000 outpatient visits per year. This figure includes active duty Army and their dependents. However, if the above group was excluded, the average outpatient visits decrease to 13,000 per year. Therefore, some of the outpatient flow can be redirected to this clinic.

The Primus Clinic of Monterey averages approximately 63,000 outpatient visits per year. If the active duty Army and their dependents were excluded the average would decrease to 29,000 outpatient visits per year. Once again, additional outpatient clientele could be redirected to this particular clinic.

In further evaluating the clinics, it has been determined that the closure of Fort Ord would reduce the Troop Medical Confinement Clinic outpatients customers would drop to zero. Only Army personnel in confinement use this particular clinic. Therefore, no redirection of patients are required.

The Occupational Health Clinic patronage in 1989 and 1990 totaled 3,531 and 3,284 respectively. This data includes active duty Army personnel and their dependents. Excluding the above personnel reduces this figure 3,431 in 1989 (3 percent decrease) and 2,877 (12 percent decrease). This is not a significant change. The chief users of this clinic are civilian-DoD authorized employees.

The Combined Troop Medical Clinic reported a 1989 and 1990 outpatient visits totalling 74,454 and 78,796 respectively. This figure includes the active duty Army and their dependents. The figure decreases to 2,923 in 1989 and 1,267 in 1990, when active duty Army and their dependents are excluded. This represents and astronomical decline in of 96.07 percent in 1989, and 98.39 percent in 1990. The main users of this particular clinic are active duty Army and their dependents.

The Fort Hunter Liggett Clinic 1989 and 1990 outpatient visits was 6,746 and 7,385 respectively. This figure includes the active duty Army and their dependents. Excluding the active duty army and dependents, the data decreases to 1,446 for 1989 (78.56 percent decline) and 834 for 1990 (88.71 percent decline). The principal users of this clinic are the active duty personnel and their dependents. It has not been determined whether or how many of this population will remain in this location after the closure of Fort Ord. Therefore, the status of this clinic for closure or realignment of outpatients is unclear.

Finally, the Clinic Presidio of Monterey outpatient clinic reported in 1989 and 1990 data of 3,644 and 2,514 respectively. This figure includes active duty Army and their dependents. Excluding these personnel, this figure decrease to 1,517 (58.37 percent decline) in 1989 and to 1,179 in 1990 (53.10 percent decline). The highest users of this clinic are active duty Army, Navy, Air Force, and Marine Corps (no Coast Guard data was recorded). This clinic is able to receive outpatients from Silas B. Hays Army Community Hospital.

It should be noted that the data for the active duty Army personnel stationed at the Defense Language Institute and Fort Hunter Liggett could not be broken out separately from the data collected for Silas B. Hays Army Community Hospital. The Monterey Peninsula has the facilities, capabilities and

the available bed space to service and support the medical requirements of the remaining military personnel, their dependents, retirees and their families.

Some of the outpatient visits can be handled by the local area hospitals. Two of the seven Silas B. Hays Army Community Hospital outpatient clinics should be maintained to assist and offset the additional requirements placed on the hospitals.

The medical services available to the personnel stationed in the area will remain unchanged. However, the locations for these services change. The closure of Silas B. Hays Army Community Hospital will mean the convenience of the hospital as a one-stop medical service facility will no longer be available. Personnel requiring inpatient medical care will be redirected to a local area hospital or government facility. The outpatient care can be directed to the nearest available hospital or clinic.

Inpatient care will depend on which hospital has the available facilities and what particular medical service is required. CHAMPUS cost coverage will play a major role if Silas B. Hays Army Community Hospital is closed. The three local hospitals in this thesis are not currently under a CHAMPUS contract. The cost for the Monterey area reported by CHAMPUS from January 1990 through December 1990 for the government during this period was $9,567,472. This cost is not totally inclusive because claims for CHAMPUS are accepted after December 1990. The cost of CHAMPUS is expected to rise if Silas B. Hays Army Community Hospital is closed, due to the simple fact that more service members will have to seek medical support from civilian hospital facilities vice using a government facility. The costs for CHAMPUS will depend on what medical services are provided and the hospital the member receives treatment. The decision must be made whether or not it is worth keeping Silas B. Hays Army Community Hospital open to defray the cost of outside medical care.

Secretary of Defense Dick Cheney summarized base closing best when he said "closing bases has become an economic necessity for the military. As defense spending decreases and the military shrinks, it is essential that we reduce the number of installations if we are to get the greatest value from a declining Defense Budget" [Ref. 18]

The consequences of the closure of Fort Ord and Silas B. Hays Army Community Hospital will definitely affect the Monterey Peninsula and the remaining service members, dependents and retirees. The local area hospitals will have to assist/support the additional medical requirements of the military.

B. AREAS FOR FURTHER STUDY

Potentially productive areas for additional research arising out of this study include a number of topics. Additional research is recommended as follows:

1. Examine the various health care areas at Silas B. Hays to determine the most frequent services required. Evaluate local hospitals to determine if the services can be provided. Estimate the financial implications to the potential patient of obtaining these services.

2. Evaluate the full financial implications of closing of Silas B. Hays Army Community Hospital, e.g., is it cost effective to keep it open given the demand data developed in this thesis?

3. Evaluate the CHAMPUS requirements in relationship to the local area hospitals (CHOMP, Natividad, and Salinas Valley) to determine if it is feasible for the DoD and these facilities to pursue contracts for services?

C. CONTRIBUTION OF THE STUDY

This study contributes data and analysis relevant to the issue of whether Silas B. Hays Army Community Hospital should be closed or kept open. The answer to this question is not simple. Applying the utilization statistic estimations, the Army may no longer be able to afford to be the primary users of the hospital. The new primary users in order of significance is projected be the Navy, Air Force, Marine Corps, Army and perhaps the Coast Guard. Services for military retirees and their families will remain stable as long as the current medical support that Silas B. Hays (location/convenience/cost) afforded them is maintained. To fully answer the question of closure, other issues should be examined as listed under areas for additional research. If the decision were based strictly on the estimated utilization statistics for the remaining area armed services as forecasted in this thesis, then Silas B. Hays Army Community Hospital would be closed. Residual personnel medical requirements could be handled by the local area hospitals given the availability of financing to support this arrangement.

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APPENDIX A
SILAS B. HAYS ARMY COMMUNITY HOSPITAL OCCUPANCY RATE

Including Active Duty Army and their Dependents:

Authorized Beds	400	
Number of Days in a Year	x 365	
	146,000	Total Bed Days Per Year

Total Patient Days for 1990 = 36,373

Army	31,264
Navy	2,762
Marine Corps	468
Air Force	1,294
Coast Guard	145
Other	440
	36,373

Computed Occupancy Rate = 36,373/146,000 = 24.9 %

Excluding Active Duty Army and their Dependents:

Authorized Beds	400	
Number of Days in a Year	x 365	
	146,000	Total Bed Days Per Year

Total Patient Days for 1990 = 12,198

Army	7,089
Navy	2,762
Marine Corps	468
Air Force	1,294
Coast Guard	145
Other	440
	12,198

Computed Occupancy Rate = 12,198/146,000 = 8.35 %

APPENDIX B
MONTEREY PENINSULA HOSPITALS OCCUPANCY RATE

Community Hospital of the Monterey Peninsula:

Community Hospital:

Authorized Beds	174
Number of Days in a Year	x 365
	63,510 Total Bed Days Per Year
Total Patient Days for 1990	= 51,729
Computed Occupancy Rate	= 51,729/63,510 = 81.5 %

Recovery Center:

Authorized Beds	86
Number of Days in a Year	x 365
	31,390 Total Bed Days Per Year
Total Patient Days for 1990	= 5,807
Computed Occupancy Rate	= 5,807/31,390 = 18.5 %

Natividad Medical Center:

Authorized Beds	211
Number of Days in a Year	x 365
	77,015 Total Bed Days Per Year
Total Patient Days for 1990	= 40,638
Computed Occupancy Rate	= 40,638/77,015 = 52.8 %

Salinas Valley Memorial Hospital:

Authorized Beds	229
Number of Days in a Year	x 365
	83,585 Total Bed Days Per Year
Total Patient Days for 1990	= 50,064
Computed Occupancy Rate	= 50,064/83,585 = 59.9 %

APPENDIX C

FORECASTING MODEL INPUT VALUES

1. Types of Data Values - This indicates whether the observations to be entered are in the form of integers or real numbers with decimal parts. In the model used the data are integer-valued, therefore, forecasts are rounded-off to the nearest integer.

2. Range of Data Values - This indicates whether the series is entirely made up of positive numbers, entirely negative numbers, or a mixture of both. Positive numbers are used in this forecasting model.

3. Length of Seasonal Pattern - The length of time to repeat any seasonal pattern. In this case twelve was chosen to accommodate monthly data.

4. Number of Periods to be used for Model Validation (Model Val) - To explain this parameter, we must go a little deeper into the functioning of the module. The series of observations are divided into three groups, to be used for Initial Conditions, Model Fitting and Model Validation. The value chosen for model val is m+4 (m represents the length of the seasonal pattern).

APPENDIX D

STORM DATA SET LISTING

DETAILED PROBLEM DATA LISTING FOR

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL

ROW LABEL	ARMY	NAVY	MARINE	AIR FORCE	COASTGUARD
DATA TYPE	INT	INT	INT	INT	INT
DATA RANGE	POS	POS	POS	POS	POS
SEASON LNG	12	12	12	12	12
MODEL VAL	1	1	1	1	1
PLAN HORIZ	1	1	1	1	1
LEVL ALPHA	0.2	0.2	0.2	0.2	0.2
TRND ALPHA	0.2	0.2	0.2	0.2	0.2
SEAS ALPHA	0.2	0.2	0.2	0.2	0.2
SEARCH ?	YES	YES	YES	YES	YES
STEP SIZE	0.1	0.1	0.1	0.1	0.1
MODEL	BEST	BEST	BEST	BEST	BEST
JAN 1989	503	66	8	37	6
FEB 1989	142	64	19	25	5
MAR 1989	159	68	7	25	7
APR 1989	132	70	6	28	6
MAY 1989	183	69	11	25	8
JUN 1989	175	51	9	30	0
JUL 1989	139	51	10	24	3
AUG 1989	136	58	16	33	9
SEP 1989	135	71	9	49	5
OCT 1989	156	73	19	37	2
NOV 1989	143	69	11	39	4
DEC 1989	137	66	9	29	9
JAN 1990	183	91	4	40	9
FEB 1990	141	72	8	32	3
MAR 1990	160	72	11	39	4
APR 1990	153	82	13	25	3
MAY 1990	154	65	10	29	3
JUN 1990	127	86	27	23	12
JUL 1990	116	87	14	17	5
AUG 1990	137	86	14	21	7
SEP 1990	139	88	6	38	1
OCT 1990	149	84	13	14	3
NOV 1990	128	70	10	31	3
DEC 1990	114	55	14	21	0
JAN 1991	133	61	10	23	5
FEB 1991	91	56	16	22	2
MAR 1991	124	50	13	19	4
APR 1991	116	67	6	30	4
MAY 1991	138	59	9	37	4
JUN 1991	147	59	9	20	3
JUL 1991	106	76	11	19	1
AUG 1991	126	64	12	34	2

STORM DATA SET LISTING
DETAILED PROBLEM DATA LISTING FOR
SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION DATA MODEL

ROW LABEL	OTHER
DATA TYPE	INT
DATA RANGE	POS
SEASON LNG	12
MODEL VAL	1
PLAN HORIZ	1
LEVL ALPHA	0.2
TRND ALPHA	0.2
SEAS ALPHA	0.2
SEARCH ?	YES
STEP SIZE	0.1
MODEL	BEST
JAN 1989	11
FEB 1989	15
MAR 1989	25
APR 1989	15
MAY 1989	12
JUN 1989	17
JUL 1989	16
AUG 1989	13
SEP 1989	8
OCT 1989	6
NOV 1989	8
DEC 1989	5
JAN 1990	15
FEB 1990	12
MAR 1990	16
APR 1990	15
MAY 1990	7
JUN 1990	28
JUL 1990	7
AUG 1990	17
SEP 1990	10
OCT 1990	0
NOV 1990	19
DEC 1990	11
JAN 1991	11
FEB 1991	5
MAR 1991	11
APR 1991	11
MAY 1991	13
JUN 1991	11
JUL 1991	7
AUG 1991	16

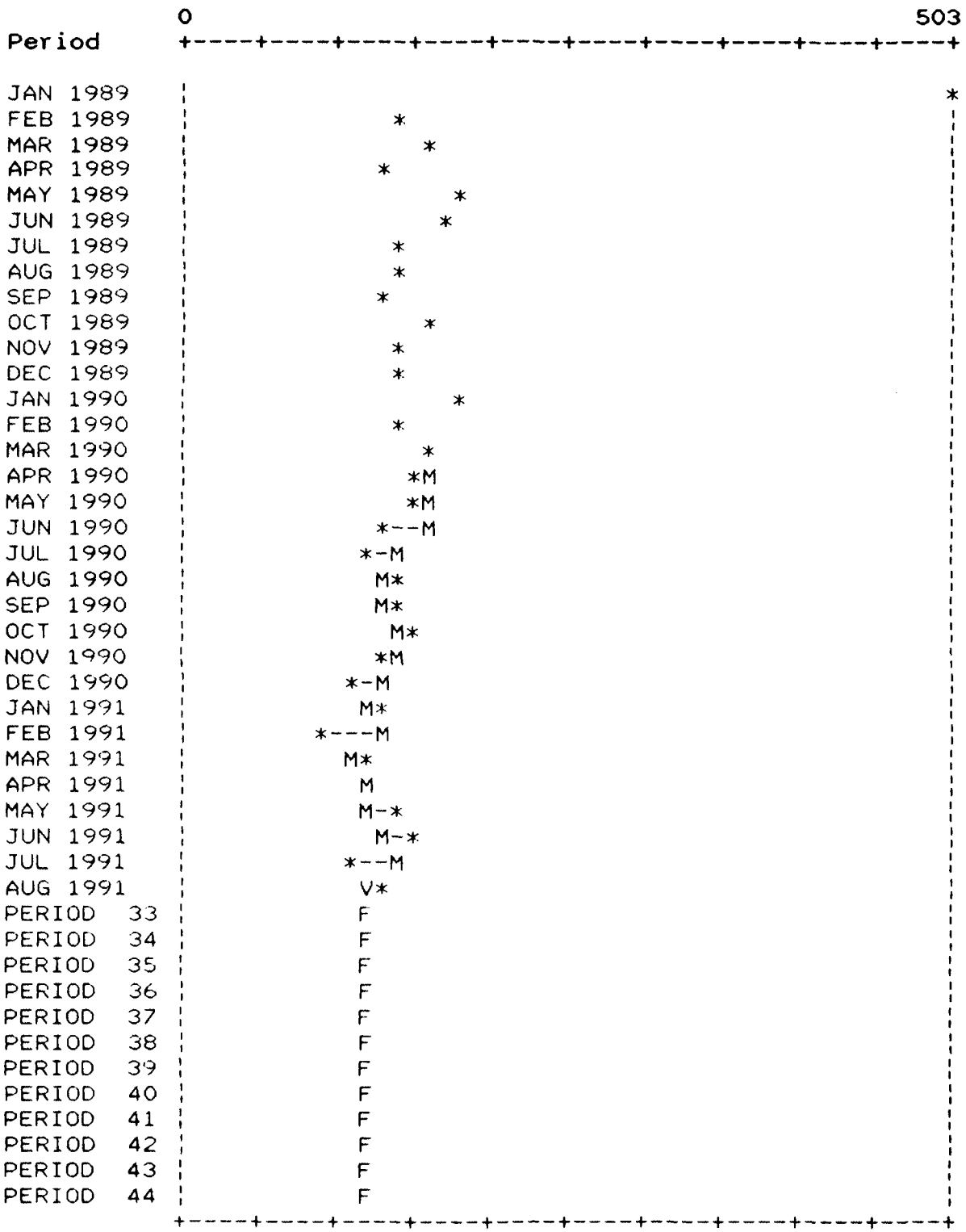
SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL FITTING STATISTICS FOR ARMY
SMOOTHING CONSTANTS USED : 0.50(LEVEL)

Period	Actual	Forecast	Error	Level
APR 1990	153	165	-12	158.8421
MAY 1990	154	159	-5	156.4211
JUN 1990	127	156	-29	141.7105
JUL 1990	116	142	-26	128.8553
AUG 1990	137	129	8	132.9276
SEP 1990	139	133	6	135.9638
OCT 1990	149	136	13	142.4819
NOV 1990	128	142	-14	135.2410
DEC 1990	114	135	-21	124.6205
JAN 1991	133	125	8	128.8102
FEB 1991	91	129	-38	109.9051
MAR 1991	124	110	14	116.9526
APR 1991	116	117	-1	116.4763
MAY 1991	138	116	22	127.2381
JUN 1991	147	127	20	137.1191
JUL 1991	106	137	-31	121.5595

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL VALIDATION STATISTICS FOR ARMY
SMOOTHING CONSTANTS USED : 0.50(LEVEL)

Period	Actual	Forecast	Error	Level
AUG 1991	126	122	4	123.7798

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL PLOT FOR ARMY (PLAN HORIZON = 1)



* : Actual Data Point M : Model Fitting
V : Model Validation F : Future Forecasts

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR ARMY

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	-5.3750	6.3750	-4.9375	3.0625
Mean % Err	-5.7393	2.6515	-3.7092	1.4593
Mean Absolute Err	16.7500	20.2500	18.3125	25.6875
Mean Abs % Err	13.9560	15.8543	13.8257	19.7780
Root Mean Sq Err	19.5927	23.6590	22.3173	34.4882

Model selected was Level

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	4.0000	4.0000	19.0000	10.0000
Mean % Err	3.1746	3.1746	15.0794	7.9365
Mean Absolute Err	4.0000	4.0000	19.0000	10.0000
Mean Abs % Err	3.1746	3.1746	15.0794	7.9365
Root Mean Sq Err	4.0000	4.0000	19.0000	10.0000

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL FORECASTS FOR ARMY
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	124
PERIOD	34	124
PERIOD	35	124
PERIOD	36	124
PERIOD	37	124
PERIOD	38	124
PERIOD	39	124
PERIOD	40	124
PERIOD	41	124
PERIOD	42	124
PERIOD	43	124
PERIOD	44	124

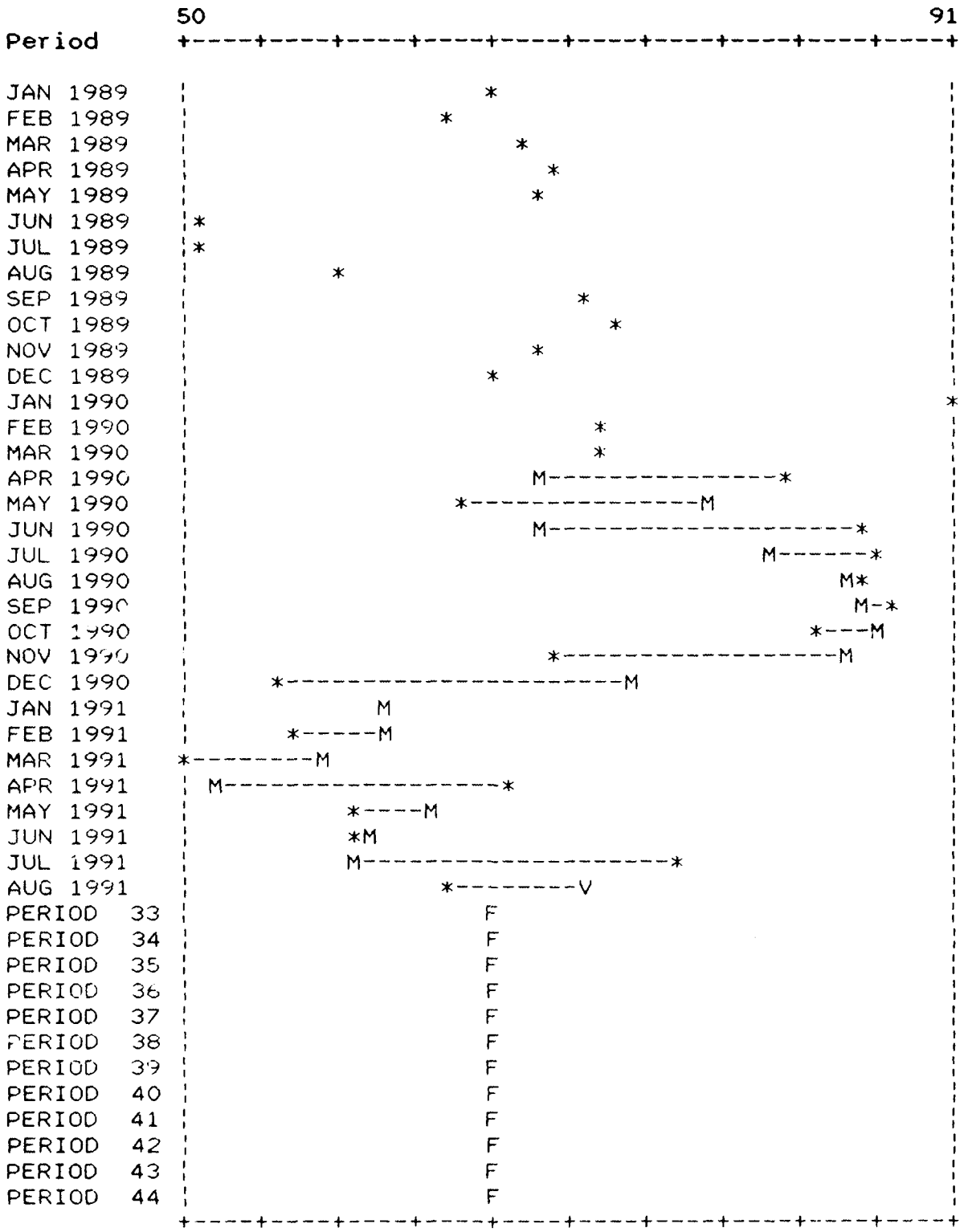
SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL FITTING STATISTICS FOR NAVY
SMOOTHING CONSTANTS USED : 0.70(LEVEL)

Period	Actual	Forecast	Error	Level
APR 1990	82	69	13	78.0866
MAY 1990	65	78	-13	68.9260
JUN 1990	86	69	17	80.8778
JUL 1990	87	81	6	85.1633
AUG 1990	86	85	1	85.7490
SEP 1990	88	86	2	87.3247
OCT 1990	84	87	-3	84.9974
NOV 1990	70	85	-15	74.4992
DEC 1990	55	74	-19	60.8498
JAN 1991	61	61	0	60.9549
FEB 1991	56	61	-5	57.4865
MAR 1991	50	57	-7	52.2459
APR 1991	67	52	15	62.5738
MAY 1991	59	63	-4	60.0721
JUN 1991	59	60	-1	59.3216
JUL 1991	76	59	17	70.9965

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL VALIDATION STATISTICS FOR NAVY
SMOOTHING CONSTANTS USED : 0.70(LEVEL)

Period	Actual	Forecast	Error	Level
AUG 1991	64	71	-7	66.0989

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL PLOT FOR NAVY (PLAN HORIZON = 1)



* : Actual Data Point M : Model Fitting
V : Model Validation F : Future Forecasts

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR NAVY

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	0.2500	-0.4375	0.5625	0.0000
Mean % Err	-1.2649	-1.8676	0.0677	-0.2202
Mean Absolute Err	8.6250	8.3125	12.9375	11.8750
Mean Abs % Err	12.6036	12.1721	18.3232	16.7575
Root Mean Sq Err	10.8051	11.0538	15.2172	14.7564

Model selected was Level

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	-7.0000	-7.0000	-22.0000	-24.0000
Mean % Err	-10.9375	-10.9375	-34.3750	-37.5000
Mean Absolute Err	7.0000	7.0000	22.0000	24.0000
Mean Abs % Err	10.9375	10.9375	34.3750	37.5000
Root Mean Sq Err	7.0000	7.0000	22.0000	24.0000

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL FORECASTS FOR NAVY
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	66
PERIOD	34	66
PERIOD	35	66
PERIOD	36	66
PERIOD	37	66
PERIOD	38	66
PERIOD	39	66
PERIOD	40	66
PERIOD	41	66
PERIOD	42	66
PERIOD	43	66
PERIOD	44	66

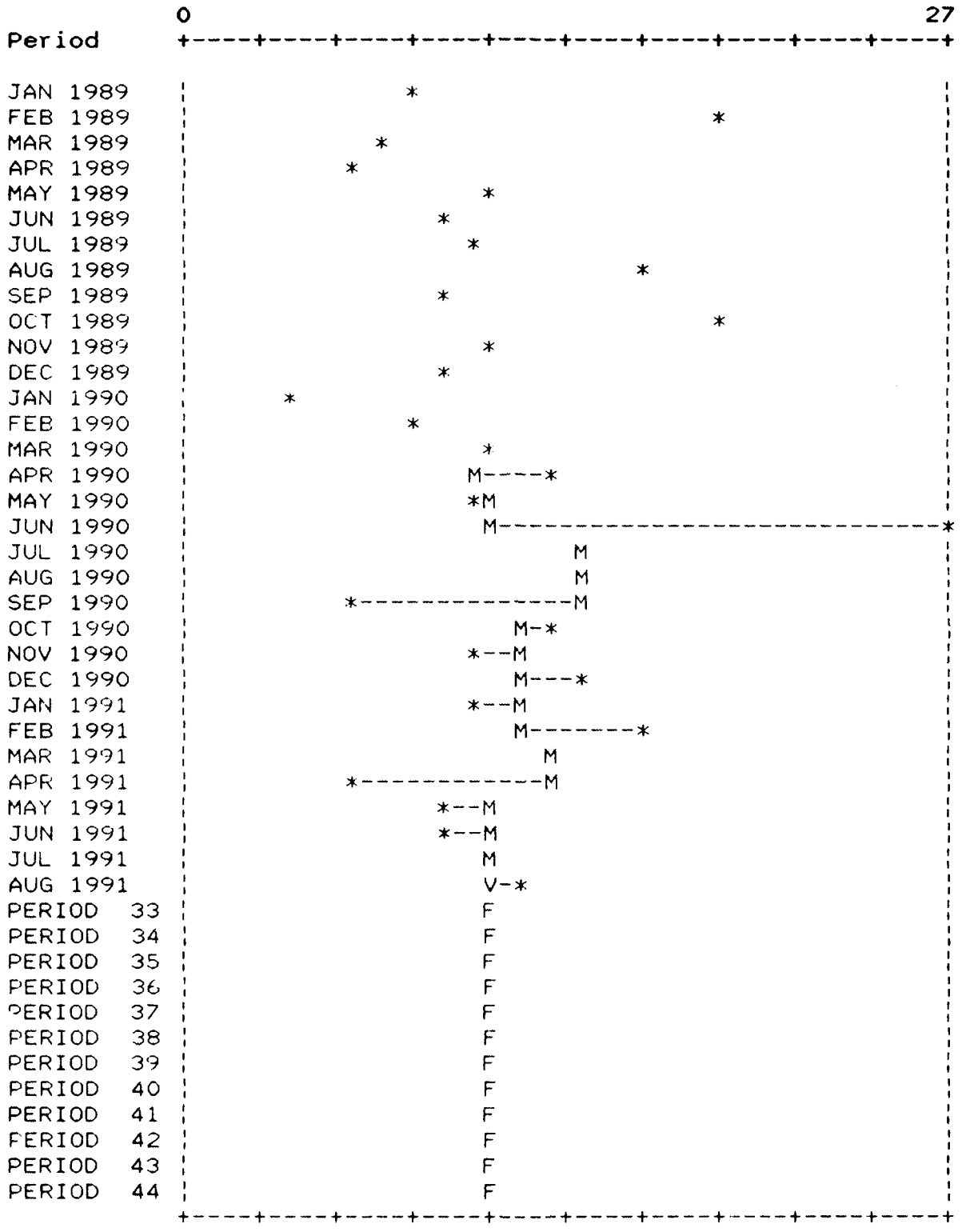
SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL FITTING STATISTICS FOR MARINE
SMOOTHING CONSTANTS USED : 0.20(LEVEL)

Period	Actual	Forecast	Error	Level
APR 1990	13	10	3	10.8056
MAY 1990	10	11	-1	10.6445
JUN 1990	27	11	16	13.9156
JUL 1990	14	14	0	13.9324
AUG 1990	14	14	0	13.9460
SEP 1990	6	14	-8	12.3568
OCT 1990	13	12	1	12.4854
NOV 1990	10	12	-2	11.9883
DEC 1990	14	12	2	12.3907
JAN 1991	10	12	-2	11.9125
FEB 1991	16	12	4	12.7300
MAR 1991	13	13	0	12.7840
APR 1991	6	13	-7	11.4272
MAY 1991	9	11	-2	10.9418
JUN 1991	9	11	-2	10.5534
JUL 1991	11	11	0	10.6427

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL VALIDATION STATISTICS FOR MARINE
SMOOTHING CONSTANTS USED : 0.20(LEVEL)

Period	Actual	Forecast	Error	Level
AUG 1991	12	11	1	10.9142

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL PLOT FOR MARINE (PLAN HORIZON = 1)



* : Actual Data Point M : Model Fitting
V : Model Validation F : Future Forecasts

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR MARINE

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	0.1250	1.5625	-0.1875	0.5625
Mean % Err	-13.4456	-0.4309	-12.7041	-5.7243
Mean Absolute Err	3.1250	3.6875	5.0625	4.8125
Mean Abs % Err	29.6099	30.5413	41.9258	37.9066
Root Mean Sq Err	5.0990	5.5057	6.3689	6.5717
Model selected was Level				
Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	1.0000	1.0000	-7.0000	-6.0000
Mean % Err	8.3333	8.3333	-58.3333	-50.0000
Mean Absolute Err	1.0000	1.0000	7.0000	6.0000
Mean Abs % Err	8.3333	8.3333	58.3333	50.0000
Root Mean Sq Err	1.0000	1.0000	7.0000	6.0000

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
LEVEL MODEL FORECASTS FOR MARINE
Extended Forecasts for Periods beyond AUG 1991

Period	Forecast
PERIOD 33	11
PERIOD 34	11
PERIOD 35	11
PERIOD 36	11
PERIOD 37	11
PERIOD 38	11
PERIOD 39	11
PERIOD 40	11
PERIOD 41	11
PERIOD 42	11
PERIOD 43	11
PERIOD 44	11

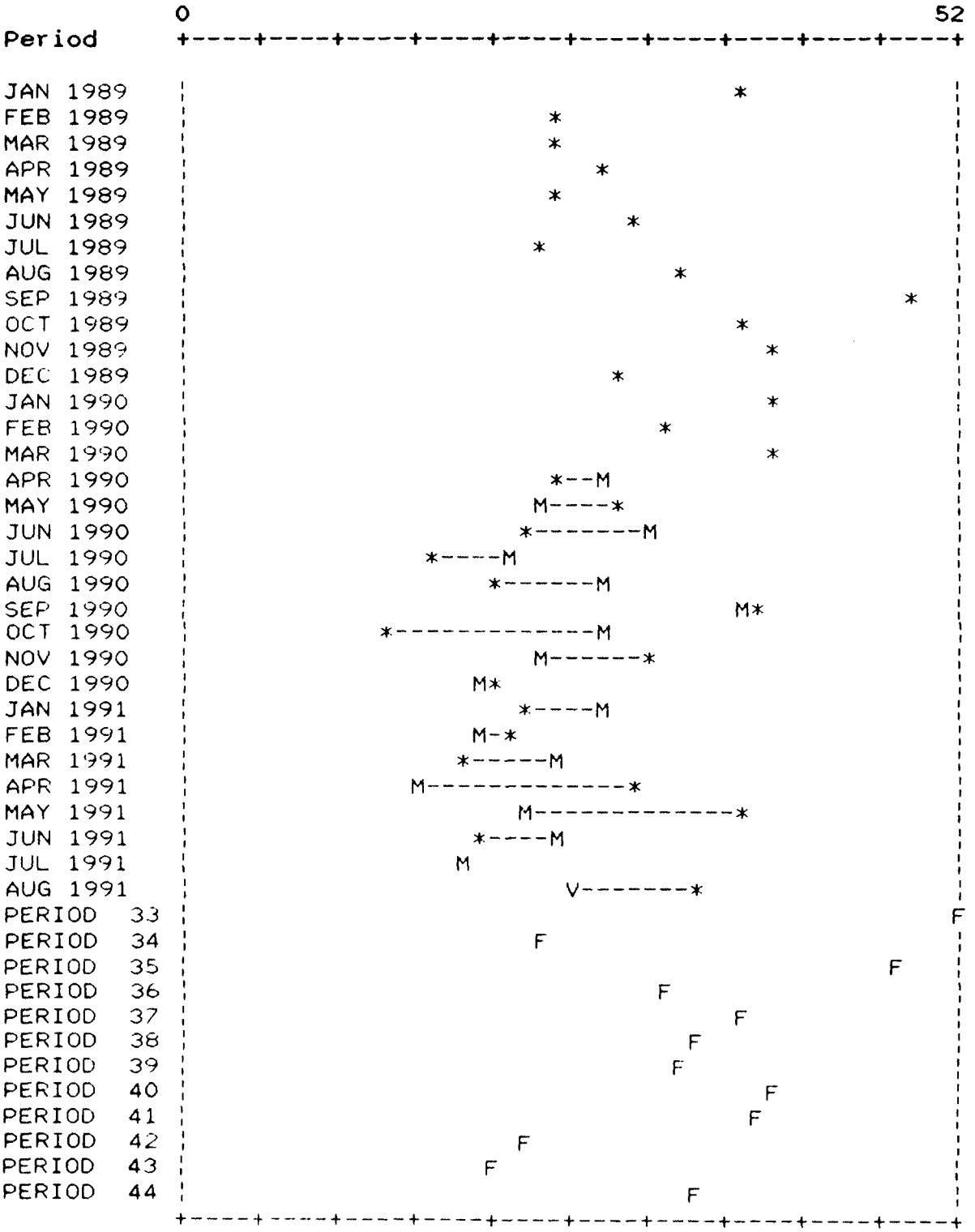
SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
SEASONAL MODEL FITTING STATISTICS FOR AIR FORCE
SMOOTHING CONSTANTS USED : 0.40(LEVEL), 1.00(SEASONAL)

Period	Actual	Forecast	Error	Level	Seasonal
APR 1990	25	28	-3	31.9944	0.7814
MAY 1990	29	24	5	34.7747	0.8339
JUN 1990	23	31	-8	31.1664	0.7380
JUL 1990	17	22	-5	28.2222	0.6024
AUG 1990	21	28	-7	25.4919	0.8238
SEP 1990	38	37	1	25.7292	1.4769
OCT 1990	14	28	-14	20.5301	0.6819
NOV 1990	31	24	7	23.0197	1.3467
DEC 1990	21	20	1	23.5638	0.8912
JAN 1991	23	28	-5	21.9319	1.0487
FEB 1991	22	20	2	22.5905	0.9739
MAR 1991	19	25	-6	20.3160	0.9352
APR 1991	30	16	14	27.5469	1.0891
MAY 1991	37	23	14	34.2752	1.0795
JUN 1991	20	25	-5	31.4056	0.6368
JUL 1991	19	19	0	31.4603	0.6039

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
SEASONAL MODEL VALIDATION STATISTICS FOR AIR FORCE
SMOOTHING CONSTANTS USED : 0.40(LEVEL), 1.00(SEASONAL)

Period	Actual	Forecast	Error	Level	Seasonal
AUG 1991	34	26	8	35.3852	0.9609

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
SEASONAL MODEL PLOT FOR AIR FORCE (PLAN HORIZON = 1)



* : Actual Data Point M : Model Fitting
V : Model Validation F : Future Forecasts

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR AIR FORCE

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	-3.0000	-1.6250	-0.5625	-0.7500
Mean % Err	-21.0066	-15.5779	-9.1897	-9.9964
Mean Absolute Err	7.5000	7.7500	6.0625	7.0000
Mean Abs % Err	33.9408	33.3576	26.7910	30.4202
Root Mean Sq Err	8.3141	9.2331	7.5042	8.1854

Model selected was Seasonal

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	10.0000	11.0000	8.0000	6.0000
Mean % Err	29.4118	32.3529	23.5294	17.6471
Mean Absolute Err	10.0000	11.0000	8.0000	6.0000
Mean Abs % Err	29.4118	32.3529	23.5294	17.6471
Root Mean Sq Err	10.0000	11.0000	8.0000	6.0000

Note : Trend-Seas Model performed best during validation

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
SEASONAL MODEL FORECASTS FOR AIR FORCE
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	52
PERIOD	34	24
PERIOD	35	48
PERIOD	36	32
PERIOD	37	37
PERIOD	38	34
PERIOD	39	33
PERIOD	40	39
PERIOD	41	38
PERIOD	42	23
PERIOD	43	21
PERIOD	44	34

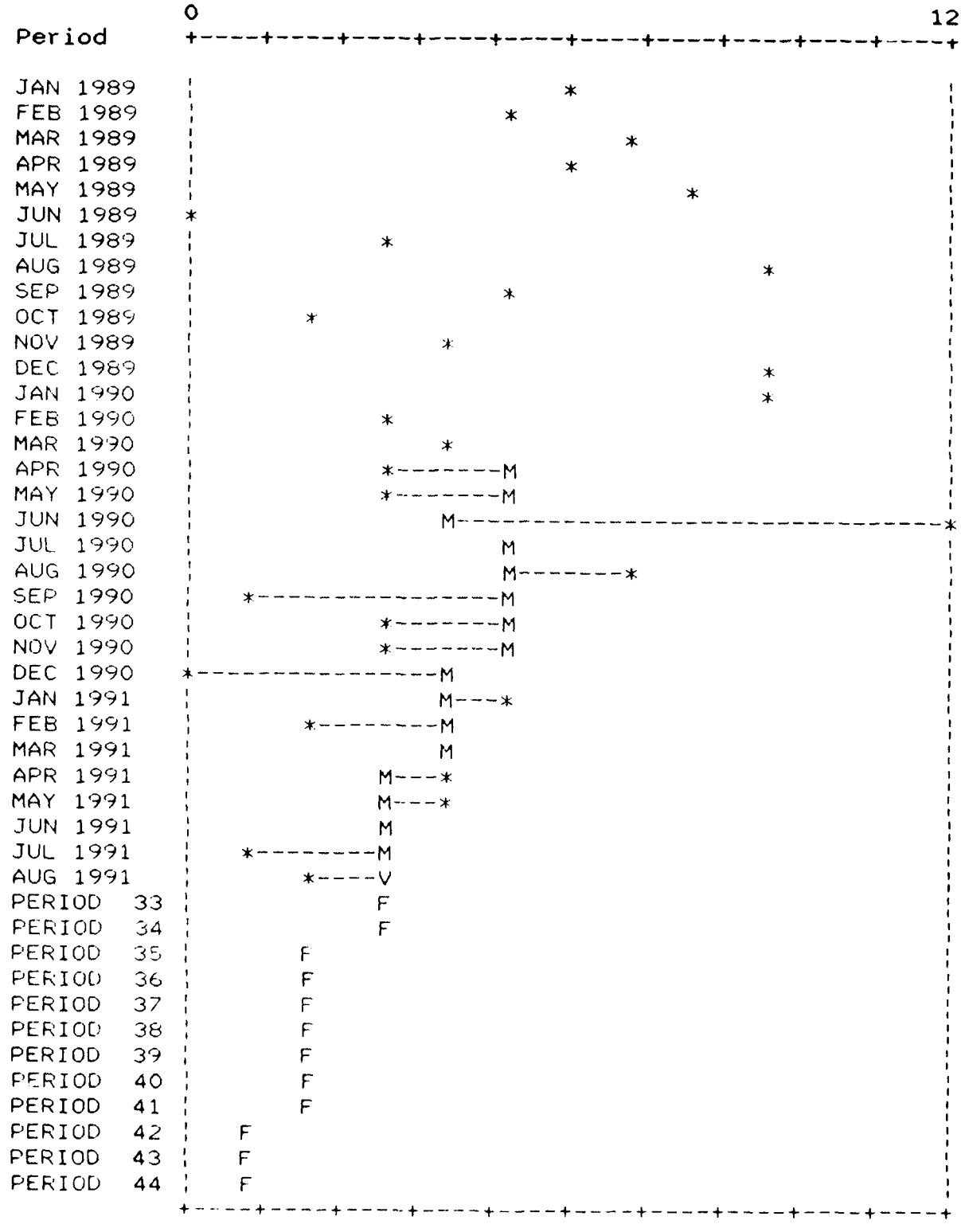
SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
TREND MODEL FITTING STATISTICS FOR COASTGUARD
SMOOTHING CONSTANTS USED : 0.10(LEVEL), 0.10(TREND)

Period	Actual	Forecast	Error	Level	Trend
APR 1990	3	5	-2	4.7270	-6.855E-02
MAY 1990	3	5	-2	4.4926	-8.514E-02
JUN 1990	12	4	8	5.1667	-9.213E-03
JUL 1990	5	5	0	5.1417	-1.079E-02
AUG 1990	7	5	2	5.3178	7.9030E-03
SEP 1990	1	5	-4	4.8932	-3.535E-02
OCT 1990	3	5	-2	4.6720	-5.393E-02
NOV 1990	3	5	-2	4.4563	-7.011E-02
DEC 1990	0	4	-4	3.9476	-0.114
JAN 1991	5	4	1	3.9502	-0.102
FEB 1991	2	4	-2	3.6631	-0.121
MAR 1991	4	4	0	3.5881	-0.116
APR 1991	4	3	1	3.5247	-0.111
MAY 1991	4	3	1	3.4724	-0.105
JUN 1991	3	3	0	3.3306	-0.109
JUL 1991	1	3	-2	2.9997	-0.131

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
TREND MODEL VALIDATION STATISTICS FOR COASTGUARD
SMOOTHING CONSTANTS USED : 0.10(LEVEL), 0.10(TREND)

Period	Actual	Forecast	Error	Level	Trend
AUG 1991	2	3	-1	2.7818	-0.140

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
TREND MODEL PLOT FOR COASTGUARD (PLAN HORIZON = 1)



* : Actual Data Point M : Model Fitting
V : Model Validation F : Future Forecasts

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR COASTGUARD

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	-1.0000	-0.4375	-0.9375	-0.5000
Mean % Err	0.0000	0.0000	0.0000	0.0000
Mean Absolute Err	2.1250	2.0625	3.0625	2.7500
Mean Abs % Err	0.0000	0.0000	0.0000	0.0000
Root Mean Sq Err	2.8723	2.8174	4.4511	4.1833

Model selected was Trend

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	-2.0000	-1.0000	-3.0000	-2.0000
Mean % Err	0.0000	0.0000	0.0000	0.0000
Mean Absolute Err	2.0000	1.0000	3.0000	2.0000
Mean Abs % Err	0.0000	0.0000	0.0000	0.0000
Root Mean Sq Err	2.0000	1.0000	3.0000	2.0000

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION MODEL
TREND MODEL FORECASTS FOR COASTGUARD
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	3
PERIOD	34	3
PERIOD	35	2
PERIOD	36	2
PERIOD	37	2
PERIOD	38	2
PERIOD	39	2
PERIOD	40	2
PERIOD	41	2
PERIOD	42	1
PERIOD	43	1
PERIOD	44	1

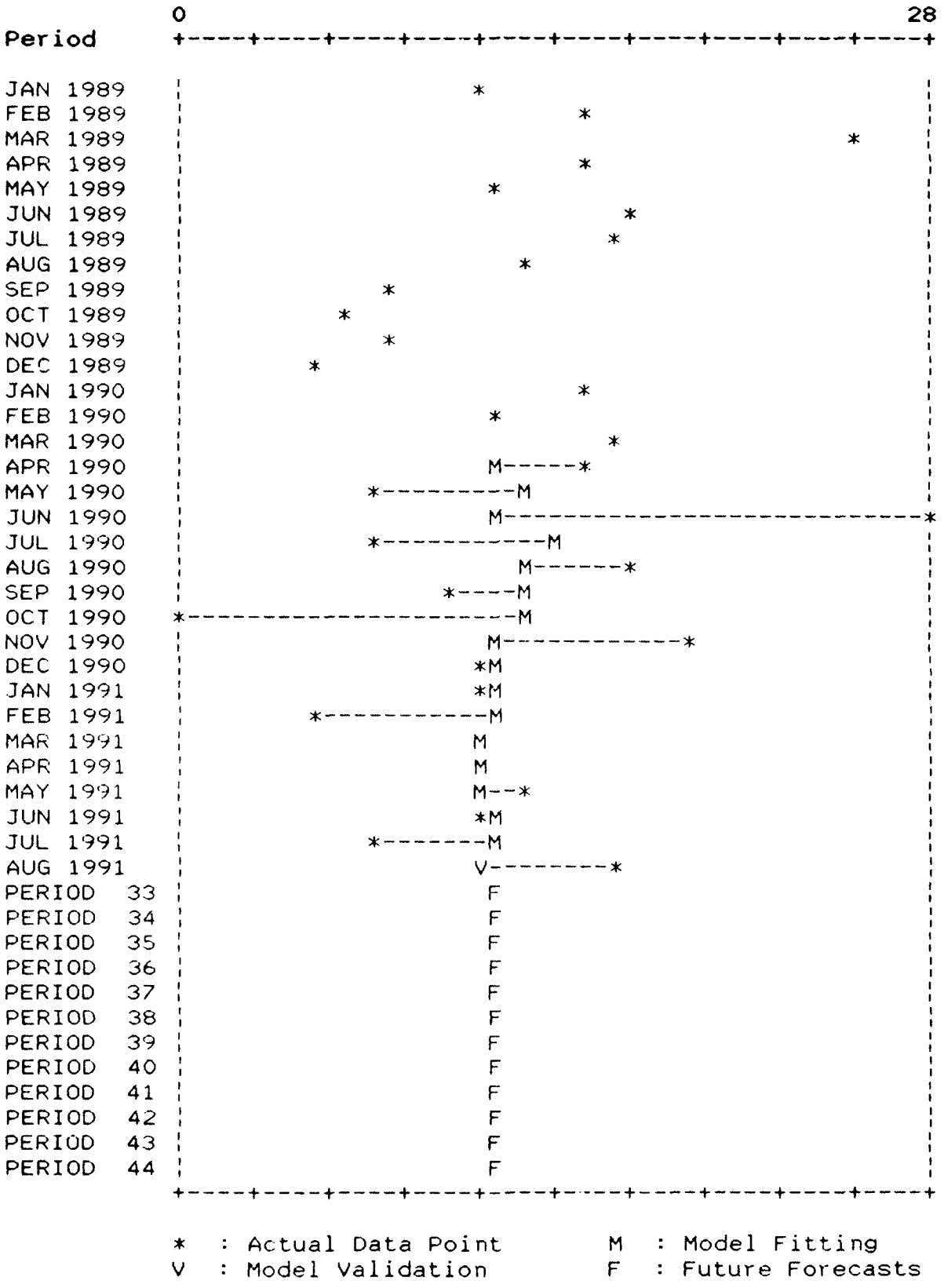
SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION DATA MODEL
LEVEL MODEL FITTING STATISTICS FOR OTHER
SMOOTHING CONSTANTS USED : 0.10(LEVEL)

Period	Actual	Forecast	Error	Level
APR 1990	15	12	3	12.6816
MAY 1990	7	13	-6	12.1134
JUN 1990	28	12	16	13.7021
JUL 1990	7	14	-7	13.0319
AUG 1990	17	13	4	13.4287
SEP 1990	10	13	-3	13.0858
OCT 1990	0	13	-13	11.7772
NOV 1990	19	12	7	12.4995
DEC 1990	11	12	-1	12.3496
JAN 1991	11	12	-1	12.2146
FEB 1991	5	12	-7	11.4931
MAR 1991	11	11	0	11.4438
APR 1991	11	11	0	11.3994
MAY 1991	13	11	2	11.5595
JUN 1991	11	12	-1	11.5035
JUL 1991	7	12	-5	11.0532

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION DATA MODEL
LEVEL MODEL VALIDATION STATISTICS FOR OTHER
SMOOTHING CONSTANTS USED : 0.10(LEVEL)

Period	Actual	Forecast	Error	Level
AUG 1991	16	11	5	11.5479

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION DATA MODEL
LEVEL MODEL PLOT FOR OTHER (PLAN HORIZON = 1)



SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION DATA MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR OTHER

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	-0.7500	0.4375	-1.5000	-0.2500
Mean % Err	0.0000	0.0000	0.0000	0.0000
Mean Absolute Err	4.7500	4.5625	6.2500	6.2500
Mean Abs % Err	0.0000	0.0000	0.0000	0.0000
Root Mean Sq Err	6.4904	6.4952	7.0887	7.0887

Model selected was Level

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	5.0000	6.0000	4.0000	5.0000
Mean % Err	0.0000	0.0000	0.0000	0.0000
Mean Absolute Err	5.0000	6.0000	4.0000	5.0000
Mean Abs % Err	0.0000	0.0000	0.0000	0.0000
Root Mean Sq Err	5.0000	6.0000	4.0000	5.0000

Note : Seasonal Model performed best during validation

SILAS B. HAYS ARMY COMMUNITY HOSPITAL ADMISSION DATA MODEL
LEVEL MODEL FORECASTS FOR OTHER
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	12
PERIOD	34	12
PERIOD	35	12
PERIOD	36	12
PERIOD	37	12
PERIOD	38	12
PERIOD	39	12
PERIOD	40	12
PERIOD	41	12
PERIOD	42	12
PERIOD	43	12
PERIOD	44	12

APPENDIX E

STORM DATA SET LISTING

DETAILED PROBLEM DATA LISTING FOR

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL

ROW LABEL	ARMY	NAVY	MARINE	AIR FORCE	COASTGUARD
DATA TYPE	INT	INT	INT	INT	INT
DATA RANGE	POS	POS	POS	POS	POS
SEASON LNG	12	12	12	12	12
MODEL VAL	1	1	1	1	1
PLAN HORIZ	1	1	1	1	1
LEVL ALPHA	0.2	0.2	0.2	0.2	0.2
TRND ALPHA	0.2	0.2	0.2	0.2	0.2
SEAS ALPHA	0.2	0.2	0.2	0.2	0.2
SEARCH ?	YES	YES	YES	YES	YES
STEP SIZE	0.1	0.1	0.1	0.1	0.1
MODEL	BEST	BEST	BEST	BEST	BEST
JAN 1989	587	177	12	133	9
FEB 1989	456	157	50	86	15
MAR 1989	572	215	29	96	28
APR 1989	493	241	17	108	13
MAY 1989	585	173	22	89	18
JUN 1989	604	187	41	97	0
JUL 1989	489	209	36	78	6
AUG 1989	436	236	46	127	39
SEP 1989	460	243	28	151	7
OCT 1989	601	251	52	122	4
NOV 1989	593	211	45	123	6
DEC 1989	505	220	45	119	17
JAN 1990	717	210	7	105	29
FEB 1990	566	262	25	104	8
MAR 1990	622	166	60	137	10
APR 1990	574	274	30	108	13
MAY 1990	622	167	32	194	10
JUN 1990	563	242	48	117	29
JUL 1990	543	284	52	91	14
AUG 1990	534	257	41	110	15
SEP 1990	550	286	28	113	3
OCT 1990	615	211	47	61	7
NOV 1990	579	214	25	83	7
DEC 1990	492	189	73	71	0
JAN 1991	680	182	21	67	14
FEB 1991	486	171	71	83	8
MAR 1991	599	154	28	59	10
APR 1991	547	165	20	81	8
MAY 1991	643	156	24	120	8
JUN 1991	597	188	40	83	13
JUL 1991	554	200	31	57	1
AUG 1991	570	204	56	140	6

STORM DATA SET LISTING
DETAILED PROBLEM DATA LISTING FOR
SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL

ROW LABEL	OTHER
DATA TYPE	INT
DATA RANGE	POS
SEASON LNG	12
MODEL VAL	1
PLAN HORIZ	1
LEVL ALPHA	0.2
TRND ALPHA	0.2
SEAS ALPHA	0.2
SEARCH ?	YES
STEP SIZE	0.1
MODEL	BEST
JAN 1989	37
FEB 1989	27
MAR 1989	83
APR 1989	43
MAY 1989	37
JUN 1989	44
JUL 1989	41
AUG 1989	27
SEP 1989	30
OCT 1989	22
NOV 1989	18
DEC 1989	21
JAN 1990	30
FEB 1990	35
MAR 1990	39
APR 1990	32
MAY 1990	40
JUN 1990	92
JUL 1990	25
AUG 1990	33
SEP 1990	28
OCT 1990	39
NOV 1990	56
DEC 1990	30
JAN 1991	28
FEB 1991	13
MAR 1991	22
APR 1991	34
MAY 1991	41
JUN 1991	23
JUL 1991	13
AUG 1991	41

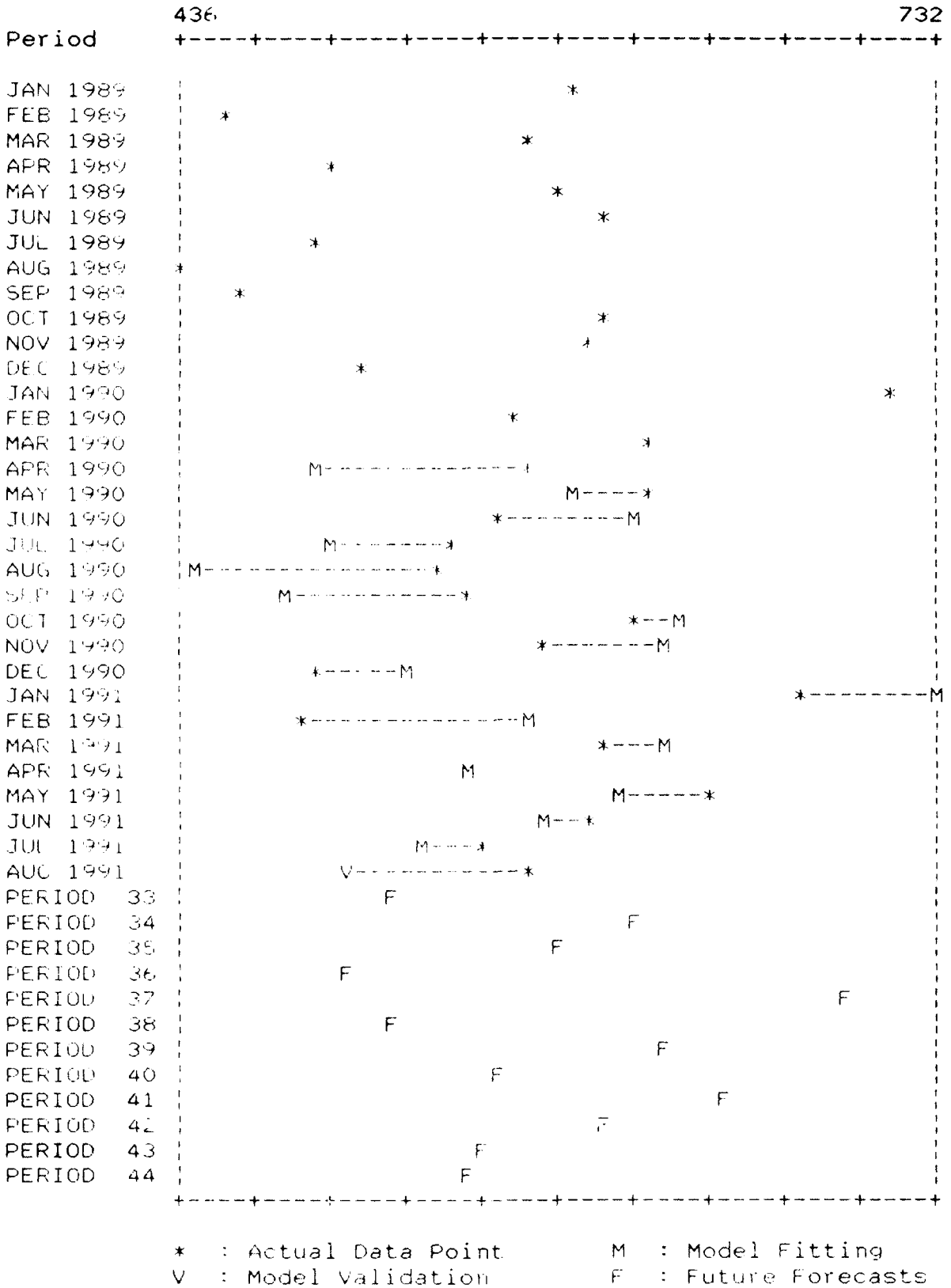
SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
SEASONAL MODEL FITTING STATISTICS FOR ARMY
SMOOTHING CONSTANTS USED : 0.10(LEVEL), 0.70(SEASONAL)

Period	Actual	Forecast	Error	Level	Seasonal
APR 1990	574	491	83	560.7736	0.9836
MAY 1990	622	592	30	563.6056	1.0893
JUN 1990	563	614	-51	558.9071	1.0321
JUL 1990	543	493	50	564.5802	0.9378
AUG 1990	534	444	90	576.0440	0.8848
SEP 1990	550	478	72	584.7630	0.9072
OCT 1990	615	633	-18	583.0620	1.0633
NOV 1990	579	623	-44	578.9396	1.0206
DEC 1990	492	527	-35	575.1206	0.8718
JAN 1991	680	732	-52	571.0643	1.2152
FEB 1991	486	573	-87	562.3625	0.9062
MAR 1991	599	627	-28	559.8209	1.0837
APR 1991	547	551	-4	559.4533	0.9795
MAY 1991	643	609	34	562.5376	1.1269
JUN 1991	597	581	16	564.1294	1.0504
JUL 1991	554	529	25	566.7879	0.9656

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
SEASONAL MODEL VALIDATION STATISTICS FOR ARMY
SMOOTHING CONSTANTS USED : 0.10(LEVEL), 0.70(SEASONAL)

Period	Actual	Forecast	Error	Level	Seasonal
AUG 1991	570	501	69	574.5328	0.9599

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
SEASONAL MODEL PLOT FOR ARMY (PLAN HORIZON = 1)



* : Actual Data Point M : Model Fitting
V : Model Validation F : Future Forecasts

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR ARMY

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	6.5625	-11.7500	5.0625	-10.6250
Mean % Err	0.3557	-2.9160	0.8290	-1.7595
Mean Absolute Err	42.1875	51.2500	44.9375	44.1250
Mean Abs % Err	7.3224	9.0589	8.0356	7.7293
Root Mean Sq Err	52.8778	60.8892	51.7017	52.5749

Model selected was Seasonal

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	-3.0000	-6.0000	69.0000	80.0000
Mean % Err	-0.5263	-1.0526	12.1053	14.0351
Mean Absolute Err	3.0000	6.0000	69.0000	80.0000
Mean Abs % Err	0.5263	1.0526	12.1053	14.0351
Root Mean Sq Err	3.0000	6.0000	69.0000	80.0000

Note : Level Model performed best during validation

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
SEASONAL MODEL FORECASTS FOR ARMY
Extended Forecasts for Periods beyond AUG 1991

Period	Forecast
PERIOD 33	521
PERIOD 34	611
PERIOD 35	586
PERIOD 36	501
PERIOD 37	698
PERIOD 38	521
PERIOD 39	623
PERIOD 40	563
PERIOD 41	647
PERIOD 42	603
PERIOD 43	555
PERIOD 44	551

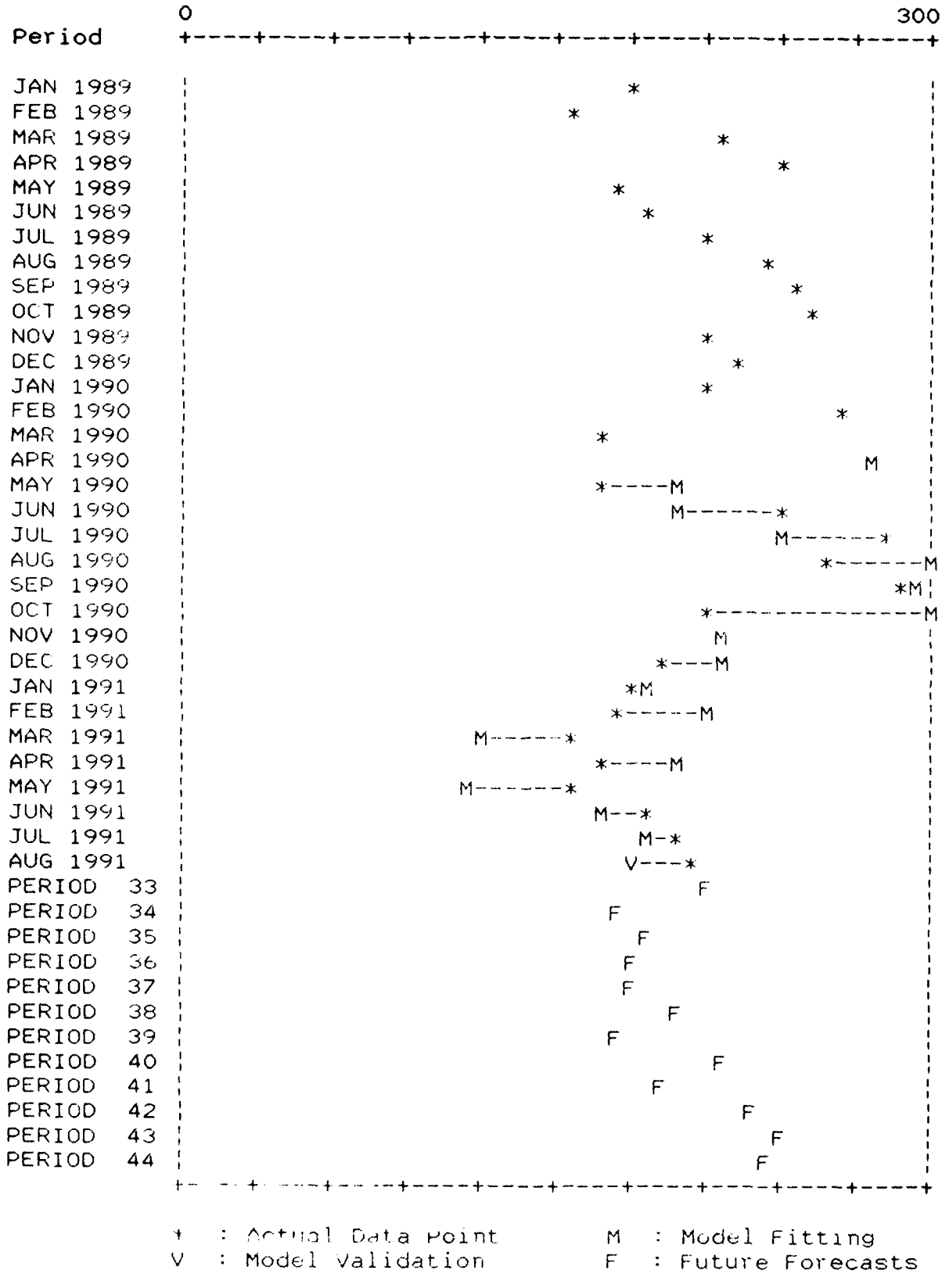
SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
TREND-SEAS MODEL FITTING STATISTICS FOR NAVY
SMOOTHING CONSTANTS USED : 0.40(LEVEL), 0.30(TREND), 1.00(SEASONAL)

Period	Actual	Forecast	Error	Level	Trend	Seasonal
APR 1990	274	278	-4	233.9010	2.0939	1.171
MAY 1990	167	198	-31	221.3707	-2.293	0.754
JUN 1990	242	196	46	239.6702	3.8845	1.010
JUL 1990	284	241	43	261.1109	9.1514	1.088
AUG 1990	257	298	-41	255.3741	4.6849	1.006
SEP 1990	286	292	-6	257.9416	4.0497	1.109
OCT 1990	211	300	-89	230.8083	-5.305	0.914
NOV 1990	214	215	-1	225.1132	-5.422	0.951
DEC 1990	189	216	-27	208.7336	-8.709	0.905
JAN 1991	182	185	-3	198.6563	-9.120	0.916
FEB 1991	171	211	-40	175.0469	-13.467	0.977
MAR 1991	154	121	33	179.2963	-8.152	0.859
APR 1991	165	200	-35	159.0278	-11.787	1.038
MAY 1991	156	111	45	171.0603	-4.641	0.912
JUN 1991	188	168	20	174.3276	-2.269	1.078
JUL 1991	200	187	13	176.7878	-0.850	1.131

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
TREND-SEAS MODEL VALIDATION STATISTICS FOR NAVY
SMOOTHING CONSTANTS USED : 0.40(LEVEL), 0.30(TREND), 1.00(SEASONAL)

Period	Actual	Forecast	Error	Level	Trend	Seasonal
AUG 1991	204	177	27	186.6465	2.3627	1.093

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
TREND-SEAS MODEL PLOT FOR NAVY (PLAN HORIZON = 1)



SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR NAVY

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	-3.2500	-5.1250	-4.1250	-4.8125
Mean % Err	-4.1467	-4.5454	-2.7949	-2.4811
Mean Absolute Err	33.7500	33.5000	31.5000	29.8125
Mean Abs % Err	16.3401	16.4465	15.6149	15.1763
Root Mean Sq Err	39.4858	40.4892	37.8286	36.9349

Model selected was Trend-Seas

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	17.0000	23.0000	-17.0000	27.0000
Mean % Err	8.3333	11.2745	-8.3333	13.2353
Mean Absolute Err	17.0000	23.0000	17.0000	27.0000
Mean Abs % Err	8.3333	11.2745	8.3333	13.2353
Root Mean Sq Err	17.0000	23.0000	17.0000	27.0000

Note : Level Model performed best during validation

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
TREND-SEAS MODEL FORECASTS FOR NAVY
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	210
PERIOD	34	175
PERIOD	35	184
PERIOD	36	178
PERIOD	37	182
PERIOD	38	196
PERIOD	39	175
PERIOD	40	213
PERIOD	41	190
PERIOD	42	227
PERIOD	43	241
PERIOD	44	235

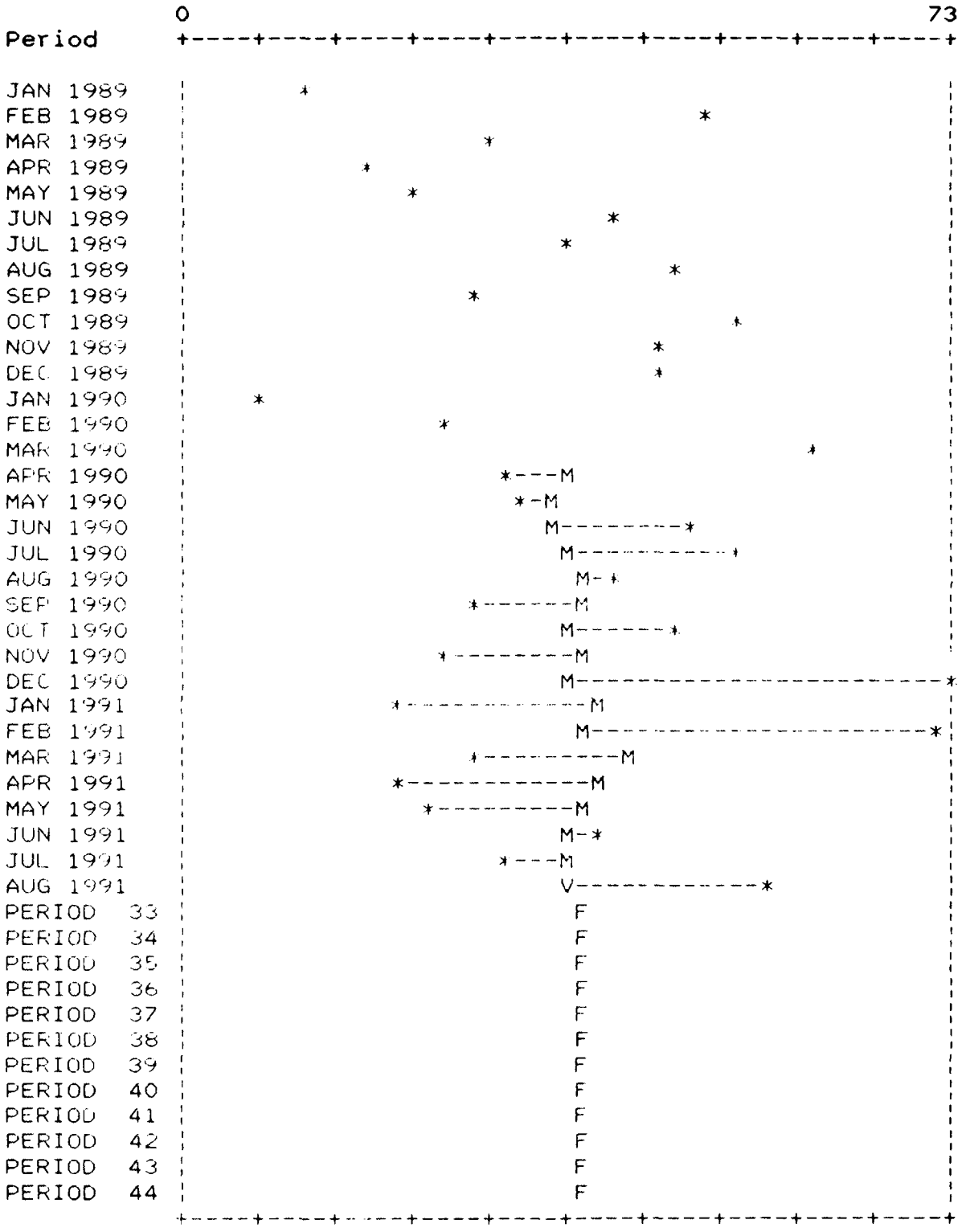
SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL FITTING STATISTICS FOR MARINE
SMOOTHING CONSTANTS USED : 0.10(LEVEL)

Period	Actual	Forecast	Error	Level
APR 1990	30	36	-6	35.1127
MAY 1990	32	35	-3	34.8015
JUN 1990	48	35	13	36.1213
JUL 1990	52	36	16	37.7092
AUG 1990	41	38	3	38.0383
SEP 1990	28	38	-10	37.0344
OCT 1990	47	37	10	38.0310
NOV 1990	25	38	-13	36.7279
DEC 1990	73	37	36	40.3551
JAN 1991	21	40	-19	38.4196
FEB 1991	71	38	33	41.6776
MAR 1991	28	42	-14	40.3099
APR 1991	20	40	-20	38.2789
MAY 1991	24	38	-14	36.8510
JUN 1991	40	37	3	37.1659
JUL 1991	31	37	-6	36.5493

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL VALIDATION STATISTICS FOR MARINE
SMOOTHING CONSTANTS USED : 0.10(LEVEL)

Period	Actual	Forecast	Error	Level
AUG 1991	56	37	19	38.4944

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL PLOT FOR MARINE (PLAN HORIZON = 1)



SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR MARINE

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	0.5625	-1.3750	-2.0625	-4.2500
Mean % Err	-15.3446	-21.5919	-14.8197	-21.3321
Mean Absolute Err	13.6875	14.1250	15.8125	16.8750
Mean Abs % Err	39.0621	42.4241	45.2307	49.4800
Root Mean Sq Err	16.6414	16.9337	20.5350	21.7256

Model selected was Level

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	19.0000	17.0000	2.0000	-3.0000
Mean % Err	33.9286	30.3571	3.5714	-5.3571
Mean Absolute Err	19.0000	17.0000	2.0000	3.0000
Mean Abs % Err	33.9286	30.3571	3.5714	5.3571
Root Mean Sq Err	19.0000	17.0000	2.0000	3.0000

Note : Seasonal Model performed best during validation

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL FORECASTS FOR MARINE
Extended Forecasts for Periods beyond AUG 1991

Period	Forecast
PERIOD 33	38
PERIOD 34	38
PERIOD 35	38
PERIOD 36	38
PERIOD 37	38
PERIOD 38	38
PERIOD 39	38
PERIOD 40	38
PERIOD 41	38
PERIOD 42	38
PERIOD 43	38
PERIOD 44	38

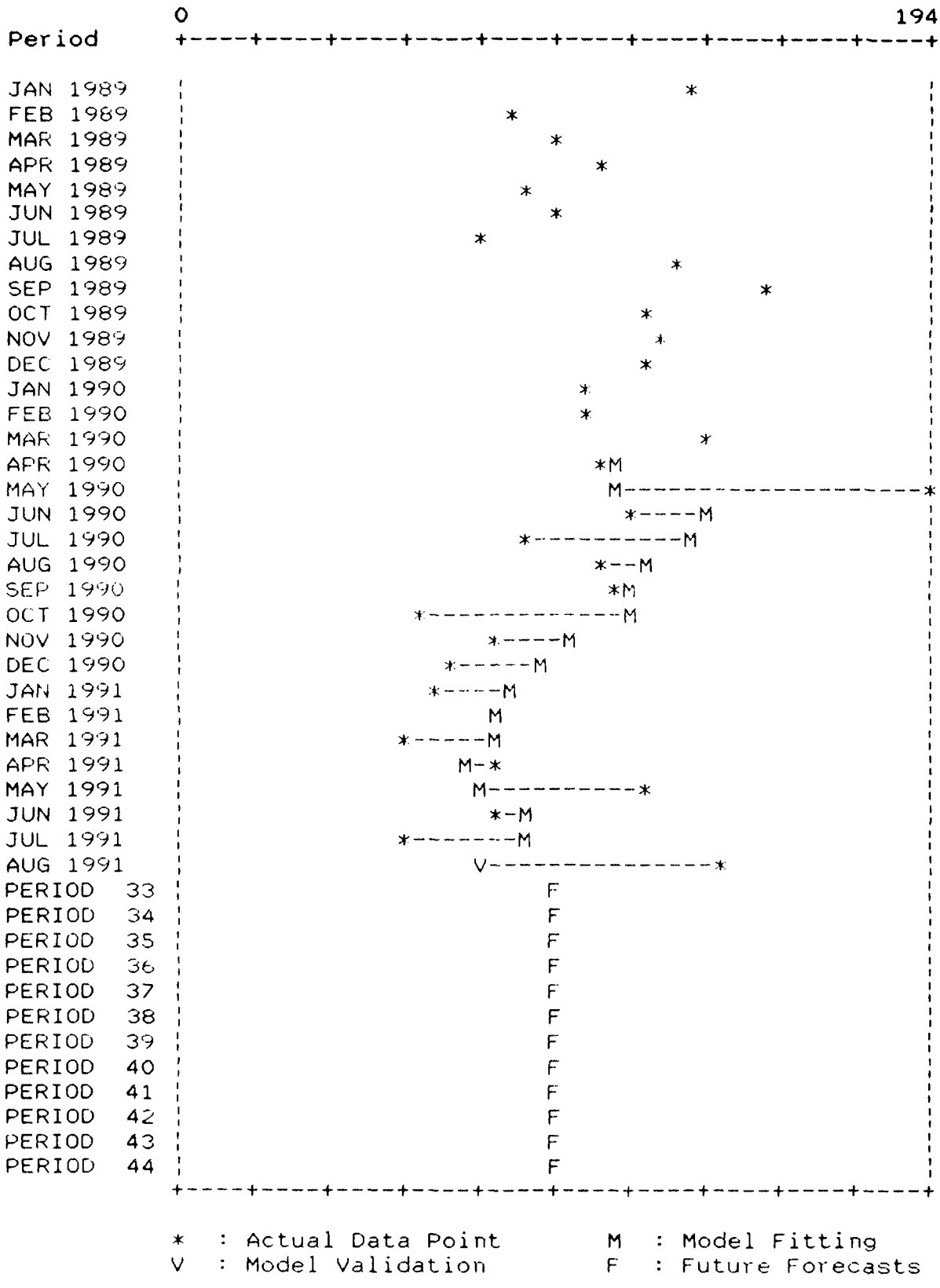
SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL FITTING STATISTICS FOR AIR FORCE
SMOOTHING CONSTANTS USED : 0.30(LEVEL)

Period	Actual	Forecast	Error	Level
APR 1990	108	114	-6	112.3067
MAY 1990	194	112	82	136.8147
JUN 1990	117	137	-20	130.8703
JUL 1990	91	131	-40	118.9092
AUG 1990	110	119	-9	116.2364
SEP 1990	113	116	-3	115.2655
OCT 1990	61	115	-54	98.9858
NOV 1990	83	99	-16	94.1901
DEC 1990	71	94	-23	87.2331
JAN 1991	67	87	-20	81.1631
FEB 1991	83	81	2	81.7142
MAR 1991	59	82	-23	74.8999
APR 1991	81	75	6	76.7300
MAY 1991	120	77	43	89.7110
JUN 1991	83	90	-7	87.6977
JUL 1991	57	88	-31	78.4884

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL VALIDATION STATISTICS FOR AIR FORCE
SMOOTHING CONSTANTS USED : 0.30(LEVEL)

Period	Actual	Forecast	Error	Level
AUG 1991	140	78	62	96.9419

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL PLOT FOR AIR FORCE (PLAN HORIZON = 1)



SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR AIR FORCE

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	-7.4375	-6.5625	-4.6250	-2.6250
Mean % Err	-16.3358	-14.3543	-10.9879	-7.6163
Mean Absolute Err	24.0625	25.5625	28.8750	30.8750
Mean Abs % Err	27.3256	28.2482	29.4129	31.0681
Root Mean Sq Err	31.9951	32.7729	39.0128	39.6280

Model selected was Level

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	62.0000	68.0000	52.0000	48.0000
Mean % Err	44.2857	48.5714	37.1429	34.2857
Mean Absolute Err	62.0000	68.0000	52.0000	48.0000
Mean Abs % Err	44.2857	48.5714	37.1429	34.2857
Root Mean Sq Err	62.0000	68.0000	52.0000	48.0000

Note : Trend-Seas Model performed best during validation

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL FORECASTS FOR AIR FORCE
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	97
PERIOD	34	97
PERIOD	35	97
PERIOD	36	97
PERIOD	37	97
PERIOD	38	97
PERIOD	39	97
PERIOD	40	97
PERIOD	41	97
PERIOD	42	97
PERIOD	43	97
PERIOD	44	97

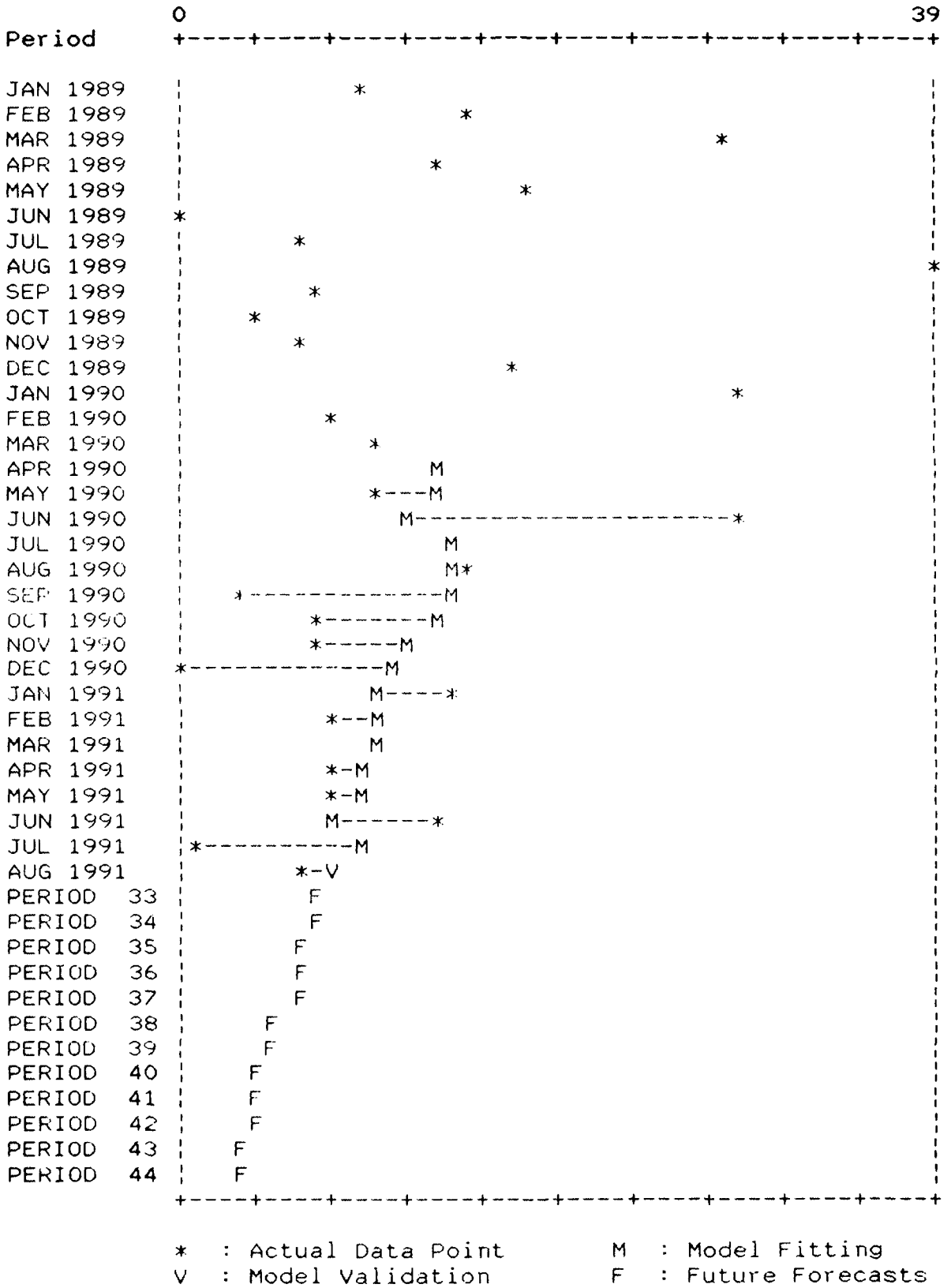
SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
TREND MODEL FITTING STATISTICS FOR COASTGUARD
SMOOTHING CONSTANTS USED : 0.10(LEVEL), 0.10(TREND)

Period	Actual	Forecast	Error	Level	Trend
APR 1990	13	13	0	12.8276	-0.138
MAY 1990	10	13	-3	12.4204	-0.165
JUN 1990	29	12	17	13.9297	2.2693E-03
JUL 1990	14	14	0	13.9387	2.9499E-03
AUG 1990	15	14	1	14.0475	0.0135
SEP 1990	3	14	-11	12.9550	-9.708E-02
OCT 1990	7	13	-6	12.2721	-0.156
NOV 1990	7	12	-5	11.6048	-0.207
DEC 1990	0	11	-11	10.2582	-0.321
JAN 1991	14	10	4	10.3436	-0.280
FEB 1991	8	10	-2	9.8571	-0.301
MAR 1991	10	10	0	9.6007	-0.296
APR 1991	8	9	-1	9.1739	-0.309
MAY 1991	8	9	-1	8.7780	-0.318
JUN 1991	13	8	5	8.9140	-0.273
JUL 1991	1	9	-8	7.8772	-0.349

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
TREND MODEL VALIDATION STATISTICS FOR COASTGUARD
SMOOTHING CONSTANTS USED : 0.10(LEVEL), 0.10(TREND)

Period	Actual	Forecast	Error	Level	Trend
AUG 1991	6	8	-2	7.3753	-0.364

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
TREND MODEL PLOT FOR COASTGUARD (PLAN HORIZON = 1)



* : Actual Data Point M : Model Fitting
V : Model Validation F : Future Forecasts

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR COASTGUARD

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	-1.9375	-1.3125	-3.6250	-2.7500
Mean % Err	0.0000	0.0000	0.0000	0.0000
Mean Absolute Err	5.1875	4.6875	8.7500	8.1250
Mean Abs % Err	0.0000	0.0000	0.0000	0.0000
Root Mean Sq Err	6.8966	6.6755	12.6046	12.0208

Model selected was Trend

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	-2.0000	-2.0000	-17.0000	-13.0000
Mean % Err	0.0000	0.0000	0.0000	0.0000
Mean Absolute Err	2.0000	2.0000	17.0000	13.0000
Mean Abs % Err	0.0000	0.0000	0.0000	0.0000
Root Mean Sq Err	2.0000	2.0000	17.0000	13.0000

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
TREND MODEL FORECASTS FOR COASTGUARD
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	7
PERIOD	34	7
PERIOD	35	6
PERIOD	36	6
PERIOD	37	6
PERIOD	38	5
PERIOD	39	5
PERIOD	40	4
PERIOD	41	4
PERIOD	42	4
PERIOD	43	3
PERIOD	44	3

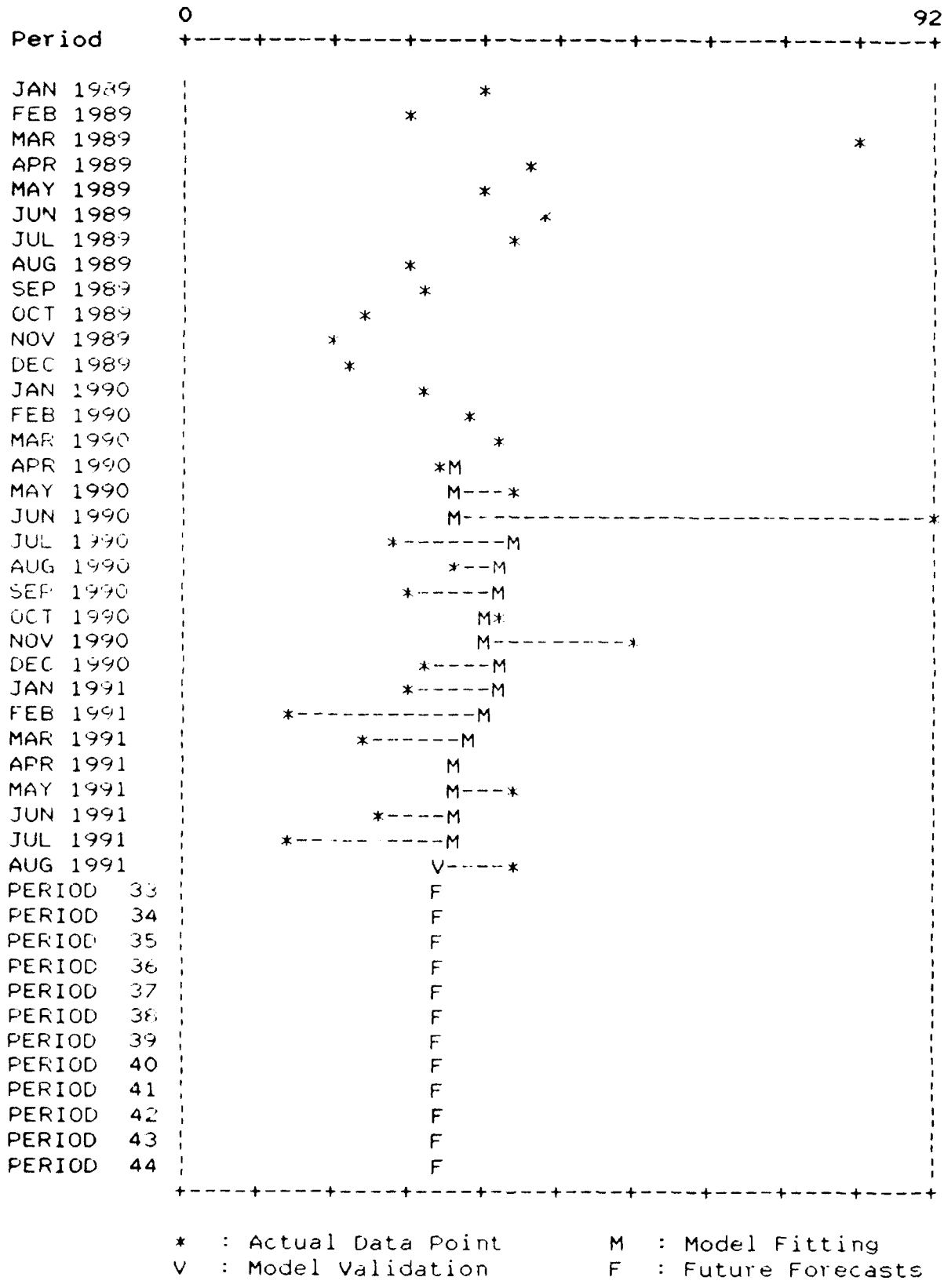
SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL FITTING STATISTICS FOR OTHER
SMOOTHING CONSTANTS USED : 0.10(LEVEL)

Period	Actual	Forecast	Error	Level
APR 1990	32	34	-2	33.5231
MAY 1990	40	34	6	34.1708
JUN 1990	92	34	58	39.9537
JUL 1990	25	40	-15	38.4584
AUG 1990	33	38	-5	37.9125
SEP 1990	28	38	-10	36.9213
OCT 1990	39	37	2	37.1292
NOV 1990	56	37	19	39.0162
DEC 1990	30	39	-9	38.1146
JAN 1991	28	38	-10	37.1032
FEB 1991	13	37	-24	34.6928
MAR 1991	22	35	-13	33.4236
APR 1991	34	33	1	33.4812
MAY 1991	41	33	8	34.2331
JUN 1991	23	34	-11	33.1098
JUL 1991	13	33	-20	31.0988

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL VALIDATION STATISTICS FOR OTHER
SMOOTHING CONSTANTS USED : 0.10(LEVEL)

Period	Actual	Forecast	Error	Level
AUG 1991	41	31	10	32.0889

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL PLOT FOR OTHER (PLAN HORIZON = 1)



* : Actual Data Point M : Model Fitting
V : Model Validation F : Future Forecasts

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
MODEL FITTING / VALIDATION ERROR STATISTICS FOR OTHER

Statistic	Level Model	Trend Model	Seasonal Model	Trend-Seas Model
Model Fitting Error Statistics for 16 periods from APR 1990				
Mean Err	-1.5625	1.2500	-4.5625	1.3750
Mean % Err	-30.5409	-21.2280	-47.4631	-30.6845
Mean Absolute Err	13.3125	14.5000	18.1875	19.1250
Mean Abs % Err	47.9851	48.2762	70.4347	69.2206
Root Mean Sq Err	18.7600	20.0281	22.8569	25.0125

Model selected was Level

Model Validation Error Statistics for 1 periods from AUG 1991				
Mean Err	10.0000	16.0000	14.0000	17.0000
Mean % Err	24.3902	39.0244	34.1463	41.4634
Mean Absolute Err	10.0000	16.0000	14.0000	17.0000
Mean Abs % Err	24.3902	39.0244	34.1463	41.4634
Root Mean Sq Err	10.0000	16.0000	14.0000	17.0000

SILAS B. HAYS ARMY COMMUNITY HOSPITAL BED DAYS MODEL
LEVEL MODEL FORECASTS FOR OTHER
Extended Forecasts for Periods beyond AUG 1991

Period		Forecast
PERIOD	33	32
PERIOD	34	32
PERIOD	35	32
PERIOD	36	32
PERIOD	37	32
PERIOD	38	32
PERIOD	39	32
PERIOD	40	32
PERIOD	41	32
PERIOD	42	32
PERIOD	43	32
PERIOD	44	32

APPENDIX F
MONTEREY PENINSULA BED DAYS AVAILABILITY

Community Hospital of the Monterey Peninsula:

Total Bed Days Available Per Year	=	63,510	
Total Bed Days Used in 1990 (81.5%)	=	-51,729	
		11,781	Excess Beds

Natividad Medical Center:

Total Bed Days Available Per Year	=	77,015	
Total Bed Days Used in 1990 (52.8%)	=	-40,638	
		36,377	Excess Beds

Salinas Valley Memorial Hospital:

Total Bed Days Available Per Year	=	83,585	
Total Bed Days Used in 1990 (59.9%)	=	-50,064	
		33,521	Excess Beds

Total Excess Beds Available = 81,679

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