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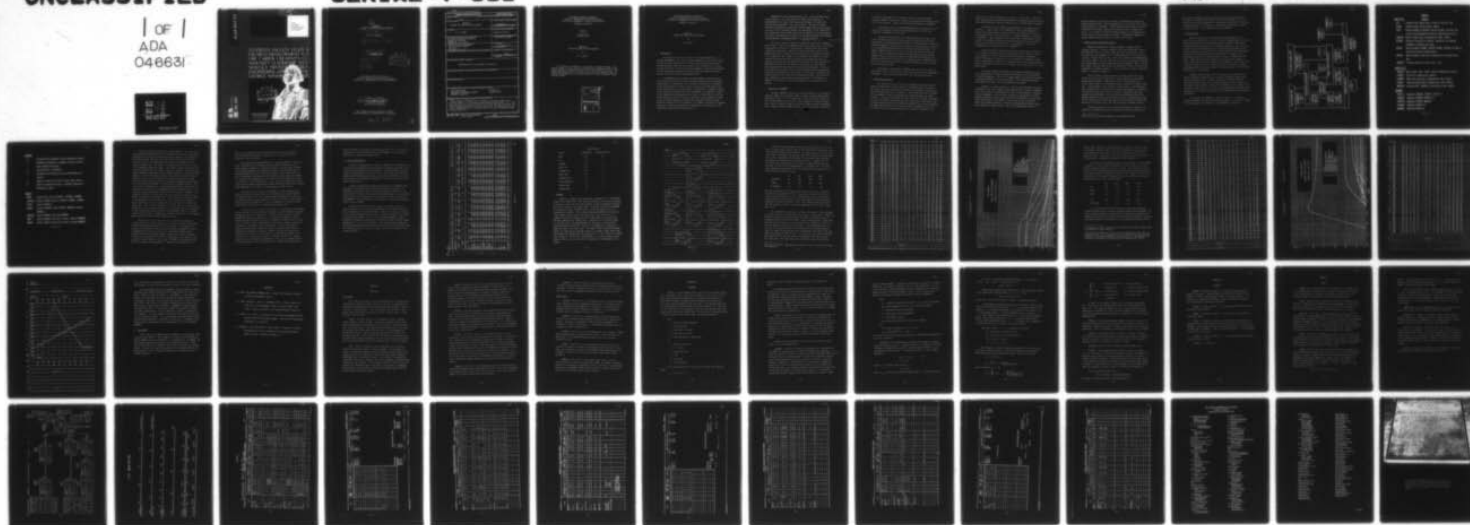
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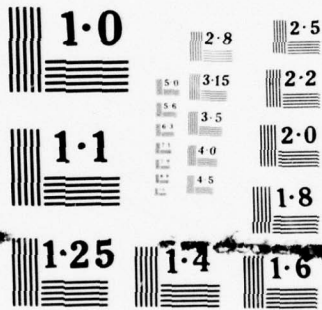
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**HOWGOZIT:
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by

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E. D. Napier

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Abstract
of
Serial T-361
6 October 1977

HOWGOZIT
A MODEL FOR NAVAL AVIATION TRAINING

by

E. D. Napier

The objective of HOWGOZIT is to provide an evaluation (HOW) of the progress (GOES) of pilot training toward meeting planned goals (IT). This paper discusses the organization and flow of data through the system. The concept was demonstrated in a scenario based upon the transition from the current Undergraduate Pilot Training System to the Navy Integrated Flight Training System.

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THE GEORGE WASHINGTON UNIVERSITY
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HOWGOZIT
A MODEL FOR NAVAL AVIATION TRAINING

by

E. D. Napier

1. Introduction

The mission of the Chief of Naval Air Training (CNATRA) is: "to provide undergraduate pilot training and undergraduate naval flight officer training for Navy, Marine Corps, and Coast Guard personnel and selected foreign nationals; supervise and coordinate the functioning of all naval aviation activities in the Naval Training Command not specifically assigned to other functional commanders; prosecute such other aviation training tasks as the Chief of Naval Training may direct."

The NATRACOM (Naval Aviation Training Command), comprised of over 42 naval aviation activities widely dispersed throughout the southeastern United States, is responsible for the effective and efficient utilization of over \$1,400 million in total resources, including 20,000 military and civilian personnel, on an annual budget of \$88 million. TRAWINGS (training wings), the next subordinate echelons of NATRACOM, are comprised of three to six TRARONS (training squadrons) colocated at a NAS (Naval Air Station). The NAS maintains the base facilities, provides training support in ground school and flight simulators, and provides certain maintenance support beyond the capabilities of the TRARONS. The TRARONS, consisting of students, instructors, aircraft, maintenance and administrative personnel, are the fundamental organizational training units.

NATRACOM has a well defined product line - pilots and NFOs (Naval Flight Officers). The pilot production lines, which represent the preponderance of the cost of facilities and personnel, are split into three so-called pipelines - jet, prop and helo. CNO (Chief of Naval Operations) specifies the time-phased student inputs and the annual training rates for all pipelines; however, the variability in the availability and capabilities of the student input and the vagaries of the environment that affect training rates so perturb the training pipelines that workloads vary enormously, something analogous to a "pig in a python".

The flow of students through the respective pipelines is managed at three levels: first, at the NATRACOM level where student input is allocated among pipelines according to planned annual training rates and student capabilities (and within a pipeline by base capacities); second, at the TRAWING level where loading between squadrons can be adjusted to remedy a local irregularity and, finally, at the squadron level where the flow of students can be further paced according to the student abilities, the resources available, and the unfilled requirements for phase completions. Experience has shown that the pipelines can easily get out-of-kilter causing undesirable fluctuations in the downstream squadrons. But it is these downstream squadrons that are usually faced with the extraordinary pressures to meet planned training rates or a deficiency in students that usually follows on the heels of an extraordinary effort. The problem is how to manage this interrelated network effectively. The purpose of HOWGOZIT is to provide a tool to assist CNATRA in the solution of this problem.

2. Objectives of HOWGOZIT

The name, HOWGOZIT, reveals its principal objective - to provide an evaluation (HOW) of the progress (GOES) of pilot training toward meeting planned goals (IT). It is of small value to get to the final quarter of the year and discover for the first time an inability to meet the annual goal. What is obviously needed is a method to make continued assessments of the progress toward meeting this goal. This necessitates a capability

to forecast requirements for aircraft, instructors, and maintenance personnel needed to sustain the student flow and determine whether students will be bottlenecked. These are the principal objectives of HOWGOZIT.

The principal user is the NATRACOM Headquarters although the techniques can be applied at the wing and squadron level for their own evaluation of HOWGOZIT at their level.

The model should identify the constraining resource based on the actual operating experience of each squadron. Hopefully with forecast information of expected workloads and projected availabilities of resources, squadron commanders should permit operation to avoid impending bottlenecks by accelerating/decelerating rates of training at opportune times. For CNATRA, HOWGOZIT should act to locate critical and slack resources and assist in any realignment necessary to minimize underutilized resources. HOWGOZIT should also provide a method for comparing the productivity of wings and pipelines and verification of planning factors. HOWGOZIT should assist in controlling the tempo of training through allocation of flying hours and operating funds.

Underlying the development of HOWGOZIT was an effort to limit the collection of data to that for which there had already been an established requirement. This poses some difficulties which are mentioned later.

3. Related Developments

For a number of years as part of the budgetary processes the staff members of CNET (Chief of Naval Education and Training) have calculated the student input and flight hour requirement using planning factors which have evolved through years of experience. Their work sheets are a network-like arrangement of boxes representing the sequential phases of flight training. A copy of a work sheet for fiscal year 1976 is shown in Appendix E. This form clearly shows important data in the proper input-output relationships between phases and was adopted in HOWGOZIT as one form of display. The CNET approach does not lend itself further as a HOWGOZIT since it is not dynamic or self-correcting and does not account for imbalances that

might exist in student loading at the start of a fiscal year. There are also some problems with differing definitions of planning factors and statistical data apparently having the same name; e.g., average weeks to complete.

In another effort to improve the management of training resources, Captain R. J. Smith, when he was COMTRAWING 3, developed nomographs to display the balance between training resources and student load based on the planning factors used by CNET staff. A sample nomograph is contained in Appendix E. These nomographs gave a good visual representation of the extent of any imbalance between resources existing at the time but had no facility for forecasting the duration of any imbalance. As such the nomographs were of limited utility in a HOWGOZIT.

The most extensive and potentially useful related work is reported in the Dynamic Integrated Facilities Requirements Study (IFRS) [1], which is an outgrowth of studies done by Operations Research, Incorporated. Dynamic IFRS appears to embrace most of the objectives of HOWGOZIT except that it extrapolates on the basis of planning factors rather than experience. Dynamic IFRS might have found a wider audience had it been easier to use and more credible.

The Dynamic Student Flow Model [2], developed separately, is meant to be substituted for Student Flow Model used herein for the calculation of student throughput. The use of a simpler model was dictated by a desire to exercise HOWGOZIT in an interactive mode. Where comparisons between these models were made, the correspondence has been good.

Finally, in a paper prepared as a part of the professional military comptroller course [3], Commander Govan concluded that "students graduated" is of little value for determining efficiency or effectiveness of training resource management. This is easily confirmed in the analysis of weekly aviation statistical reports where the number of graduates in a week bears little relationship to the number of hours flown in the same period. Within the training squadrons, scheduling and maintenance officers orient their thinking to number of hops. This has a disadvantage because of

varying lengths of hops and the inclusion of overhead hours along with direct production hours. These disadvantages are not present when student syllabus hours are considered. Student syllabus hours account for direct utilization of aircraft, student, and instructor time in production of pilots. It is probably the most meaningful measure of work contained in the statistical data now regularly reported. Accordingly, HOWGOZIT has adopted student syllabus hours as its basic unit of work.

4. Weekly Aviation Statistical Reports

CNATRA has required all training squadrons to submit weekly¹ training statistics. These are compiled within the CNATRA staff and are published some three to six weeks after the close of the period. They are relatively good snapshots of the training process, but need some sort of model to relate them as a flow. While the statistics are comprehensive in certain respects, they are deficient in a strict accounting for students and provide almost no data to assess maintenance workload. And, of course, more timely statistics are required for them to be useful in the real time management of training resources. A copy of a weekly aviation statistical report is contained in Appendix F.

About 18 months of data extracted from these reports have been reduced to punch cards and analyzed to derive significant relationships between major variables. Among items of note in the analysis are: (1) that there seems to be a perpetual state of agitation in flight training - a new syllabus, a new aircraft, a base closure, a new PTR (annual pilot training rate); (2) that there are peaks and valleys in utilization of aircraft and instructors that are related to something other than daylight hours and weather; (3) that there are shallower swings in the student instruction rate (student syllabus hours per student-flyable day) and (4) finally, that without some model it is not possible to make early detection of variation in the flow rate through the training pipeline.

Another deficiency in the statistical reporting is evident in the inability to determine how near to completion the various students are.

¹This report has since been changed to a semi-monthly report.

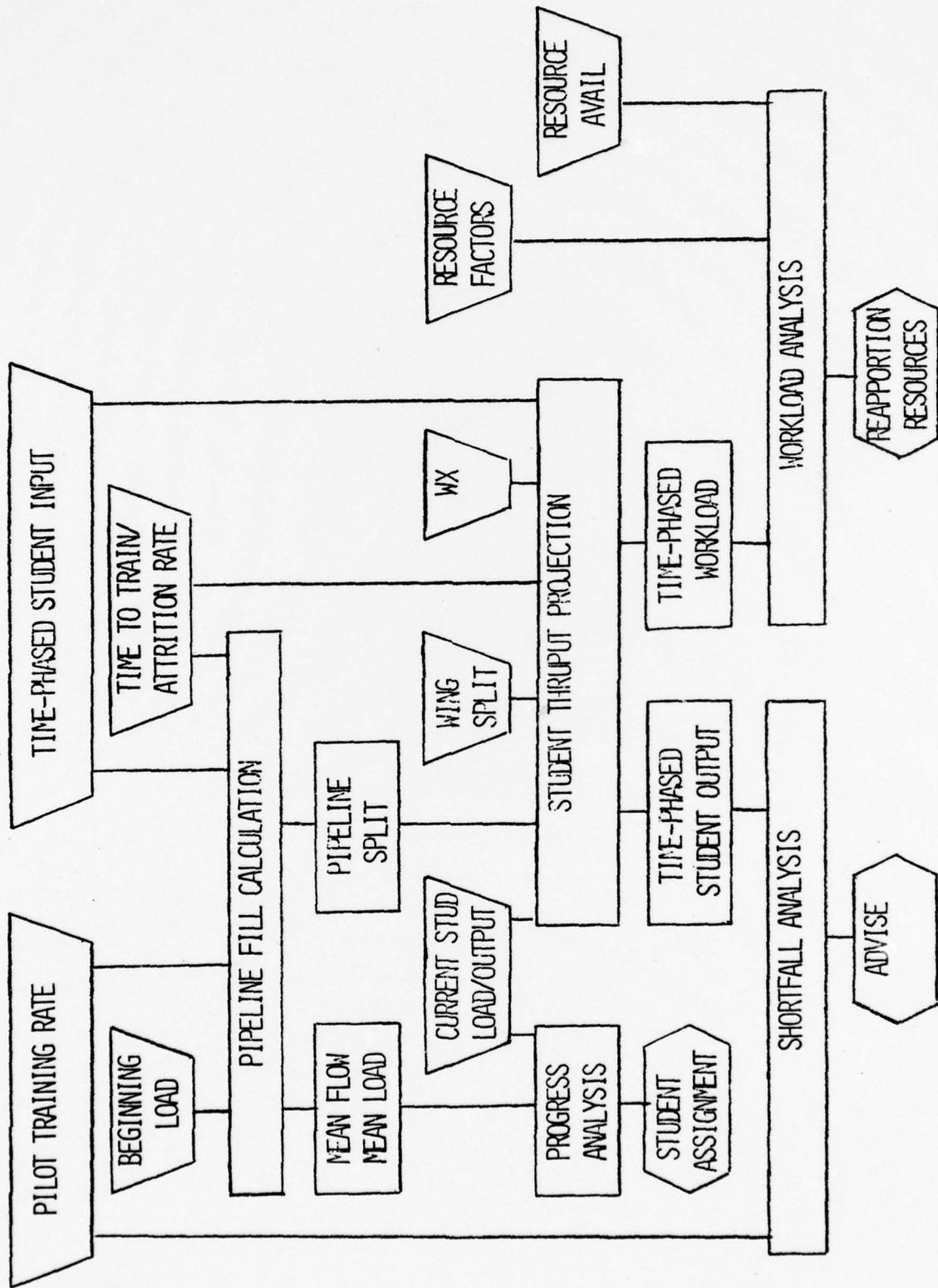
Early in 1976, CNATRA requested a one-time report from all squadrons of the number of students by the number of hops to be completed. The data showed a rather uneven progression to completion but provided the basis for an assumption that on the average a student under instruction is halfway through the course. This assumption is used in HOWGOZIT.

5. Model Overview

From the requirement for appropriate information upon which to manage and the availability of statistical data, a methodology has evolved. It basically consists of entering the data now submitted in the Weekly Aviation Statistical Reports into an automated data base. There the data is merged with prior experience data to provide moving averages and new points of departure for projection of student loading in the coming months. Projections are based upon the time-phased input of students from the predecessor phase and the assumption that the rate of training will continue. These projections are compared with the PTR and the status, in terms of weeks ahead or behind schedule, is determined. Additionally, the resources required to meet the training load are calculated as a demand and compared with the resource supply to determine excess or shortfall and the duration of any imbalance.

HOWGOZIT maintains data bases of planned student input and pilot output, projected availabilities of resources, historical usage factors, and current student loads. Updates, based upon the Weekly Aviation Statistical Reports, and other occasional changes, such as a revision to the student input schedule, cause specific programs to be executed. These programs, in turn, result in a series of routine displays and output file generation. The output files may be used for additional non-routine query and display.

The schematic of HOWGOZIT is shown in Figure 5.1. The files, programs, displays and updates are listed in Figure 5.2. Details of these files and programs are contained in the Appendices A through D.



HONGZIT SCHEMATIC

Figure 5.1

HOWGOZITINPUT FILESCONTENTS

PTR PLANNED PILOTS COMPLETIONS BY PIPELINE, SERVICE, YEAR.

STUDIN PLANNED STUDENT INPUT BY WEEK, SOURCE.

TRAIN MOVING AVERAGES OF SSH/SFD, COMPLETIONS/SSH, ATTRITES/ COMPLETION, AND ACCELERATION FACTOR BY ORGANIZATION, SERVICE.

STUDLOAD ACTUAL STUDENT LOAD BY ORGANIZATION, WEEK, SERVICE.

RESAVAIL PROJECTED AVAILABILITY AIRCRAFT, INSTRUCTORS, MAINTENANCE PERSONNEL BY ORGANIZATION, WEEK.

RESFACT MOVING AVERAGES IFH/SSH, IFH/IFD, AFH/SSH, AFH/AFD, AFH/MMH AND EFFICIENCY FACTOR BY ORGANIZATION.

WEATHER MOVING AVERAGE FLYING DAYS/ SCHEDULED DAYS BY ORGANIZATION, WEEK.

WINGSPLIT PIPELINE FRACTION BY WING, SERVICE, WEEK.

OUTPUT FILES

STUDFLOW MEAN STUDENT INPUT, OUTPUT, LOAD BY ORGANIZATION, SERVICE.

STUDSPLT FRACTION BY ORGANIZATION, SERVICE.

STUDPROG WEEKS AHEAD (BEHIND) BY ORGANIZATION, WEEK, SERVICE.

STUDOUT PROJECTED COMPLETIONS BY ORGANIZATION, WEEK, SERVICE.

WORKLOAD PROJECTED SSH, STUDLOAD BY ORGANIZATION, WEEK, SERVICE.

PROGRAMS

PIPEFILL GENERATES STUDFLOW, STUDSPLT, DISPLAY 1.

PROGRESS GENERATES STUDPROG, DISPLAY 2,3.

STUDTHRU GENERATES STUDOUT, WORKLOAD.

STUDANAL GENERATES DISPLAY 4,5.

WORKANAL GENERATES DISPLAY 6.

Figure 5.2a

DISPLAYS

- 1 FLOWGRAPH WITH INCREMENTAL INPUTS REQUIRED BY SERVICE.
- 2 FLOWGRAPH FY MOVEMENT OF STUDENTS TO DATE WITH WEEKS AHEAD (BEHIND) BY SERVICE.
- 3 JET/PROP DETAIL OF DISPLAY 2.
- 4 FLOWGRAPH WITH PROJECTED FLOW WITH PTR SHORTFALL BY SERVICE.
- 5 TABULAR LISTING PILOT OUTPUT BY WING, WEEK, SERVICE.
- 6 GRAPH OF RESOURCES AVAILABLE - RESOURCES REQUIRED BY ORGANIZATION, WEEK.

UPDATES

- NUPTR UPDATES PTR; EXECUTES PIPEFILL, STUDTHRU, STUDANAL.
- NUSTUDIN UPDATES STUDIN; EXECUTES STUDTHRU, STUDANAL, WORKANAL.
- NU SPLT UPDATES WINGSPLT.
- NUWASR UPDATES STUDLOAD, TRAIN, RESFACT, WEATHER; EXECUTED PROGRESS.
- NURESAVL UPDATES RESAVAIL; EXECUTES WORKANAL.
- NUEFF UPDATES RESFACT (EFFICIENCY FACTOR); EXECUTES WORKANAL.
- NURATE UPDATES TRAIN (ACCELERATION FACTOR); EXECUTES WORKANAL.

Figure 5.2b

There are basically three routes through HOWGOZIT. The first route approximates what CNET staff does for sizing the student input requirements. Beginning with the output desired from the final phases of each pipeline, mean flows and mean loads are calculated in the program called PIPEFILL. The annual input to the final phases are equal to the output plus any change in student load. The input to the final phases also are the output of the immediate predecessor phases. This process is then repeated for all predecessor phases until the original inputs are reached. If any deficiency between planned student inputs and the number required to fill the pipelines appears, it will be arbitrarily assigned to the input of Aviation Officer Candidate School as the one which has the greatest latitude for change. PIPEFILL also calculates the fraction of students completing primary which enter the respective pipelines. This method of calculating inputs is only a first cut at feasibility of a PTR and misunderstanding of this point has contributed to some grief in the management of the training pipeline. To elaborate on this point, when it takes a year or more for a student to flow through the system, the inputs during any one year have no effect on the number of graduates in that same year. If the pipeline is properly loaded at the beginning of the year and there is not a great deal of change to the PTR from year to year, an input sized to the output will not hurt the system much. However if the pipeline is too lean, there is a limit in the amount which can be graduated regardless of the student input. Calculations of input requirements which ignore the initial student load (i.e., assume steady state) may result in aggravated conditions especially if the training experience departs much from the planning factors.

The next step in the first route is to simulate the movement of students through each phase according to the characteristics of that phase. The Dynamic Student Flow Model [2] is such a model. For demonstration purposes a more elementary model based on transition probabilities served as *STUDTHRU* and was used to calculate the time-phased student output. *STUDTHRU* assumes that students progress through the system at an average rate which is controlled by the flight syllabus and at this point not constrained by other resources. The output of *STUDTHRU* is compared with the PTR in the program called *STUDANAL*. If shortfall is predicted at this

point, it is assumed that the CNO would be advised of the infeasibility and the PTR would be adjusted as appropriate. A feasible PTR is the objective of the first route.

The second route through HOWGOZIT is to assure adequacy of resources. Given a feasible PTR, the student population under instruction at each phase generates a demand for training resources - the time-phased workload. In the program WORKANAL, the time-phased demand for training resources is compared graphically with the time-phased supply. With a presentation of both the magnitude and duration of any imbalance between supply and demand, it is expected that management at each echelon will take appropriate action to alleviate or avert the bottleneck. Since there are a myriad of possible conditions and options available and without more solid cost-benefit relationships, HOWGOZIT is not capable of identifying any optimal action.

The third route is the heart of HOWGOZIT. On the assumption that CNO has prescribed a feasible PTR and that CNATRA has allocated students and training resources in a near optimal fashion, HOWGOZIT then evaluates the progress by phase toward completion of the PTR in terms of weeks ahead or behind the expected production. With such information it becomes clearly evident where acceleration or deceleration should take place.

At this point a few words on the subject of acceleration and efficiency may be in order. Time-to-train may be reduced by simply pushing the student through the system at a faster rate. This will result in smaller student populations (with some reductions in the amount paid students as salary during training) and some possibility of economies in support costs if, and only if, support personnel and support facilities are actually curtailed in proportion to the smaller student populations. The real efficiencies result only when higher average utilization of aircraft, instructors, and maintenance personnel are achieved. HOWGOZIT includes an acceleration factor in the TRAIN file as a variable bias to the moving average of the training rate - student syllabus hours per student flyable day. An efficiency factor is included in the RESFACT file for use as a variable bias to the moving average of the utilization ratios - student syllabus hours per

aircraft flyable day and student syllabus hours per instructor flyable day. Judicious use of these factors should enable CNATRA to set the tempo of operation at a high but achievable level.

6. Concept Demonstration

In order to demonstrate the concept of HOWGOZIT in a meaningful way, a scenario was developed which approximated the expected transition of the current UPT (undergraduate pilot training) to the NIFTS (Navy Integrated Flight Training System) in the fall of 1976. The scenario was drawn from fragmentary information gathered by the research team and does not necessarily reflect the intentions of NATRACOM. Details of the scenario can be found in Reference [2].

Certain representative programs and displays of the HOWGOZIT were programmed on the Hewlitt-Packard 3000 minicomputer at the School of Engineering and Applied Science, The George Washington University. The construction of the data files and update programs remains to be completed; however, there is sufficient reason to believe the concept is sound and that HOWGOZIT can be programmed on a minicomputer or time-sharing computer system, such as INFONET.

The Weekly Aviation Statistical Report of 21 March 1976 was the latest available at the time of the demonstration (late April) and is the point of departure for the HOWGOZIT runs. Figure 6.1 contains a printout of certain data derived from this report which would regularly be included in the TRAIN and RESFACT files of a fully automated HOWGOZIT. Data is presented by squadron (in pairs when colocated at an NAS) and other upward aggregations. It is of some interest to note the difference between the attrition experienced and the planning factors shown in the following table. This difference accounts in part for some of the current leanness in the training pipeline.

REV
ED:BA

FOLLOWING DATA IS FROM 21 MARCH 76 WEEKLY AVIATION STATISTICAL REPORT

APR 16, 1976, 12:21 PM

WASR COL	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44			
NAME	STUD	AVE	AVE	AVE	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD	STUD			
COMP	COMP	WKS	HRS	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR	ATTR			
VAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD				
SQUAD																																		
ADCS	I	131	11.4	.0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
EI	I	948	3.5	.0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
VT1/5	I	949	5.3	28.5	107	29947	24653	34029	29947	36396	5.523	31.6	.101	1.135	.581	1.215	.427																	
VT4(B)	I	36	34.9	123.2	7	3620	3173	5575	3970	6331	2.622	100.6	.163	1.540	.396	1.749	.358																	
VT9/19	I	94	22.5	105.2	9	12289	10516	16455	13295	16254	5.539	130.7	.087	1.339	.727	1.323	.572																	
VT23	I	116	27.6	113.9	15	13456	11340	17451	14939	18140	3.945	115.0	.115	1.297	.502	1.348	.415																	
VT26	I	125	22.1	103.7	20	14392	11636	18982	13356	19085	4.817	115.1	.138	1.319	.623	1.326	.479																	
VT4(A)	I	44	32.9	127.0	4	5713	4872	6319	6769	8032	3.769	129.3	.083	1.106	.463	1.406	.403																	
VT7	I	78	19.4	120.3	13	9502	8832	12699	11679	13824	5.734	121.3	.143	1.335	.859	1.455	.617																	
VT21/22	I	99	20.2	117.9	6	14261	11437	17503	17038	20695	6.934	144.1	.057	1.227	.945	1.451	.774																	
VT24/25	I	110	20.9	119.8	14	15433	13151	19266	19337	22584	6.316	140.4	.113	1.233	.875	1.462	.710																	
VT3	I	158	19.8	100.6	39	14808	13366	17143	14990	17134	4.220	93.7	.198	1.158	.432	1.157	.349																	
VT27	I	185	20.9	92.3	22	16487	15449	18238	15840	18410	4.025	89.1	.106	1.106	.394	1.117	.321																	
VT28/31	I	278	15.4	85.8	10	27799	24974	31582	25359	29938	6.384	100.0	.035	1.135	.625	1.077	.458																	
VT2/6	I	335	22.0	100.6	61	31817	28558	39026	32659	38983	3.952	95.0	.154	1.227	.429	1.225	.345																	
HT8	I	332	6.4	36.6	2	12239	10699	13986	12241	14333	5.761	36.9	.006	1.143	.549	1.172	.432																	
HT18	I	351	10.2	65.4	17	24282	24282	32570	24232	28767	6.641	69.2	.046	1.345	.770	1.135	.529																	
BJ	I	371	25.2	109.2	51	43757	36765	53463	47370	59810	4.381	117.9	.121	1.335	.574	1.367	.453																	
AJ	I	331	21.9	120.3	37	44919	38292	55787	54873	65135	5.859	135.7	.101	1.242	.808	1.450	.653																	
BP	I	343	20.4	96.1	61	31295	28815	35381	31830	35544	4.111	91.2	.151	1.131	.411	1.136	.334																	
TW6	I	44	61.5	227.8	11	9333	8045	11894	10739	14363	3.064	212.1	.200	1.274	.411	1.539	.365																	
TW1	I	78	46.6	247.0	22	21791	19448	29154	24984	30078	5.256	279.4	.220	1.339	.740	1.380	.552																	
TW2	I	99	52.5	251.3	21	27717	22777	34954	31927	39835	4.819	280.0	.175	1.261	.401	1.522	.522																	
TW3	I	110	46.0	237.7	34	29835	24787	38248	31693	41669	5.102	271.2	.236	1.282	.598	1.397	.552																	
NATRACOM	I	960	53.5	242.7	391	246055	217038	300924	259561	308915	3.979	256.3	.289	1.223	.487	1.265	.352																	

Figure 6.1

PHASE	ATTRITION RATE	
	EXPERIENCED	PLANNING FACTOR
AOCS	12.6	10
EI	2.0	2
PRIMARY	10.1	8
BASIC JET	12.1	10
ADVANCED JET	10.1	4
BASIC PROP	15.1	14
ADVANCED PROP	3.5	2
BASIC PROP/HELO	15.4	14
PRIMARY HELO	.6	1
ADVANCED HELO	4.6	1

7. Results

Figure 7.1, similar to the work sheet in Appendix E, is the HOWGOZIT display for 21 March 1976. This display represents the fiscal year movement of students to date with the status (number of weeks ahead/behind schedule) shown in the center of the larger boxes. Using the box labeled "NATRACOM" as a guide and reading clockwise around the box the numbers are to be interpreted as follows: 1,373 students entered NATRACOM this fiscal year; 1,766 students were on board at the beginning of the fiscal year; 391 students have attrited during the year; 1,788 students are now on board; 960 have completed; the average time to completion was 52.9 weeks (based on a 50-week year); and that NATRACOM as a whole was 4.0 weeks behind schedule meeting the FY76 PTR. Details of the HOWGOZIT by pipeline and phase are shown in the other boxes. The smaller boxes interspersed between phases are student pools awaiting training, the numbers inside these boxes representing the beginning and end populations. In this display all students were considered. In the full blown HOWGOZIT, it is expected that the user would be able to call out the source of students to be displayed in this format.

RUN EDN7A		
+-----V-----+		I 245
IAOC	47I	
I	I	
I	-24.5 WKS	> 26
I	I	
I	11.4	85I
+-----V-----+		
		I 181
+-----V-----+		
		I 1128
IEI	54I	
I	I	
I	+2.2 WKS	> 19
I	I	
I	3.5	138I
+-----V-----+		
		I 1025
+-----V-----+		
		I 1206
+-----V-----+		
IPRI	124I	
I	I	
I	-5.6 WKS	> 107
I	I	
I	5.3	192I
+-----V-----+		
		I 1031
+-----V-----+		
		I 1031
+-----V-----+		
		I 1031
+-----V-----+		
I 455		I 275
+-----+ I		+-----+ I
I 40I I		I 112I I
I 26I--+		I 54I--+
+-----+ I 469		+-----+ I 333
+-----V-----+		
IBJ	272I	IBP
I	I	I
I	-3.1 WKS	> 51
I	I	I
I	25.4	306I
+-----V-----+		
		I 384
+-----+ I		
I 48I I		I 17I I
I 32I--+		I 5I--+
+-----+ I 400		+-----+ I 376
+-----V-----+		
IAJ	195I	IAP
I	I	I
I	-5.1 WKS	> 37
I	I	I
I	22.1	227I
+-----V-----+		
		I 331
+-----V-----+		
		I 364
+-----+ I		
I 0I I		I 31I--+
+-----+ I 323		+-----+ I 323
+-----V-----+		
IPH	64I	
I	I	I
I	-4.4 WKS	> 2
I	I	I
I	6.4	58I
+-----V-----+		
		I 332
+-----+ I		
I 25I I		I 7I--+
+-----+ I 350		+-----+ I 350
+-----V-----+		
		I 1373
+-----V-----+		
INATRACOM	1765I	
I	I	I
I	-4.0 WKS	> 391
I	I	I
I	52.9	1783I
+-----V-----+		
		I 960
+-----V-----+		
		I 351

Figure 7.1

With only 14 weeks between 21 March 1976 and the end of the fiscal year, it looked quite unlikely that the jet and helo PTR could be met since the predecessor phases are also behind. For some reason, not clear at this point, some 112 students were awaiting basic prop training at the beginning of the year. Undoubtedly, the existence of this large group prejudiced the chances for meeting the jet and helo PTR later. It might also be noted that weekly projections of the number of completions by pipelines were made in a run of the STUDTHRU model on 11 November 1975. The table below compares the projection for 21 March 1976 with that reported in the Weekly Aviation Statistical Report.

	JET	PROP	HELO	TOTAL
PROJECTED	341	262	352	955
ACTUAL	331	278	351	960
DIFFERENCE	-10	+16	-1	+5

The same run projected 1313 completions for the fiscal year, a shortfall of 232 from the stated PTR of 1545. Subsequent revision of the PTR to 1435 reduced the shortfall by 110. But the point is that as far back as November there were warnings that the student population was incapable of supporting a PTR much in excess of 1313. The current projections, based upon the 21 March statistics, show 1360 completions for the year, a shortfall of 75.²

Next, HOWGOZIT was exercised to project the windup of UPT considering no further inputs to the system after the week of 27 August 1976. Figure 7.2 displays the populations of each phase (including the terminal states of designated pilots or attrites) by week. Week is designated by a three digit code where the first digit is the last digit of the calendar year and the last two digits are the weekly report number. (The NATRACOM year has only 50 weeks since training ceases for two weeks over the Christmas Season.) Figure 7.3 graphs the populations under training and shows rather long tails before the populations drop to zero. At first these tails were viewed with some suspicion since they are a direct consequence of the way the model was constructed. Will some students be around this long after input has

²The actual shortfall experienced for FY76 was a total of 60 in the jet and helo pipelines.

WEEK	PRI	PPRI	PJET	BAS.F	ADV.F	PPRP	BASP	AQWP	PHET	BRPH	PRIM	ADVI	JET	PRRP	HELO	ATTN
612	193	39	3	310	258	2	220	151	3	231	60	21	312	228	350	401
613	173	37	15	310	258	2	171	133	14	210	57	21	312	228	350	401
614	157	35	15	313	257	8	121	133	14	210	51	21	313	229	377	422
615	151	34	14	316	255	8	121	133	13	215	51	21	314	318	345	432
616	157	33	14	317	255	8	122	131	13	212	51	21	314	324	325	443
617	153	32	13	319	255	8	127	141	12	241	57	21	314	334	404	453
618	150	32	13	319	255	7	115	115	12	212	37	23	405	317	412	463
619	148	31	13	320	255	7	184	141	12	243	57	23	415	356	421	473
620	146	31	13	320	254	7	182	141	12	244	57	23	425	355	430	483
621	144	31	12	320	254	7	181	140	11	244	57	23	435	374	433	492
622	143	30	12	320	254	7	179	131	11	245	57	23	447	373	437	502
623	142	30	12	319	253	7	177	137	11	245	53	22	457	372	434	512
624	141	30	12	319	253	7	175	135	11	245	53	22	467	431	441	522
625	141	30	12	318	253	7	174	133	11	245	53	22	474	409	473	531
626	140	30	12	318	253	7	172	131	11	245	53	22	10	4	9	10
627	140	30	12	317	252	7	171	130	11	245	53	22	21	17	17	17
628	139	29	12	316	252	7	159	124	11	244	59	22	31	25	24	29
629	139	29	12	316	252	7	168	127	11	244	53	22	41	33	34	39
630	139	29	12	315	251	7	144	125	11	244	53	22	52	41	43	48
631	138	29	12	315	251	7	145	124	11	244	53	22	62	49	51	56
632	138	29	12	314	251	7	143	122	11	244	53	22	72	57	60	67
633	138	29	12	313	250	7	142	121	11	243	53	22	83	64	66	77
634	138	29	12	313	250	7	151	119	11	243	59	22	93	72	77	86
635	138	29	12	312	250	7	160	113	11	243	59	22	103	80	84	96
636	138	29	12	311	249	7	159	117	11	243	59	22	114	87	94	105
637	138	29	12	311	249	7	158	115	11	243	59	22	124	95	103	114
638	133	29	12	310	249	7	157	114	11	242	59	22	134	102	111	124
639	112	24	12	310	249	7	154	113	11	242	59	22	10	7	9	9
640	91	19	9	309	248	5	155	112	9	242	59	22	20	14	17	17
641	74	16	8	307	248	4	153	111	7	240	57	22	31	21	24	25
642	60	13	6	302	247	4	150	110	6	234	57	21	41	29	34	33
643	48	10	5	297	247	3	144	109	5	231	57	21	51	35	43	41
644	35	8	4	290	246	2	142	108	4	225	57	21	61	42	51	51
645	24	6	3	283	245	2	137	105	3	219	55	21	71	49	60	63
646	12	4	2	275	244	1	132	105	2	212	55	21	81	56	68	77
647	0	2	2	244	242	1	127	102	2	204	55	21	91	62	77	92
648	0	0	1	258	241	0	122	102	1	197	54	20	101	69	85	98
649	0	0	0	248	239	0	116	100	0	193	53	20	111	75	94	104
650	0	0	0	238	237	0	111	98	0	189	51	20	121	82	102	109
701	0	0	0	229	234	0	105	95	0	172	50	20	131	89	110	114
702	0	0	0	220	232	0	100	94	0	164	49	20	140	94	118	119
703	0	0	0	211	229	0	95	92	0	154	47	20	150	100	127	124
704	0	0	0	203	224	0	90	90	0	149	45	20	159	106	135	129
705	0	0	0	195	223	0	85	83	0	143	44	20	168	112	143	133
706	0	0	0	187	220	0	82	85	0	135	42	20	178	117	150	138
707	0	0	0	180	214	0	78	83	0	130	41	20	187	122	158	142
708	0	0	0	173	213	0	74	81	0	123	39	20	195	128	164	147
709	0	0	0	166	209	0	70	79	0	117	38	20	204	133	173	152
710	0	0	0	160	204	0	66	74	0	110	36	20	213	138	180	157
711	0	0	0	153	202	0	62	74	0	104	34	20	221	143	187	163
712	0	0	0	147	198	0	58	72	0	97	33	20	229	147	194	169
713	0	0	0	140	194	0	54	69	0	91	31	20	238	152	201	175
714	0	0	0	134	191	0	51	67	0	84	30	20	246	155	208	184
715	0	0	0	128	187	0	47	65	0	78	29	20	254	160	214	192
716	0	0	0	121	183	0	43	62	0	71	27	20	261	165	220	201
717	0	0	0	115	179	0	39	60	0	65	25	20	269	169	224	210
718	0	0	0	109	175	0	35	58	0	59	24	20	276	172	232	220
719	0	0	0	102	170	0	31	55	0	52	22	20	283	174	237	231
720	0	0	0	96	165	0	27	53	0	45	21	20	290	179	243	242
721	0	0	0	89	162	0	23	51	0	39	19	20	297	183	248	254
722	0	0	0	83	158	0	19	48	0	32	18	20	304	186	253	264
723	0	0	0	77	154	0	16	45	0	25	16	20	310	189	258	279
724	0	0	0	70	149	0	12	44	0	19	14	20	314	192	262	292
725	0	0	0	64	145	0	8	41	0	13	13	20	323	195	264	304
726	0	0	0	57	141	0	4	37	0	6	11	20	328	197	271	321
727	0	0	0	51	136	0	0	35	0	0	10	20	334	200	274	335
728	0	0	0	45	132	0	0	34	0	0	9	20	341	202	278	341
729	0	0	0	38	128	0	0	32	0	0	7	20	345	204	282	347
730	0	0	0	32	123	0	0	30	0	0	5	20	351	206	285	352
731	0	0	0	26	119	0	0	28	0	0	4	20	354	208	288	360
732	0	0	0	19	114	0	0	25	0	0	3	20	359	210	291	367
733	0	0	0	13	110	0	0	24	0	0	1	20	365	212	294	374
734	0	0	0	6	105	0	0	23	0	0	0	20	372	213	295	382
735	0	0	0	0	101	0	0	21	0	0	0	20	374	214	298	389
736	0	0	0	0	95	0	0	20	0	0	0	20	378	215	300	389
737	0	0	0	0	92	0	0	18	0	0	0	20	382	217	301	390
738	0	0	0	0	88	0	0	17	0	0	0	20	384	218	303	390
739	0	0	0	0	84	0	0	15	0	0	0	20	384	218	303	390
740	0	0	0	0	80	0	0	14	0	0	0	20	384	218	303	390
741	0	0	0	0	74	0	0	13	0	0	0	20	384	218	303	390
742	0	0	0	0	73	0	0	11	0	0	0	20	384	218	303	390
743	0	0	0	0	69	0	0	10	0	0	0	20	384	218	303	390
744	0	0	0	0	64	0	0	9	0	0	0	20	384	218	303	390
745	0	0	0	0	62	0	0	7	0	0	0	20	384	218	303	390
746	0	0	0	0	59	0	0	6	0	0	0	20	384	218	303	390
747	0	0	0	0	55	0	0	5	0	0	0	20	384	218	303	390
748	0	0	0	0	52	0	0	3	0	0	0	20	384	218	303	390
749	0	0	0	0	49	0	0	1	0	0	0	20	384	218	303	390
750	0	0	0	0	45	0	0	0	0	0	0	20	384	218	303	390

Figure 7.2

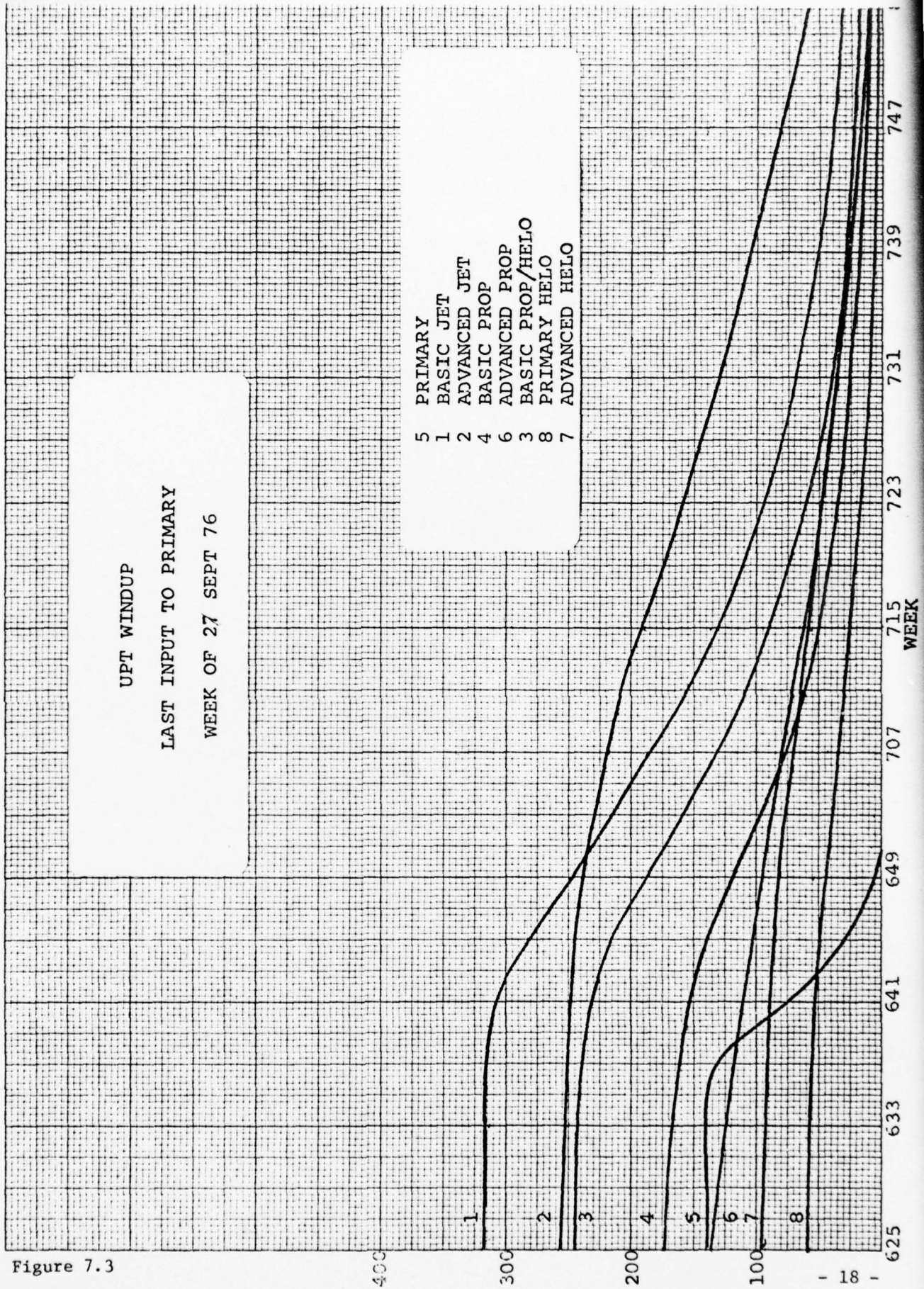


Figure 7.3

ceased? While the data on the distribution of times to complete a phase of training is sketchy, there is at least some evidence [4] to show that some students may take twice as long as the average to complete. The suggestion that it might take a long time to shut down the UPT pipeline is one that must be considered in planning the NIFTS transition.

A projection of the NIFTS buildup is shown in Figure 7.4 and graphed in Figure 7.5. The striking characteristic of this buildup is the large growth of the basic phase in the first 16 weeks. This will place a heavy load on the T28 and T34C aircraft and the instructors available, especially when coupled with the load remaining under the UPT syllabus. The projected completions for FY77 under the combination of the UPT and NIFTS are compared with the PTR in the following table.³

	JET	PROP	HELO	TOTAL
UPT	386	218	303	907
NIFTS	34	98	138	270
TOTAL	420	316	441	1177
PTR	555	329	506	1390
DIFFERENCE	-135	-13	-65	-213

It is obvious that the FY77 PTR cannot be met with the present student population even if adequate training resources were available. In order to assess how much of this shortfall is caused by the transition to NIFTS another run was made in which UPT was continued unchanged. The print-out shown in Figure 7.6 indicated that the shortfall would still be 102.⁴

³ A comparison of these projections with actual results cannot be made since the scenario was never executed.

⁴ The projected completions for FY77 as of 1 September 1977 was 1,251 or a shortfall of 139. While neither the NIFTS or UPT scenarios were executed precisely, the actual circumstances were part of each. The shortfall of 139 was also inbetween the projected 213 for NIFTS and 102 for UPT.

WEEK	BAS	PUAS	PSEK	INFS	ADVS	PHAS	INER	ADVM	PROT	INER	PROT	ADVM	STK	MAR	OUT	ATTN
612	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
613	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
614	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
616	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
617	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
618	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
619	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
621	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
622	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
628	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
629	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
632	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
633	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
635	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
636	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
637	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
639	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
640	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
641	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
642	174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
643	218	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
644	261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
645	303	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
646	344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
647	395	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
648	426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24
649	456	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29
650	506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34
701	531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39
702	555	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
703	549	31	0	0	0	0	0	0	0	0	0	0	0	0	0	51
704	542	30	12	0	0	7	0	0	11	0	0	0	0	0	0	54
705	537	30	12	12	0	7	7	0	11	11	0	0	0	0	0	42
706	531	30	12	24	0	7	14	0	11	23	0	0	0	0	0	49
707	526	29	12	36	0	7	21	0	11	34	0	0	0	0	0	71
708	521	29	12	48	0	7	28	0	11	44	0	0	0	0	0	90
709	517	29	12	60	0	7	29	5	11	45	9	0	0	0	0	84
710	513	29	12	71	0	7	30	11	11	48	18	0	0	0	0	92
711	509	28	11	82	0	7	30	17	11	49	27	0	0	0	0	89
712	505	28	11	94	0	7	31	23	11	50	36	0	0	0	0	105
713	502	28	11	105	0	7	31	29	10	50	39	7	0	0	0	111
714	498	28	11	115	0	6	32	35	10	51	41	15	0	0	0	117
715	495	28	11	126	0	6	32	41	10	51	42	23	0	0	0	124
716	493	28	11	137	0	5	32	47	10	51	44	31	0	0	0	130
717	490	27	11	147	0	5	32	53	10	51	45	40	0	0	0	137
718	487	27	11	158	0	5	32	52	10	51	44	42	0	0	0	143
719	485	27	11	168	0	5	32	45	10	51	47	51	0	0	0	150
720	483	27	11	178	0	5	32	47	10	51	47	47	0	5	0	154
721	481	27	11	180	8	6	32	43	10	51	43	75	0	9	0	153
722	479	27	11	182	16	6	31	49	10	51	49	77	0	14	7	149
723	477	27	11	184	25	6	31	70	10	50	43	81	0	19	14	174
724	475	27	11	185	33	6	31	71	10	50	43	83	0	24	21	183
725	474	27	11	197	42	6	31	72	10	50	43	85	0	29	29	189
726	472	26	11	189	50	5	31	73	10	50	42	87	0	34	35	194
727	471	26	11	189	59	6	31	74	10	50	43	89	0	39	44	203
728	470	26	11	190	67	6	31	75	10	50	43	91	0	44	52	209
729	468	26	11	191	76	6	31	75	10	49	43	92	0	49	60	214
730	467	26	10	192	84	5	31	75	10	49	43	93	0	55	69	223
731	466	26	10	193	93	6	31	77	10	49	43	94	0	60	77	230
732	465	26	10	194	102	5	30	77	10	49	43	95	0	65	85	234
733	464	26	10	195	110	5	30	77	10	49	43	95	0	71	94	243
734	463	26	10	195	113	5	30	73	10	49	43	97	7	76	103	250
735	463	26	10	194	114	5	30	73	10	49	43	97	13	82	111	257
736	462	26	10	197	116	5	30	74	10	49	43	98	20	87	120	263
737	461	26	10	197	119	5	30	77	10	48	43	99	27	93	129	270
738	460	26	10	198	120	5	30	79	10	48	47	99	34	98	138	277
739	460	26	10	198	121	5	30	79	10	48	47	99	7	6	9	7
740	459	26	10	199	123	5	30	79	10	48	47	100	14	11	13	14
741	458	26	10	199	124	5	30	79	10	48	47	100	22	17	27	20
742	458	26	10	199	124	5	30	79	9	48	47	100	22	22	35	27
743	457	26	10	200	127	5	30	80	9	48	47	100	37	28	45	34
744	457	26	10	200	128	5	30	80	9	48	47	101	44	33	54	41
745	457	26	10	200	129	5	30	80	9	48	47	101	52	39	63	47
746	456	26	10	200	131	5	30	80	9	48	47	101	60	44	72	54
747	456	26	10	201	132	5	30	80	9	48	47	101	69	50	81	61
748	455	26	10	201	133	5	30	80	9	47	45	101	78	55	90	69
749	455	25	10	201	134	5	29	80	9	47	44	101	87	61	99	74
750	455	25	10	201	134	5	29	80	9	47	44	101	92	67	101	81

Figure 7.4

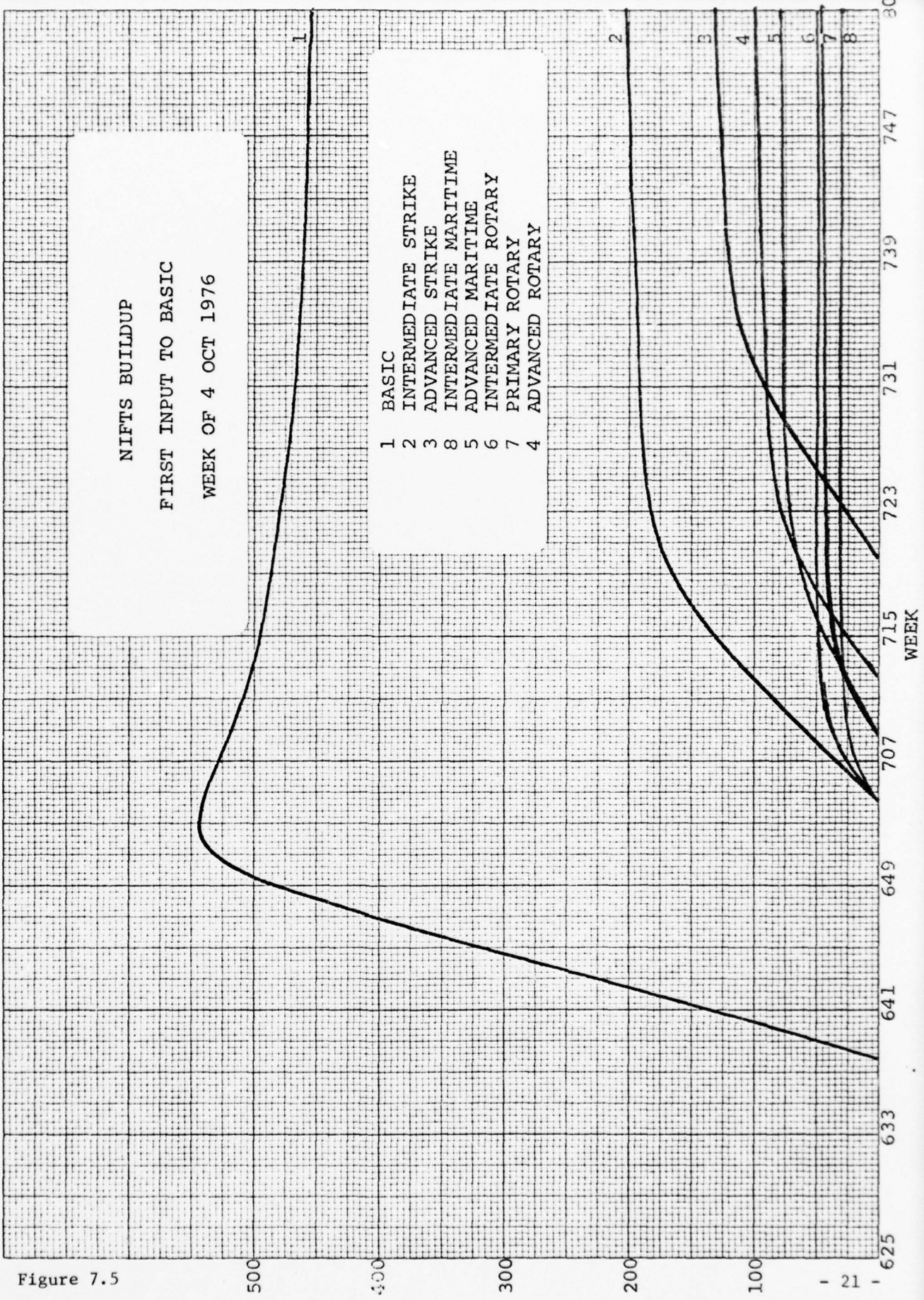


Figure 7.5

WEEK	SPIN												MAY 8, 1974, 1111			
	P21	P21	P21	BAGJ	ADVJ	PRD2	BAGP	ADVP	PHE1	BPV1	P211	ADV1	NET	PRDP	PRD1	ATT2
612	192	40	1	320	253	2	210	141	3	234	40	91	343	229	360	402
613	190	40	14	310	247	9	121	152	15	237	62	91	352	229	359	413
614	134	39	14	314	254	9	121	154	15	234	59	91	363	303	377	424
615	126	37	15	317	256	9	121	154	14	231	59	91	373	313	374	434
616	170	35	15	320	255	8	120	152	14	242	59	91	374	328	375	445
617	144	34	14	322	254	8	120	152	13	241	59	91	391	337	404	455
618	158	33	14	323	254	8	119	144	13	244	59	91	405	347	413	465
619	153	32	13	324	254	8	117	145	12	243	59	91	415	356	422	476
620	150	31	13	325	253	7	116	145	12	242	59	91	426	365	430	486
621	147	31	13	325	253	7	114	143	12	242	59	91	436	374	439	496
622	145	30	12	324	253	7	112	141	11	250	60	91	446	383	448	507
623	142	30	12	324	253	7	120	140	11	250	60	91	457	392	457	516
624	141	29	12	323	252	7	118	138	11	249	61	91	467	401	466	525
625	137	29	12	322	252	7	116	137	11	249	61	91	477	409	474	536
626	137	29	12	321	252	7	115	135	11	249	61	95	10	9	9	10
627	136	28	11	320	252	7	113	134	11	248	61	95	21	17	18	19
628	134	29	11	319	251	7	111	132	11	247	61	95	31	25	27	29
629	139	29	11	317	251	7	109	131	11	247	61	95	41	34	35	37
630	143	30	12	316	251	7	107	129	11	246	61	95	52	42	44	46
631	141	30	12	315	250	7	106	128	11	246	61	95	62	50	53	55
632	148	31	12	315	250	7	104	126	11	245	61	95	72	58	62	63
633	150	31	12	314	249	7	103	125	11	245	61	95	82	66	71	73
634	152	32	13	314	249	7	103	124	12	245	61	95	93	74	80	83
635	151	32	13	314	248	7	102	122	12	245	61	95	103	81	89	93
636	148	31	13	315	248	7	101	121	12	247	61	95	113	89	93	103
637	145	30	12	315	247	7	101	120	11	247	61	95	123	97	107	115
638	140	29	12	315	247	7	100	119	11	248	61	95	133	104	116	127
639	137	29	12	314	247	7	100	118	11	248	61	95	143	112	124	137
640	136	28	11	314	247	7	100	117	11	247	61	95	153	120	135	147
641	135	28	11	313	246	7	100	116	10	247	61	95	163	128	143	157
642	133	29	11	312	246	7	100	115	10	246	61	95	173	136	151	167
643	131	30	12	311	245	7	100	114	11	245	61	95	183	144	159	177
644	145	30	12	310	245	7	100	113	11	245	61	95	193	152	167	187
645	150	31	12	309	245	7	100	112	11	244	61	95	203	160	175	197
646	155	32	13	309	245	7	100	111	12	245	61	95	213	168	183	207
647	160	33	13	309	244	7	100	110	12	245	60	95	223	176	191	217
648	164	34	13	310	244	8	100	109	12	246	60	95	233	184	200	227
649	167	35	14	311	243	8	100	108	13	247	60	95	243	192	208	237
650	171	36	14	312	243	8	100	107	13	248	61	95	253	200	216	247
701	174	36	14	314	243	8	100	107	13	250	61	95	263	208	224	257
702	175	37	15	314	243	8	100	107	13	252	61	95	273	216	232	267
703	175	37	15	318	243	8	100	106	14	254	61	95	283	224	240	277
704	179	37	15	320	243	8	100	105	14	255	61	95	293	232	248	287
705	172	37	15	322	243	9	100	105	14	253	61	95	303	240	256	297
706	173	37	15	324	243	9	100	105	14	250	62	95	313	248	264	307
707	175	37	15	326	243	9	100	105	14	242	62	95	323	256	272	317
708	173	36	15	328	243	8	100	104	14	244	62	97	333	264	280	327
709	159	35	14	330	244	8	100	104	13	245	63	97	343	272	288	337
710	164	34	14	331	244	8	100	104	13	247	63	97	353	280	296	347
711	159	33	14	332	245	8	100	104	13	249	64	97	363	288	304	357
712	156	33	13	332	245	8	100	104	12	243	64	93	373	296	312	367
713	152	32	13	333	245	9	100	104	12	243	64	93	383	304	320	377
714	147	31	13	332	246	7	100	104	12	243	65	93	393	312	328	387
715	141	29	12	332	246	7	100	104	11	243	65	92	403	320	336	397
716	136	28	12	331	246	7	100	104	11	247	65	92	413	328	344	407
717	131	27	11	330	247	7	100	103	11	246	65	92	423	336	352	417
718	126	26	11	328	247	6	100	103	10	244	65	92	433	344	360	427
719	122	25	11	326	247	6	100	103	10	242	65	92	443	352	368	437
720	121	25	10	324	247	6	100	103	9	240	65	92	453	360	376	447
721	118	25	10	321	247	6	100	103	9	238	65	92	463	368	384	457
722	116	24	10	318	247	6	100	102	9	236	65	92	473	376	392	467
723	114	24	10	316	247	6	100	102	9	234	64	92	483	384	400	477
724	114	24	10	313	247	5	100	101	9	230	64	92	493	392	408	487
725	115	24	10	310	246	5	100	101	9	228	64	92	503	400	416	497
726	117	25	10	307	246	6	100	100	9	245	63	92	513	408	424	507
727	121	25	10	305	245	6	100	100	9	243	63	92	523	416	432	517
728	126	26	10	302	245	6	100	99	9	241	62	92	533	424	440	527
729	132	28	11	300	244	6	100	99	9	239	62	92	543	432	448	537
730	137	29	11	299	244	6	100	98	10	238	61	92	553	440	456	547
731	141	30	11	298	243	7	100	97	11	238	61	92	563	448	464	557
732	145	30	12	297	242	7	100	97	11	234	61	92	573	456	472	567
733	145	30	12	293	241	7	100	96	11	232	60	92	583	464	480	577
734	142	30	12	292	241	7	100	96	11	233	60	92	593	472	488	587
735	135	29	12	292	240	7	100	95	11	232	60	92	603	480	496	597
736	129	27	11	290	240	7	100	95	10	232	60	92	613	488	504	607
737	121	25	11	289	239	6	100	95	10	233	59	92	623	496	512	617
738	114	25	10	297	239	6	100	94	9	237	59	92	633	504	520	627
739	114	24	10	295	238	6	100	94	9	235	59	92	643	512	528	637

Figure 7.6

>>RUN
DISPLAY7

T34C/T28

VT2/3/6/27

APR 20, 1975

NUMBER	WEEKS									
	6	6	6	6	7	7	7	7	7	7
	3	4	4	5	0	1	1	2	2	3
	5	0	5	0	5	0	5	0	5	0
280	.	.	.	.	X	.	.	.	.	.
270	.	.	.	X	X	.	.	.	.	.
260	.	.	.	X	X	.	.	.	.	.
250	.	.	.	.	X	.	.	.	.	.
240	.	.	X	.	.	X	.	.	.	CC
230	.	.	.	.	.	X	.	.	.	CCC
220	.	.	X	.	.	.	X	.	CCC	CCCC
210	.	.	.	.	.	.	CCX	.	.	.
200	.	.	X	.	.	CCC	X	.	.	.
190	.	X	.	CCC	.	.	.	X	.	.
180	.	X	CCC	.	.	.	.	X	.	.
170	CCCC	.	.	.	.	.	.	XX	.	.
160	.	.	.	.	.	.	.	.	XXXXXXX	.
150	.	X.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.
	XXXX									
	6	6	6	6	7	7	7	7	7	7
	3	4	4	5	0	1	1	2	2	3
	5	0	5	0	5	0	5	0	5	0

Figure 7.7

Thus, while some of the shortfall is due to the slow drying up of the old UPT pipelines, at least 102 of the shortfall is due to too lean a pipeline.

The final demonstration of the HOWGOZIT concept examined the supply and demand relationship for T28 and T34C aircraft during the transition to NIFTS. Figure 7.7 shows the supply, C, and demand, X, based upon the numbers of aircraft given in the scenario and the student populations determined by the model. Note that from the 41st week of 1976 to the 15th week of 1977, there will be a shortage of aircraft and that by mid 1977 there will be a large excess of capacity. Management has many options to alleviate this crunch. It could pool students at the start of training and accept a reduced PTR. It could load the jet pipeline in advance of the transition. It could attempt to obtain more T28 aircraft and instructors for that short period. Or it could attempt some modification of the syllabus during transition. Obviously, the search for a reasonable alternative would be facilitated with the capabilities of a fully developed HOWGOZIT.

8. Conclusions

On the basis of the demonstration of HOWGOZIT, the following conclusions have been reached. First, HOWGOZIT can track the NIFTS transition. Second, HOWGOZIT could be implemented on a minicomputer or on INFONET, the time-sharing computer service used in the CNATRA Headquarters. Third, some initial capability in HOWGOZIT seems essential to track the training process. Finally, that watchful management with a HOWGOZIT should be in good position to effect substantial economies in the efficient use of training resources.

REFERENCES

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APPENDIX A

DATA FILES

Input Files

PTR - This file contains a three dimensional array of planned pilot completions by pipeline, service, and year. This data is obtained from the CNO notice issued annually with modifications as occurring. Currently there are: three pipelines - jet, prop and helo; four services - Navy, Marine Corps, Coast Guard, and Foreign; and two or three years - current and one or two out years.

STUDIN - This file contains a two dimensional array of planned student inputs by source and week. This data is obtained from the CNO notice issued annually with modifications as occurring. Currently there are: five input sources - AOC, AVROC, Officer, Marine Corps, Coast Guard, and Foreign; and 50 input weeks (two weeks over the Christmas-New Year period have no input). Note that service and source are identical for non-Naval personnel. Naval personnel have different routes through Naval Aviation Schools Command depending upon source and the source distinction must be maintained until entry into the primary phase of flight training.

TRAIN - This file contains a three dimensional array of moving averages of variables related to student training. The variables are: student syllabus hours/student flying day (SSH/SFD); student completions/student syllabus hours (COMP/SSH), student attrition/student completion (ATTR/COMP), and an acceleration factor. Each variable is tabulated by organization and service; currently there are 22 squadrons providing flight training and four services. The acceleration factor is used to project a training rate (SSH/SFD) scaled to the moving average and is a management dictated input. All other data is obtained by regular updates from the Weekly Aviation Statistical Reports.

STUDLOAD - This file contains a three dimensional array of actual student load by organization, service and week. In this file it is necessary to account for all students who have entered the system, therefore it includes as organizations: all pools, in transit states and terminal states (final completions and attritions) as well as the 22 training squadrons. Thus each week's data will be a table of about 50 organizations by four services. Normally 50 weeks of data will be maintained in these files. All data is obtained by regular updates from the Weekly Aviation Statistical Reports.

RESAVAIL - This file contains a three dimensional array of variables related to the projected availability of resources by organization and week. Resources considered are aircraft, instructors, and maintenance personnel for the some 22 squadrons providing flight training. Normally 50 weeks of projected availabilities will be maintained. As a default when a new week is added, the availabilities will equal to those in the immediate prior week. As impending changes to availabilities become known, an update to this file should be made.

RESFACT - This file contains a two dimensional array of moving averages of factors related to the productivity of resources. The variables are: instructor flight hour/student syllabus hour (IFH/SSH), instructor flight hour/instructor flying day (IFH/IFD), aircraft flight hour/student syllabus hour (AFH/SSH), aircraft flight hour/aircraft flying day (AFH/AFD), aircraft flight hour/maintenance man-hour (AFH/MMH) and an efficiency factor. Each variable is tabulated by organization, currently 22 squadrons. The efficiency factor is a coefficient used to scale projected resource utilization to the moving average and is a management dictated input. All other data is obtained by regular updates from the Weekly Aviation Statistical Reports.

WEATHER - This file is a two dimensional array of moving averages of flying days/scheduled days by organization and week. There are 22 squadrons and 50 weeks of data in this file. The source of the data is the regular updates of the Weekly Aviation Statistical Reports.

WINGSPLIT - This file contains a three dimensional array of coefficients reflecting the fractional split of pipeline students between the wings. The data is tabulated by wing, service and week. The data in this file reflects a management determination and is relatively static.

Output Files

STUDFLOW - This file is a two dimensional array of the mean student input, output, and load by organization and service. This data is calculated by PIPEFILL on the assumption of feasibility of the PTR given the beginning student load and planned input schedule. It is recalculated whenever there is a change in the PTR or STUDIN files.

STUDSPLT - This file is a two dimensional array of coefficients reflecting the fractional input required to meet the PTR by pipeline and service. The data is calculated by PIPEFILL under the assumption of feasibility of PTR as stated above. It is recalculated whenever there is a change in the PTR or STUDIN files.

STUDPROG - This file is a three dimensional array of number of weeks ahead/behind schedule by organization and service. The calculations are made weekly by the PROGRESS program and added to the file to form a historical record.

STUDOUT - This file is a three dimensional array of most recent projection of number of students completing by organization, service, and week. The projections are made by the STUDTHRU program whenever there is a change in the PTR or STUDIN files and at other times when it seems desirable.

WORKLOAD - This file is a three dimensional array of the most recent projection of student syllabus hours (SSH), and number of students available for training by organization, service, and week. The projections are made by the STUDTHRU program whenever there is a change in the PTR or STUDIN and at other times when it seems desirable.

APPENDIX B

PROGRAMS

PIPEFILL - For any pipeline phase, given an initial student population, an attrition rate, a mean time to complete, a mean time to attrite, and a required number of completions, this program will calculate the mean flow of students through the phase (completions and attritions). This sizes the mean student load at that phase. The program assumes that the final population should be equal to the mean student load. The input is then calculated as the completions plus attritions plus any difference between final and initial student load. The output of the predecessor phase is then set equal to the required input for the following phase.

Given

S = initial student population

a = attrition rate

L_c = mean time to complete

L_A = mean time to attrite

C = required number of completions.

Let

A = number of attrites

$A = C \times a / (1-a)$

F = mean weekly flow

$F = C/50$

M = mean load

$M = (C \times L_c + A \times L_A) / 50.$

If the final population is set equal to the mean load, then the input,

$I = C + A + M - S .$

The input, in turn, becomes the required output of the predecessor phase.

The program assumes one week would be spent in a post-primary pool and one week in either a pre-jet, pre-prop, or pre-helo pool. This serves two purposes. First, it accounts for the approximately two weeks time students spend changing stations following primary training. Secondly, by splitting the period this way, the mean loads in the pools represent the expected weekly completions from primary and the expected weekly inputs to each pipeline. STUDSPLT is then calculated as the ratio of the various pipeline inputs to primary output. For all other pools there is no planned delay and therefore no planned load.

PIPEFILL calculations are executed by services recognizing that all students except Navy AOC enter through EI. Therefore all deficiencies in non-Navy input appear on the EI side. Since the Navy input is split it must be handled differently. As a convention, it is assumed the Navy flow through EI is fixed and any deficiency must be made up in the AOC input. Therefore the program calculates the output of EI using input from STUDIN and subtracts this from the input to primary to give the required output from AOC. The calculation of input to AOC then proceeds as with other phases.

PIPEFILL permits viewing the type 1 display for either a single service or the total aggregation.

PROGRESS - The state of training is determined by a combination of the number of completions and the number of students under training. If a phase were exactly on schedule, it would have made the required number of completions and had the required number of students on board under training. As discussed elsewhere in the text, a student in training is considered halfway to completion. PROGRESS applies a correction to the number of completions by one half the difference between the actual student load and the mean load. The corrected completions are divided by the mean flow to determine the number of equivalent weeks completed. The difference between the equivalent weeks and the actual weeks is the status in weeks

ahead or behind schedule. A weather correction may be applied if considered worthwhile. The weather correction is due to a season variation. In the case of primary training where weather is most constraining, the correction ranges from plus 1.0 week in November to minus .3 week in late spring. A graph of the seasonal adjustment for primary is shown in Appendix E.

Given

C_k = cumulative completions through the k th week from STUDLOAD

S_k = student population for the k th week from STUDLOAD

F = mean weekly flow from STUDFLOW

M = mean weekly load from STUDFLOW

W = week number from user

WX_k = weather correction, k th week, from WEATHER.

Let

P_k = state of training at the k th week

$$P_k = (C_k + (S_k - M) / 2) / F - W - WX_k .$$

The results of this calculation are tabulated in STUDPROG and displayed in type 2 or 3 displays.

STUDTHRU - This program assumes students flow through the training network as a Markov process. A transition matrix, T , based on transitions occurring at regular weekly intervals, can be constructed where t_{ij} is the fraction of those in state i remaining at state i after a single transition.

$$t_{ii} = 1 - \sum_{j \neq i} t_{ij}$$

$$t_{ii} = 1/L_i$$

where L_i is the mean time in state i .

$$t_{ij} = f_{ij} / L_i$$

where f_{ij} is the fraction of those leaving state i which enter state j .

If $S(t)$ is a vector of student population S at each state, $S_1, S_2 \dots S_N$, at time t , then at time $T + 1$

$$S(t+1) = S(t) \times T .$$

Where there are additional inputs, $I(t)$, to the system from outside sources during the transition from t to $T + 1$, then

$$S(t+1) = (S(t) \times T) + I(t)$$

where $I(t)$ is a vector of inputs to state i from outside sources.

For STUDTHRU the transition matrix is quite sparse. From any state there are only a few successor states. If i is a training state (except primary), j is either the next phase in the pipeline or an attrite. If i is the primary phase, j is the post primary pool or an attrite. If i is a pool (except the post primary pool), j is only the next pipeline phase. (No attrition from pools.) If i is the post primary pool, j are the several pre-pipeline pools. If i is terminal state (completion or attrition) there are, of course, no successor states.

Mean time in state i , L_i , is calculated as follows:

L_{c_i} = mean weeks to complete state i

L_{A_i} = mean weeks to attrite from state i

a_i = attrition fraction

$$L_i = a_i \times L_{A_i} + (1-a_i) L_{c_i} .$$

Unfortunately, the Weekly Statistical Reports do not show the time to attrite. However, there is a widely held assumption that attrition takes place about halfway through the course. If this is so, then

$$L_i = (1-a_i/2) L_{c_i}$$

$$L_{c_i} = \begin{cases} 1 & \text{for } i = \begin{cases} \text{a pool} \\ \text{a terminal state} \end{cases} \\ \infty & \end{cases} .$$

Then the elements of T are

$$t_{ii} = \begin{cases} 0 & \\ 1 - 1/L_i & \\ 1 & \end{cases} \quad i = \begin{cases} \text{a pool} \\ \text{a training state} \\ \text{a terminal state} \end{cases} .$$

$$t_{ij} = \begin{cases} f_{ij} & i = \text{post primary pool} & j = \text{prepipeline pool} \\ 1 & i = \text{other pools} & j = \text{successor training state} \\ 1 - a_i/L_i & i = \text{training state} & j = \text{successor training state} \\ a_i/L_i & i = \text{training state} & j = \text{attrition state} \\ 0 & \text{elsewhere} \end{cases}$$

The data for the current student load is read from the STUDLOAD file. The data for the transition matrix is read from the STUDSPLI and TRAIN files. The output of STUDTHRU is; first, the cumulative projected completions by organization, service and week (STUDOUT file) and second, the projected onboard student population by organization, service and week (WORKLOAD FILE).

STUDANAL - This program generates DISPLAY 4 (similar to Figure 7.1) showing the projected state of the system at the end of the fiscal year. Completions from the final phases are shown as the required PTR \pm projected differences. There are otherwise no computational actions in this program.

STUDANAL also generates DISPLAY 5 (similar to Figure 7.2) showing the cumulative projected completions by organization and week. If desired, the user may specify the service to be shown in either of the foregoing displays, otherwise the composite total will be shown.

STUDANAL reads data from the STUDOUT, PTR and STUDLOAD files.

WORKANAL - This program generates DISPLAY 6 (similar to Figure 7.7) for instructors, aircraft and maintenance personnel. The demand for resources is the product of the expected student load and the ratio of resource required per student. The latter ratios for aircraft and instructors to students are shown in the right hand and second from right columns of Figure 6.1 These ratios are in turn the product of three other ratios which are maintained as moving averages in the TRAIN and RESFACT file.

For the instructor/student ratio

$$I/S = ((IFH/IFD) \times (SSH/IFH))/(SSH/SFD) .$$

The supply of resources is read from the RESAVAIL FILE.

APPENDIX C

DISPLAYS

DISPLAY 1 - Similar to Figure 7.1 except that outputs are the required PTR outputs. End populations and attrition are calculated by PIPEFILL. Inputs to AOC and EI are shown as the planned input \pm any deficiency as calculated by PIPEFILL. Status is omitted from display. Title indicates year and service displayed.

DISPLAY 2 - Shown in Figure 7.1. Title indicating date and service displayed should be added.

DISPLAY 3 - Similar to Figure 7.1 except that the jet pipeline is displayed by wings.

DISPLAY 4 - Similar to Figure 7.1 except that the inputs are the planned inputs. End populations, attrition, and outputs are calculated by STUDTHRU. Outputs from final phases are shown as the PTR \pm any deficiency as calculated by STUDTHRU. Status is omitted from display. Title indicates year and service displayed.

DISPLAY 5 - Similar to Figure 7.2 Title indicating date and service displayed should be added.

DISPLAY 6 - See Figure 7.7.

APPENDIX D

UPDATES

UPDATES have a twofold function. They modify data to HOWGOZIT and, as a secondary action, they cause the execution of programs which operate on this modified data. UPDATES are in themselves programs and are the essential feedback mechanism which leads to improved projections.

NUPTR - Annually and on occasion when a new PTR is promulgated, the PTR file is modified and the student route through HOWGOZIT is executed for the first order test of feasibility of the new PTR. (The user may try a PTR of his own selection to observe resulting changes in the system.)

NUSTUDIN - This update is executed annually for each annual CNO promulgation of planned student input. The new schedule is added to STUDIN and the student throughput is analyzed in detail by execution of the STUDTHRU, STUDANAL and WORKANAL programs. On the infrequent occasion of a midyear change of the input schedule, NUSTUDIN will reexecute the analysis procedure. (As with PTR, the user is free to experiment with an input schedule of his own selection in order to observe resulting changes in the system.)

NUSPLT - The split of students between wings in the jet pipeline and the prop pipeline are an internal NATRACOM action. The split must account for differences in base capacities plus special requirements, say for Master's degree students or certain foreign students. NUSPLT updates the WINGSPLT file but does not cause execution of other programs.

NUWASR - Until recently this update would have been executed weekly with each new Weekly Aviation Statistical Report. Now the period has been changed to biweekly. NUWASR computes various moving averages which are maintained in the TRAIN, RESFACT and WEATHER files. The technique of exponential smoothing is used to reduce the amount of data stored. If $x(t)$ is the observation of x between $t - 1$ and t and $\bar{x}(t)$ is the moving average at time t ,

$$\bar{x}(t) = k x(t) + (1-k) \bar{x}(t-1)$$

where k is the smoothing constant. Note if $k = 1$, then the moving average is only the most recent observation. As k becomes smaller, the memory of prior observations becomes larger.

For the moving averages in the TRAIN and RESFACT files, a value of $k = 1/25$ for biweekly data is used. In the WEATHER file there are moving averages of flying days/scheduled day by week of the year since this relationship is so seasonably dependent. NUWASR updates the period of concern using $k = 1/5$ since the current data has been taken as a five year average.

NUWASR then causes the PROGRESS program to be executed in order to display the current state of progress toward the required PTR.

NURESAVL - This update is provided to permit planned changes in resource availability. NURESAVL modifies the appropriate data in the RESAVAIL file and executes WORKANAL for the resource changed. (The user may test various allocations of resources using NURESAVL.)

NUEFF - This update is provided to permit the change in the efficiency factor in RESFACT. The efficiency factor biases the historical resource productivity factors in order for management to set production goals relative to past performance. NUEFF causes WORKANAL to be executed for the organization and resources concerned. (The user may experiment with various local changes in order to observe the overall effect on the system.)

NURATE - This update is provided to permit changes in the student instruction rate. NURATE functions similarly to NUEFF.

PILOT TRAINING FLOW WORKSHEET
 NIFTS - (LEVEL)
 (With T-34C - 2B37 and
 T-44A - 2F129)

Report Date August 1977 300

1587
 S - Student level
 A - A-1 status aircraft
 P - Pilot status aircraft
 H - Aircraft in U.S. hands
 * - Aircraft on

Theoretical
 Flow Sheet

AOC SCHOOL		
12	69	10

1587 In
 1400 Out
 25.8% Attr.

ENVIRONMENTAL INDOCTRINATION		
4	127	2

270

1555

ENL
 VT/AOD
 114/0
 -15/0
 99/0

1825			
PRIMARY	T-34C	Sim IUT	Admin
16	513	219	70 + 29 + 27 = 315
16	157	1219	10
55190 Sim.			

1533

STRIKE

MARITIME

ROTARY

623

368

542

949/116
 -52/14
 897/102

ENL
 Incl.
 in Prim.
 VT's

ENL
 Incl.
 in Prim.
 VT's

INT. STRIKE T-20	
19	...
8	*
230	*
124	(172)
103+35+14+10=192	
71225+28765 Sim.	

INT. MARITIME T-34C	
5	...
3	*
37	*
14	*
17+6+3+0=26	
10780+4175 Sim.	

INT. ROTARY T-34C	
5	...
3	*
54	*
20	*
25+8+4+0=37	
15885+6155 Sim.	

573

357

526

842/113
 -60/15
 782/98

44/0
 -6/0
 38/0

113/3
 -5/1
 105/2

ADVANCED STRIKE TA-4J	
16	...
4	*
182	*
108	*
80+16+13+10=199	
66440+43230 Sim.	

ADVANCED MARITIME T-44A	
14	...
2	*
100	*
45	*
40+16+6+10=72	
35910+13160 Sim.	

HELICO-PRIMARY TH-57	
6	...
1	*
64	*
33	*
33+2+1+6=45	
22215+1145 Sim.	

550

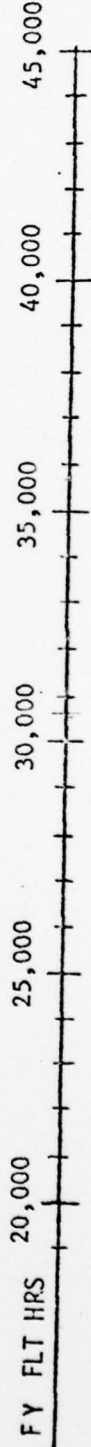
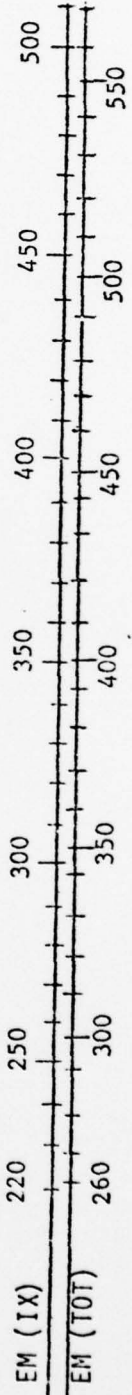
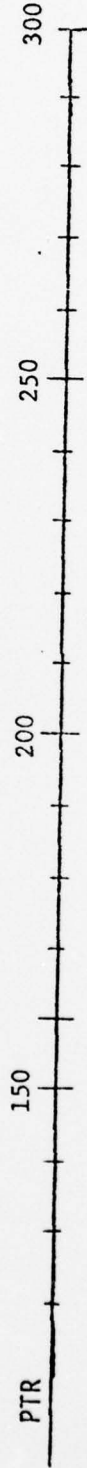
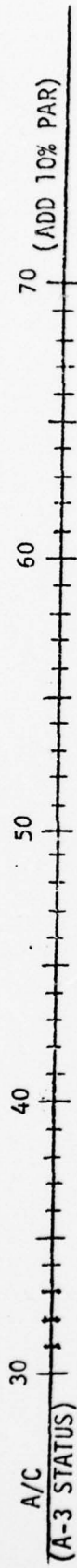
350

500

FY	NAVY	MARINE	OTHER	Total
Strike				550
Maritime				350
Rotary				500
Total				1400

FY	NAVY	MARINE	OTHER	Total
Jet				
Prop				
Helos				
Total				

T-2C SQDN RA-10S



APPENDIX F

Free Washington Univ Study Group
WEEKLY AVIATION STATISTICAL REPORT

DATE: 140300Z MAR 76
 WEEK ENDING: 21 MARCH 1976
 DAY: 21

SQUADRON	MPVT	AVERAGE IN FLY STATUS	ON BOARD IN N/C FOR	WEEKLY COMPLETIONS			CUMULATIVE COMPLETIONS			AVERAGE HOURS TO COMPLETE	AVERAGE WEEKS TO COMPLETE	TOTAL	AVERAGE HOURS TO COMPLETE	AVERAGE WEEKS TO COMPLETE	WEEKLY N/C FOR	WEEKLY N/C FOR	CUMULATIVE N/C FOR	WEATHER
				N	M	C	N	M	C										N	M	C
AOCS (PILOT)	2/0 0/0	85	85/0/0/0	1		1	13.00	181	11.37	181	26/0/0/0							
A. I. (PILOT)	0/0	138	68/55/5/10	11	1/3	27	4.22	568	3.52	317/2	9/3/0/7			0/0/0/1				
PRIMARY	5/8	96	46/30/8/5	6	3	21	5.14	337	5.37	10/26	491	26.0	28.3	0/1/0/0		26/18/1/3		
VT1	1/0	103	59/28/8/8	5		5	5.57	321	5.25	9/25	458	25.8	28.8	1/0/0/1		26/27/1/5		
VT5	0/3	103																
BASIC JET																		
VT4	29	25	15/2/0/12	5	2	7	27.97	30	34.95	6	36	121.4	123.2			5/2/0/0		
VT4 (ASP)			XXXXXXXXXX					(3)	(46.66)	(129.2)								
VT4 (ROM MSP)			XXXXXXXXXX					(27)	(32.59)	(121.9)								
VT9	44	31	28/9/26/0	3	1/3c	4/3c	24.72	22	13/9c	35/9c	105.8	106.6	105.8			3/2/0/0		
VT19	40	34	29/9/26/0	1	2c	1/2c	20.86	22	9/10c	40/10c	104.6	106.2	104.6			2/1/0/1		
VT23	0/0	113	81/25/0/0	1		1	25.43	69	47	116	113.9	128.5	113.9			7/8/0/0		
VT26	0/0	90	69/17/0/0	7	1	8	22.06	98	27	125	103.7	103.5	103.7			11/9/0/0		
SUB TOTAL	1/2	316	228/62/5c/12	16	5/5c	21/5c	24.64	241	19c	352/	109.5	111.4	109.5			28/22/0/1		
ADVANCED JET																		
VT4	25	25	21/4/0/0	3	2	5	29.08	22	22	44	127.0	128.4	127.0			1/0/0/0		
VT4 (ASP)			XXXXXXXXXX					(11)	(6)	(17)	(122.7)	(128.2)	(122.7)					
VT4 (ROM MSP)			XXXXXXXXXX					(11)	(16)	(27)	(129.7)	(128.4)	(129.7)					
VT7	48	37	22/15/8c/2			1/1		48	10/14	64/14	120.3	120.3	120.3			7/5/0/1		
VT21	38	30	21/17/0/0					38	12	50	114.8		114.8					
VT22	4/1	34	18/16/0/0					35	14	49	121.0		121.0			4/2/0/0		
VT24	0/0	40	30/6/0/3	1	1	2	21.57	36	16	75	120.3	115.6	120.3			3/3/0/1		
VT25	0/0	46	32/9/0/3	3	1	4	23.57	35	13	75	119.3	119.5	119.3			4/2/0/1		
SUB TOTAL	0/0	231	144/67/8/8	7	4	12	25.71	214	87/16	317/	120.3	122.8	120.3			1/0/0/0		

WEEK ENDING 21 MARCH 1976

WEEKLY STUDENT ATTRITION RECORD

REMARKS	TOTAL BULLETS ISSUED EXCEPT 1X/OTHER	MTP	AVIATORS IN BULLETS	NON- AVIATORS IN BULLETS	OTHER AVIATORS	MSEA	MARINE AVIATORS	REASON			STAGE	DATE				
								GROUP	GROUP	GROUP						
	96/17	2	5	4	13	10		VT23(18)	VT4(14)	VT1(13)	VT5(17)	VT5(3)	AI(3)	LOM	FAM/RI	3-18-76
	88/20	2	5	5	17	9		VT1(13)	VT5(17)	VT5(3)	AI(3)	LOM	FLIGHT	PS	3-16-76	
	221/26	4	6	1	11	7		VT1(13)	VT5(17)	VT5(3)	AI(3)	NPQ	FLIGHT	PS	3-17-76	
	229/20	5	5	4	8	11	4	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-15-76	
	104/18	5	5	1	6	5	4	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-19-76	
	108/20	2	5		6	4	11	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-18-76	
	248/19	5	5		6	4	11	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-18-76	
	154/14	5	5		6	5	12	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-18-76	
	280/39	9	5		6	19	10	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-18-76	
	164/20	6	5		5	6	11	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-18-76	
	161/29	5	5		5	7	11	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-18-76	
	257/42	11	5		9	18	17	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-18-76	
SUB TOTAL	2108/284	65	64	6	69	123	133	VT1(13)	VT5(17)	VT5(3)	AI(3)	FLIGHT	FLIGHT	PS	3-18-76	

NAME	CATEGORY	GROUP	REASON	STAGE	DATE
BYRD, W. J.	USN ROTC FIP	VT23(18)	LOM	FAM/RI	3-18-76
ANDERSON, H. L.	AOC	VT4(14)	FLIGHT	PS	3-16-76
LANEY, D. M.	USMCR	VT1(13)	NPQ	PS	3-17-76
CHOZATI, M. H.	IRANIAN	VT5(17)	FLIGHT	PS	3-15-76
HOPPER, R. W.	OCS	VT5(3)	FLIGHT	PS	3-19-76
AL-SANAFI, A. H.	KUWAITI	AI(3)	ACADEMIC	PS	3-18-76

POOL/AWAITING TRAINING STUDENTS

7/0/0/0

AWAITING PRIMARY

AWAITING BASIC
NAVASCOLSOOM
TRAINING ONE
TRAINING TWO
TRAINING THREE
TRAINING SIX

AWAITING ADVANCED

4/1/6c/0
3/1/0/0
8/1/0/0
6/2/0/0

TOTAL BASIC 27/6/0/0

TOTAL PRIMARY 7/0/0/0

TOTAL ADVANCED 21/5/6c/0

GRAND TOTAL 55/11/6c/0

WEEKLY AVIATION STATISTICAL REPORT

WEEK ENDING 21 MARCH 1976

CONTROL NUMBER 15023

CONTROL NUMBER 15023

SQUADRON	STUDENTS				INSTRUCTORS				AIRCRAFT				MON PIPELINE STUDENTS	
	STILLABO HOURS		AVERAGE IN FLT STATUS		STUDENT HOURS		TOTAL AVIATOR HOURS		STILLABO S/C HOURS		TOTAL A/C HOURS		INPUT	REF OTHER
	WEEKLY	CUMULATIVE	(131)	(132)	(133)	(134)	(135)	(136)	(137)	(138)	(139)	(140)	(141)	(142)
PRIMARY														
VT1	466	14965	45	40	89	411	12489	469	17257	43	37	86	536	18495
VT5	411	14982	35	31	89	325	12164	415	16772	40	38	95	465	17901
BASIC JET														
VT4	131	3620	23	20	87	119	3173	137	5575	21	18	86	163	6311
VT9	106	4674	19	15	79	63	3431	128	6006	25	15	60	162	6369
VT9		931				931		931					931	
VT19	164	5715	24	19	79	139	5285	254	8549	22	13	59	231	7985
VT19	17	569				17	969	17	969				17	969
VT23	361	13456	45	43	96	326	11340	468	17451	54	34	63	448	18140
VT26	469	14291	53	46	87	398	11535	591	18881	56	35	62	599	18984
VT26		101				101		101					101	
SUB TOTAL	1248	43757	164	143	87	1062	36765	1575	58463	178	115	65	1620	59810
ADVANCED JET														
VT4	140	5713	25	21	84	108	4872	150	6319	21	14	67	200	8032
VT7	172	9502	47	34	72	211	8832	748	12699	40	21	52	274	13824
VT21	226	7430	36	25	69	194	5623	238	8956	38	19	50	305	10374
VT22	204	6831	36	27	75	183	5814	276	8547	31	21	68	308	10321
VT24	282	7638	28	28	100	230	6333	260	9672	30	20	67	368	11211
VT25	245	7805	34	27	79	208	6818	266	9594	31	18	58	332	11373
SUB TOTAL	1269	44919	206	162	79	1134	38292	1438	55787	191	113	59	1787	65135

F 3

WEEK ENDING 21 MARCH 1976

REMARKS	WEEKLY STUDENT ATTRITION RECORD										
	NAME	CATEGORY	GROUP	REASON	STAGE	DATE	HTS	HTS	HTS	HTS	HTS
	FAJER, D. J.	AOC	VT2(5)	DOR	BASIC	3-15-76	13	6	3	12	4
	HAMEL, D. A.	USNA	VT2(7)	DOR	BASIC	3-15-76	17	5	5	19	
	PEACHY, J. G.	USMCR	VT2(25)	NOM	BASIC	3-19-76	11	5	5	14	
	LAMPTON, D. J.	AVROC	VT2(7)	NPQ	FAH	3-15-76	10	5	5	13	
							166/24	6	3	24	24
							151/21	10	5	2	24
							79/12	8	1	3	15
							353/36	3	8	1	6
							1390/183	80	48	7	30
											104

POOL/AWAITING TRAINING STUDENTS

AWAITING BASIC

TRAWING FOUR (VT2/6) 39/0/0/0
 TRAWING FIVE (VT3) 12/7/5/2
 (HT8) 15/0/0/0
 (HT8) 3/0/0/0

AWAITING ADVANCED

TRAWING FOUR 5/0/0/0
 TRAWING FIVE (HT18) 2/4/1/0

TOTAL BASIC 69/7/5/2

TOTAL ADVANCED 7/4/1/0

GRAND TOTAL 76/11/6/2

WEEKLY AVIATION STATISTICAL REPORT

DATA REPORT 14827

REF. ENDING 21 MARCH 1976

DATA REPORT 14827

SQUADRON	STUDENTS						INSTRUCTORS						AIRCRAFT				NON-PIPELINE STUDENTS			
	STILLABUS HOURS		AVERAGE IN FLT STATUS	AVERAGE ASSIGNED	% IN FLT STATUS	WEEKLY	CUMULATIVE	WEEKLY	CUMULATIVE	WEEKLY	CUMULATIVE	WEEKLY	CUMULATIVE	WEEKLY	CUMULATIVE	WEEKLY	CUMULATIVE	WEEKLY	CUMULATIVE	
	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	
BASIC PROP	370	14808	43	38	88	321	13366	429	17143	37	18	49	384	14990	442	17136				
VT3																				
VT27	290	16487	42	35	83	271	15449	345	18238	34	26	76	297	16840	335	18610				
SUB TOTAL	660	31295	85	73	86	592	28815	774	35381	71	44	62	681	31830	777	35546				
ADVANCED PROP																				
TS2A	430	12887	44	39	89	394	11687	480	15510	2	2	100	42	722	56	943			71	
US2B																				
VT31	441	14912	50	44	88	388	13187	444	16072	2	1	50	28	1083	33	1343				
US2B																				
SUB TOTAL	871	27799	94	83	88	782	24874	924	31582	4	3	75	70	1805	89	2286				
BASIC PROP-HELO																				
VT2	423	16775	54	46	85	368	14804	510	19942	48	27	56	427	17097	507	20279				
VT6	380	15042	63	54	86	361	13854	506	19084	46	18	39	393	15562	477	18709				
SUB TOTAL	803	31817	117	100	85	729	28658	1016	39026	94	45	48	820	32659	984	38988				
PRIMARY HELO																				
HT8	315	12239	41	35	85	280	10699	403	13986	36	30	83	315	12241	386	14338				
ADVANCED HELO																				
HT18	536	24282	91	80	88	536	24282	722	32670	72	29	40	536	24282	629	28767			3	
MIDN CORPC																				
T34																				
TOTAL HOURS	6579	246055				5851	217038	7736	300924				7031	259561	8082	310262				
JET/PROP/HELO																				

WEEKLY AVIATION STATISTICAL REPORT

DATE: 1423 24 1967 8:22

WEEK ENDING: 21 MARCH 1976

CHARTER NUMBER: 15427

SQUADRON	STUDENTS										WEATHER					
	INPUT (1)	AVERAGE IN FLY ASSIGNED STATUS (2)	ON BOARD HOURS IN CC FOR (4)	WEEKLY COMPLETIONS NAVY (5) MARINE (6) CG (7)	AVERAGE HOURS TO WEEK TO COMPLETE (8)	AVERAGE HOURS TO COMPLETE (10)	CUMULATIVE COMPLETIONS NAVY (11) MARINE (12) CG (13)	TOTAL FOR (14)	AVERAGE WEEKS TO COMPLETE (15)	AVERAGE HOURS TO COMPLETE (16)	ATTRIBUTIONS WEEKLY IN CC FOR (17)	CUMULATIVE IN CC FOR (18)	SCHED DAYS (19)	% (20)	FLY DAYS (21)	
AOCS (NFO)	12/0 0/0	63	63/0/0/0			170	170	11.46			2/0/0/0	61/0/0/0				
A. I. (NFO)	3/3 0/0	64	20/36/0/8	5	7	217	137 / 20	3.79				8/11/0/0				
BASIC NFO	21/9 0/0	536	386/121/0/28			337	96 / 14	32.26	44.2		1/0/0/0	71/25/0/0	5.0	91.8	4.59	
VT10 HUMERO						(5)	(5)	18.80	29.9							
ADVANCED NAV NFO																
VT29		48	44/0/0/0	7		141	/ 5	10.65	61.5			2/0/0/0		6.0	89.6	5.38
ATDS		6	6/0/0/0			12										
ADVANCED NFO	9/2 0/3	53	26/27/0/3	1		42	22 / 12	13.66	63.4		0/1/0/0	15/16/0/0	5.0	73.4	3.67	
VT86 R10	10/3 0/0	36	26/9/0/0	2		95	36	7.21	37.0		1/0/0/0	28/5/0/0	5.0	74.0	3.70	
AJN						290	58 / 17				1/1/0/0	45/21/0/0				
TOTAL ADVANCED STUDENTS	19/5 0/3		102/36/0/3	10												
POOL/AWAITING			60/31/0/0													
TRAINING STUDENTS			531/224/0/38													
GRAND TOTAL	15/3 0/0															
PG																
VT29																
COAST GUARD		4	0/0/4/0				4/	8.75	56.7					6.0	100	4.00
JTUU		7	6/0/0/0	2		23		13.04	48.6					2.8	94.6	2.65

OVER

PAGE 1 OF 3

WEEKLY AVIATION STATISTICAL REPORT

WEEK ENDING 21 MARCH 1976

OUTRA REPORT 1967

SQUADRON	STUDENTS				INSTRUCTORS				AIRCRAFT				NON PIPELINE STUDENTS			
	STILLBARS HOURS		TOTAL AVIATOR HOURS		STUDENT INSTR HOURS		TOTAL AVIATOR HOURS		STILLBARS A/C HOURS		TOTAL A/C HOURS		REP OTHER	BOARD		
	WEEKLY	CUMULATIVE	AVERAGE IN FLT STATUS	WEEKLY	WEEKLY	CUMULATIVE	AVERAGE ASSIGNED	WEEKLY	WEEKLY	CUMULATIVE	WEEKLY	CUMULATIVE	INPUT	END		
(129)	(130)	(131)	(132)	(133)	(134)	(135)	(136)	(137)	(138)	(139)	(140)	(141)	(142)	(143)		
BASIC NFO	219	7057	43/42	77	91	425	13414	389	13022	22	16	73	219	7057	237	7819
VT10	320	10714								9	5	56	103	3604	116	3967
ADVANCED NAV NFO																
VT29	267	9675	/8	8	100	111	4652	111	4652							
TA4J	31	1039				69	1912	69	2326	9	6	6	69	2081	69	2343
VT86	160	5297	27/35	56	90	244	4177	90	2375	8	7	88	122	2080	77	2259
AJN	190	5952				154	5818	114	3805	8	7	88	77	2888	95	3439
SUB TOTAL	1167	39734				1003	29973	773	26180				627	19263	631	21380
FC																
VT29	198	2539	16	15	94	40	724	56	1622	5	2	40	20	343	28	783
JTU	32	1285				30	1269	38	1743				32	1330	41	1797
TOTAL HOURS																
JET/PROP/HELO/NFO	7976	289613				6924	249004	8603	130469				7710	280497	8782	334232
BCT16																
HR46A															88	3388

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