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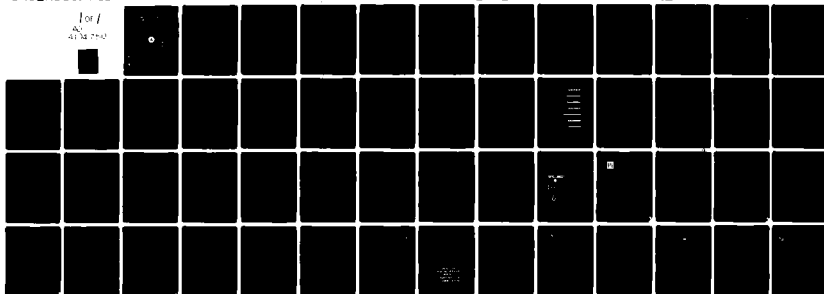
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COLUMBUS, OHIO, VOICE RESPONSE SYSTEM DEMONSTRATION AND EVALUATION

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FINAL REPORT

JUNE 1981

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13. Type of Report and Period Covered Final Report Dec 1979-Apr 1980	14. Sponsoring Agency Code	15. Supplementary Notes
16. Abstract The Voice Response System (VRS) was subjected to a 4-month demonstration in the Columbus, Ohio, Flight Service Station (FSS) preflight area. The purpose of the experiment was to test and evaluate the VRS system, user acceptance, and the effects on the specialists/facility workload, and to determine the general impact of VRS on the Columbus (CMH) FSS preflight area. In addition, the test permitted collection of technical performance data which could serve as the framework for an integrated national system for the mass dissemination of weather information. It is concluded that the VRS caused a shift in user demand/preference, reduced FSS briefer workload, reduced demand for basic pilots automatic telephone weather answering service (PATWAS), and was determined to be acceptable to the general aviation user.		
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PREFACE

Numerous organizations and individuals participated in the Voice Response System (VRS) demonstration conducted in the Columbus, Ohio, area during December 1979 through April 1980. Thus, it seems only appropriate that their contributions to this project be acknowledged as follows:

1. Transportation Systems Center of Cambridge, Massachusetts, and MITRE Corporation of McLean, Virginia, for their contributions in system design, equipment description, and data reduction support for this report.

2. Ms. Jacqueline Rehmann and Mr. Edward Jaggard of Data Transformation Corporation for their valuable assistance in providing the required programing support for data reduction and analysis.

3. The Federal Aviation Administration's (FAA's) Great Lakes Region for their commitment to the Flight Service Station (FSS) automation program by supporting the Columbus area VRS

demonstration. Acknowledgment is given to Mr. Howard Freund, Chief of the Columbus FSS, and his staff for hosting and supporting the data collection effort during both the "before" and "after" phases.

4. Mr. Charles Murray and Mr. Carey Weigel of ARD-441, Project Managers for VRS development, System Research and Development Service, Washington, D.C. Additionally, Mr. Murray provided preparation and review expertise germane to this document.

5. Mr. James Talotta, ACT-250, and Mr. Robert Meisner, ACT-63A, for their cooperative efforts in coordinating and developing the "Pilot Awareness" program viewed on WOSU's Television AM Weather Show in the Columbus, Ohio, area.

6. Mr. John Gallimore, Program Manager ACT-250, for his important contribution to the conceptual design of the evaluation effort and invaluable suggestions which served to improve the results of this study; and other personnel of the Flight Service Station Branch who spent the many hours required to reduce voice tapes necessary to this report.

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EXECUTIVE SUMMARY

During the period December 1979 through March 1980, the Federal Aviation Administration (FAA) conducted an onsite test in the Columbus, Ohio, Flight Service Station (FSS) area to determine the effectiveness and the acceptability of the Voice Response System (VRS). Specifically, a 7-day "before" and "after" VRS study was designed and conducted. The data collection in the before phase was conducted at the Columbus FSS from November 8 through 14, 1979. The after phase took place January 31 through February 6, 1980. Each study was identical in duration; daily time period, 0600 to 1800 eastern standard time (EST); and type of data collected.

The VRS is designed to provide the pilot/user with limited preflight planning information, accessible via touch-tone telephone, without first contacting the FSS specialist. The present system provides three basic weather products: hourly surface observations, terminal forecasts, and grid winds aloft. Information is communicated by voice in one direction — from computer to pilot.

The Columbus study focused attention on four questions posed by Congress and FAA management. These questions and the answers resulting from this study are as follows:

1. Will pilots use the Voice Response System? Data analyses show that 812 pilots used the system during the after collection period (7 days, 0600 to 1800 EST). This represents 28 percent of the total demand (pilot briefs, pilots automatic telephone weather answering service (PATWAS), and VRS) for this same period. It is believed that pilot usage of the system will be increased as confidence, experience, and proficiency with the system improves. Since the demonstration period during the months of January and February 1980, approximately 8,200 VRS calls have been recorded.

2. After using the VRS, will pilots require or elect to call the FSS specialist? Of the 812 pilots that used the system during the after collection period, 124 pilots called the FSS specialist. Pilots calling the specialist represent 15 percent of the total.

3. What is the impact of the Voice Response System on the FSS specialist? The following parameters affecting specialist workload changed, based on analysis of the data collected:

- a. Mean length of call (transaction time); i.e., all briefings reduced by 0.16 minute.

- b. Mean length of call for specialist briefing with VRS reduced by 0.50 minute.

- c. Potential capacity of the specialist increased by one call per hour.

- d. VRS usage resulted in a shift from the specialist-provided briefs and PATWAS.

- e. When comparing similar specific weather conditions, the Instrument Flight Rules (IFR) transaction times were reduced by 1.31 minutes.

4. What is the impact of VRS on the Columbus Preflight Area? The overall system utilization in the after study improved, which indicates an increase in capacity and specialist productivity. This change was evidenced even with fewer specialists available in the after study; however, a higher level of specialist output, based on the decrease in mean service times and a decrease in lost calls, was apparent. Although the VRS required a modified briefing for pilots using the system, it was noted that a complete briefing was given more often. This factor may have detracted from the likelihood that the specialist briefing times could have been further reduced.

INTRODUCTION

PURPOSE.

This report presents the results of analysis of data gathered prior to (before) and during (after) a demonstration of the Voice Response System (VRS) in the Columbus, Ohio, Flight Service Station (FSS) Area. The demonstration was planned to provide useful data (1) on the degree of pilot acceptance and utilization of VRS, (2) on the impact to workload of the individual specialist and of the facility, and (3) on the likely impact of the agency's proposed automated self-briefing system (based on the VRS) on the Columbus FSS preflight area.

BACKGROUND.

The report of the House Appropriations Committee on the fiscal year 1980 Budget Submission for the FSS program expressed concern about the benefits to be derived from the Flight Service Station Automation Program which had been approved by the Federal Aviation Administration (FAA) in January 1978. The Committee was particularly concerned about the pilot acceptance and utilization of the automated self-briefing system currently under development by the FAA. Specifically, the report stated that:

"At such time as additional funding is requested for this program, the Committee expects FAA to be able to demonstrate that a substantial number of pilots will actually use this automated self-briefing system without also requiring a briefing by a flight service specialist."

The agency's Flight Service Station Automation Program consists of Model I, II, and III systems which will effectuate automation in several stages. Models I and II mainly accomplish the automation of the specialist functions

(data retrieval, flight plan filing, etc.) and will be implemented in the early 1980's. The Model I and II systems contain some of the hardware and software needed for the Model III system. The Model III system will provide the direct user access to the automated self-briefing system and should reduce the need for the pilot to contact the flight service specialist. The Systems Research and Development Service has an automated self-briefing system, called the Voice Response System (VRS), under development and test. Appendix A details and fully describes this VRS equipment. In addition, there are several other enhancement efforts underway which will interface with the VRS to further reduce the need for specialist services. It is expected that the automated self-briefing system will decrease pilot and specialist contacts.

The VRS has been tested operationally in the Washington (DCA) FSS area since April 1978, and in the Columbus, Ohio, FSS area since December 1979. During the month of January 1980, the Columbus FSS specialists provided 10,234 pilot briefs. During this same period 4,242 VRS calls were recorded. VRS comprised 29.3 percent of the total number of services. The VRS system presently provides the pilot with three weather products: surface observations, terminal forecasts, and grid winds. The products do not constitute a complete briefing; however, they do provide enough weather information for the pilot to make a decision as to whether to proceed to the airport. Additional products are being developed (i.e., pilots automatic telephone weather answering service (PATWAS), transcribed weather broadcast (TWEB) routes, etc.) which will be added to the system in the near future.

METHODOLOGY

A "before" and "after" VRS study was designed and conducted in order to

obtain the needed data for analysis. In October 1979, a brochure (figure C-1) was mailed to approximately 4,400 registered general aviation pilots residing in the demonstration area. The brochure explained the reason for the demonstration — what the VRS is, and how to use it. The data collection in the before phase was conducted at the Columbus FSS from November 8 through 14, 1979. The after phase took place January 31 through February 6, 1980. In order to provide a basis for comparison, each study was identical in duration (7 days), daily time period covered (0600 to 1800 eastern standard time), and elements of data collected. This time period was chosen to provide representative activity levels within the facility.

DATA COLLECTION.

Data elements were collected using a Telephone Information and Control System (TICS). Hourly measurements were taken for the following:

1. The number of calls processed.
2. Call duration (transaction time).
3. The number of calls waiting.
4. Total waiting time.
5. Distribution of transaction time in 1/2-minute increments.
6. All trunks busy.

In addition to the above data, project personnel collected the following data:

1. Hourly weather observations from Service A.
2. Specialist availability.
3. Work samples.
4. Pilot briefing activity.

5. PATWAS activity.
6. VRS activity.
7. Number of lost calls.

For reader reference, a four-page summary of data collected during the before and after studies has been included in appendix B.

WEATHER MIX.

Weather observations from five reporting stations in the Columbus flight service area were noted. The predominant weather condition and criteria for the hour were classified as instrument flight rules (IFR), ceilings less than 1,000 feet and visibilities less than 3 miles; marginal flight rules (MVFR), ceilings 1,000 to 3,000 feet and visibilities 3 to 5 miles; or visual flight rules (VFR), ceilings better than 3,000 feet and visibilities better than 3 miles.

SPECIALIST AVAILABILITY.

The number of specialists available was determined by observations which were taken on cue at approximately 10-minute intervals. A specialist was considered available for preflight briefing if the following criteria were met: (1) He was assigned preflight as a primary duty. (2) The specialist was physically at the position. A percentage was computed of specialists available for preflight briefing duties to specialists assigned preflight duties. The sampling method provided actual specialist availability for a given hour.

VRS FAMILIARIZATION.

Following the before phase and prior to the after phase, a pilot education program on the VRS was conducted in the demonstration area in November 1979. This program made pilots aware of the test and educated them in accessing

and using the system. A mass mailing containing literature pertaining to the demonstration was sent to 4,400 licensed pilots in the Columbus flight service area. In addition, a television presentation was shown in conjunction with the nationwide TV program "AM Weather," and major "Fixed Base Operations" offices were visited by FAA personnel to demonstrate the VRS. An example of literature mailed to area pilots as well as information pertaining to the TV program is included for reader reference in appendix C.

STATISTICAL DATA COLLECTION.

The VRS equipment gathered its own statistical data. The system tallied the number of users by channel, hour, average length of call, and number of simultaneous users. In order to determine whether a pilot used the VRS and required the services of a specialist, the specialist asked pilots during the after phase if they used the VRS prior to calling. Magnetic tape recordings for each day were manually reduced to obtain the number of pilot briefings.

ANALYSIS

This section presents the analysis of the data collected during the before and after phases of the Columbus demonstration. The analysis and results are the basis for answers to the following questions:

1. Will pilots use the VRS?
2. After using the VRS, will pilots require or elect to call the FSS specialist?
3. What is the workload impact to the specialist and facility?
4. What is the general impact of the VRS on the Columbus preflight area?

QUESTION NUMBER 1. WILL PILOTS USE THE VRS?

To answer this question, the pilot usage of each of the methods for providing pilot briefs (i.e., specialist, VRS) was examined in both the before and after study. Weather conditions for the two periods were compared to find out if the results might be influenced by significantly different mixes of weather. The weather mix for the before and after phases is considered to be a typical cross section of weather types for the Columbus area. Hourly observation totals for IFR, VFR, and MVFR were calculated, and a test of their significance was performed.

The test at the 0.01 level indicated a significant difference in type of weather. Figure 1 depicts the percent of each type of weather (IFR, VFR, and MVFR) for the 7-day before and after phases. Figure 2 depicts the comparison of pilot briefs (before/after) and VRS during similar weather conditions.

Throughout the before phase, the total demand for weather-related services was divided between specialist pilot briefs and PATWAS. Table 1 shows the actual number of calls recorded for the 12-hour sample period.

Table 2 shows that pilot briefs accounted for 66 percent of the total demand and PATWAS, 34 percent. With the introduction of VRS, the demand shifted as noted in the column headed "after." The percent of PATWAS decreased to 25 percent with VRS accounting for 28 percent of the demand in the after phase. (See figure 3.)

Based on the information presented, it is believed that:

1. Pilots will use the VRS.
2. Slightly higher activity was recorded during the before phase which

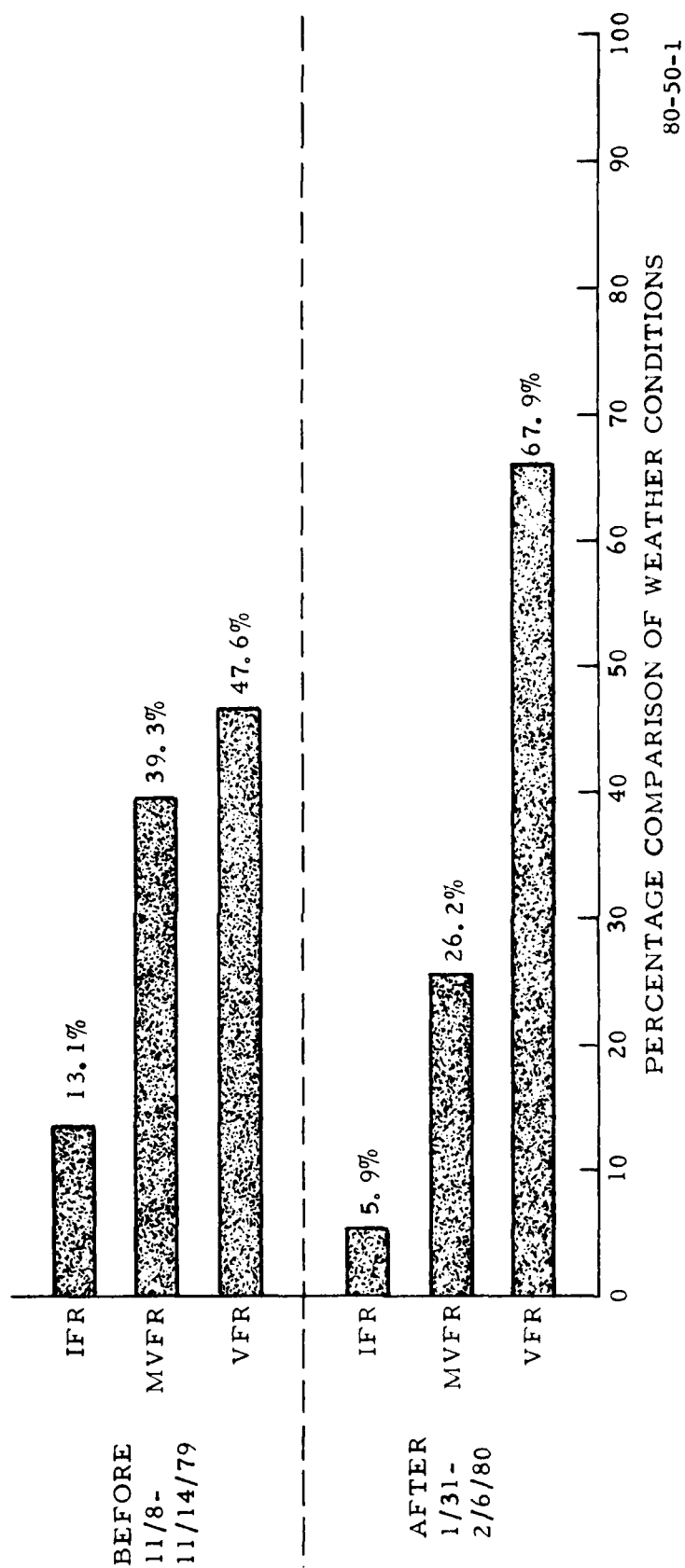


FIGURE 1. COMPARISON OF WEATHER CONDITIONS BEFORE AND AFTER STUDY

TABLE 1. WEATHER RELATED SERVICES (TOTALS)

BEFORE										
<u>Day</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>Mean</u>	<u>Total</u>	<u>Percent Of Demand</u>
Pilot Briefs	235	277	221	226	239	249	242	241	1689	66
PATWAS	113	157	185	169	75	98	66	123	863	34
Total								364	2552	100
Spec.*	2.87	3.18	2.79	3.48	3.27	2.83	3.23	3.09		

AFTER										
<u>Day</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>Mean</u>	<u>Total</u>	<u>Percent Of Demand</u>
Pilot Briefs	198	182	227	201	151	216	218	199	1393	47
PATWAS	89	79	163	145	79	91	111	108	757	25
VRS	107	102	147	109	119	121	107	116	812	28
Total								459	2962	100
Spec.*	2.05	2.04	2.04	2.01	2.43	2.06	2.06	2.10		

*Denotes mean number of specialists available based on 12-hour observation period.

TABLE 2. DEMAND ANALYSIS

<u>Weather Related Services</u>	<u>Before Percent</u>	<u>After Percent</u>	<u>Character Of Change</u>
Pilot Briefs	66	47	Decrease
PATWAS	34	25	Decrease
VRS		28	Increase

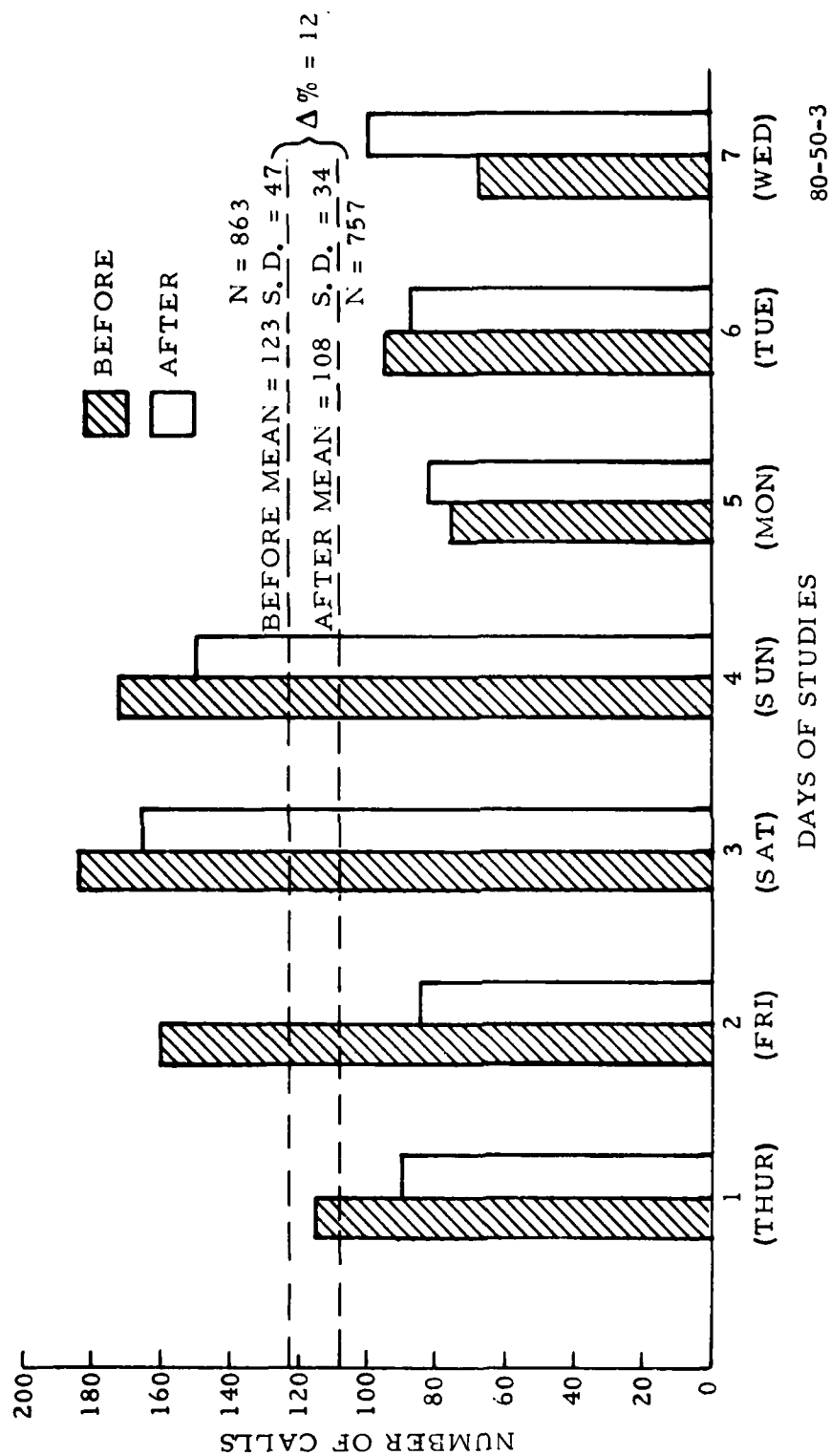


FIGURE 3. PATWAS ACTIVITY

was weather related. There was a higher percentage of IFR/MVFR weather in the before phase (52.4 percent) than in the after phase (32.1 percent). (See figure 1.)

3. Pilot usage of the VRS will increase as confidence, experience, and proficiency with the system improves.

4. Pilot usage of the VRS will increase as the number of products provided by the system increases.

QUESTION NUMBER 2. WILL THE PILOT ELECT TO CALL THE FSS AFTER RECEIVING VRS?

The VRS provided the pilot with three basic products: (1) surface observations (SA's), (2) terminal forecast (FT's), and (3) grid winds. The pilot is then advised by the VRS recorded message to call the FSS specialist for a complete briefing should he decide to fly.

To help determine the number of pilots who elected to call the FSS after receiving VRS, the standby telephone message to the pilot who is not answered immediately was changed to include a statement, "Advise the briefer if you have listened to the VRS for this proposed flight. Your briefing will be modified accordingly." In addition, the Columbus specialists were advised to ask specifically if their caller had received VRS prior to calling as a double measure of accuracy. This information was annotated on the preflight position briefing log. The results of the information obtained reveal that for the 7-day study period (0600 to 1800 local time), 124 out of 812 pilots (15 percent of VRS users) elected to call the FSS. This leaves a total of 85 percent of VRS users who did not call the specialist.

QUESTION NUMBER 3. WHAT IS THE WORKLOAD IMPACT OF VRS ON THE FLIGHT SERVICE SPECIALIST?

In order to determine the workload impact of VRS on the flight service

specialist, the following data from the before and after studies are considered:

1. Duration of preflight activity or average call length.

2. Average call length by similar weather type.

3. Shift in demand for pilot briefs and other weather related services; e.g., PATWAS.

The following formula was used to calculate the average, or mean, call length:

$$\text{Mean length of call} = \frac{\text{total duration of calls per hour}}{\text{total number of calls per hour}}$$

A review of the mean call length in the before study reveals a value of 2.81 minutes. In the after study the average call length decreased to 2.65 minutes, a difference of 0.16 minute, in pilot brief transaction time. (See figure 4.) A decrease in the average call length is inversely proportionate to the number of calls a specialist may handle in 1 hour. That is, as the mean call length decreases, the capacity of each specialist for that hour increases. In order to calculate the actual change in capacity in the before and after study, the following formula is used:

$$\text{Specialist capacity} = \frac{\text{man-minutes per hour}}{\text{adjusted transaction time}}$$

Based on past history, the total man-minutes per hour is 50 minutes. The adjusted transaction time is equal to the mean call length plus 30 seconds (0.5) to account for the other duties

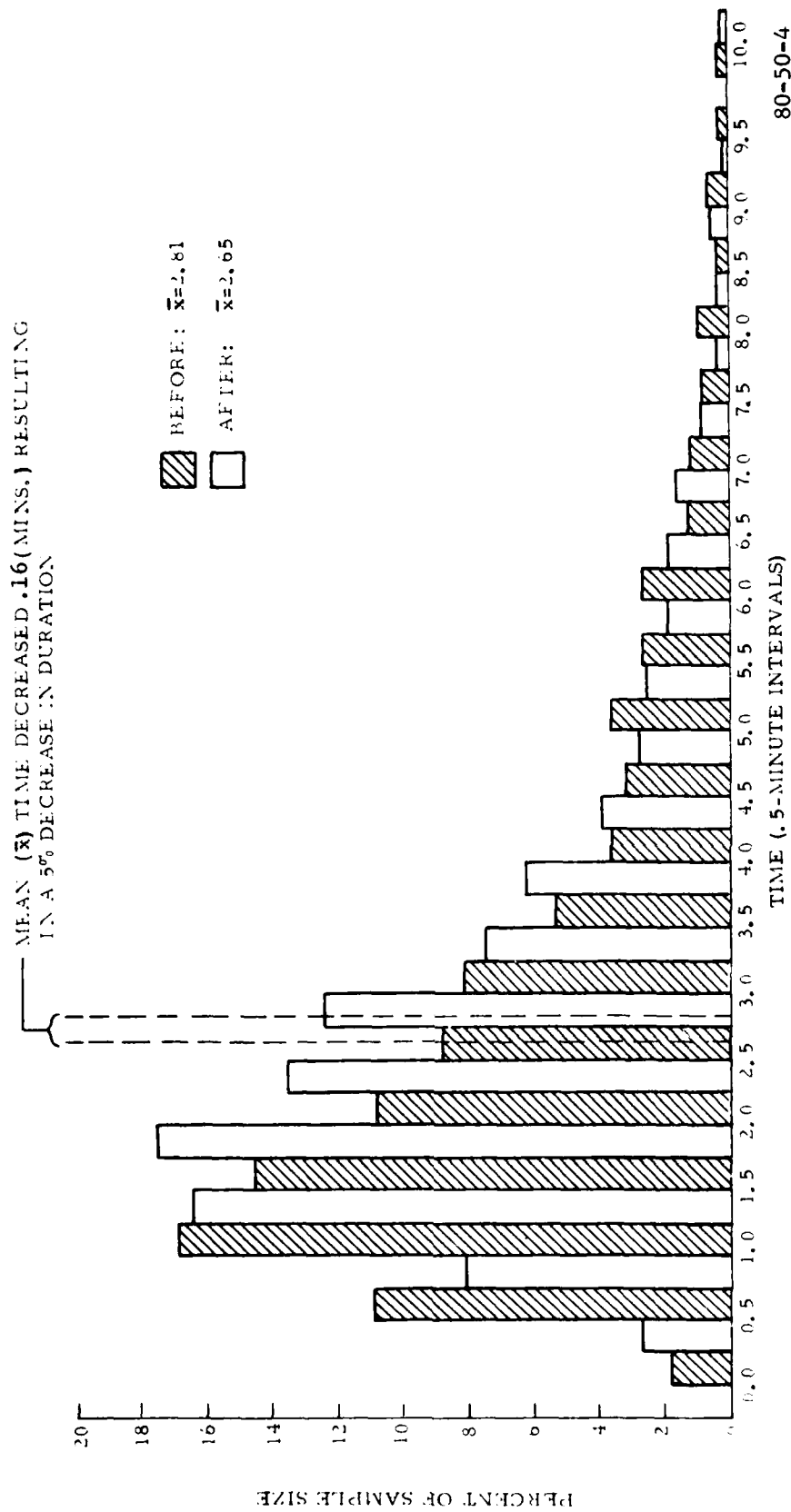


FIGURE 4. FREQUENCY DISTRIBUTION OF BEFORE AND AFTER PREFLIGHT PILOT BRIEFING DURATIONS (ALL SAMPLES)

associated with answering a call; i.e., organizing weather data, putting papers away. The total number of calls that one specialist can handle per hour is indicated in table 3. Thus, the specialist capacity increased by 0.77 calls per hour in the after study.

TABLE 3. CHANGE IN CAPACITY

<u>Predicted Number Of Calls</u>	<u>Before</u>	<u>After</u>
(1 Specialist)	15.10	15.87

To compare the activity by weather type for IFR, VFR, and MVFR, a similar number of calls was compared in the before and after totals. For example, the total number of calls in which VFR was observed in the before study was 856 calls, for a total of 2,364 minutes. A similar number of calls was compared in the after study; i.e., 861 calls for 2,294 minutes. Computing an average call length for VFR conditions reveals a similar value in the before and after studies, that is 2.76 minutes and 2.66 minutes, respectively. MVFR weather comparison reveals a similar average call length of 3.26 minutes to 3.27 in the after study.

IFR conditions reveal a more drastic reduction in average call length. For the same number of calls, the average call length decreased in the after study by 1.31 minutes. A two-tailed test of significance at the 0.05 level reveals this difference to be of statistical value and a significant factor for consideration during complex weather and briefing situations. These values are reflected in table 4.

Another aspect considered to address the workload impact on the specialist is shift in demand for services. VRS caused a shift in the demand for pilots

briefs and the PATWAS. The total demand for pilot briefs decreased from 66 to 47 percent which is equivalent to a 28 percent change in demand. The demand for PATWAS shows a similar decrease from 34 to 25 percent, a change of 26 percent. VRS calls accounted for 28 percent of the demand in the after study. These figures are shown in table 2.

The final measure of specialist performance was computed using the differences between mean transaction times for the complete specialist briefing and transaction time for a modified briefing for VRS users. The mean service time in the after study for a complete specialist briefing was 2.65 minutes (includes background and weather information); the mean transaction time for VRS users with modified briefing was 2.15 minutes (considers only weather information). A significant savings of 0.50 minute was measured. This measurement then becomes an important aspect in determining the benefits of VRS or other self-briefing systems, where such savings in time is equated to improved service and increased specialist productivity. Thus, the a priori advantage of VRS is demonstrated with the reduction in transaction time and projected increase in specialist capacity.

Reduction of data particular to VRS users (124) who called the Columbus (CMH) FSS to obtain additional information or to file a flight plan reveals that 91.2 percent (113) were asked (or volunteered) in the beginning of the call if a VRS briefing was obtained prior to calling the FSS specialist. Those who were asked in the middle or end of the briefing comprise 3.2 and 5.6 percent, respectively, of the total.

QUESTION NUMBER 4. WHAT IS THE IMPACT OF VRS ON THE COLUMBUS PREFLIGHT AREA?

The implications of the effect of VRS on the Columbus preflight area are perhaps

TABLE 4. PREFLIGHT TRANSACTION TIME ANALYSIS

(Preflight transaction times and average call lengths based on data obtained from the data collection equipment)

Before (11/8/79 - 11/14/79)

<u>WX Type</u>	<u>Number Of Calls</u>	<u>Total Call Time (minutes)</u>	<u>Avg. Call Length (minutes)</u>	<u>Avg. Call Length All WX Types (minutes)</u>
IFR	94	405.4	4.31	
MVFR	416	1355.8	3.26	
VFR	856	2364.0	2.76	
Total	1366	4125.2		3.02

After (1/31/80 - 2/6/80)

IFR	94	281.7	3.0	
MVFR	415	1356.8	3.27	
VFR	861	2294.0	2.66	
Total	1370	3932.5		2.87

the most decisive concerning the future of automation implementation. To assess the impact of VRS, the following data from the before and after studies are considered: (1) the total number of calls in the wait queue, (2) the average wait time, and (3) the total number of lost calls.

The relationship of lost calls and abandoned calls to the total preflight services is a distinctive factor in facility performance. The greater number of lost and/or abandoned calls limits effective system performance and unmet demand increases. In addition, lost calls and waiting time appear mutually interdependent; that is, the longer a caller has to wait for service, the more likely he is to hang up before contact. Thus, a decrease in the number of lost calls and waiting

time means an increase in specialist response time. (See figure 5.)

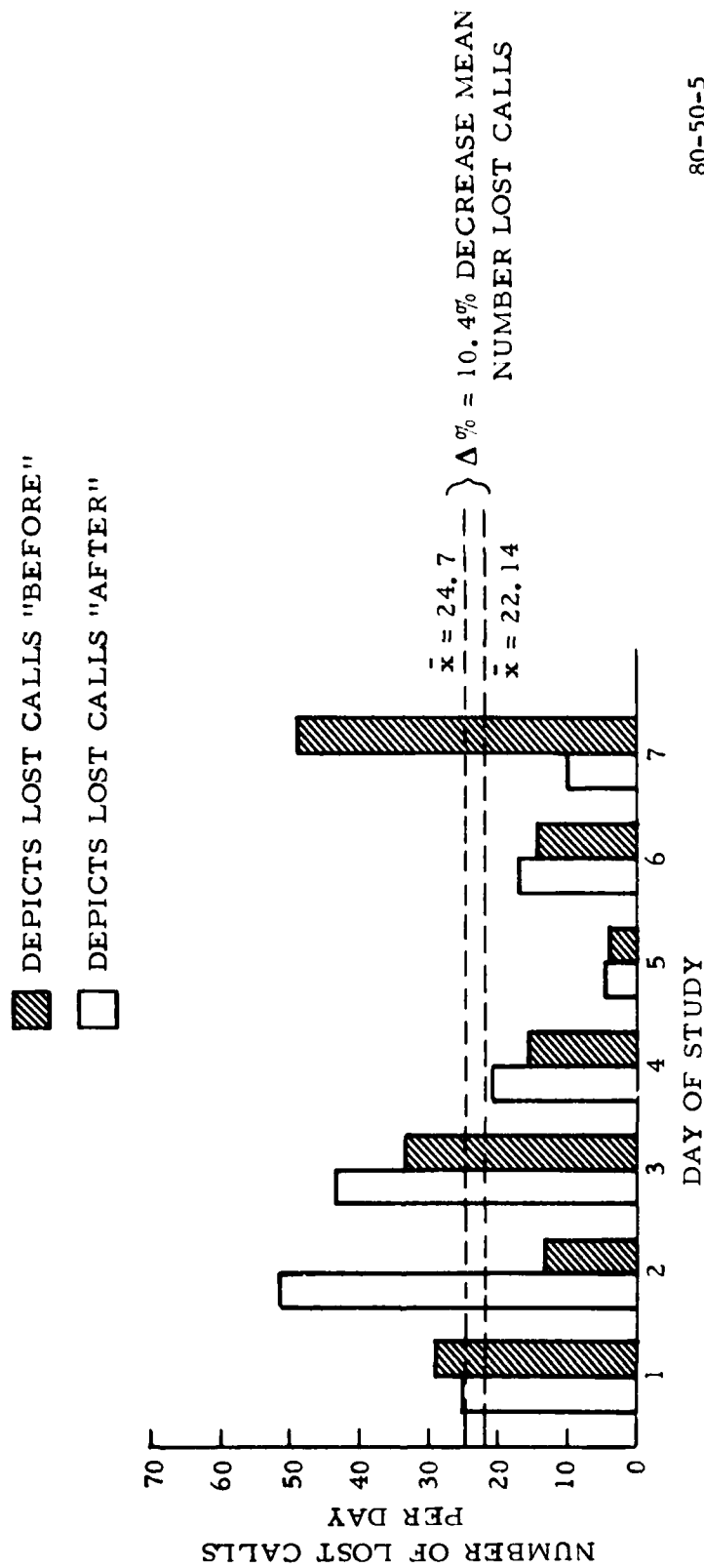
Table 5 shows the calculated mean values for the number of calls waiting, the mean wait time (in minutes), and the number of lost calls. The percent of change was then computed. Similar calculations were done for all the items. (See figure 6.)

Significant measured changes are revealed in this data. It is postulated 22 percent fewer calls had to wait for service, since the average wait time decreased by as much as 25 percent. The number of lost calls decreased in the after analysis by 20 percent.

Table 6 depicts the changes in capacity (met demand), specialist workload, and productivity.

TABLE 5. SYSTEM PERFORMANCE COMPARISON (TOTALS)

	<u>Before</u>	<u>After</u>	<u>Percent Change</u>
Mean number of calls in wait queue	104	81	22.0
Mean wait time (minutes)	214	161	25.0
Mean number lost calls	25	20	20.0



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FIGURE 5. LOST CALL ANALYSIS

DAY (7) IN THE AFTER STUDY RECORDED THE HIGHEST NUMBER OF DAILY CALLS (133) IN THE WAITING QUEUE -- THIS FOR THE MOST PART IS ATTRIBUTED TO THE WEATHER MIX FOR THIS DAY (MAXIMUM OF 5-HOURS IFR AND 7-HOURS MVFR); THIS WAS THE ONLY DAY OF AFTER STUDY THAT THIS WEATHER MIX WAS OBSERVED.

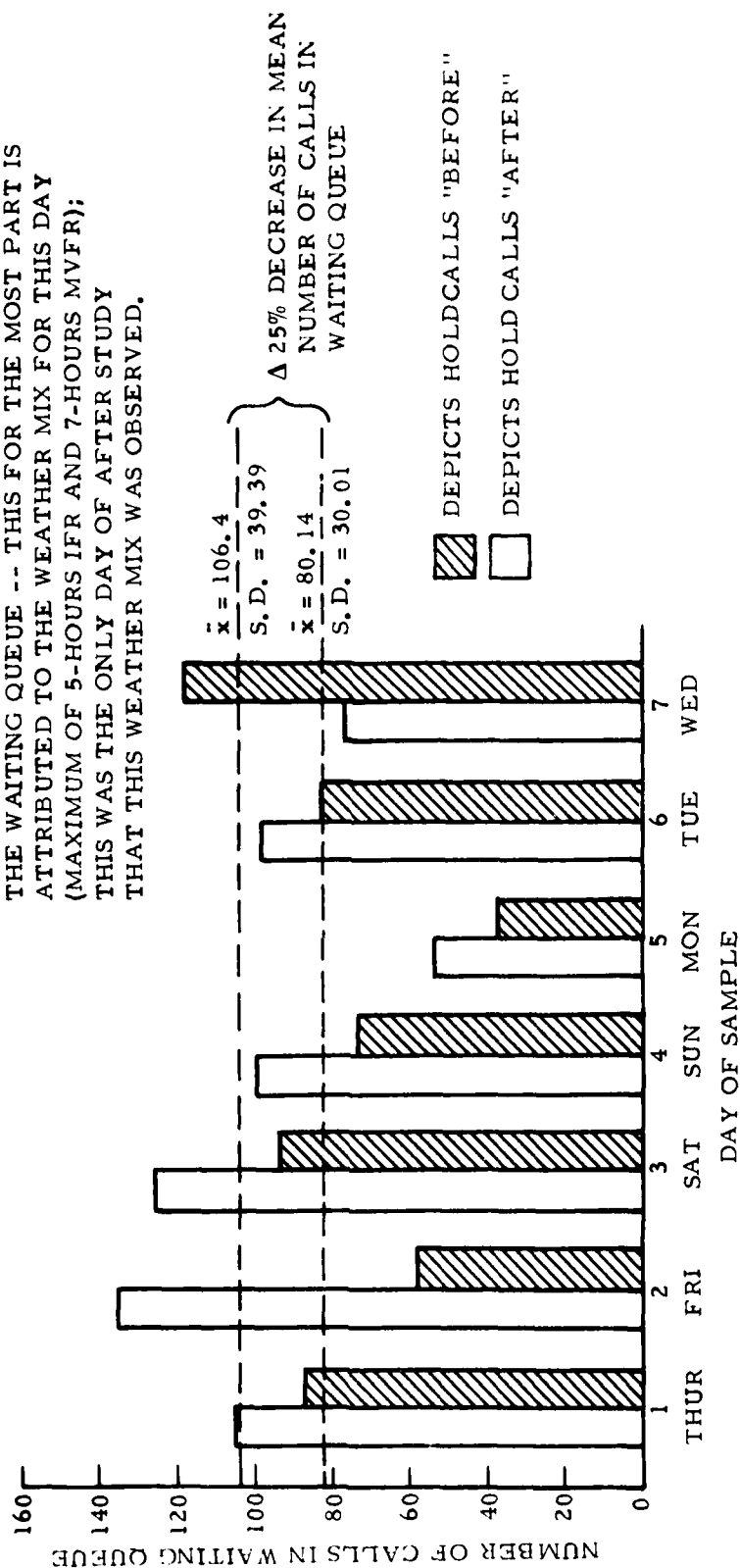


FIGURE 6. CALLS WAITING ANALYSIS

TABLE 6. CAPACITY AND SPECIALIST PRODUCTIVITY

	Before		After		Remarks
	<u>Met Demand</u>	<u>No. Of Calls Waiting</u>	<u>Met Demand</u>	<u>No. Of Calls Waiting</u>	
Pilot Briefs	1639	727	1393	568	PB's provided = productivity
PATWAS	863		757		
VRS	0		812		
System Capacity	2552		2962		increase in services by 410
Specialist Productivity	$\frac{1689}{3.09*} = 546.6**$		$\frac{1393}{2.10*} = 663.3**$		116.7 increase**

*Average number specialists available during study.

**Pilot briefs per specialist.

CONCLUSIONS

1. Will the pilots use the Voice Response System (VRS)?

Data analyses show that 812 pilots used the system during the after collection period (7 days, 0600 to 1800 EST). This represents 28 percent of the total demand (pilot briefs, PATWAS, VRS) for this same period. (See figure 7.) It is believed that pilot usage of the system will be increased as confidence, experience, and proficiency with the system improves. Since the demonstration period during the months of January and February 1980, approximately 8,200 VRS calls have been recorded.

2. After having used the VRS, will pilots require or elect to call the Flight Service Station (FSS) specialist?

Of the 812 pilots that used the system during the after collection period, 124 pilots called the FSS specialist. Pilots calling the specialist represent 15 percent of the total.

3. What is the impact of the VRS on the FSS Specialist?

The following parameters affecting specialist workload changed, based on analysis of the data collected:

a. Mean length of call (trans-action time); i.e., all briefings reduced by 0.16 minute.

b. Mean length of call for specialist briefing with VRS reduced by 0.50 minute.

c. Potential capacity of the specialist increased by one call per hour.

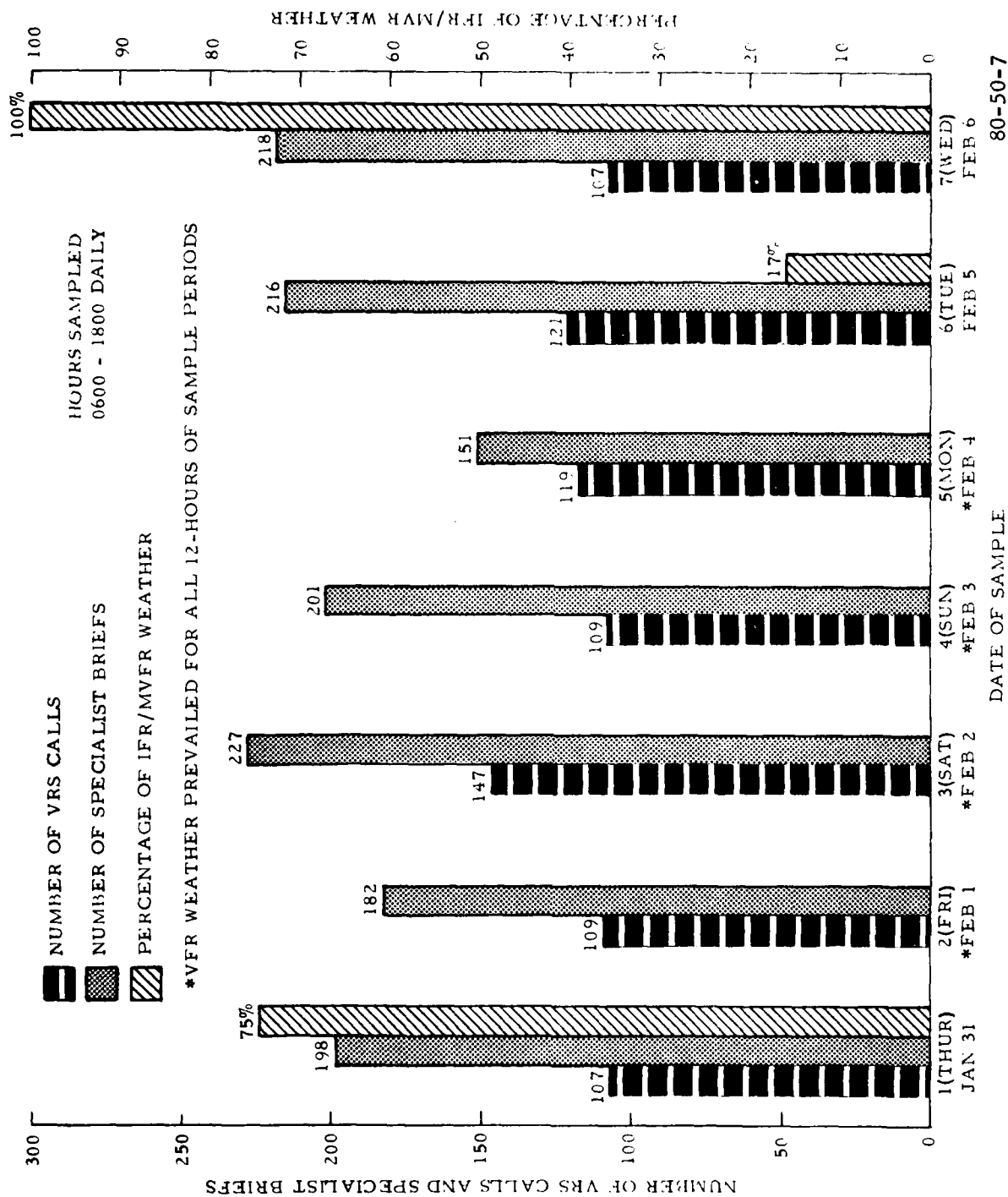


FIGURE 7. AFTER STUDY ANALYSIS

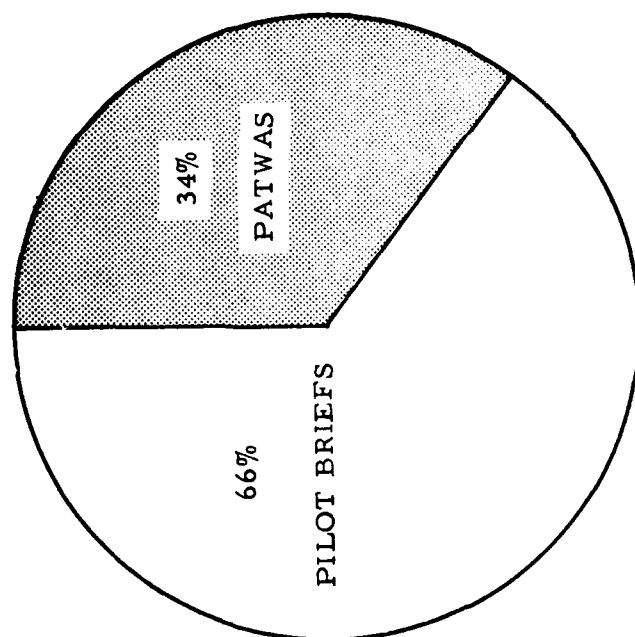
d. VRS usage resulted in a shift from the specialist-provided briefs and PATWAS. Figure 8 shows the percentage changes in services mix before and after VRS.

e. When comparing similar specific weather conditions, the Instrument Flight Rules (IFR) transaction times were reduced by 1.31 minutes.

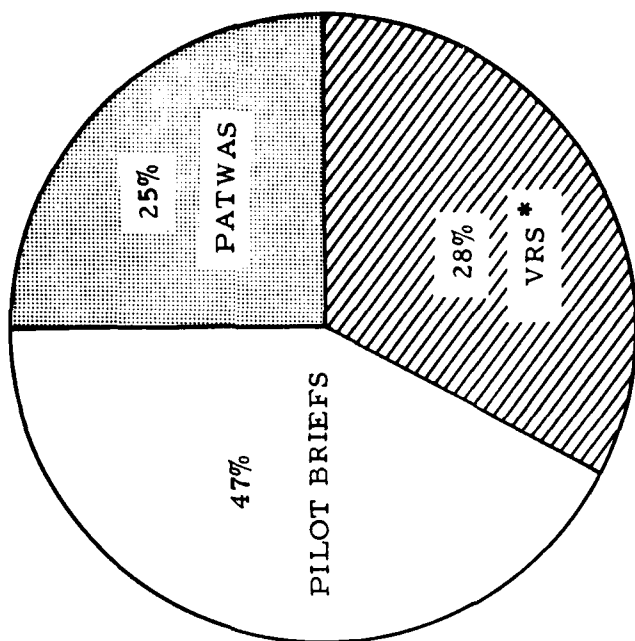
4. What is the impact of VRS on the Columbus preflight area? The overall system utilization in the after study improved which indicates an increase

in capacity and specialist productivity. (See table 6.) This change was evidenced even with fewer specialists available in the after study; however, a higher level of specialist output, based on the decrease in mean service times and a decrease in lost calls, was apparent. (See figure 9.) Although the VRS required a modified briefing for pilots using the system, it was noted that a complete briefing was more often given. This factor may have detracted from the likelihood that the specialist briefing times could have been further reduced.

*VRS IMPLEMENTED DEC. 1, 1979



BEFORE STUDY
11/8-11/15/79



AFTER STUDY
1/31-2/6/80

80-50-6

FIGURE 8. SUMMARY OF SERVICES MIX BEFORE AND AFTER

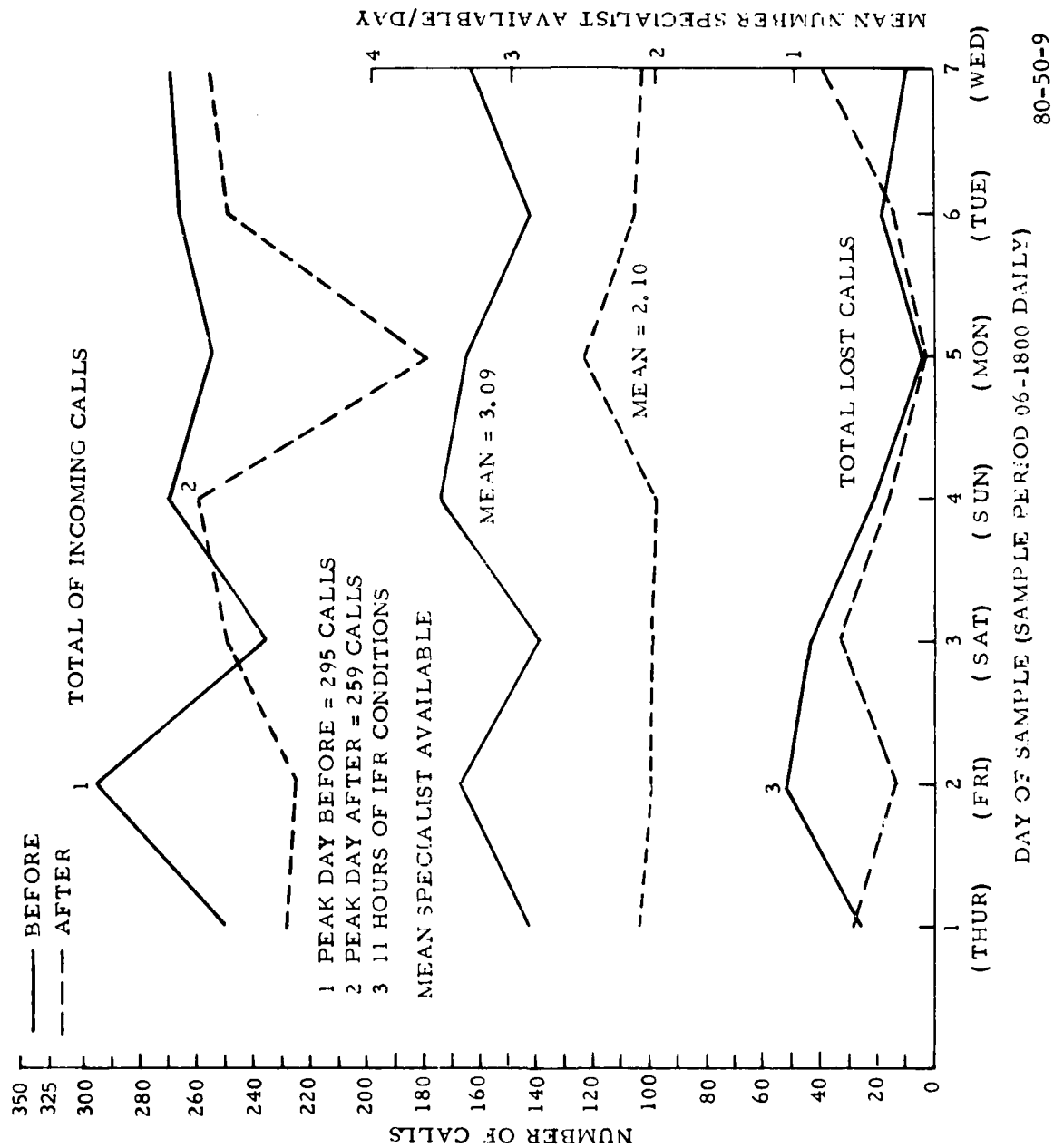


FIGURE 9. ANALYSIS OF LOST CALLS TO SERVICE DEMAND AND SPECIALIST AVAILABILITY

APPENDIX A

EQUIPMENT DESCRIPTION

The Voice Response System (VRS) provides computer-generated voice output in response to inputs from a Touch-Tone™ telephone. Stored within a Digital Equipment Corporation PDP 11/70 computer were the executive/operational programs required to operate the system and the raw national weather data base received from the Weather Message Switching Center (WMSC) located in Kansas City, Missouri. The data base was translated and reformatted into VRS weather files. All data manipulations regarding currency and validity of the national weather data base were accomplished within this computer which was located at the MITRE Corporation facility, McLean, Virginia.

The digitized voice response subsystem was located at the MITRE Corporation facility, McLean, Virginia, and was connected to the PDP 11/70 by a 1,200-baud subchannel of a multiplexed 9,600-baud communication line. The digital subsystem is composed of four major elements; i.e., processor, fixed-head disk, and Touch-Tone/voice-decoding equipment.

The processor is a Digital Equipment Corporation PDP 11/34 minicomputer with 64K of core memory. It performs the functions of interpreting the Touch-Tone inputs from the user, determining what

weather information has been requested, accessing the proper weather files in the PDP 11/70, and converting the output into speech by stringing together prestored words and phrases which result in the appropriate output message.

The fixed-head disk was used to store spoken words and phrases which had previously undergone an analog-to-digital conversation. The digital output was compressed utilizing a technique known as adaptive differential pulse code modulation (ADPCM).

The process of decompressing the data stored in the disk upon retrieval was performed by the speech decoding hardware. This equipment consisted of 20 independent decoding channels which effectively reversed the process of ADPCM.

The Touch-Tone decoding equipment consisted of 20 independent decoding channels and performed the function of decoding the Touch-Tone inputs and routing the resultant signals to the PDP 11/34. The 20-channel system uses 10 Bell Telephone Company 407C modems and a 20-channel multiplexer to multiplex these channels into one computer input channel.

For redundancy, a second PDP 11/34 was available at TSC. In the event of a PDP 11/70 failure, the weather data base was buffered at WMSC for a limited period of time.

APPENDIX B
DATA REDUCTION

COLUMBUS FSS BEFORE STUDY										DATA REDUCTION										TOTAL PAGE									
LOCAL TIME (FROM-TO)																													
HOUR OF THE STUDY																													
06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	727
43	42	68	76	68	73	85	68	39	29	57	55																		
44	106	119	240	139	156	144	166	73	57	142	50																		1495
45	0	0	10	0	0	0	0	0	0	0	0																		10
47	0	0	0	0	0	0	0	0	0	0	0																		0
48	0	0	0	0	0	0	0	0	0	0	0																		0
96	47	84	97	102	86	83	77	62	73	56	33																		863
40	10	13	24	20	18	26	13	19	7	11	4																		173
SPECIALISTS AVAILABLE	2.74	2.94	3.40	3.57	2.97	2.97	3.09	3.26	3.24	3.23	2.76																		3.09

LINE DATA FIGURES

LINE	1	2	3	4	5	6	7	8	9	10	11	12												
1	43	208	70	282	63	238	68	196	58	197	65	264	50	187	67	206	65	172	62	143	71	181	56	136
2	6	26	11	42	4	23	8	39	10	26	1	5	7	13	8	17	2	3	0	0	8	20	6	6
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	49	9	35	43	156	33	125	33	121	43	125	33	108	25	71	8	16	9	20	0	1	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6	55	232	71	279	75	256	94	219	58	203	63	226	67	196	56	147	62	176	52	146	57	181	49	138
ALL	115	515	161	638	190	693	203	579	159	552	172	560	172	504	156	441	137	367	123	309	136	383	111	260
												06/07	07/08	08/09	09/10	10/11	11/12							
AVG. LENGTH - CALL												4.47826	3.96273	3.64737	2.85222	3.47170	3.25581							
												12/13	13/14	14/15	15/16	16/17	17/18							
AVG. LENGTH - CALL												2.93023	2.82692	2.67883	2.51220	2.81618	2.52252	3.17221						

TOTAL OF ALL LINES 1835 CALLS IN 5821 MINUTES AVG CALL = 3.17221 MINUTES

80-50-B-1A

FIGURE B-1. COLUMBUS FSS BEFORE STUDY (Sheet 1 of 3)

COLUMBUS FSS BEFORE STUDY			DATA REDUCTION												TOTAL PAGE	
LENGTH OF CALLS:																
LOCAL TIME (FROM-TO) HOUR OF THE STUDY	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	TOTAL			
73 (0.0-0.5 MIN.)	2	6	5	11	8	10	4	14	10	5	31	9	115	6%		
74 (0.5-1.0 MIN.)	3	4	10	24	11	14	16	15	15	18	12	12	154	8%		
75 (1.0-1.5 MIN.)	10	15	15	30	20	23	24	32	22	19	23	17	250	13%		
76 (1.5-2.0 MIN.)	7	9	22	25	27	15	26	22	16	22	19	22	232	12%		
77 (2.0-2.5 MIN.)	15	22	14	23	9	15	23	13	22	21	13	10	200	10%		
78 (2.5-3.0 MIN.)	7	17	23	22	13	17	15	13	10	8	12	10	107	8%		
79 (3.0-3.5 MIN.)	8	16	22	16	11	10	12	9	9	5	10	5	133	7%		
81 (3.5-4.0 MIN.)	9	11	13	6	12	14	14	6	8	8	5	9	115	6%		
82 (4.0-4.5 MIN.)	6	11	7	5	7	10	3	3	5	5	6	3	71	3%		
83 (4.5-5.0 MIN.)	9	12	13	4	8	14	37	6	4	4	5	6	122	6%		
84 (5.0-5.5 MIN.)	5	8	6	6	9	7	8	4	2	3	2	0	60	3%		
85 (5.5-6.0 MIN.)	5	4	11	4	5	5	3	4	3	2	4	1	58	3%		
86 (6.0-6.5 MIN.)	3	3	6	8	4	2	6	3	4	2	4	5	50	2%		
87 (6.5-7.0 MIN.)	4	1	5	4	2	0	2	3	1	0	0	1	23	1%		
89 (7.0-7.5 MIN.)	1	3	1	0	4	3	1	1	2	1	3	0	20	1%		
90 (7.5-8.0 MIN.)	3	2	2	3	2	2	2	3	0	0	1	2	23	1%		
91 (8.0-8.5 MIN.)	4	1	6	0	1	3	0	3	0	0	1	0	17	1%		
92 (8.5-9.0 MIN.)	0	3	4	3	1	0	1	1	2	1	0	0	11			
93 (9.0-9.5 MIN.)	2	1	1	1	0	3	0	0	0	2	0	0	6			
94 (9.5-10.0 MIN.)	0	2	0	2	1	0	0	0	1	0	0	0	6			
95 (OVER 10 MINS.)	10	8	5	3	7	4	2	3	2	2	4	0	50	2%		
TOTAL CALLS	113	159	191	200	162	171	199	157	141	128	164	113	1898			

80-50-B-1B

80-50-B-1B

FIGURE B-1. COLUMBUS FSS BEFORE STUDY (Sheet 2 of 3)

COLUMBUS FSS BEFORE STUDY				DATA REDUCTION										TOTAL PAGE		
QUEUING CHARACTERISTICS																
LOCAL TIME (FROM-TO) HOUR OF THE STUDY		06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	TOTAL		
		1	2	3	4	5	6	7	8	9	10	11	12			
SPECIALISTS AVAILABLE		2.74	2.94	3.40	3.57	2.97	2.97	3.09	3.26	3.24	3.23	2.93	2.76	3.09		
		06/07	07/08	08/09	09/10	10/11	11/12									
AVG. LENGTH - CALL		4.47826	3.96273	3.64737	2.85222	3.47170	3.25581									
		12/13	13/14	14/15	15/16	16/17	17/18									
AVG. LENGTH - CALL		2.93023	2.82692	2.67883	2.51220	2.81618	2.52232	3.17221								
		06/07	07/08	08/09	09/10	10/11	11/12									
STANDARD DEVIATION		1.74319	7.37918	5.55116	4.97176	1.02938	0.56288									
SIGMA/AVERAGE CALL LENGTH		0.38926	1.86214	1.52196	1.74312	0.29651	0.17289									
		12/13	13/14	14/15	15/16	16/17	17/18									
STANDARD DEVIATION		0.43383	0.64911	0.93833	0.37333	0.55867	0.58899	3.29405								
SIGMA/AVERAGE CALL LENGTH		0.14805	0.22962	0.35028	0.14861	0.19838	0.23349	1.03841								
		06/07	07/08	08/09	09/10	10/11	11/12									
SYSTEM UTILIZATION		0.53646	0.61942	0.58235	0.46320	0.53077	0.53846									
		12/13	13/14	14/15	15/16	16/17	17/18									
SYSTEM UTILIZATION		0.46667	0.38684	0.52335	0.27345	0.37366	0.29016	0.44829								
		06/07	07/08	08/09	09/10	10/11	11/12									
PROBABILITY OF BUSY SYSTEM		0.30239	0.38536	0.30544	0.16513	0.27365	0.28247									
		12/13	13/14	14/15	15/16	16/17	17/18									
PROBABILITY OF BUSY SYSTEM		0.19726	0.11793	0.07529	0.04905	0.12593	0.08047	0.17918								
		06/07	07/08	08/09	09/10	10/11	11/12									

80-50-B-1C

80-50-B-1C

FIGURE B-1. COLUMBUS FSS BEFORE STUDY (Sheet 3 of 3)

COLUMBUS FSS AFTER STUDY										TOTAL PAGE									
LOCAL TIME (FROM-TO)																			
HOUR OF THE STUDY																			
06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18								
1	2	3	4	5	6	7	8	9	10	11	12								
43	TOTAL CALLS IN WAIT QUEUE	64	36	54	65	46	56	62	50	53	36	30	16	568					
44	TOT TIME OF CALLS IN WAIT Q	169	108	115	163	85	78	120	70	81	49	68	25	1131					
45	MITRE - VRS USERS	44	53	59	65	63	81	86	72	83	65	67	81	819					
47	MITRE - MAX. SIMUL. USERS	6	10	12	11	12	13	17	13	15	14	19	20	162					
48	ALL TRUNKS BUSY TIME (MIN.)	0	0	0	0	0	0	0	0	0	0	0	0	0					
96	PATWAS	27	61	72	87	73	89	49	78	71	66	55	26	754					
40	LOST CALLS	15	14	15	25	12	14	11	10	10	10	7	2	145					
SPECIALISTS AVAILABLE		2.07	2.07	2.18	2.17	2.20	2.21	2.21	2.03	2.01	2.01	2.00	2.01	2.10					

LINE DATA FIGURES

LINE	1	2	3	4	5	6	7	8	9	10	11	12													
1	49	215	54	228	84	225	74	206	75	207	55	164	79	218	73	175	76	183	61	153	50	141	51	118	
2	12	40	15	76	6	15	6	14	11	36	11	23	11	27	8	18	2	4	2	6	0	0	1	0	
3	0	0	0	0	3	6	5	26	3	16	4	10	2	6	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	
5	43	185	54	236	69	217	65	211	64	163	72	195	62	189	86	185	81	173	67	161	50	141	45	101	
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ALL	104	440	123	540	162	463	150	457	153	422	142	392	155	442	167	378	159	360	130	320	100	282	97	219	
AVG. LENGTH - CALL													06/07	07/08	08/09	09/10	10/11	11/12							
													4.23077	4.39024	2.85802	3.64667	2.75817	2.76056							
AVG. LENGTH - CALL													12/13	13/14	14/15	15/16	16/17	17/18							
													2.85161	2.26347	2.26415	2.46154	2.83000	2.25773	2.87150						

TOTAL OF ALL LINES 1642 CALLS IN 4715 MINUTES AVG CALL = 2.87150 MINUTES

80-50-B-2A

FIGURE B-2. COLUMBUS FSS AFTER STUDY (Sheet 1 of 4)

COLUMBUS FSS AFTER STUDY			DATA REDUCTION												TOTAL PAGE	
LENGTH OF CALLS:																
LOCAL TIME (FROM-TO) HOUR OF THE STUDY	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	TOTAL			
73 (0.0-0.5 MIN.)	2	4	12	5	8	5	8	13	16	11	8	7	99	5%		
74 (0.5-1.0 MIN.)	3	2	14	11	13	13	15	22	17	14	14	16	154	9%		
75 (1.0-1.5 MIN.)	8	10	14	24	13	20	18	21	27	21	17	15	208	12%		
76 (1.5-2.0 MIN.)	13	5	20	26	27	19	24	29	25	20	11	12	231	13%		
77 (2.0-2.5 MIN.)	6	14	15	14	19	18	22	29	19	19	9	15	199	11%		
78 (2.5-3.0 MIN.)	8	18	12	16	23	9	11	23	13	12	2	11	158	9%		
79 (3.0-3.5 MIN.)	10	7	17	11	17	12	9	3	16	8	12	4	126	7%		
80 (3.5-4.0 MIN.)	6	15	14	10	8	7	18	5	12	4	5	6	110	6%		
81 (4.0-4.5 MIN.)	6	7	9	6	9	10	4	5	3	1	3	2	65	3%		
82 (4.5-5.0 MIN.)	10	9	6	4	4	11	6	6	1	3	2	2	64	3%		
83 (5.0-5.5 MIN.)	6	6	9	6	2	4	2	3	5	4	2	2	51	3%		
84 (5.5-6.0 MIN.)	7	8	3	8	2	1	3	5	0	2	1	1	41	2%		
85 (6.0-6.5 MIN.)	9	7	4	3	4	0	6	1	2	1	4	1	42	2%		
86 (6.5-7.0 MIN.)	2	3	1	7	0	3	1	0	1	3	1	0	22	1%		
87 (7.0-7.5 MIN.)	5	1	0	1	0	1	1	0	1	1	1	0	12			
88 (7.5-8.0 MIN.)	0	4	1	2	0	0	0	0	0	2	0	1	10			
89 (8.0-8.5 MIN.)	3	2	2	0	1	0	0	0	0	1	1	1	11			
90 (8.5-9.0 MIN.)	3	3	1	2	1	2	0	1	1	1	1	1	17	1%		
91 (9.0-9.5 MIN.)	3	1	0	1	0	0	0	0	0	0	0	1	7			
92 (9.5-10.0 MIN.)	1	0	2	0	1	0	2	0	0	0	0	0	6			
93 (OVER 10 MINS.)	3	5	0	1	2	2	5	1	1	2	4	0	26	1%		
TOTAL CALLS	114	131	156	158	154	140	155	168	160	130	98	98	1662			

80-50-B-2B

FIGURE B-2. COLUMBUS FSS AFTER STUDY (Sheet 2 of 4)

COLUMBUS FSS AFTER STUDY				DATA REDUCTION										TOTAL PAGE		
QUEUEING CHARACTERISTICS																
LOCAL TIME (FROM-TO) HOUR OF THE STUDY				06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	TOTAL
				1	2	3	4	5	6	7	8	9	10	11	12	
SPECIALISTS AVAILABLE				2.07	2.07	2.18	2.17	2.20	2.21	2.21	2.03	2.01	2.01	2.00	2.01	2.10
				06/07		07/08		08/09		09/10		10/11		11/12		
AVC. LENGTH - CALL				4.23077		4.39024		2.85802		3.04667		2.75817		2.76056		
				12/13		13/14		14/15		15/16		16/17		17/18		
AVC. LENGTH - CALL				2.85161		2.26347		2.26415		2.46154		2.82000		2.25773		2.87150
				06/07		07/08		08/09		09/10		10/11		11/12		
STANDARD DEVIATION				*****		*****		*****		*****		*****		0.68594		
SIGMA/AVERAGE CALL LENGTH				*****		*****		*****		*****		*****		0.24848		
				12/13		13/14		14/15		15/16		16/17		17/18		
STANDARD DEVIATION				1.19948		0.91793		1.06923		1.00402		1.30948		0.77080		*****
SIGMA/AVERAGE CALL LENGTH				0.42063		0.40554		0.47224		0.40788		0.46435		0.34140		*****
				06/07		07/08		08/09		09/10		10/11		11/12		
SYSTEM UTILIZATION				0.60815		0.74483		0.60761		0.60132		0.54876		0.50679		
				12/13		13/14		14/15		15/16		16/17		17/18		
SYSTEM UTILIZATION				0.57032		0.53090		0.51100		0.45455		0.40286		0.31174		0.53513
				06/07		07/08		08/09		09/10		10/11		11/12		
PROBABILITY OF BUSY SYSTEM				0.45361		0.63046		0.44252		0.43529		0.36973		0.32059		
				12/13		13/14		14/15		15/16		16/17		17/18		
PROBABILITY OF BUSY SYSTEM				0.39355		0.36489		0.34438		0.28302		0.23138		0.14767		0.36356

80-50-B-2C

FIGURE B-2. COLUMBUS FSS AFTER STUDY (Sheet 3 of 4)

VRS USERS THAT CALLED COLUMBUS FSS TOTAL PAGE

124 VALUES WERE READ.
 THE SUM OF THE VALUES IS.... 266.94995
 THE MEDIAN VALUE IS..... 1.79000
 THE MEAN VALUE IS..... 2.17500
 THE VARIANCE S**2 IS..... 4.95415
 THE STANDARD DEVIATION IS... 2.22579

CLASS BOUNDARIES	FREQ
0.10 - 0.60	9
0.60 - 1.10	21
1.10 - 1.60	25
1.60 - 2.10	18
2.10 - 2.60	18
2.60 - 3.10	8
3.10 - 3.60	8
3.60 - 4.10	6
4.10 - 4.60	1
4.60 - 5.10	1
5.10 - 5.60	4
5.60 - 6.10	1
6.10 - 6.60	1
6.60 - 7.10	2
7.10 - 7.60	0
7.60 - 8.10	0
8.10 - 8.60	0
8.60 - 9.10	0
9.10 - 9.60	0
9.60 - 10.10	1

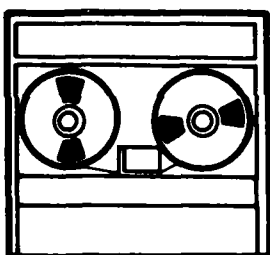
80-50-B-2D

FIGURE B-2. COLUMBUS FSS AFTER STUDY (Sheet 4 of 4)

APPENDIX C

THE VOICE RESPONSE SYSTEM USER INFORMATION

**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**



To obtain actual weather information for pre-flight planning, dial the designated number for your local area.

Select Surface Observations, Terminal Forecasts, and Forecast Winds Aloft for specific locations along your route of flight. A computer voice provides the information; and any push-button telephone can be used. For a complete weather briefing, please contact your Flight Service Station.

FAA is testing this system as part of a wide-ranging program to improve and automate weather briefings for general aviation pilots. Comments about the Voice Response System should be mailed to:

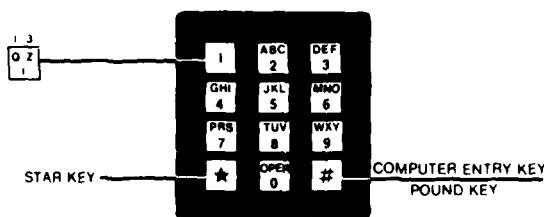
**VRS
DOT/FAA/NAFEC
ANA-250
Atlantic City
New Jersey 08405**

Columbus, Ohio Area System Access dial:

Columbus	(614) 461-1659
Lancaster	(614) 654-5457
Marion	(614) 382-1777
Mansfield	(614) 525-2955
Newark	(614) 345-1493

Note: At press time the above listed numbers were correct; however, pilots experiencing difficulty accessing the VRS should contact the Columbus FSS to confirm validity.

VOICE RESPONSE SYSTEM



OPERATING PROCEDURES

Any public, business, or home telephone with a standard 12-key signalling system will be used to access the system. The conventional rotary dial telephone may be utilized only for dialing the access numbers, but an acoustically-coupled tone signalling device, in lieu of a TOUCHTONE® telephone, must be employed in conjunction with the rotary dial telephone to enter the information requests. Acoustically-coupled tone signalling devices (with 12- or 16-key data entry device) are generally available from electronics supply houses at low costs or can be leased from your local telephone company.

Initially, you access the Voice Response System by dialing a local access number. This will be a toll free call when initiated in one of the test locations; otherwise, it is a toll call to your closest VRS.

To communicate with the computer you must use the keypad in a way that the computer "understands."

Locations (weather reporting stations and airports) are uniquely identified by three-letter combinations and you enter these three letter identifiers to delineate a single location or a series of locations (e.g., a proposed flight path) for which you desire to know the weather.

The keypad does not have enough keys to allow the entry of an alphabetic character (letter) with a single keystroke. But it is possible to make an unambiguous entry by depressing two keys. You can

enter a particular letter by depressing the key on which that letter appears and another key to indicate which of the three letters, 1st, 2nd, or 3rd. The numeral "1" key indicates the first letter, the numeral "2" key indicates the 2nd, and the numeral "3" key indicates the 3rd. Thus the letter B is signalled by depressing the key on which B appears (the number "2" key) and then the numeral "2" key (2nd letter in the group, ABC).

The letter C is signalled by depressing the key on which "C" appears and the numeral "3" key (3rd letter in group ABC).

The letters Q and Z and the blank character are assigned to the numeral "1" key. Q is 1—1, 'blank' is 1—2, and Z is 1—3. Each of the twenty-six letters of the alphabet can be entered in this fashion (two keystrokes) and no confusion will result. The 'blank' is not used.

But it does not suffice just to be able to communicate a string of letters of the alphabet to the computer. You must be able to tell the computer what you want done with the information you have provided. At the lower right-hand corner of the keypad, there is a key imprinted with a "#" symbol. We call this the 'computer entry' key or, for conciseness, the 'pound' key. Since this key is not used to transmit letters or numbers, it creates no confusion to employ it as a control key to signal an action or a request. Used in conjunction with other keys, a number of different actions can be signalled. Other control functions will be explained later.

The computer must be able to recognize the end of an entry (i.e., a string of alphabetic, numeric or mixed characters) and the request that it respond. The computer entry key ('#' or 'pound' key) is depressed twice to provide the end-of-entry signal immediately following each and every field. Thus, to request weather data for Martinsburg, W. Va. (and vicinity), you generate the keystroke sequence 'M—1', 'R—2', 'B—2', '#', '#.

Some location identifiers use both letter and numerals. For these entries, it is necessary to utilize two keystrokes for each letter or numeral. The context of the pilot—computer dialogue will often preclude ambiguities and permit simpler data entry. Numbers can be entered unambiguously by

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depressing the 'OPER' key and the appropriate numeral key. The 'OPER' key is the key representing the numeral '0' (or zero) so that entry of the numeral '0' involves two actuations of the 'OPER' key. The numeral '5' is communicated by depressing 'OPER' and '5' and the other numerals are similarly communicated.

The procedure described is used only for entering numbers in three-letter location identifiers with mixed letters and numbers. For all other numeric entries, single keystrokes for numbers are required. For example, if the computer 'voice' requests an altitude or a number of hours (from the present time), then the numeric entries for these fields may be made via a single keystroke for each digit of the entry.

You will seldom, if ever, be confused in practice and you will find that most of the numerical entries you need to make will require only a single key actuation per digit. In the uncommon case where you wish to enter an identifier such as 6B2 (Greenville, Maine), you will probably experience no difficulty in recognizing that the keystroke sequence should be 0-6, B-2, 0-2, '#', '#'.

The computer will 'read back' each item entered so that you may verify the correctness of your entry. The phonetic alphabet will generally be used so that the identifier MIV will be read back as "MIKE" "INDIA" "VICTOR"; CHO will be read back as "CHARLIE" "HOTEL" "OSCAR". For some locations, the actual name of the airport will be read back to determine the mode of response preferred by pilots. For example, DCA (Washington National Airport) will be read back as "Washington National."

CONTROL FUNCTIONS:

The use of the '#' (pound) key was discussed previously. The '*' (STAR) key is used to stop the computer response. While in the response mode, if you wish to interrupt the computer voice response, simply depress the '*' key. You can halt the voice response until you are ready to proceed. After stopping the response, you may then order a resumption of voice response, a repeat, a jump ahead (skip), or a begin over, by selecting the appropriate keystroke sequence shown below. Notice that the

enter command '#'-'#' is not required after the control functions containing the '*' (STAR) keystroke.

ENTER	[]	[]	REPEAT	[*]	[R]
YES(Y)	[Y]	[]	JUMP AHEAD	[*]	[J]
NO(N)	[N]	[]	DELETE	[*]	[D]
STOP	[*]		BEGIN OVER	[*]	[B]
GO	[*]	[G]			

Notice that "YES" or "NO" only requires three keystrokes "Y" '#' '#' or "N" '#' '#'.

AN EXAMPLE OF A TYPICAL VRS DIALOGUE:

Now that we have explained the procedures necessary to obtain access to the weather briefing, let's follow a pilot through a typical briefing.

Initially, you access the Voice Response System by dialing or keying the published number.

PILOT— pilot dials xxx-xxxx
 SYSTEM— "HELLO", "Current Greenwich Time is XXXX."
 SYSTEM— "Enter Location Identifier."
 PILOT— (Desired location — PIT) P-1; I-3; T-1; # #
 SYSTEM— "PAPA", "INDIA", "TANGO" "ENTER NEXT LOCATION"
 PILOT— (Desired location — ILG) I-3; L-3; G-1; # #
 SYSTEM— "INDIA", "LIMA", "GOLF" "ENTER NEXT LOCATION"
 PILOT— (If no additional entries, enter # #)
 SYSTEM— "Do you want hourly surface observations? Answer yes or no."
 PILOT— Y; # #
 SYSTEM— reads hourly for PIT, ILG, etc.
 SYSTEM— "Do you want terminal forecasts? Answer yes or no."
 PILOT— Y; # #
 SYSTEM— reads forecasts for PIT and ILG
 SYSTEM— "Do you want forecast winds aloft? Answer yes or no."
 PILOT— Y; # #
 SYSTEM— "How many hours from now? The maximum is 30."
 PILOT— 6; # #
 SYSTEM— "six"

FIGURE C-1. BROCHURE: VOICE

SYSTEM— "At what altitude?"

PILOT— 85; (or 8500; no matter) ##

SYSTEM— "eight five"

SYSTEM— reads winds aloft at requested altitude,
+ 4000 feet and - 4000 feet for each
location.

SYSTEM— "Do you want more information?
Answer yes or no."

PILOT— Y: ##

SYSTEM— "Enter location identifier, etc."

DATA NOT AVAILABLE

When data are not available, one of the follow-
ing will occur:

1. Wrong Identifier: If a three-character entry
which does not constitute a valid location
identifier is made (e.g., ABC), the VRS will
read back the characters as entered. However,
when the report requested is to read out, the
VRS will say "ALPHA—BRAVO—CHARLIE
... is not a location identifier."

2. No Report for a Given Location: If the loca-
tion identifier is a valid one but not a reporting
station for the type of report requested, the
VRS will say "ALPHA—BRAVO—CHARLIE
... is not an Hourly Observation Station" or
"... is not a terminal forecast location."

3. Noncurrent Data: If the location identifier
is a valid one but the current data are not
available, the VRS will say (e.g., SBY),
"SIERRA—BRAVO—YANKEE... report not
available" for report type requested.

NOTE: 1. HOURLY OBSERVATIONS: Only
the latest available observation will be given
provided that the observation is not more
than 2 hours old. Special observations will be
appended to last hourly.

2. All reporting stations for weather
observations within the continental United
States are contained in the data base.

3. Minimum altitude for forecasted
winds aloft is approximately 2,000 feet above
terrain level.

4. The system has some time-out
functions which limit the amount of time an
individual can use the system. This feature
has been incorporated to preclude an indi-
vidual from tying up the phone lines for an
extended period.

LOCATION IDENTIFIERS

Weather information
from these airports and
weather reporting stations
is available to the pilot
through the FAA telephone
voice response system.

* TERMINAL FORECAST LOCATIONS

ALABAMA

*ANB Anniston
*BHM Birmingham
*DHN Dorhan
*GAD Gadsden
*HSV Huntsville
*MOB Mobile
*MGM Montgomery/
Dannelley Field
*MXF Montgomery/
Maxwell AFB
*MSL Muscle Shoals
*OZR Ozark Ft. Rucker AAF
*SEM Selma
*TCL Tuscaloosa

ARIZONA

*CHD Chandler-Williams AFB
*DUG Douglas
*FLG Flagstaff
*FHU Ft. Huachuca/Sierra
Vista-Libby AAF
*GBN Gila Bend AF AUX
*LUF Glendale/
Luke Field AFB
*GCN Grand Canyon
*JBR Jonesboro
*IGM Kingman
*PGA Page
*PHX Phoenix
*PRC Prescott
*SAD Safford
*DMA Tucson/Davis
Monthan AFB
*TUS Tucson
*INW Winslow
*YUM Yuma

ARKANSAS

*BYH Blytheville AFB
*ELD El Dorado.
*FYV Fayetteville

*FSM Fort Smith
*HRO Harrison
*HOT Hot Springs
*LRF Jacksonville/Little
Rock AFB
*LIT Little Rock
*PBF Pine Bluff
*TXK Texarkana
*ARG Walnut Ridge
*AWM West Memphis

CALIFORNIA

*NGZ Alameda NAS
*ACV Arcata
*AVX Avalon Catalina
Island
*BFL Bakersfield
*BUO Beaumont
*BIH Bishop
*BLU Blue Canyon
*BLH Blythe
*BUR Burbank
*BNY Burney
*CZZ Campo
*CRG Carlsbad
*CIC Chico
*CCR Concord
*CEC Crescent City
*NRC Crows Landing NAF
*DAG Daggett
*EDW Edwards AFB
*SUU Fairfield/Travis AFB
*FAT Fresno
*FUL Fullerton
*HHR Hawthorne
*HWD Hayward
*IPL Imperial
*NRS Imperial Beach OLF
*NID Inyokern NAS
*WJF Lancaster
*NLC Lemoore NAS
*VVG Lompoc/
Vandenberg AFB

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*LGB Long Beach	*TVL South Lake Tahoe	*DAB Daytona Beach	SGB Grangeville	KAN
*NTB Los Alamitos NAS	*SCK Stockton	*FLL Ft. Lauderdale	SUN Hailey	*CNE
*LAX Los Angeles Int'l	*SVE Susanville	*FMY Ft. Myers	*IDA Idaho Falls	*CNE
*VNY Los Angeles Van Nuys	*TRM Thermal	*GNV Gainesville	*LWS Lewiston	*DDG
*BAB Marysville Beale AFB	*TOA Torrance	*HST Homestead AFB	*MLD Malad City	*IKS
*MYV Marysville Yuba County	*UKI Ukiah	*NZC Jacksonville/Cecil Field NAS	*MUO Mountain Home AFB	*EMC
*MER Merced Castle AFB	*VCV Victorville George AFB	*JAX Jacksonville Int'l	*PIH Pocatello	*FBI
*MOD Modesto	*VIS Visalia	*NIP Jacksonville/NAS Towers Field	*SMN Salmon	*GCC
*SIY Montague	*L22 Yucca Valley		*TWF Twin Falls	*GLE
*OAR Monterey Fort Ord AAF				*GBE
*MRY Monterey Peninsula	COLORADO	*EYW Key West	ILLINOIS	*HLC
*MHS Mount Shasta	*AKO Akron	*HRT Mary Esther	ALN Alton	*HUT
*MWS Mount Wilson	*ALS Alamosa	*NRB Mayport NAS	BLV Belleville/Scott AFB	FLV
*NUQ Mountain View Moffett NAS	*ASE Aspen	*MLB Melbourne	BMI Bloomington/Normal	LBL
*APC Napa	*COS Colorado Springs Muni	*MIA Miami Int'l	BDF Bradford	MHE
*EED Needles	*CEZ Cortez	*NSE Milton/NAS Whiting	MDH Carbondale/Murphysboro	OJC
*OAK Oakland	*BKF Denver Buckley ANGB	*ORL Orlando/Herndon	*CMI Campaign/Urban	RSL
*ONT Ontario Int'l	*DEN Denver Stapleton Int'l	*MCO Orlando Int'l	*MDW Chicago/Midway	*SLN
*OXR Oxnard	*DRO Durango	*PFN Panama City/Bay County	CGX Chicago/Merrill C. Meigs	*FOE
*PSP Palm Springs	*EGE Eagle	*PAM Panama City/Tyndall AFB	*ORD Chicago/O'Hare Int'l	*TOP
*PMD Palmdale AF Plant 42	*FCS Fort Carson Butts AAF	*NPA Pensacola/Sherman NAS	*DPA Chicago	IAB
*PRB Paso Robles	*FCL Fort Collins	*PNS Pensacola Regional	DNV Danville	*ICT
*NTD Point Mugu NAS	*GJT Grand Junction	SFB Sanford	*DEC Decatur	KENT
*RBL Red Bluff	*GUC Gunnison	SRO Sarasota/Bradenton	CPS East St. Louis	*BWG
*RDD Redding	2V9 Gunnison Weather Reporting Station	PIE St. Petersburg/Clearwater	NBU Glenview NAS	FTK
*RIV Riverside	*HDN Hayden	*TLH Tallahassee	MWA Marion	HOP
*MHR Sacramento	4LJ Lamar	*MCF Tampa/MacDill AFB	*MTO Mattoon/Charleston	
*MCC Sacramento McClellan AFB	LHX La Junta	*TPA Tampa Int'l	*MLI Moline	*LEX
*SAC Sacramento Executive	LXV Leadville	*VPS Valparaiso/Eglin AFB	*MYN Mt. Vernon	*LOZ
*SMF Sacramento Metro	LIC Limon	*VRB Vero Beach	*PIA Peoria	LOU
*SNS Salinas	*MTJ Montrose	*PBI West Palm Beach	*UIN Quincy	*SDF
*SJT San Angelo	*PUB Pueblo		*RFD Rockford	*OWB
*SBD San Bernardino Norton AFB	*STK Sterling	GEORGIA	*SPI Springfield	*PAH
NUC San Clemente Island NALF	*TAD Trinidad	*ABY Albany	VLA Van Dala	
*NZY San Diego Halsey Field, North Island	CONNECTICUT	*AMG Alma		LOU
*NKX San Diego Mitscher Field, Mirimar NAS	*BDR Bridgeport	*AHN Athens	INDIANA	AEX
*SAN San Diego Int'l Lindbergh Field	*DXR Danbury	*FTY Atlanta/Charlie Brown County	BMG Bloomington	*ESF
SEE San Diego Santee Gillespie	*GON Gordon New London	*ATL Atlanta/Hartsfield Int'l	*EVS Evansville	
*SFO San Francisco	*HFD Hartford	*AGS Augusta	*FWA Ft. Wayne	*BTR
*SJC San Jose	*HUN New Haven	*SSI Brunswick	*IND Indianapolis	BVE
*NSI San Nicolas Island	788 New London	*CSG Columbus	*LAF Lafayette	HUM
*SRF San Rafael Hamilton Field	*BDL Windsor-Locks	*LSF Ft. Benning AAF	*MIE Muncie	7R4
SDB Sandberg	DELAWARE	*LHW Hinesville	*GUS Peru	*LFT
*NZJ Santa Ana El Toro MCAS	*DOV Dover AFB	*LGC La Grange	*SBN South Bend	*LCH
*SNA Santa Ana Orange County	*ILG Wilmington	*MCN Macon/Wilson	*HUF Terre Haute	POE
*SBA Santa Barbara	DISTRICT OF COLUMBIA	*WRB Macon/Warner Robins AFB		*MLU
*SXC Santa Catalina Island	*IAD Washington Dulles	MGE Marietta AFB	IOWA	NBG
*SZN Santo Cruz Island	*DCA Washington National	*MGR Moultrie	*CID Cedar Rapids	
*SMX Santa Maria	FLORIDA	7A9 Plains	*BRL Burlington	NEW
*SMO Santa Monica	AQQ Apalachicola	*RMG Rome	*DSM Des Moines	
*STS Santa Rosa	AGR Avon Park Aux.	*SAV Savannah	*DBQ Dubuque	*MSY
	BOW Bartow	*VAD Valdosta/Moody AFB	FOD Ft. Dodge	BAD
	X53 Clewiston	*VLD Valdosta Muni	301 Lamoni	*SHV
	COF Cocoa		*MEY Mapleton	
	CEW Crestview	IDAHO	*MCW Mason City	
	CTY Cross City	*BOI Boise	*OTM Ottumwa	MAINE
		*BYI Burley	*SUX Sioux City	*AUG
		GNG Gooding	3SE Spencer	*BGR
			*ALO Waterloo	

FIGURE C-1. BROCHURE: VOICE RESPO

KANSAS

*CNU Chanute
 *CNK Concordia
 *DDC Dodge City
 *IKS Elkhart
 *EMP Emporia
 *FRI Ft. Riley
 Marshall AAF
 *GCK Garden City
 *GLD Goodland
 *GBD Great Bend
 *HLC Hill City
 *HUT Hutchinson
 *FLV Leavenworth
 Sherman AAF
 *LBI Liberal
 *MHK Manhattan
 *OJC Olathe
 *RSL Russell
 *SLN Salina
 *FOE Topeka Forber Field
 *TOP Topeka Philip Billard
 Muni
 *IAB Wichita McConnell
 AFB
 *ICT Wichita Mid-Continent

KENTUCKY

*BWG Bowling Green
 *FTK Ft. Knox Goodman
 AAF
 *HOP Hopkinsville Campbell
 AAF
 *LEX Lexington
 *LOZ London
 *LOU Louisville Bowman
 *SDF Louisville Standiford
 *OWB Owensboro
 *PAH Paducah

LOUISIANA

*AEX Alexandria England
 AFB
 *ESF Alexandria Esler
 Regional
 *BTR Baton Rouge
 *BVE Boothville
 *HUM Houma
 *7R4 Intracoastal City
 *LFT Lafayette
 *LCH Lake Charles
 *POE Leesville Fort
 Polk AAF
 *MLU Monroe
 *NBG New Orleans Alvin
 Callendar NAS
 *NEW New Orleans
 Lakefront
 *MSY New Orleans Int'l
 *BAD Shreveport Barksdale
 AFB
 *SHV Shreveport Regional

MAINE

*AUG Augusta
 *BGR Bangor

*BHB Bar Harbor
 *NHZ Brunswick NAS
 *CAR Caribou
 *6B2 Greenville
 *HUL Houlton
 *LIZ Limestone
 *MLT Millinocket
 *75B Mount Vernon
 *OLD Old Town
 *PWM Portland
 *PQI Presque Isle
 *HKD Rockland

MARYLAND

*BWI Baltimore
 Washington Int'l
 *MTN Baltimore Glenn L.
 Martin
 *ADW Camp Springs
 Andrews AFB
 *FME Ft. Meade Tipton
 AAF
 *HGR Hagerstown
 *NHK Patuxent River NAS
 *SBY Salisbury

MASSACHUSETTS

*BED Bedford
 *BVG Beverly
 *BOS Boston
 *CEF Chicopee Falls
 *GTR Columbus
 *FMH Falmouth Otis AFB
 *HYA Hyannis
 *MYV Martha's Vineyard
 *ACK Nantucket
 *EWB New Bedford
 *OWD Norwood
 *OLV Olive Branch
 *PSF Pittsfield
 *NZW South Weymouth
 NAS
 *BAF Westfield
 *ORH Worcester

MICHIGAN

*APN Alpena
 *ARB Ann Arbor
 *BTL Battle Creek
 *BEH Benton Harbor
 *DET Detroit City
 *PTW Detroit Metro,
 Wayne County
 *VIP Detroit Willow Run
 *ESC Escanaba
 *FNT Flint
 *GRR Grand Rapids
 *SAW Gwinn Sawyer AFB
 *CMX Hancock
 *HTL Houghton Lake
 *IMT Iron Mountain/
 Kingsford
 *IWD Ironwood
 *AZO Kalamazoo
 *LAN Lansing
 *MBL Manistee

*MQT Marquette
 *MNM Menominee
 *MTC Mt. Clemens/Selfridge
 ANOB
 *MKC Muskegon
 *OSC Oscoda Wurtsmith AFB
 *PLN Pellston
 *PTK Pontiac
 *MBS Saginaw
 *SSM Sault Ste. Marie/
 County
 *INR Sault Ste. Marie/
 Kincheloe AFB
 *TVC Traverse City

MINNESOTA

*AXN Alexandria
 *BDE Baudette
 *BJI Bemidji
 *BRD Brainerd
 *DLH Duluth
 *FRM Fairmont
 *HIB Hibbing
 *INL International Falls
 *MKT Mankato
 *MSP Minneapolis
 *AWF Redwood Falls
 *RST Rochester
 *STC St. Cloud
 *TVF Thief River Falls
 *OTG Worthington

MISSISSIPPI

*BIX Biloxi/Keesler AFB
 *CBM Columbus AFB
 *GLH Greenville
 *GWO Greenwood
 *GPT Gulfport
 *HBC Harrisburg
 *JAN Jackson/Thompson
 Field
 *JXN Jackson County/
 Reynolds Field
 *LUL Laurel
 *MCB McComb
 *MEI Meridian/Key Field
 *NMM Meridian/McCain
 Field NAS
 *HEZ Natchez
 *UOX Oxford
 *PGL Pascagoula
 *TUP Tupelo
 *VKS Vicksburg

MISSOURI

*CGI Cape Girardeau
 *COU Columbia
 *TBN Ft. Leonard Wood/
 Forney AAF
 *GVW Grandview/Richards
 Gebaur AFB
 *JEF Jefferson City
 *JLN Joplin
 *MKC Kansas City/
 Downtown
 *MCI Kansas City Int'l

*JRK Kirksville
 *SZL Knob Noster/
 Whiteman AFB
 *VIH Rolla/Richy
 *STL St. Louis Lambert-
 St. Louis Int'l
 *SUS St. Louis Spirit
 of St. Louis
 *STJ St. Joseph
 *SGF Springfield

MONTANA

*BIL Billings
 *BZN Bozeman
 *4BQ Broadus
 *BTM Butte
 *CTB Cut Bank
 *DLN Dillon
 *3DU Drummond
 *GGW Glasgow
 *GDV Glendive
 *GTF Great Falls Int'l
 *GFA Great Falls/
 Malsstrom AFB
 *3HT Harlowton
 *HVR Harve
 *HLN Helena
 *FCA Kalispell/Glacier
 Int'l
 *LWT Lewistown
 *LVM Livingston
 *MLS Miles City
 *MSO Missoula/
 Johnson Bell
 *MQM Monida
 *SDY Sidney
 *3TH Thompson Falls
 *WYS West Yellowstone
 *4HA Whitehall
 *OLF Wolf Point

NEBRASKA

*ANW Ainsworth
 *AIA Alliance Muni
 *BIE Beatrice
 *BBW Broken Bow
 *CDR Chadron Muni
 *OLU Columbus Muni
 *GRI Grand Island/
 Hall County
 *HSI Hastings
 *IML Imperial
 *EAR Kearney
 *LNK Lincoln
 *MCK McCook
 *MHN Mullen
 *OFK Norfolk
 *LBF North Platte/
 Lee Bird
 *OMA Omaha/Eppley Airfield
 *OFF Omaha/Offutt AFB
 *ONL O'Neill
 *BFF Scottsbluff
 *SNY Sidney
 *VTN Valentine Miller

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NEVADA		*TCC Tucuman	NORTH DAKOTA	*LMT Klamath Falls	*GSP
*BAM Battle Mountain		ZUN Zuni/Pueblo	*BIS Bismarck Muni.	CVO Corvallis Muni	
*EKO Eiko			DVL Devils Lake	*EUG Eugene Sweet	MYE
*ELY Fly			*DIK Dickinson	HBO Hillsboro Portland	*CRZ
*NFL Fallon NAS		NEW YORK	*FAR Fargo	LGD La Grande	*SPA
*LAS Las Vegas		*ALB Albany	RDR Grand Forks AFB	4LW Lakeview	SSC
LSV Las Vegas		*BGM Binghamton/Broome	*GFK Grand Forks Int'l	MEH Meacham	
		*BUF Buffalo Int'l	*JMS Jamestown	*MFR Medford-Jackson	SOUT
		*ELM Elmira	MLB Minot AFB	JNW Newport	*ABE
*LOI Lovelock		FRG Farmingdale	*MOT Minot Int'l	OTH North Bend Muni	*BKE
OWY Owyhee		*GLF Glens Falls	*ISN Williston Soudin	ONO Ontario	*HON
*RNO Reno		*ISP Islip		*PDT Pendleton	Y22
*TPH Tonopah		*ITH Ithaca Tompkins County	OHIO	*PDX Portland Int'l	MHE
*WMC Winnemucca		*JHW Jamestown/Chautauqua	*CAK Akron/Canton	*RDM Redmond Roberts Muni	Y26
UCC Yucca Flats		*MSS Massena	*LUK Cincinnati/Lunken	RDG Roseburg Muni	YHP
NEW HAMPSHIRE		MSV Monticello Sullivan	BKL Cleveland/Burke Lakefront	*SLE Salem/McNary Field	*PIR
BMI Berlin		*SWF Newburg Stewart	CGF Cleveland/Cuyahoga County	SXT Sexton Summit	RCA
*CON Concord		*JFK New York/John F. Kennedy Int'l	*CLE Cleveland Hopkins Int'l	*DLS The Dalles Muni	*RAP
EEN Keene		*LGA New York/La Guardia	OSU Columbus/Ohio State University	*TTD Troutdale	*FSD
LCI Laconia		*IAG Niagara Falls	*CMH Columbus/Port Columbus Int'l	PENNSYLVANIA	*ATY
*LEB Lebanon		*OGS Ogdensburg	LCK Columbus/Rickenbacker AFB	*ABE Allentown	YKN
MHT Manchester		*PBG Plattsburg AFB	*CVG Covington/Cincinnati	*BFD Bradford	
MWS Mount Washington		*POU Poughkeepsie	*DAY Dayton/James M. Cox Int'l	*ERI Erie Int'l	TENN
PSM Portsmouth		*ROC Rochester	FFO Dayton/Wright-Patterson AFB	*FKL Franklin/Lamberton	*TRI
NEW JERSEY		RME Rome/Griffiss AFB	*FDY Findlay	CXY Harrisburg/Capital City	*CHA
*ACY Atlantic City/NAFEC		*SLK Saranac Lake	*MFD Mansfield/Lahm Muni	HAR Harrisburg PSS	CKV
NEL Lakehurst NAEC		*SYR Syracuse	SGH Springfield Muni	HZL Hazelton	*CSV
*MIV Millville		*UCA Utica Oneida	*TOL Toledo Express	*JST Johnstown/Cambria	DYR
MMU Morristown		*ART Watertown	ILN Wilmington Industrial	LNS Lancaster	*MKL
*EWR Newark		FOK Westhampton Beach	*YNG Youngstown Muni	LBE Latrobe	*TYS
TEB Teeterboro		*HPN White Plains	*ZZV Zanesville Muni	AOO Martinsburg	*MEM
TTN Trenton				*MDT Middletown	NQA
WRI Wrightstown/McGuire AFB		NORTH CAROLINA	OKLAHOMA	*PNE Philadelphia/North Philadelphia	*MGL
		*AVL Asheville	LTS Altus AFB	*PHL Philadelphia Int'l	*BNA
NEW MEXICO		*CLT Charlotte/Douglas	*ADM Ardmore Muni	*AGC Pittsburgh/Allegheny County	TEXA
HMN Alamogordo/Holland AFB		*ECG Elizabeth City	CSM Clinton Sherman	*PIT Greater Pittsburgh Int'l	*ABD
*ABQ Albuquerque		*FAY Fayetteville Muni	END Enid Vance AFB	*RDG Reading	DYS
*CNM Carlsbad		*FBG Fayetteville/Ft. Bragg AAF	FSI Ft. Sill AAF	7TB Tobyhanna	*ALI
CAO Clayton		POB Fayetteville/Pope AFB	*GAG Gage Muni	*AVP Wilkes-Barre/Scranton	*AMA
CVS Clovis		GSB Goldsboro/Seymour Johnson AFB	*HBR Hobart	*IPT Williamsport	BSM
4CR Corona		*GSO Greensboro	*MLC McAlester Muni	NXX Willow Grove NAS	*AUS
4SL Cuba		HAT Hatteras WSO	TIK Oklahoma City/Tinker AFB	RHODE ISLAND	*BPT
*DMN Deming		HSS Hot Springs	*OKC Oklahoma City/Will Rogers World	BID Block Island	NIR
*FMN Farmington		OAJ Jacksonville/Albert J. Ellis	*PNC Ponca City Muni	*PVD Providence	BGD
*GUP Gallup		NCA Jacksonville/New River	SWO Stillwater		*BRO
GNT Grants		ISO Kinston	*TUL Tulsa Int'l	SOUTH CAROLINA	BVE
*HOB Hobbs/Lea County		*EWN New Bern/Simmons Nott		*AND Anderson	*CDS
LRU Las Cruces/Crawford		*RDU Raleigh-Durham	OREGON	NBC Beaufort MCAS	*CLL
*LVS Las Vegas		RMT Rocky Mount	*AST Astoria/Clatsop	*CHS Charleston AFB/Muni	*CRP
LAM Los Alamos		*RWI Rocky Mount-Wilson	*BKE Baker	*CAE Columbia Metro	NGP
4MY Moriarty		SOP Southern Pines	4BK Brookings	MMT Columbia/McEntire ANGB	NBE
RTN Raton/Crews		*ILM Wilmington	4BW Burns	*FLO Florence	*DAL
*ROW Roswell Industrial		*INT Winston-Salem	CZK Cascade Locks	GRD Greenwood	*DFW
RUI Ruidoso					*DHT
*SAF Santa Fe					*DRT
SVC Silver City/Grant					DLF
ONM Socorro					*ELP
*TCS Truth or Consequences					

FIGURE C-1. BROCHURE: VOICE RESPONSE

*GSP Greer
Greenville
Spartanburg
*MYR Myrtle Beach
*CRE North Myrtle Beach
*SPA Spartanburg
*SNC Sumter Shaw AFB

SOUTH DAKOTA

*ABR Aberdeen Regional
*BKK Brookings
*HON Huron Regional
Y22 Lemmon
*MHE Mitchell
Y26 Mobridge
*PHP Philip
*PIR Pierre
*RCA Rapid City
Ellsworth AFB
*RAP Rapid City Regional
*FSD Sioux Falls
Joe Foss
*ATY Watertown
YKN Yankton

TENNESSEE

*TRI Bristol
*CHA Chattanooga
Tovell
*CKV Clarksville
*CSV Crossville
*DYR Dyersburg
*MKL Jackson
*TYS Knoxville
McGee Tyson
*MEM Memphis Int'l
*NQA Memphis NAS
*MGL Monteagle
*BNA Nashville

TEXAS

*ABI Abilene Muni
*DYS Abilene Dyess AFB
*ALI Alice
*AMA Amarillo Int'l
*BSM Austin Bergstrom
AFB
*AUS Austin Mueller
Muni
*BPT Beaumont Jefferson
*BIR Beeville
*BGD Borger
*BRO Brownsville Int'l
*BWD Brownwood
*CDS Childress
*CLI College Station
Easterwood
*CRP Corpus Christi Int'l
*NGP Corpus Christi NAS
*NBE Dallas Hensley NAS
*DAL Dallas Love
*DFW Dallas Ft. Worth
*DHT Daltan Muni
*DRI Del Rio Int'l
*DLF Del Rio
Laughlin AFB
*ELP El Paso Int'l

*FWH Ft. Worth
Carswell AFB
*FTW Ft. Worth Meacham
*GLS Galveston
*GDP Guadalupe Pass
*HRI Harlingen
*EFD Houston
Ellington AFB

*IAH Houston

Intercontinental
*HOI Houston
William P. Hobby
*JCT Junction
*ERV Kerrville Muni
*HLR Killeen Hood AAF
*GRK Killeen
Robert Gray AAF

*LOI Laredo
*LRD Laredo Int'l
*GGG Longview
*LBB Lubbock Int'l
*REE Lubbock Reese AFB
*LTK Lufkin
*MRF Marfa Muni
*MFE McAllen
*MAE Midland Airpark
*MWL Mineral Wells
*PSX Palacios Muni
*PRX Paris Cox
*PVW Plainview Hale Muni
*SAF San Antonio
Kelly AFB

*RND San Antonio
Randolph AFB
*SAT San Antonio Int'l
*TPL Temple Draughton
Miller
*TYR Tyler
*VCT Victoria Regional
*ACT Waco Madison Copper
*SPS Wichita Falls
Shepard AFB

*JNK Wink
*UTAH
*ABL Blanding
*BCE Bryce Canyon
*U17 Bullfrog
*CDC Cedar City
*DPG Dugway Tooele
Michael AAF
*U28 Green River
*HNV Hanksville
*MLF Milford Muni
*CNY Moab
*HIF Ogden Hill AFB
*OGD Ogden Muni
*PUC Price
*SLC Salt Lake City Int'l
*VEL Vernal
*ENV Wendover

*VERMONT
*MPV Barre-Montpelier
*BTB Burlington Int'l
*RUT Rutland
*VSE Springfield

VIRGINIA

*BKT Blackstone
*CHO Charlottesville
Abermarle
*WAL Chincoteague
*DAN Danville
*PSK Dublin
*DAA Ft. Belvoir
*FAF Ft. Eustis
*LFI Hampton
*HSP Hot Springs
*LYH Lynchburg Muni
*PHF Newport News
*ORF Norfolk Int'l
*NGU Norfolk NAS
*NTU Oceana
*NYG Quantico
*RIC Richmond/Bird Int'l
*ROA Roanoke
*SHD Staunton/Waynesboro/
Harrisonburg/
Shenandoah Valley

WASHINGTON

*BLI Bellingham Int'l
*PWT Bremerton
*63S Colville
*EPH Ephrata Muni
*PAE Everett Snohomish/
Paine
*HQM Hoquiam
*MWH Moses Lake/
Grant County
*OLM Olympia
*4OM Omak
*PSC Pasco/Tri-Cities
*NOW Port Angeles CGAS
*CLM Port Angeles/
William R. Fairchild
Int'l

*PUW Pullman Moscow
*UIL Quillayute
*RLD Richland
*BFI Seattle/Boeing Field/
King County Int'l
*SEA Seattle-Tacoma Int'l
*SHN Shelton
*SKA Spokane/Fairchild AFB
*SFF Spokane/Felts Field
*GEG Spokane Int'l
*SMP Stampede Pass
*GRF Tacoma/Ft. Lewis AAF
*TIW Tacoma Industrial
*TCM Tacoma/McChord AFB
*TDO Toledo
*ALW Walla Walla City
County

*EAT Wentscher Pangborn
*NUW Whidbey Island NAS
*YKM Yakima Air Terminal

WEST VIRGINIA

*BKW Beckley
*BLF Bluefield
*CEW Charleston
*CKB Clarksburg
*EKN Elkins
*MTS Huntington/Tri-State/
Walker-Long
*MRB Martinsburg
*MGW Morgantown
*PSB Parkersburg
*HLG Wheeling
*SSU White Sulphur Springs

WISCONSIN

*VOK Camp Douglas
*EAU Eau Claire County
*GRG Green Bay/
Austin-Straubel
*JVL Janesville/Rock County
*LSE LaCrosse
*LNR Lone Rock
*MSN Madison Dane County/
Traux
*MTW Manitowoc
*MKE Milwaukee/
General Mitchell Field
*MWC Milwaukee/Lawrence
J. Timmerman
*CWA Mosinee
*OSH Oshkosh/Wittman
*RHI Rhinelander/
Oneida County
*AUW Wausau Muni

WYOMING

*BPI Big Piney
*CPR Casper/Natrona
County
*CYS Cheyenne Muni
*COD Cody Muni
*4DG Douglas
*EVW Evanston
*GCC Gillette-Campbell
County
*JAC Jackson Hole
*LND Lander
*LAR Laramie/Breos
*RWL Rawlins
*RIW Riverton
*RKS Rock Springs
*SHR Sheridan County
*WRL Worland

80-50-A-1D

ERRATA SHEET

<u>FROM</u>	<u>TO</u>
<u>ARIZONA</u>	<u>ARKANSAS</u>
JBR Jonesboro	JBR Jonesboro
<u>CALIFORNIA</u>	<u>CALIFORNIA</u>
CRG Carlsbad VVG Lompoc/Vandenberg AFB	CRQ Carlsbad VBG Lompoc/Vandenberg AFB
<u>FLORIDA</u>	<u>FLORIDA</u>
SRO Sarasota/Bradenton St Petersburg/Clearwater	SRQ Sarasota/Bradenton St Petersburg/Clearwater
<u>ILLINOIS</u>	<u>ILLINOIS</u>
MYN Mt. Vernon	NVN Mt. Vernon
<u>KANSAS</u>	<u>KANSAS</u>
FOE Topeka/Forber Field	FOE Topeka/Forbes Field
<u>MISSISSIPPI</u>	<u>MICHIGAN</u>
JXN Jackson County/ Reynolds Field	JXN Jackson County/ Reynolds Field
<u>MISSOURI</u>	<u>MISSOURI</u>
JRK Kirksville	IRK Kirksville
<u>WEST VIRGINIA</u>	<u>WEST VIRGINIA</u>
PSB Parkersburg	PKB Parkersburg
<u>WISCONSIN</u>	<u>WISCONSIN</u>
GRG Green Bay/Austin-Straubel	GRB Green Bay/Austin-Straubel

TELEPHONE NUMBER

Change the area code for MANSFIELD from (614) to (419)

80-50-A-2A

FIGURE C-2. OTHER USER INFORMATION (Sheet 1 of 5)

**DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**

WASHINGTON, D.C. 20591

October 22, 1979



TO: All Pilots in the Columbus Area

SUBJECT: Columbus, Ohio, Demonstration of the Voice Response System

On or about November 18, 1979, the Federal Aviation Administration (FAA) will conduct a demonstration of the computer generated Voice Response System (VRS) in the Columbus, Ohio, Flight Service Station (FSS) area. This automated weather dissemination system has been developed to evaluate the concept that a pilot can receive limited preflight weather products directly from a computer. An approximate 4-month evaluation is planned.

Material presented in the VRS is current weather data as reported at the time of access. The demonstration system provides three preflight weather products: hourly surface observations, terminal forecasts, and forecast winds aloft. Although the three products currently available will not provide a complete preflight weather briefing, they will enable pilots to make important early flight planning decisions prior to their contacting an FSS specialist for briefing and flight plan filing.

The enclosed brochure contains instructions on how to use and operate the system. Applicable phone numbers for toll-free access from Columbus, Mansfield, Lancaster, Newark, and Marion are included. Normally, 24-hour-a-day availability of service can be expected but because this VRS is an experimental system, with limited redundancy, some occasional system outages may occur.

Maximum pilot participation in this demonstration is encouraged. Pilots contacting the Columbus FSS should advise the specialist at the beginning of their briefing if they used the VRS for early flight planning and indicate the approximate time of the most recent VRS call. This information regarding your utilization of VRS data will enable the FAA to determine what effect a limited VRS capability has on FSS operations. We urge you to help us evaluate this new concept. Your assistance is welcomed and appreciated.

Sincerely,

A handwritten signature in dark ink, appearing to read "R. Wedan", is written over the word "Sincerely,".

ROBERT W. WEDAN
Acting Director, Systems Research
and Development Service

Enclosure

80-50-A-2B

FIGURE C-2. OTHER USER INFORMATION (Sheet 2 of 5)

IMPORTANT MESSAGE

BECAUSE OF DIFFERENCES IN THE DESIGN OF THE NEWARK AND MANSFIELD TELEPHONE EXCHANGES, IT IS IMPORTANT THAT PILOTS USING THESE EXCHANGES MAKE SURE THAT THEIR CALL HAS BEEN COMPLETED SO THAT THE VRS SYSTEM IS AVAILABLE FOR THE NEXT CALLER. TO INSURE THIS, PILOTS SHOULD REMAIN ON LINE UNTIL THE SYSTEM INQUIRY "DO YOU NEED MORE INFORMATION? ANSWER YES OR NO." WHEN THE PILOT HAS DECIDED THAT NO ADDITIONAL INFORMATION IS NEEDED, A RESPONSE OF "N" '###' MUST BE ENTERED. THE VRS SYSTEM THANKS THE PILOT AND SIGNALS THAT THE CALL HAS BEEN COMPLETED. THIS ACTION MAKES THE SYSTEM AVAILABLE TO THE NEXT CALLER. FAILURE TO FOLLOW THE ABOVE PROCEDURE WILL LIMIT THE NUMBER OF CALLS HANDLED PER UNIT TIME IN THE MANSFIELD AND NEWARK EXCHANGES.

January 4, 1980

80-50-A-2C

FIGURE C-2. OTHER USER INFORMATION (Sheet 3 of 5)

**DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**

WASHINGTON, D.C. 20591

DATE:

JAN 8 1980

IN REPLY
REFER TO:

ARD-420

SUBJECT: Columbus, Ohio, Demonstration of the Voice Response System



FROM: Acting Director, Systems Research and Development Service, ARD-1

TO: All Pilots in the Columbus FSS Area

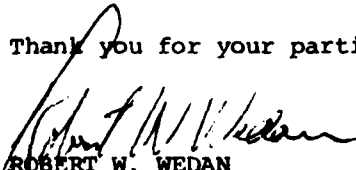
The Federal Aviation Administration, by letter dated October 22, 1979, advised of a demonstration in the Columbus FSS area of a computer-generated Voice Response System (VRS). This system provides direct pilot access through push-button telephones to limited aviation information. The demonstration will continue to April. Included with the letter was a brochure which provided instructions on how to use the system, applicable phone numbers for toll-free access and a list of LOCATION IDENTIFIERS. This letter is to advise you of some of the changes that have occurred since our last communication and to bring you up to date on the current situation. The Newark telephone number has been changed effective December 27, 1979, due to technical problems. The new number for Newark is (614) 323-2112.

Technical problems have been encountered in the Mansfield area also. For the pilots in the Mansfield area, engineering solutions to some of your problems are being explored with the telephone company to provide more satisfactory service.

We would like to take this opportunity to inform you of typographical errors we have found in the brochure since its issuance date, October 1, 1979. The corrections are listed in the enclosed errata sheet. We are sorry for the inconvenience these errors may have caused you.

If there are any questions concerning the VRS, please call (609) 641-8200, extension 3734, from 8:30 am to 4:30 pm, or you may call the Columbus Flight Service Station at (614) 237-8020 during administrative hours.

Thank you for your participation and cooperation.


ROBERT W. WEDAN

Enclosure

80-50-A-2D

FIGURE C-2. OTHER USER INFORMATION (Sheet 4 of 5)

NOTE

TWELVE-KEY PUSHBUTTON TELEPHONES
ARE READILY AVAILABLE IN THE
COLUMBUS, OHIO, AREA FROM THE
TELEPHONE COMPANY. TWELVE-KEY
PUSHBUTTON ACOUSTIC COUPLING
DEVICES MAY BE PURCHASED FROM
ELECTRONIC SHOPS OR TELEPHONE
STORES.

THE FOLLOWING TELEPHONE NUMBERS
MAY BE USED TO ACCESS THE VRS IN
THE COLUMBUS FLIGHT SERVICE AREA.

COLUMBUS	(614) 461-1659
LANCASTER	(614) 654-5457
MARION	(614) 382-1777
MANSFIELD	(419) 525-2955
NEWARK	(614) 345-1493

80-50-A-2E

**WATCH
AM WEATHER
WOSU
CHANNEL 34
COLUMBUS, OHIO**

80-50-A-2F

FIGURE C-2. OTHER USER INFORMATION (Sheet 5 of 5)

APPENDIX D
UNSOLICITED LETTERS



Beasley Industries, Inc.

James C. Whitt
Pilot/Photographer

December 12, 1979

VRS
DOT/FAA/NAFEC
ANA-250
Atlantic City, NJ 08405

Gentlemen:

After using your voice response system, I am very pleased with the service, speed of service, and clarity of the computer. Hopefully, this system will stay in operation and I can see utilization being very helpful to the pilots.

I, like many other pilots, spend too much time on the telephone waiting for the weather to file a flight plan. This system will free the briefers for taking flight plans and give detailed weather information as needed.

Just wanted to give my support to this system.

Sincerely,

James C. Whitt
James C. Whitt
Corporate Pilot

JCW:kc

FIGURE D-1. UNSOLICITED LETTERS (Sheet 1 of 5)

William E. Huff
8080 Kingsley Dr.
Reynoldsburg, Ohio
43068

IRS
DOT/FRA/NAFEC
ANA-230
ATLANTIC CITY
NEW JERSEY 08405

GENTLEMEN:

I have it, hope to deliver.

Sincerely,

W. E. Huff

FIGURE D-1. UNSOLICITED LETTERS (Sheet 2 of 5)

Madison Aviation Center, Inc.

Phones: 614-852-1914
614-878-1693
513-323-6962



1281 U.S. Rt 40, SW
London, Ohio 43140

December 8, 1979

VRS
DOT/FAA/NAFEC
ANA-250
Atlantic City, New Jersey 08405

Gentlemen:

After utilizing the voice response system, we had a positive first impression. The system seems to cover all the necessary weather information. However, we feel that the system would be much more effective if it were to have a list of NOTAM'S on file.

Sincerely yours,

Blair Sullivan

GREG SCHWALL

Blair Sullivan - CFI
Greg Schwall

FIGURE D-1. UNSOLICITED LETTERS (Sheet 3 of 5)

MEDICAL ARTS LABORATORY

OKLAHOMA CITY OKLAHOMA 73103

January 14, 1980

FAA/DO-178-100
754 Pictorial

VRS
DOT/FAA/NAFEC
ANA/250
Atlantic City, N.J. 08405

Gentlemen:

I recently had the opportunity to try out the computer generated VRS installed in Washington, D.C. What a tremendous advance!

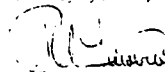
The quality of the reports and quantity of information given is infinitely better than I have ever received from any flight station ever. Further, the organizational discipline imposed by the computer system vastly improved my own planning (something in which I personally take great pride).

If the current weather products available could be expanded by area forecasts and route summaries, this would be a truly invaluable aviation weather tool.

There should be a tremendous relief of the workload on flight service station personnel if the above weather product could be added and the system implemented nationwide. One would need to trouble scarce flight service station personnel only for the obtaining of current notams, appropriate radar summaries and pireps, then file a flight plan and go. From the clever formatting employed, it might even be able to file flight plans directly into the computer using touchtone telephone pads.

Again, my compliments on the VRS system.

Sincerely yours,


Perry A. Lambird, M.D.

PAL:sky

cc: AOPA
FAA

FIGURE D-1. UNSOLICITED LETTERS (Sheet 4 of 5)



PHYSICIANS INSURANCE COMPANY OF OHIO

BATES DRIVE
P.O. BOX 281
PICKERINGTON, OHIO 43147
(614) 864-7100

February 4, 1980

ARD-1/L-400
GEORGE N. BATES, M.D.
Chairman of the Board

JOSEPH K. GILMORE
President

Robert W. Wedan, Acting Director
Systems Research and Development Service, ARD-1
Department of Transportation
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Wedan:

Allow me to inform you that the voice response system available to pilots in the Columbus, Ohio flight service station area has been of assistance to me many times. It would be very helpful if this service were some how made to become permanent. I am a multi-engine instrument pilot with business concerns in Louisville, Kentucky; Indianapolis, Indiana; Lansing, Michigan; and Charleston, West Virginia and this system allows me to be up-to-date on weather regionally without tying up any flight service station personnel.

If it would be appropriate, I will be glad to formalize my recommendation as you might instruct.

Sincerely,

David L. Rader
Sr. Vice President

DLR/skb

FIGURE D-1. UNSOLICITED LETTERS (Sheet 5 of 5)

