technical note techn

Initial Operational Evaluation of Flight Service Automation System

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16. Abstract

The purpose of this report is to document the results of the test and evaluation of selected Model 2 operational message functions, which are part of the Flight Service Automation System (FSAS) Software, Phase II. The evaluation was conducted using Flight Service Station (FSS) field specialists to assess the operational effectiveness and acceptability of selective Model 2 functional capabilities per FAA-E-2684, Volume II. The recommendations made by the specialists were summarized and included in the appropriate sections of this report.

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METRIC CONVERSION FACTORS

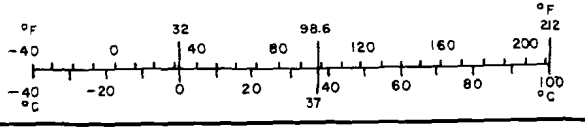
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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EXECUTIVE SUMMARY

The results of the Flight Service Automation Study conducted at the Federal Aviation Administration Technical Center from September 4 through October 17, 1980, reveal no significant problems encountered by the 24 Flight Service Station (FSS) specialists who evaluated the system. The Model 2 functional capabilities that were tested include flight data messages, weather messages, digitized weather radar displays, and some weather graphics with overlay capabilities. Specialists from three levels of flight service facilities participated in the test.

1. The majority of responses recorded on the questionnaires and during interviews with the specialists were favorable.

2. The rate of concurrence was high among the three levels of flight service.

3. Confidence in the new system was evident; for example, 100 percent of the specialists (1) felt that the weather messages were an aid to efficient briefing, (2) felt they could effectively conduct a preduty briefing using the system, and (3) liked the concept of function keys and felt they provided speedy and efficient information retrieval.

4. The major problems with the system centered around messages whose format included a mask. Many specialists disliked having to select from several different masks during an air-to-ground contact. The problems started when several aircraft called at once and the specialist found it cumbersome switching masks while trying to record intervening contacts. A solution many of the specialists suggested was the use of one "universal" mask in which all fields from the other masks would be combined. The computer would format the various fields into Pilot Reports (PIREP's), Position Reports, etc.

5. Specialists were reluctant to do away completely with paper and pencil, especially at the inflight position.

6. Many of the specialists felt that some of the detailed weather messages contained excessive information, such as long Notices to Airmen (NOTAM's) in the detailed weather briefing (WWD) message, thereby increasing briefing time.

7. All of the specialists felt that the first entry should be the aircraft identification versus entering the message type first. They also felt that the aircraft identification should be continuously displayed on the cathode-ray tube (CRT) during a briefing to avoid confusion.

8. A graphic display of the route of flight was desired in some of the route messages, and a graphic display of some of the weather messages was desired.

9. An improved direction finding display was desired, including a display of local weather and a local area situation map display.

In addition to the above findings, numerous valid and well-thought-out comments were recorded by specialists and are summarized. The major points of the comments are included in the discussion of each message type. Actual specialists' comments are included in appendix B.

INTRODUCTION

PURPOSE.

The purpose of this report is to document the results of the test and evaluation of selected Model 2 operational message functions, which are part of the Flight Service Automation System (FSAS) Software, Phase II. The evaluation was conducted using Flight Service Station (FSS) field specialists to assess the operational effectiveness and acceptability of selective Model 2 functional capabilities per FAA-E-2684, Volume II.

BACKGROUND.

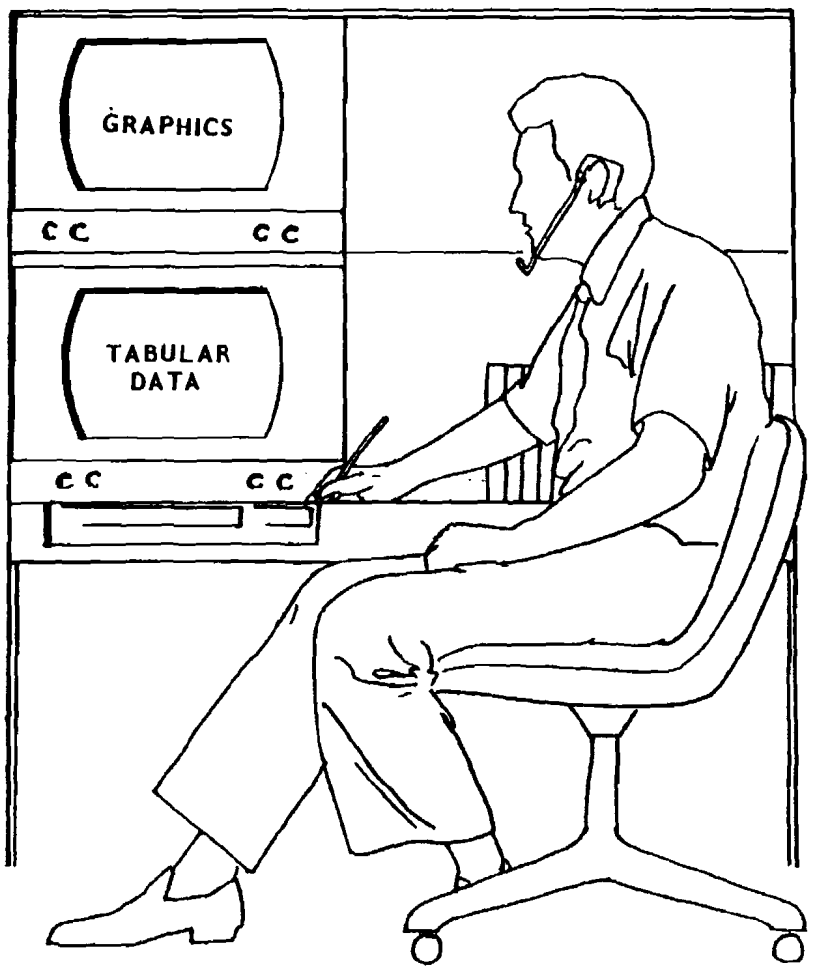
The Federal Aviation Administration (FAA) is in the process of implementing a national FSS automation program. The program is designed to meet the increasing demands for services to the general aviation fleet without a concomitant increase in cost. An important goal of the program is the development of a system to display tabular weather information and graphic weather charts in a clear and efficient presentation to the FSS specialist. This information will be interpreted by the specialist who must present it to pilots in a manner to permit them to make decisions concerning the safe operation of aircraft before and during flight. This test, conducted at the FAA Technical Center, Atlantic City, New Jersey, provided as realistic a simulation as possible of the preflight, inflight, and en route flight advisory service (EFAS) positions, as they will be operated in the future automated FSS. The test situation allowed the flight service specialist to obtain weather information at each of the three positions. All flight data and weather message processing was simulated, and all requests for briefing and flight plan filing followed predetermined scripts. In-house testing of the proposed operational messages was necessary to obtain valuable comments/critique from FSS specialists for consideration and possible implementation into the Model 2 system.

EQUIPMENT DESCRIPTION.

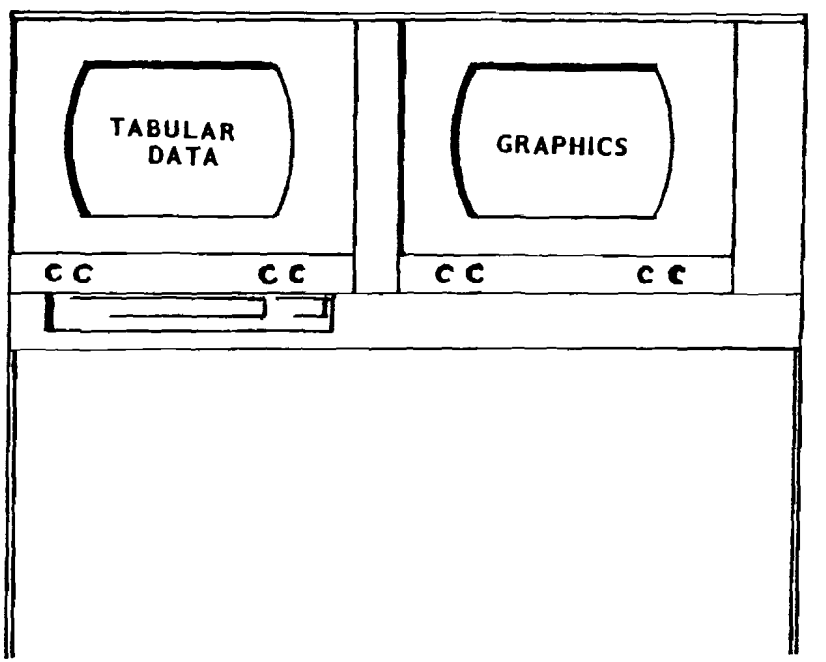
The simulation was conducted on a system built around an Interdata 8/32 computer. Major peripherals include a 256-megabyte disc, magnetic tape, line printers, and a number of terminals for time sharing. The computer drives up to three Genisco graphic generators. Each generator controls two black and white displays and interacts with keyboards and a graphics editing tablet. Each position, inflight, preflight, and EFAS, has two displays and a single keyboard. See figure 1 for preflight and inflight/EFAS position illustration. Figure 2 shows the keyboard configuration.

POSITION DESCRIPTIONS.

PREFLIGHT. Each preflight console had a cathode-ray tube (CRT) for tabular data, and one for graphics, a keyboard for data entry, and a phone with headset. During preflight testing, a simulated pilot called and requested weather or other aeronautical information relative to a proposed flight. Using keyboard input, the specialist requested information prestored in the data base appropriate to the scenario. Depending on the script, the pilot asked for more information and/or filed a flight plan.

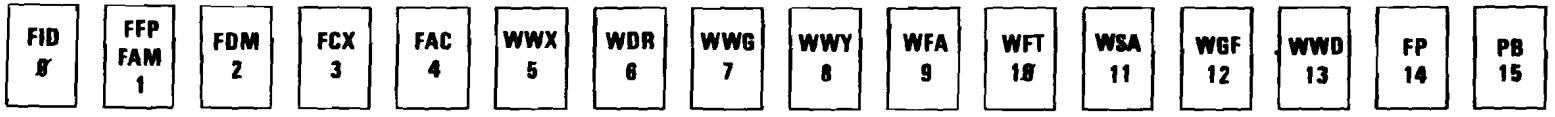


INFLIGHT/EFAS



PREFLIGHT

FIGURE 1. SPECIALISTS OPERATING POSITIONS



FUNCTION SWITCH ARRAY (DETAIL)

LEGEND

0 Aircraft Ident
1 Flight Plan and Amend FP
2 Departure Message
3 Cancel Flight Plan
4 Aircraft Contact
5 Multiple Weather Message
6 Radar
7 Graphics
8 PIREP entry
9 Area Forecast
10 Terminal Forecast
11 Surface Observations
12 Winds Aloft
13 Detailed Weather
14 Forward Page
15 Back Page

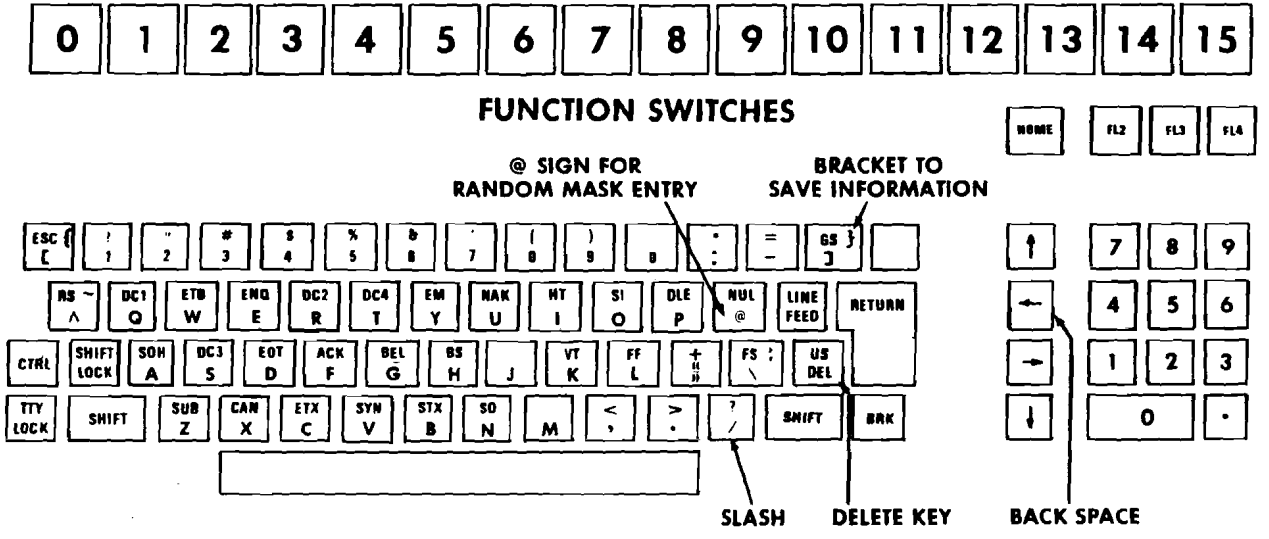


FIGURE 2. KEYBOARD CONFIGURATION

INFLIGHT. This position is similar to preflight, containing a CRT for tabular weather and aeronautical data, another CRT for graphics, a keyboard for entry, and a phone with a headset. Pilot/specialist transaction was similar to preflight testing. A "pilot" called the inflight position on telephone equipment specially modified to simulate radio communication. Services were requested according to prepared scripts. Inflight scenarios featured requests for "air-to-ground" weather briefing, activating and cancelling flight plans, amending active flight plans, changes in route of flight and corresponding weather requirements, Pilot Report (PIREP) handling, position reports, and emergency assistance. The new direction-finding procedures were evaluated at this position.

EFAS. The EFAS console had the same essential equipment and capabilities as the inflight console. The EFAS specialist, however, is only engaged in providing real-time weather information to airborne pilots; i.e., PIREP entry and inflight updating of weather conditions. The filing of flight plans or other routine nonweather functions are not normally performed. Like inflight, the console contains two CRT's, a keyboard, and a phone with headset specially modified for air-to-ground simulation.

METHODOLOGY

SELECTION OF TEST SUBJECTS AND TEST FORMAT.

Specialists from three levels of flight service facilities participated in the test. Six specialists came from level one facilities, 8 from level two, and 10 from level three. Level three participants had a variety of automation experience including Aviation Weather and NOTAM System (AWANS) and Meteorlogical Aeronautical Presentation System (MAPS). All regions were represented by one or more specialists. A "Specialist's Training Packet" was sent to each FSS specialist in advance of the test to familiarize test subjects with background information. The formal training and test period lasted 5 days for each group of four specialists. One day was devoted to training and familiarization of the system. The remaining time allowed each specialist to evaluate inflight, preflight, and EFAS positions. Each specialist then filled out a questionnaire and was interviewed by a staff psychologist.

A realistic weather mix was used during the test based on 4 consecutive hours of weather and Notice to Airmen (NOTAM) information collected from service A. Appropriate portions of this weather were selected for use and became the data base. Actual digitized weather radar data, corresponding to the service A data, were available at all positions. Standard weather graphics were prepared by copying facsimile charts and entered into the system using the graphics editing tablet. These charts corresponded to the other weather data. The capability to overlay products was unlimited up to the point of impracticality. However, the specialists were advised to limit overlays to three products, as called for by the specifications.

Since programming constraints precluded full dynamic testing of the system, it was necessary to select portions of the weather and incorporate it into specially prepared scenarios. When the scenario was used, appropriate data were displayed, relevant to whichever message type was being tested. For example, a message requesting a full route briefing would contain complete information and be

displayed as required by the specifications for a route briefing. If a specialist requested information other than what was built around this route briefing scenario, the data would not be available. This was explained to their satisfaction before testing. This limitation was taken into consideration during test preparation, and the scenarios were constructed with enough variety to exercise as many situations as would test the messages to maximum advantage. By the time testing was completed, the specialists exercised enough message types involving various scenarios, to have a good "feel" for the messages and to know how to apply them to their own operational situations.

Following a request for flight information from a "pilot," the specialist entered a message type by hitting the appropriate function key for the message, and entered other data if pertinent; i.e., location, altitude, etc. If the information entered was unacceptable for some reason, an error message was generated; otherwise, the appropriate data were displayed. Depending on the script, the "pilot" asked for more information or filed a flight plan. The option to display weather radar, any graphic product singly or in combination, was available to the specialist throughout the contact. The most important messages could be entered by function key, and all of them could be entered by typing. If no data were stored apropos to the request, the message "DATA NOT AVAILABLE" was displayed. The weather radar could not be overlaid with graphics, but graphics could be overlaid in any combination with no limit.

SUBJECTIVE MEASURES.

Two methods were used to obtain subjective data from the FSS specialists participating in the evaluation. The first method involved questionnaires designed to elicit the specialists' comments concerning the inflight, preflight, and EFAS positions, weather messages, graphics, and flight data messages. The specialists were asked to evaluate the options available in each message, the format of data on the CRT, the sequence of data as it appeared, data content, and mask displays, where applicable. They were given a choice of adequate/not adequate, satisfactory/unsatisfactory, or sufficient/insufficient in rating each aspect. Sample questionnaires can be found in appendix C. The questionnaires were administered at the end of the 5-day training and evaluation period. Each specialist was given ample time to answer all questions and make comments.

The second method consisted of an interview, conducted after each specialist completed their questionnaires. The interview format was designed to assess the general attitude of the subject specialist toward the overall system, and to encourage additional comments regarding the system. Eight open-ended questions comprised the interview format. A specific format was devised in advance of the actual interviews to avoid or reduce bias through interviewer improvisation. Also, a battery of questions is preferred to a single question both for reasons of reliability and validity. The interviewer recorded responses during the interview using paper and pencil notes. The procedures used for obtaining subjective data from each of the subject specialists was standardized. These procedures are described below.

1. The subject specialists were briefed on the purpose and objectives of the evaluation, and the flight service tasks each would be asked to perform. The briefing was accomplished with the aid of a "test guide" (appendix D) which provided instructions on data retrieval. Any questions that arose were then clarified for him. The point stressed at this time was that the test was not

designed to evaluate the subjects briefing ability, but rather the idea was to allow specialists to evaluate some Model 2 functional capabilities.

2. The specialists were given the opportunity to become familiar with the lab area, the simulated "pilots" who would call requesting information, the personnel monitoring the test, and finally, the three positions with keyboard and CRT configuration. Specialists had a full day to practice on the positions.

3. The subject specialists had the opportunity to evaluate each of the three positions — preflight, inflight, and EFAS — during the next 3 days of the evaluation. Direction-finding procedures were also evaluated.

4. Questionnaires were administered to the specialists at the completion of the test. Ample time was allowed for the subject to thoroughly evaluate the aspects of the Model 2 capabilities provided during the test. The final interview was conducted following questionnaire completion.

OBJECTIVE MEASURES.

In addition to the data obtained through the use of the questionnaire and interviews, other objective data was collected. Stopwatch samples of time spent disseminating specific briefing data, with separate values for flight data functions and weather information, were recorded. Data collection procedures were standardized using the following formula:

1. Type of position
2. Type of activity
3. Stopwatch transaction time

The stopwatch samples are timed beginning as the briefer pushes the connect button to "answer" the call. Separate values were recorded for:

1. Single message weather briefing
2. Two message weather briefing
3. Three message weather briefing
4. Four message weather briefing
5. Detailed weather briefing (WWD)
6. Multiple weather message (WWX)
7. Weather summary (WSM)
8. Single flight data message (i.e., FED, FCX)
9. Flight data/single weather message combined
10. Flight plan filing only (FFP)
11. PIREP entry (WWY)
12. Aircraft contact (FAC)
13. Direction finder (MDF)

Measures of central tendency, including the mean and mode, variance, and standard deviation for transaction times in each category, were calculated.

System response times were recorded using stopwatch samples recorded during testing. Response times were recorded when all three positions were fully operational. A mean time was calculated for each of the following areas: (1) single tabular data request, (2) multiple tabular data request, (3) graphics, and (4) radar, and (5) route briefing requests. These values are shown in table C-1.

The mean response time for the radar includes the time from when the specialist presses the radar key until the picture is completely painted, since the keyboard is disabled during this time. All other response times indicate the time, beginning when the specialist completes keyboard input, until the first character of information appears on the CRT. It is important to remember, when persuing this data, that since the test system is not a fully operational one, the time recordings will not be useful as an efficiency indicator of a fully operational system.

DATA ANALYSIS AND RESULTS.

QUESTIONNAIRES. The responses of the subject specialists to each of the questions were, where possible, quantified and presented in a table which shows N = number of responses in a category and the percent of specialists making that response. A nonparametric binomial test of probability with Yates correction for continuity was used to statistically categorize data. Our test results consisted of two classes of response; i.e., adequate/inadequate, yes/no, etc. For such cases, all of the observations fall into either one or the other of the classifications. For any comparison of two classes, the proportion of cases in one class is P and the proportion in the other is 1-P, or Q. The formula used was:

$$Z = \frac{(X \pm .5) - NP}{NPQ}$$

The significance of an obtained Z may be determined by reference to an appropriate statistical table. Calculated Z values and the probability associated with that score (Zp) are found for each level and for all levels combined. Since we do not predict the direction of responses favorable or unfavorable, a two-tailed test is used. If the value of (Zp) is less than 0.05, the significance of the result goes beyond the likelihood of chance, and is, therefore, noteworthy. Likewise, a (Zp) greater than 0.05 indicates the difference in the distribution of response can be attributed to chance variation or, in other words, there is no significantly different number of favorable responses versus unfavorable. Tables showing results of the data analysis are included in appendix A.

The comments from the questionnaires and final interview (see appendix B) were subjected to a content analysis and placed into the following categories:

1. Graphics comments
2. System comments (comments of a general or overview nature)
3. Position comments (inflight, EFAS, preflight)
4. Flight data messages comments
5. Weather message comments

Results are shown in tables A-2 through A-6 for level 1, tables A-7 through A-11 for level 2, and tables A-12 through A-16 for level 3 facilities. The tables are divided into flight data messages: messages with masks (those without); weather messages, and the positions and graphic questions.

All significant results obtained for level 1 indicate the majority of responses are favorable. The sample size for level 1 is N = 6. In order to achieve significance, all six responses must be in one category. Looking at the percentage of responses, the greatest disparity exists in flight data messages with masks, where one or more specialist had difficulty with the options for PIREP entry and the direction-finder format.

The results obtained for level 2, with a sample size N = 8, are similar to those of level 1. With an alpha level of 0.05, significant results were achieved when 100 percent of responses were in one category or the other. However, a review of the percentage of responses reveals that in some categories the flight data messages with masks presented difficulty for the specialists.

Level 3 results concur with level 1 and level 2. With N = 10, nine or more responses in one category are significant. The masks provided the most problems for the specialist in this level, as well. The most frequently occurring comment involved the method of entering data on the mask format. Many specialists felt that the format was too rigid, that one "universal" mask may suffice, and that, for example, on the aircraft contact mask, some data were extraneous.

Data from all three levels were combined for a total N = 24. A similar statistical evaluation revealed that the majority of responses were favorable for the messages evaluated. With N = 24, at least 19 responses would have to appear in either category for a significant result. Results for the combined levels are found in tables C-17 through C-21. Again, the masks incurred the least favorable responses, although not significant at the 0.05 level. The flight plan mask and amendment messages were given the most favorable evaluation of the messages with masks. The PIREP entry message received a less favorable response, with the aircraft contact and the direction finder receiving the most criticism. Specific comments regarding each of these messages are included in this report.

The majority of the specialists liked the graphics and used the overlay capability. Also, most preferred the dual screen capability. The comments indicated that a wider range of graphics would be preferred with a zoom capability. All specialists felt that the graphics were a great briefing aid.

Although the significance test revealed that specialists were, on the whole, satisfied with the messages and their formats, the position evaluation revealed that in almost every case, no significant results were found to indicate that the type and content of messages available were complete enough at each position to effectively do their job. The dissatisfaction revealed in the percentage evaluation of responses on individual messages becomes significant here. Several comments explain the problems that specialists had and can be found in the System Comments section.

In reviewing the percentage of responses favorable in the position evaluation, it was apparent that specialists were most comfortable with the preflight capabilities. Seventy-nine percent of the specialists felt that the type and content of messages were complete enough to allow them to satisfactorily perform their duties at the preflight position. At the inflight position, 63 percent of the specialists were satisfied, and at EFAS, 58 percent. Figure 3 graphically depicts these results.

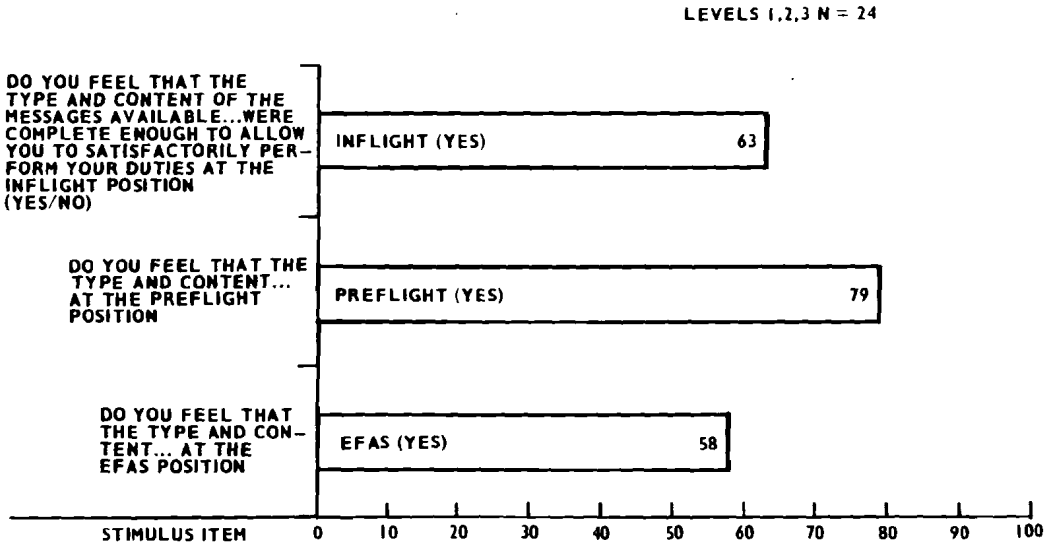


FIGURE 3. POSITION EVALUATION/PERCENTAGE

INTERVIEW RESULTS. The interview format consisted of eight open-ended questions and is found in appendix C. The questions were more general in nature than the questionnaires which addressed specific messages. The results of the first six questions were quantified and percentages calculated. These results are shown in figure 4. Generally, all the specialists felt that the weather messages were an aid to briefing, that they could effectively conduct a preduty briefing, that the function keys are a definite aid in retrieving information, and that the amount of information on the screen at one time was adequate.

A large majority (75 percent) of the specialists felt that the weather messages were excessive or redundant. Ninety-six percent of the specialists said they would not give all of the information in the collective weather message (e.i., WWD, WSM, etc.) unless specifically requested by the pilot. Paging through the information is costly in time and led to frustration, in some cases, as the specialist searched through data to find what he needed. The last two questions of the interview asked for additional comments or suggestions. Following a content analysis, these comments were placed in the subject area to which they pertain in the comments section of this report.

TRANSACTION TIMES.

Transaction times samples were obtained with the use of a stopwatch by personnel monitoring the test. The stopwatch samples were timed, beginning as the briefer pushes the connect button to "answer" the call. Times were recorded for various weather briefings, including single and multiple message briefings, as well as flight plan filing and the direction-finding message. As with all other data, the samples were recorded for each level of flight service.

Descriptive statistics calculated for each group of data include mean, variance, standard deviation, kurtosis and skewness. These values are found in table 1 for level 1, table 2 for level 2, and table 3 for level 3.

The skewness and kurtosis values are useful in measuring the nature and amount of departure from a normal distribution of data points. Skewness is another name for asymetry where one tail of the curve is drawn out more than the other. The other type of departure from normality is kurtosis, or peakedness of a curve. A leptokurtic curve has more items near the mean and at the tails, with fewer items in the intermediate regions relative to a normal distribution with the same mean and variance. A platykurtic curve has fewer items at the mean and at the tails than the normal curve, but has more items in intermediate regions. A negative value for skewness (g1) indicates skewness to the left; a positive value, skewness to the right. A negative value for kurtosis (g2) indicates platykurtosis, and a positive g2 shows leptokurtosis.

The equations used to calculate g1 and g2 are as follows:

$$g1 = \frac{E(y - \bar{y})^3}{S^3}$$

$$g2 = \frac{E(y - \bar{y})^4}{S^4}$$

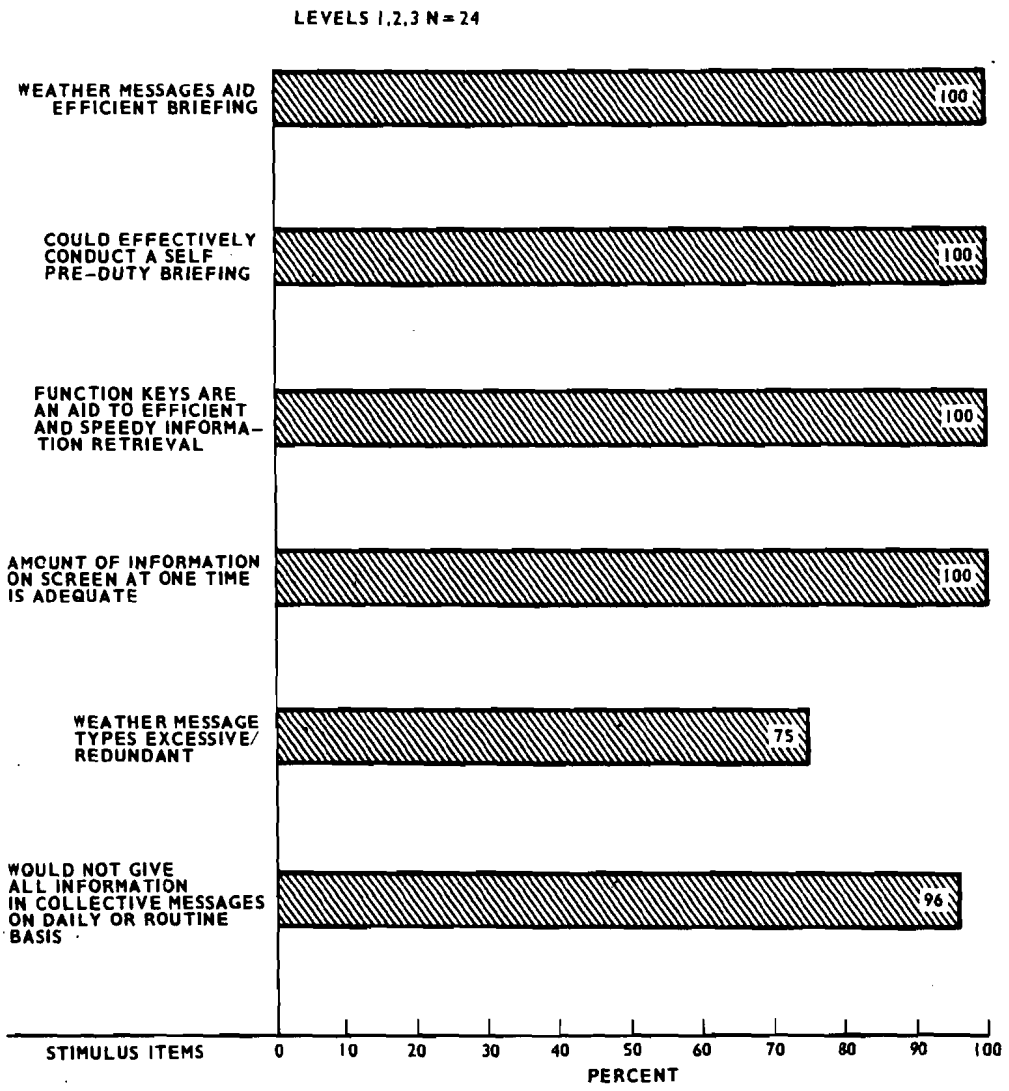


FIGURE 4. FINAL INTERVIEW RESPONSES

TABLE 1. TRANSACTION TIME STATISTICS, LEVEL 1

Variable	Mean	Variance	Std. Dev.	Skewness	Kurtosis
Single Weather Message	3.15817	27.4858	5.24269	6.77017	47.2315
Two Weather Message	4.108	4.5791	2.13988	0.445358	-1.19121
Three Weather Message	--	--	--	--	--
Four Weather Message	6.122	7.8549	2.80268	1.08301	-0.249015
Detailed Weather (WWD)	7.39572	10.8898	3.29997	0.035897	-1.59347
Multiple Weather Message Briefing (WWX)	--	--	--	--	--
Weather Summary (WSM)	--	--	--	--	--
Single Flight Data Message	1.94257	2.19994	1.48322	0.576432	0.721338
Flight Data Single Weather Message Combined (except FFP)	2.18667	1.21029	1.10013	0.927422	0.166436
Flight Plan Filing Only (FFP)	2.50625	0.307998	0.554976	0.0480038	-0.690961
PIREP Entry (WWY)	2.73667	0.132024	0.36335	0.700675	-1.5000
Aircraft Contact (FAC)	1.88	2.039	1.42793	0.528893	-1.08827
Direction-Finder (MDF)	3.71667	0.351489	0.592865	0.668677	-1.5

TABLE 2. TRANSACTION TIME STATISTICS, LEVEL 2

Variable	Mean	Variance	Std. Dev.	Skewness	Kurtosis
Single Weather Message	1.83714	1.38939	1.17641	0.95392	0.294661
Two Weather Message	3.06458	1.41775	1.19069	1.22939	1.12053
Three Weather Message	3.53189	1.32891	1.15278	-0.421956	-0.0783404
Four Weather Message	--	--	--	--	--
Detailed Weather (WWD)	4.28333	1.87657	1.36988	0.648616	-0.701652
Multiple WX Message Briefing (WWX)	3.89143	2.47244	1.5724	-0.202175	-0.478868
Weather Summary (WSM)	8.065	13.0961	3.61885	-0.575286	-0.97943
Flight Data Single WX Message Combined (except FFP)	2.18667	1.21029	1.1013	0.927422	0.166436
Flight Plan Filing Only	3.08786	1.77631	1.33278	0.413315	-1.03441
PIREP Entry (WWY)	--	--	--	--	--
Aircraft Contact (FAC)	1.7	0.1634	0.404228	-0.477964	-1.5
Direction Finder (MDF)	5.22111	3.16993	1.78043	0.677294	-1.16064

TABLE 3. TRANSACTION TIME STATISTICS, LEVEL 3

Variable	Mean	Variance	Std. Dev.	Skewness	Kurtosis
Single Weather	1.92391	1.80706	1.34427	1.5449	1.82499
Two Weather Message	3.3229	2.267361	1.163512	0.782734	-0.676657
Three Weather Message	3.54278	1.94949	1.39624	0.365362	0.796608
Four Weather Message	3.37	0.651648	0.807247	0.325395	-1.0959
Detailed Weather (WWD)	3.78	2.78057	1.6675	1.20196	2.1173
Multiple WX Message Briefing	3.295	0.323296	0.568591	-0.28230	-1.13673
Weather Summary (WXM)	3.37467	2.96622	1.72227	0.948438	0.2144
Single Flight Data Message	2.1668	47.0717	6.86088	6.36388	40.4357
Flight Data Single Weather (except FFP)	2.18667	1.21029	1.10013	0.927422	0.166436
Flight Plan Filing Only	2.52818	0.638815	0.799259	0.201772	-0.890916
PREP Entry (WWY)	2.91429	2.5377	1.59302	0.714623	-0.531162
Aircraft Contract (FAC)	1.34007	1.17055	1.08192	0.647021	-0.78427
Direction Finder (MDF)	5.030	1.45	1.20	--	--

SPECIALISTS' COMMENTS ON FUNCTIONAL MESSAGES

This section contains a summary of specialists' comments gathered from three sources: (See appendix B for complete review of specialists' comments.)

1. Specialist Evaluation Questionnaire divided into individual Weather Message Comments, Position Comments, and Graphics Comments.

2. Final Interview Questionnaire.

3. Observations of Technical Center personnel.

After analysis, the comments from the questionnaires were organized into the following groups: final interviews responses, weather message comments, flight data message comments, position comments, graphics comments, and system comments.

As a result of forming the groups, the same comment may appear in more than one group. An example would be where a specialist makes a comment on graphics when evaluating the detailed weather message. In this case, that comment would appear in the Weather Message Comments under the WWD message evaluation, and also appear in the Graphics Comments section. Another example would be a comment about graphics in reference to a specific operating position. The comment would appear in Graphics Comments and Position Comments. Using this method, a specific area of interest can be investigated knowing that all appropriate reference to that subject is complete.

The section on weather messages and flight data messages contains a narrative discussion on each message type, immediately followed by a conclusion and any recommendation to modify the message for further testing. These recommendations will be the basis for the message content changes to be evaluated during the modification test period. The recommendations are general in nature, the details to be worked out by project personnel.

Occasionally, a specialist may have failed to document an important point that was brought up during discussions with Technical Center personnel. These points or observations were often noted by Center personnel and used to reinforce the commentary analysis. Any observation attributed to Center personnel is identified, as such.

Often a specialist indicated a preference for a particular option or feature that may already be included in the specification. Also, there were occasions where a specialist did not recall something that was demonstrated and commented about it on the questionnaire. This occurred due to the nature of the test, the programming constraints which limited full dynamic testing of all functions and options surrounding the messages, and the sheer volume of material that was presented to them.

When filling out the questionnaires and participating in the posttest interview, the specialists were invited to review any of the messages or graphics products. This allowed a more liesurely examination of the material and helped clarify their impressions. A copy of the specifications was available for examination and any questions were immediately resolved by Technical Center personnel.

Each group of comments is divided into the three levels of flight service they represent. Additionally, level 2 and level 3 comments are categorized according to the type of facility; i.e., SAS, AWANS, etc. All comments are listed and many occur more than once.

The final interview responses are divided by flight service levels and the number of times the response occurs in indicated.

Responses to the following questions are listed:

1. "Do you feel that the various weather message types are an aid to efficient briefing?"

2. "Do you think any weather message types are excessive or redundant?"

3. "Would you give a pilot all of the information provided in the collective weather message on a daily or routine basis?"

4. "Could you effectively conduct a self preduty briefing using the system?"

5. "Do you feel that the function keys are an aid to efficient and speedy information retrieval?"

6. "What comments, if any, would you make regarding the amount of information that is displayed on the screen at one time?"

7. "Would you add or delete anything from the system, based on what you have worked with here?" and,

8. "Is there anything you want to add or comment on?"

The last two questions of the final interview elicited summoned several different responses from the specialists. These have been subjected to a content analysis and placed in appropriate categories. For example, if a specialist responding to question 7 referred to the overall system, his comment would be placed in the Systems Comments section and would appear in the summary of that section.

As can be seen in figure 4, a significant percent of specialists responded alike to a number of the questions. For example, 100 percent of the specialists felt that the weather messages aided briefing, that they could conduct an adequate preduty briefing, and that the amount of information on the screen at one time was adequate. Seventy-five percent of the specialists felt that some of the messages contained excessive amounts of information. When specific references to a message were made, these comments were included with the particular message summary.

WSM - (WEATHER SUMMARY).

The weather summary message was well liked but suffered the criticism of being too much like the detailed weather message (WWD); specifically, too much data to be called a summary. The differences between the WWD and the WSM were too subtle to be readily evident. It was usually necessary to point out and explain the differences to the specialist even after they had used the message more than once.

Sample comments were: "Contained too much information. WSM and WWD repeated themselves," "WSM isn't really a summary; a lot of extraneous material that's not necessary is included. Also, WSM and WWD are very similar," "WSM and WWD repeat each other." "WWD, WSM are the same; WSM includes too much information; it's not really a summary," etc.

The procedure for testing most WSM messages was to utilize a scenario for a cross-country flight for which a complete briefing had been previously given using the detailed weather message. This was to provide a good comparison between WWD and WSM formats.

Despite the above, enough favorable comments were received on the WSM in general, to indicate the concept of a separate message to summarize or update weather is a very popular idea. Sample comments were: "Very good aid for summarizing," "Effective for updating," "The Weather Summary is great;...." One specialist commented that they would "like summary with only significant changes to previous briefing." Several comments made during discussions supported this idea of only displaying information that has changed from a previous briefing. This would require searching the files, locating the aircraft and some way of scanning the data to determine what information has been given previously and then comparing it with new data for changes in order to display only new material. A drawback would be the long system response time for this procedure, and even though you would be updating the weather for the same aircraft identification, it wouldn't necessarily be the same pilot receiving the updated data. It could be a different crewmember. This can be determined by the specialist.

The feature providing Estimated Time Over a Fix (ETOV) and Estimated Time of Arrival (ETA) at destination for route briefings was well liked. Some discussion developed over what criteria would determine ETA if the destination is not served by a terminal forecast. No suggestions were advanced.

CONCLUSION. The WSM was so similar to the WWD as to seriously reduce its value in its present form. The vast majority of the data did not change or was not really summarized. The WSM was a very popular concept.

RECOMMENDATION. Retest the WSM with a different format to make it more effective. Specifically, reduce some of the data and explore a method of displaying only data that has changed.

WUA - (PILOT REPORT REQUEST).

The message comments contained remarks from four specialists. Two of these expressed a preference for some form of graphics display of PIREP's. However, comments gathered under the Graphics Questionnaire contained five remarks in favor of a graphics display. Most comments were from Level III facilities.

The need to extract discrete items of information from PIREP's for display was expressed by several people. For example, only icing or turbulence information might be requested by a pilot. Although only one written comment on this was documented, several verbal requests for this feature were recorded during testing. This function is available under Model 2, as an option in field EI where the element indicator is entered, and only those discrete items selected are extracted from current PIREP's and displayed. This particular feature was not tested.

CONCLUSION. The WUA was satisfactory. Some specialists did indicate a preference for a graphic PIREP display.

RECOMMENDATION. Possible development of a graphic PIREP display.

WNO - (NOTICES TO AIRMEN).

The specialists evaluated the WNO message primarily in terms of its content in the WWD message as indicated by comments such as "FDC NOTAM's excessive," "should not be shown but made available as an option," "delete FDC NOTAM's except temporary flight restrictions and NOTAM's not related to flight, such as airport NOTAM's for overflight." Other comments were the "need for a provision for dropping self-cancelling NOTAM's" and "data would be summarized in a briefing, it is too much."

CONCLUSION. Specialists would prefer NOTAM's not be included automatically but an indication when given a request is made to let the specialist know NOTAM's are available, with the exception of temporary flight restrictions which would always be displayed. Prefer deletion of en route NOTAM's that pertain to an airport condition.

RECOMMENDATION. Look into alternate method of displaying NOTAM's with emphasis on NOTAM's being made available as an option.

WFX - (PROGNOSTIC MAP DISCUSSION).

Specialists were initially confused as to what the WFX was, since they were used to seeing it as the bottom panel of the 36- and 48-hour prognostic chart. Verbal comments indicate that it is useful to the specialists, and that some specialists find some of the terminology difficult to understand, specifically references to vorticity and the LFM model. It should be noted that these areas (vorticity, LFM) have, within the last few years, been included into formal meteorology training at the FAA Academy in the EFAS course. Consequently, the specialists who have received EFAS training are at an advantage in correctly interpreting and using the information in this message.

CONCLUSION. The WFX message was satisfactory.

RECOMMENDATION. No modification to the WFX message.

WSO - (SEVERE WEATHER OUTLOOK).

No one was sure what the WSO was until it was displayed, since it is commonly referred to as the AC or Convective Outlook.

There was little comment on the WSO. One specialist said it had "little use for pilot briefing," but verbal comments from the other specialists indicate it has wide use.

CONCLUSION. The Convective Outlook is used by specialists. There is no strong basis for changing or eliminating the Convective Outlook.

RECOMMENDATION. The Convective Outlook be retained as is except for possibly changing the message identifier to WAC in order that the message identifier can be identified more readily with the message.

WGF - (GRID WINDS FORECAST).

Programming constraints would not allow as much latitude as we would have liked in the selection of discrete altitudes for display with this message. This generated the comments requesting more versatility in altitude selection. Most of the stated recommendations are, in fact, provided for in the specification.

Several remarks refer to the need for a complete display of winds from the lowest level through the highest. This display is useful for preduty briefing and periodic refresher on conditions during an assigned shift. Winds at all levels are available by entering an altitude in field and receiving a display of the altitude requested plus a display 4,000 feet above and below the primary altitude. Below 10,000 feet, the spread is 2,000 feet above and below the primary altitude. Requesting individual altitudes, even with a multiple entry, is tedious. If no altitude is entered in field altitude, the wind processing normal altitude (WPNA) parameter is applied and winds are displayed only through 18,000 feet. No provision is evident in the specification for a single request to obtain winds at all altitudes for a station ("all altitudes" means high and low, through 54,000 feet). A specialist from the southwest stated, "I used FD's above 18,000 regularly and would like them displayed through 39,000." Other comments were "Need winds higher than 18,000," "Should be 3-39,000."

CONCLUSION. The winds aloft lacked a method for a complete display of high altitude winds similar to the low altitude display when the WPNA parameter is applied.

RECOMMENDATION. Further test of the WGF message to include some method of displaying high altitude winds when no specific altitude is entered similar to the low altitude display when the WPNA parameter is applied.

WFA - (AREA WEATHER FORECAST).

The most pertinent comments about the WFA have already been covered under the discussion on the WWD.

The most significant comment was the problem regarding the large amount of data displayed, especially in bad weather. It was suggested that smaller portions of the area forecast be displayed, recognizing the resultant disadvantages.

CONCLUSION. The WFA is important and seemed especially important during preduty briefing based on observations by Technical Center personnel. Because of the large amount of data provided in the area forecast, the specialist must search through the data to obtain the desired information, and this is very time consuming.

RECOMMENDATION. Retest the WFA message using some abbreviated format which would display only those segments of the cloud heights/visibilities that involve the specific route width or zone size as opposed to displaying the entire area forecast.

WWS/WWA - (SIGMETS/AIRMETS).

The comments on these messages are combined because the messages are so similar. Specialists often referred to "Airmets and Sigmets" collectively, even when commenting on just one of them. Written comments suggested combining the two for display. This was supported during discussions with several specialists. Two

written comments suggested appending them to the area forecast, and even possibly incorporating them into the body of the area forecast. Presently, current Airmets are incorporated into a new area forecast, when it is issued.

CONCLUSION. The necessity for Sigmets/Airmets is well documented.

RECOMMENDATION. Retest the WWS and WWA Message in which Sigmets and Airmets are called up together. Also, test appending Sigmets and Airmets to the area forecast.

WSA - (SURFACE WEATHER OBSERVATIONS).

The WSA Message was characterized by a significant absence of comments or criticism. The message content and format all appear adequate. One specialist made a comment that she would rather see the surface observation format as it is now, but admitted the only reason was habit (familiarity with the present format). The slight change in format did not present any problems.

CONCLUSION. The WSA was satisfactory.

RECOMMENDATION. No change to the WSA.

WWD - (DETAILED WEATHER).

The detailed weather message was demonstrated by using a wide variety of route situations. With a few exceptions, the routes extended in all directions out of the Atlantic City area. Several routes went to the midwest and southwest; the longest routes (3) to southern California.

The WWD message was generally well accepted. The main area of discussion was the amount of data included which centered on NOTAM's, flow control, and military operations information. The vast majority thought this information was excessive and several comments suggested this information be accessed by a separate key(s). Some commented that any military activity displayed be confined to those routes/areas in the Automated Flight Service Station (AFSS) local area of responsibility only. The main difficulty with displayed military training route (MTR)/military operations area (MOA) information on long routes is the lack of a means to identify where the area/route is geographically located in reference to the proposed flight path. One suggestion was the inclusion of a two-letter state identifier after the data to partially locate it. On long flights, the chance of a MTR/MOA not being in use by the time the aircraft reaches the MTR/MOA is great. Likewise, a new area may be in use which was not given the pilot in the original briefing, and he would not be aware of it unless he checked with the en route FSS. For this reason, several specialists suggested only giving the military activity in the local area during initial briefing and have the pilot contact FSS's en route for information on activity in their respective areas. It was suggested that the WWD display the names of the FSS's located along the proposed route, in order, along with their appropriate frequencies.

Having the WFA as an option for route briefings seemed to work quite well. It was observed that specialists used the area forecast less as they became more familiar with its contents. A problem with the area forecasts was the large amount of data displayed, especially with bad weather. Even for a short flight, several area forecasts may be displayed even though most of the material in any one area

forecast may be irrelevant to that particular flight. It was suggested that since the contents of the area forecast are broken down into smaller geographic areas, only that smaller portion within the area forecast that falls within that portion of the route of flight be displayed. A serious problem with this is that the scope of the weather information is substantially reduced. The briefer is the only one who can make a professional decision, based on training and experience, as to what is important, and what is not. Denying the briefer data to begin with, does not seem to contribute to sound decisionmaking. A compromise would be to automatically display selected portions of the area forecast and still have the entire area forecast available as an option (as it is now). In any case, the part of the area forecast containing data on flight precautions, etc., would still have to be included in both displays.

Several specialists wanted a graphic display of the flight route on some kind of map background.

CONCLUSIONS. The WWD was popular. Some of the data was excessive, specifically military training activity, NOTAM's, and flow control messages. While these data are important, their significance is reduced as the route extends farther in time from the briefing AFSS. A graphic display depicting the route of flight for reference is desirable.

RECOMMENDATION. Retest the WWD with a modification to improve the display of military training areas, NOTAM's, and flow control information. Develop a method for displaying the route of flight in relation to geographic fixes and/or weather reporting points.

WFT - (TERMINAL FORECAST).

The WFT message was satisfactory overall. Many specialists liked the idea of displaying only the unexpired portions of the terminal forecasts. This saves time going through outdated material. On the other hand, the unexpired material provides a trend in the forecast which is not available otherwise. No written comments addressed this fact. The weather trend (WWT) message can only access unexpired terminal forecasts.

Someone suggested being able to call up all terminal forecasts that meet criteria for Instrument Flight Rules (IFR) alternate minimums (ceilings/visibility 800/2, 600/2). The availability of a suitable alternate is a legal requirement for filing a flight plan under certain weather conditions. It is a frequent and important request in IFR briefings, and it is time consuming to scan all the terminal forecasts.

CONCLUSION. The WFT was satisfactory.

RECOMMENDATION. Develop and retest an option to display only terminal forecasts which meet criteria for IFR alternate minimums.

WSD - (RADAR REPORT).

Comments on the radar summary message were few and varied. Specialists from the western part of the country usually had difficulty interpreting the data since they do not receive tabular summaries of radar reports. Weather detection radar units

are sparse in the west so precipitation echoes are manually traced off Air Route Traffic Control Center (ARTCC) radar scopes periodically. This information is eventually reproduced on the Radar Summary Facsimile Chart, normally distributed to all FSS's in the country.

Some comments suggest that the radar report might lose some of its importance where digitized weather radar displays provide sufficient coverage and interpretive data.

At least two comments referred to a need for the digital plot which comes off the teletype. This plot located precipitation by intensity in numerical values from zero to nine. (Its use would be negated by the planned digitized coverage.)

CONCLUSION. The WSD is acceptable, but comments indicate a need for some sort of graphic display of the material to aid in interpretation. The WSD is not available in the western part of the country. Briefers from the West had difficulty reading the reports due to unfamiliarity.

RECOMMENDATION. Retest the WSD by displaying it in conjunction with a graphic display of weather radar.

WWX - (MULTIPLE WEATHER SELECTION).

The multiple weather message was one of the most popular tested. Some comments were, "Best option of board...," "Excellent," "This selection would be the most widely used in the field."

Analysis of the negative comments reveals they were generated by programming constraints which resulted in necessarily limited use of the message type. All the possible types of weather data and their various combinations could not be tested.

CONCLUSION. The WWX was favorably accepted.

RECOMMENDATION. Attempt to simulate more fully the capabilities of this message in the modification test.

WWY - (PIREP ENTRY, MASK FORMAT).

The main operational problems with filling in the PIREP mask are the pilot (1) giving the information faster than the specialist can enter the data, (2) giving the information out of sequence, and (3) mixing PIREP data with other information forcing the specialist to sort out what is pertinent. All of this combines to slow down entry of data, and additional aircraft calling for service increases the workload further.

Analysis of the WWY message can be broken down into two areas; mask display and data entry.

The PIREP field identifiers were displayed exactly as in the specification example. One comment concerned space restriction, "Should not have space restrictions on most items; i.e., location of phenonema (OV) might require two lines. With the exception of "OV," the specialists did not identify which fields they thought were most important regarding space, and this was the only comment recorded.

With the WWY message, the specialists had the option of calling up the WWY mask and entering the data in sequence according to mask display or random entry by typing first the two-letter element indicator followed by the information. Each element was previewed at the bottom of the screen and then entered into the mask by a keystroke. This procedure was the same for both sequenced entry and random entry. Since PIREP's are rarely received in correct order from pilots, most of the scenarios reflected this and provided the specialists with a realistic challenge.

There were two requests for a separate field for altitude entry. During testing, it was noted that many specialists spent a good deal of time looking for a place to enter an altitude and it was usually necessary to point out to them that it was located over OV. FAA Form 7110-2, presently used for filing pilot reports, contains a separate element indicator, FL, to record altitude (or flight level). The element FL is not included in the specification. Position, time, and altitude are to be entered under element OV. This is what caused the confusion. Interestingly, another comment requested use of the "standard PIREP format" when, in fact, this slight change in altitude reporting is the only deviation from the present system.

CONCLUSION. The method of entering pilot reports using the WWY mask does not provide enough flexibility to accomplish the task quickly.

RECOMMENDATION. Develop a method of filing pilot reports using a mask that will provide for flexibility and speed in input of data. (See recommendations for all masks.)

WWL - (LOCAL WEATHER).

The WWL message did not receive many comments, but most were favorable. Possibly the WWL display was too close in appearance to the WWD and the WSM to have produced much impact. One level II comment was "duplicate feature, could be eliminated," and a Level III comment "WWL not necessary with WSM and WWD."

Other comments indicated the message was especially good for briefing local pilots. For preduty briefing, one commented "best tool is the WWL."

CONCLUSION. No firm conclusion can be reached since comments were divided.

RECOMMENDATION. Retest the WWL message in a way to provide a direct comparison between the WWL and WWD using a zone option with the WWD. The WWD zone option was not tested.

WWT - (WEATHER TREND).

The WWT was one of the most successful messages tested. Comments were all positive and enthusiastic. The only suggestion received was to include the synopsis from the area forecast.

CONCLUSION. The WWT was useful and very popular.

RECOMMENDATION. Further testing of the WWT message to include the synopsis from the area forecast.

FFP - (FLIGHT PLAN FILING, MASK FORMAT).

The majority of comments concerned the ability to swiftly and accurately enter the information as it is given by the pilot, which may or may not be in correct order. One method tested was consecutive entry of data in proper order; each field was typed onto a preview area at the bottom of the screen, and then with a keystroke, that field was entered the appropriate space on the fill-in mask. At any time, an item received out of order could be entered by typing in the two-letter field identifier, followed by the information, and then the keystroke to enter. The specialist could continue entering data in this way until the mask was full. A correction could be made to any field simply by reentering data as above. When completed, a single keystroke entered it into the "system" where it was placed into temporary storage, and an acceptance message was generated. Testing was not elaborate enough to experiment with rejection messages and corrections. The only entry method (option) not tested was where the entire flight plan is typed out completely without preceding each item of data with a two-letter field identifier. When completed, a single keystroke enters the plan. The requirement here is the data must be in correct order. Although not tested, it was explained to the specialists that this option would be available in Model 2.

Comments indicate the random entry method to be most important, with a strong preference to have the computer do a lot of the sorting work. Regarding random entry of data, one comment suggested a slightly different approach than what was tested. Typing in the two-letter field identifier after the data rather then before could speed up entry. Suggestions were made to reduce the field identifier from two to one letter or number to further speed entry.

There was concern that the FFP mark was, like the other masks, too rigid for fast use. Several comments suggested combining the masks somehow to allow more flexibility to the whole system.

Various comments concerned cosmetic changes to the mask; such as, sufficient space for route of flight, pilot data and remarks, and changing the sequence of some of the flights. However, most specialists wanted the basic sequence of flight plan fields the same as that presently used. Changing field identifiers to numbers was suggested.

Concern was shown in a number of comments about how to handle multiple flight plans filed for the same aircraft and pilot. Most wanted the capability of recalling information that does not change, such as aircraft identification, pilot data, type, etc., and retaining this data in subsequent masks for each additional flight plan filed.

The vast majority could see no use for Beacon Code (BC), since this function is assigned by air traffic control (ATC) usually when the pilot receives a clearance. Only one written comment expressed this, but personnel conducting the test noted verbal comments from almost everyone questioning the usefulness of the BC field. Written and verbal comments showed some confusion over Output Routing (OP) and Closure Points (CP). These functions were new to the specialists.

CONCLUSION. The mask concept for flight plan filing was accepted and well liked by the specialists, but more flexibility is needed, if possible. Random entry was considered most useful, and further streamlining of this feature is desired.

Handling of multiple flight plans was a concern. The flight plan fields should be retained in their present format. The use of field BC is questionable.

RECOMMENDATION. Retest the FFP message trying out new methods of field entry including use of single numbers or letters replacing field identifiers. Test the option of entering the whole flight plan without using field identifiers. Retest the other methods again for comparison. Develop and test a multipurpose mask which would incorporate the functions of the other masks into the FFP mask.

FAM - (AMEND FLIGHT PLAN).

The only amendment option tested involved calling up a flight plan previously filed and making necessary corrections to the appropriate field. Numerous comments suggested, combining the FAM with the FFP (Flight Plan) message, or even replacing it with the FFP. These comments were generated by an unforeseen occurrance involving programming of one of the function keys. When it was desired to recall a flight plan from storage, occasionally a specialist would strike the FFP key instead of the FAM key, and in either case, the flight plan would appear. The intent was to recall the plan using the FAM key only. The specialists were cautioned that this might happen during testing and were advised to consider this when filling out the questionnaire.

Since simulation of interfacility message processing was not done, this area was discussed at length with the specialists. There was concern over amendments to multiroute military flights and flight plans on file outside the AFSS area of responsibility.

CONCLUSION. There is concern over interfacility processing of amendment messages. When the FFP key was inadvertently struck, a flight plan would come up for amending which caused confusion with some of the specialists.

RECOMMENDATION. Retest the FAM message to exercise all correction options, and simulate interfacility message processing.

FRR - (PREFERRED ROUTE REQUEST).

Our method of testing the preferred route message was to have the specialist call up a preferred route using the FRR message in the midst of filing a flight plan. These was no method to automatically incorporate the route into the flight plan as called for by the specifications. The specialist stored the partially completed plan, called up the route, copied it, and typed it into the flight plan mask. When the FRR message was called up, the flight plan was not visible. It was explained to the specialists that the specifications called for the route to be incorporated into the flight plan and other weather messages. While our system involved more work, the value of the message was not lost to the specialists and their reaction was quite favorable.

CONCLUSION. The FRR message was favorably accepted.

RECOMMENDATION. No changes to the message.

FSU - (SPECIAL USE AREAS/ROUTES).

MTR's and MOA's were considered important to the specialists but there was universal agreement on one point. The display of military activity beyond the parent FSS area loses much of its impact. There are so many routes and areas that it is beyond the capability of the specialist to know their construction or their location, and some felt it was pointless to give the information to the pilot when nothing else was known about the area/route. Several comments suggested a graphic display along with the message as a step toward a solution. This would be especially helpful for those routes outside the parent FSS area. Another suggestion was to include only those areas/routes within the parent FSS area since, at present, they are only responsible for a 100-mile radius. Another comment was to include with the MTR/MOA display, the ident of the FSS responsible for that MTR. This way the pilot would at least know who to contact en route for more information on the area, and the information would most likely be more current on a long flight. The same specialist thought NOTAM's on temporary flight restrictions would be a useful addition here.

CONCLUSION. Specialists would like a graphic display of MTR/MOA information. They are most concerned with the area around their own FSS, but would like more distant information displayed if meaningful data could be supplied with that information.

RECOMMENDATION. Retest the FSU message with a graphic display of the routes/areas. Also include supplemental information with the tabular data, such as FSS identifiers or frequencies for the pilot to contact.

FCF - (ATC SYSTEM COMMAND CENTER).

The specification calls for the display of Central Flow Control (FCF) Data by entering the name of an airport. If no airport is entered, all FCF data stored is displayed.

Four comments were received. Two comments indicated the FCF message was not used; it was found in the WWD message. Single comments indicated the specialist thought it was a good aid; it was useful to long-range flights.

CONCLUSION. The FCF was received favorably.

RECOMMENDATION. No further testing of the FCF message.

FED - (ENCODE/DECODE).

The FED message was very well received. One specialist expressed concern over proper spelling to retrieve data. To solve that problem, a two-letter state identifier could display all the locations in that state. Some specialists wanted FSS and Center included in the display. It was explained to them that complete data, such as found in the Location Identifier Handbook (7350.4), would be available under Model 2. One comment supported programming contractions and aircraft types, as well. Another comment suggested a listing of state two-letter identifiers be supplied. The capability to enter more than one location at a time was considered important to at least one person. Several mentioned the need to retain data on the screen while utilizing the FED function.

CONCLUSION. The FED message was very popular. The specialists would like as much supplemental help as possible for full utilization of the feature, such as handy list of state identifiers, retention of other data on the screen while using the FED, etc.

RECOMMENDATION. Retest FED message implementing as many of the above mentioned features as possible.

FCX - (CANCELLATION/CLOSE).

Our test exercised the entry of departure points, destination, and times to demonstrate the various options. Complex problems were not attempted, such as generation of rejection messages, etc. Comments from the specialists indicate concern with areas we could not investigate at his point. An attempt was made to satisfy the specialists queries on message processing by referring to the specifications and our knowledge of the system.

CONCLUSION. The FCX message was satisfactory from the standpoint of the limited testing done.

RECOMMENDATION. Retest the FCX message with more dynamic situations and improved programming.

FDM - (DEPARTURE MESSAGE).

Testing the FDM involved simple flight plan activations with various times and destinations involved. Complex problems, such as generation of rejection messages for solving were not attempted. Like the FCS, an attempt was made to satisfy the specialists questions by referring to the specifications and our knowledge of system operation as it will be under Model 2.

CONCLUSION. The FDM message was satisfactory from the standpoint of the limited testing done.

RECOMMENDATION. Retest the FCX message with more dynamic situations and improved programming.

FAC - (AIRCRAFT CONTACT).

Because of programming limitations, two masks were used, displayed separately. One was for progress reports and the other for flight monitoring. To callup the monitoring mask, the specialist struck the FAC key and then typed in M. For progress reports, they struck FAC and typed P. It was believed that the extra keystroke to call up the appropriate mask was not any extra work, since even if one mask was used, the specialist would still have to utilize a separate keystroke to access the proper area on the mask for data entry. For example, if a pilot wanted flight monitoring service, and the cursor was in position to make an entry in the position reporting section, some method would have to be employed to get the cursor over to the special monitoring section. However, overwhelming preference was for one mask. Further, several specialists would like the FAM mask combined with others, notably, the FFP and FAM.

The IFR position reporting section was considered not applicable to FSS inflight operations. Typically, "Too many options for position report, aircraft I.D., fix, time should be sufficient," "Need more pertinent mask for FSS" (position report unsuitable), "Mask should contain fields for aircraft I.D., type, position, time altitude, and required information for a visual flight rules (VFR) position report." The vast majority of specialists related to Technical Center personnel that receiving IFR position reports for relay to ARTCC is a relatively rare event in FSS.

Many specialists thought they would be in trouble with multiple contacts using the mask in its present form: "I was limited to what I could do with the mask! Under test conditions it worked but if I had to talk to more than one aircraft I would be down the tube. Need an "open" mask to type aircraft number, its request, and another aircraft that might call...." "Would work with one contact but can cause problems with a series of contacts in a row." "Not efficient during heavy traffic; only one contact is displayed." "Too restrictive and too slow for intensive operations." Closely associated with this area were comments for more free or "open" space to record information, despite the fact that the remarks section of the mask would cover this, as was pointed out to them.

The need to enter the aircraft ident first and have it displayed throughout the contact was considered important to many.

There were questions about whether subsequent data would be displayed for a pilot calling more than once. Since all data are archived, some feature could allow all preceding information on the same aircraft to be displayed on request. This is especially true of the special monitoring function. "On bay monitoring when each position report is added, the last is removed. I would like to be able to see each report on the mask with each succeeding report added to the end without erasing the previous information."

CONCLUSION. The FAC aircraft contact mask should be on one display (as called for by the specifications) and possibly combined with other masks to simplify operation. Some of the information, notably the IFR position reporting data should be modified for use more relevant to FSS. The method of displaying fixes and times in the flight monitoring section could be improved. The overall layout of the data fields could probably be adjusted for improved utility. More flexibility in handling multiple contacts and repeated contacts is necessary.

RECOMMENDATION. Retest the FAC using a modified mask(s). Develop solutions to the above problems and utilize effective scenarios to fully test these changes.

MDF - (DIRECTION FINDING, MASK FORMAT).

The MDF program used in the Model 2 evaluation was tested using combinations of single bearing very high frequency omni-directional radio range (VOR), multiple bearing direction finding (DF)/VOR, and multiple bearing direction finding. Technical Center personnel, with FSS background simulated lost pilots. The specialist was instructed to handle the situation in the same manner as they would in their own facility. A portable training direction finding unit was used to display required bearing information for entry into the system. The specialist had reference to a sectional chart and a printed checklist containing minimum information necessary to work the problems per Handbook 7110.10, Section 400.

The following listed comments are summarized and in order of frequency of occurrence.

1. Additional fields should be added to the mask for required information necessary to work a problem, such as fuel remaining, number on board, and weather as reported by the pilot, etc.

2. Graphics display of local area including terrain features, prominent landmarks, VOR's, local airports, and minimum altitudes. Graphic display of aircraft position and weather radar superimposed. Zoom capability.

3. Ability to call up weather data for display.

4. Display of airports that are VFR.

5. Retention of direction finding mask when calling up weather and other data.

6. Use, in conjunction with Doppler, for distance readout.

7. Good for locating aircraft but not for running direction finding approaches.

8. Dual screen for direction finding graphics and tabular data; two tabular data screens, one for direction finding mask, other for requested weather.

Other comments were for random format entry, provision for "other emergencies VFR-on-top, low fuel, etc.," provide left/right turn information, computer display of closest airport to aircraft position, and weather for that airport.

Although airspeed is a designated field for entry of data, there is no provision for display of time-to-station in the output section of the specification. Also, no provision is made for altitude entry, although winds aloft are calculated for aircraft guidance.

There were only 2 negative comments out of 30. One concerned inability to run a direction finding approach and the other was nonspecific. The remaining comments were varied and lengthy in many cases, with many useful ideas presented.

CONCLUSION. The MDF message is considered useful and an improvement over present methods. Specialists would like a graphic display of the local area to include VOR's, airports, terrain features, minimum altitudes, a zoom capability, radar overlay, and the aircraft position superimposed on the map. Distance and direction to selection airports, such as VFR airports or clear areas to which the aircraft could be steered, should be displayed along with weather information. Additional fields should be added to the mask to enter minimum information needed to work the emergency and coordinate with adjacent ATC facilities.

RECOMMENDATION. Retest MDF message implementing as many of the specialists ideas as possible including field changes to mask, graphics display, and improved method of procuring and displaying tabular weather data.

ALL MASKS.

A large number of comments pertained to the format and method used in the flight plan, aircraft contact, and pilot report filing masks. These comments are summarized in order of their frequency of occurrence.

The greatest percentage of comments indicate the specialists prefer a free format method of input. In conjunction of this, a slightly smaller percentage of comments indicate a preference for the computer to format the data after all entries have been made. In addition, they indicate a preference to retain basic information, such as aircraft identification on the screen, in a reserved area throughout the transaction. This was stressed particularly at the inflight and EFAS positions.

A large percentage of the comments indicated a preference for recall capability of basic information to be used, for example, in the filing of multiple flight plans for the same aircraft and pilot.

A smaller percentage suggested a moveable cursor rather than field entry of data to facilitate editing and input, preference for a universal mask to be used for flight plan filing, aircraft contacts and pilot reports, one digit or letter be used as field identifiers, and entry of aircraft identification before any mask or message type is selected.

Less than 2 percent of comments pertaining to all masks showed the specialist(s) did not see any reason for the aircraft identification or pilot data to be an input requirement.

Verbal comments indicated the specialists disliked not being able to leave the mask, obtain weather or other data, and return to the completion of the mask without losing the previous entries.

CONCLUSION. Specialists prefer a free-format method of input with the computer formatting the data after input is complete; retention of basic information, such as aircraft identification on the CRT throughout the transaction; and more flexibility between the various mask functions. Verbal comments, such as being able to transfer common fields of data from one mask to another (i.e., from the aircraft contact mask to the flight plan mask, flight plan mask to the pilot report mask, etc.) support the desire for flexibility. Specialists also prefer entry of the aircraft identification before the message type, as the aircraft identification is usually the first item of data the pilot gives. This is supported by numerous verbal comments made during testing. Some specialists preferred using one mask for all of the mask functions and having the computer put the pertinent data into the proper format and simplified field identifiers.

RECOMMENDATION. A more flexible method of input be developed with messages formatted by the computer. Possible development of one mask to encompass the functions of the FFP, FAC, and WWY masks. Reserve an area of the CRT for display of basic data, have aircraft identification as first field to be input, and possibly develop field identifiers using one letter or number or other simplified identifiers.

POSITION COMMENTS SUMMARY.

Specialists comments were grouped to see if anything significant would be revealed regarding the relationship of the message types to the operating positions. Since the majority of these comments appear in the other sections, including the weather and flight data message section, an analysis has already been performed for most of the comments and their areas of respective concern.

The comments with respect to operating position support the need for an improvement in mask display to improve efficiency. Selecting and filling in separate masks for flight plan filing, copying pilot reports, and position reports becomes arduous when compounded by requests for various weather information and multiple contacts. A few specialists believed it would be necessary to retain either flight progress strips or some sort of pencil recording of information. This reference to progress strips was about evenly divided between levels 1 and 3, including a specialist from an AWANS facility. However, since this complaint was not overwhelming throughout the survey, it might suggest that more flexibility in mask display for recording and/or processing of information would tend to alleviate this problem. Before testing commenced we requested all participants to operate their respective positions without the aid of pencil and paper. It was well into the second day of testing before we allowed use of any such aid if the specialist preferred it. Most took advantage of this, especially the air-to-ground positions. When specialists resorted to the paper aid, it was usually to record the aircraft idents and locations for weather or aeronautical information that was requested. Often mentioned was the need to enter the aircraft ident first, and to retain it during the contact. The need to store and record operational data during a contact was universal among all levels of FSS.

There were several positive comments about the data contained in the weather messages themselves, the only complaint being too much data in the WWD message. One comment was "I have not worked a real EFAS position but I felt sufficient information was available."

At least one person commented that the preflight position was easier to brief, due to the advantage of not having other pilots interrupt a briefing. One said, EFAS was "easiest to adapt to."

Other ideas advanced were "A separate mask for EFAS.., the FAC mask is not adequate." No suggestion for improvement was advanced here. "On UA's - type in all data given by the pilot, out of sequence, then by use of slewball, put the proper data in appropriate fields."

GRAPHICS COMMENTS SUMMARY.

The graphics products available for overlay during the test were as follows:

1. Surface analysis
2. Radar summary
3. Hi-level sig. prog.
4. 36-hr. surface prog.
5. 48-hr. surface prog.
6. Surface analysis, isobars only
7. Surface analysis, fronts only

8. 500 mb analysis, heights
9. 500 mb analysis, heights accented
A. 500 mb temperature
B. 500 mb temperature, accented
C. 500 mb stations
D. Freezing level

Specialists were encouraged to use the graphics, either alone or in overlay combinations, throughout the test period. All of the written comments made by the specialists regarding the graphics are recorded in appendix B. Those remarks that appeared most often are summarized here.

Generally, the specialists felt that the graphics were a great briefing aid. The aspects which received the greatest amount of response pertain to the dual screen capability, additional graphics capabilities (the specialists would like added), and general comments regarding the overall effectiveness of graphics at the positions.

Opinion was divided on the dual screen capability. Some specialists felt that the dual screen allowed for many useful combinations of graphics. Some said that "with the dual screen, the specialist can use both screens at the same time as a briefing tool." Also, the dual screen "gives you the capability of having a remote screen for the pilot to look at while you are briefing from your own position." This comment was made by a specialist with AWANS experience in reference to face-to-face briefing. On the other side, some specialists felt that the dual screen might be confusing. Specialists requested several additions to the graphics, such as 12-24-hour progs; graphic display of pilot reports pertinent to the briefing area; top of the prog map which shows areas of IFR, VFR, and turbulence; weather depiction chart; severe weather outlook chart; and low altitude en route, sectional, terminal control area (TCA) and MTR information. Many specialists indicated a desire for direction finding graphics, such as an area map with terrain features and capability to zoom in on the area the lost aircraft is in, and VOR sites, airports, and National Data Bases as a minimum. Also, a means of graphically displaying the aircraft location along with a course line from the aircraft to the desired location superimposed on the screen was popular with many.

Three graphics in overlay combination were most often thought to be the maximum number that could be simultaneously viewed without confusion. "I think that more than three overlays at a particular time detracts and defeats the purpose."

Regarding the overall effectiveness of graphics at the positions, all but one specialist felt that the graphics were an improvement to the present facsimile transmission system. "Excellent capability; by making the charts available at the positions, more specialists will use the data."

Regarding the overall effectiveness of graphics at the positions, all but one specialist felt that the graphics were an improvement to the present facsimile transmission positions, more specialists will use the data."

CONCLUSIONS AND RECOMMENDATIONS. For the modification test period, the following changes/additions will take place in the graphics evaluation:

1. The number of graphics products will be expanded to include additional charts requested by the specialists, including additional direction finding graphics.

2. Several combinations of overlays will be prepared in advance conforming to the specialists' preference.

3. New products will be created and tested, based on specialists' comments for improved presentation of data.

SYSTEM COMMENTS SUMMARY.

The comments made during the final interview and in the questionnaire that pertained to the system in general, rather than to any particular message type or position, have been grouped under the heading of System Comments.

The comments received varied greatly in the items they covered. The majority showed the specialists preferred to have the aircraft identification remain on the screen, a moveable cursor (aid in editing or adding information), and function keys for each message type that can be used simultaneously.

Less frequent comments were: The ability to recall data so that a message or data is not lost when going to another function; i.e., WWD to FED message; a clear key be added to the keyboard; entry of the aircraft identification as the first input field; the FFP, FAM, and FAC messages use a single format; and an aircraft identification or pilot's name should not be a required input field — the specialist should have free entry into the system.

Some specialists also voiced the concern of how statistical data will be recorded, such as "VFR not recommended," "pilot briefing" and other comments specialists now record on the briefing log. They also felt it would be impossible to do away with aircraft contact strips at the EFAS and inflight positions. Others wanted items in the data base, such as the Airman's Information Manual (AIM), approach plates, and DF approach procedures.

GENERAL SUMMARY AND CONCLUSIONS

A review of the results of the initial evaluation of some Model 2 capabilities reveals a high level of confidence in the system among the flight service personnel who participated in the test. The major concern voiced by the specialists pertained to the messages whose format included a mask.

The recommendations made by the specialists were summarized and included in the appropriate sections of this report. Accordingly, changes and modifications based on these recommendations will be made. Additional testing will be conducted again to evaluate the chanes with actual flight service personnel participating.

Four major areas will be changed or modified for the next test. These areas are:

1. The direction finder message will be improved to provide a better display with associated graphics.

2. A universal mask will be developed to include most of the functions of the other masks.

3. Improved graphics will be added, including a display of information contained in en route weather messages.

4. The format of data entry for message retrieval will be streamlined.

Minor changes to the format and context of certain messages will also be made, based on specialists' recommendations.

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3. Nonparametric Statistics for the Behavioral Sciences, New York 1956, McGraw Hill Book Co., Inc. by Sidney Siegel.

APPENDIX A

RESULTS OF DATA ANALYSIS

TABLES A-1 THROUGH A-21

LIST OF TABLES

TABLE A-1. MEAN SYSTEM RESPONSE TIMES

(3 OPERATING POSITIONS — INFLIGHT, PREFLIGHT, EFAS — STOPWATCH SAMPLES)

TYPE OF REQUEST	9/8/80	9/9/80	9/10/80	9/15/80	9/16/80	9/17/80	9/22/80	9/24/80	10/1/80	10/6/80	10/7/80	10/8/80
SINGLE TABULAR DATA REQUEST	1.40	0.79	1.58	1.83	0.81	1.32	1.04	0.98	0.85	0.83	1.15	0.94
MULTIPLE TABULAR DATA REQUEST	—	2.32	4.91	3.77	6.24	3.57	3.38	1.68	—	4.08	2.90	6.65
GRAPHICS	1.49	0.86	1.57	1.99	1.48	1.95	1.18	1.04	1.50	1.15	1.70	1.51
*RADAR	11.61	9.07	12.89	10.45	9.04	—	5.67	—	10.95	—	12.36	11.11
ROUTE BRIEFING REQUESTS	4.20	3.91	2.99	1.48	4.20	4.89	4.63	3.06	4.28	3.17	2.84	4.51

* TIME DENOTES RADAR FROM START TO FINISH SINCE KEYBOARD IS DISABLED

TABLE A-2. LEVEL 1, RESPONSES TO FLIGHT DATA MESSAGE EVALUATION: MESSAGES WITH MASKS

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT						MASK					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.
FFP	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
	6	100	0	0	2.04	.04	□	4	67	2	33	.408	.63	○	5	83	1	17	1.22	.22	○	6	100	0	0	2.04	.04	□	4	67	2	33	.408	.63	○
FAM	6	100	0	0	2.04	.04	□	5	83	1	17	1.22	.22	○	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	5	83	1	17	1.22	.22	○
FAC	*		*					*		*					1	17	5	83	1.22	.22	○	*		*					3	50	3	50	0	1.0	○
WWY	*		*					*		*					5	83	1	17	1.22	.22	○	*		*					5	83	1	17	1.22	.22	○
MDF	5	83	1	17	1.22	.22	○	6	100	0	0	2.04	.04	□	5	83	1	17	1.22	.22	○	4	67	2	33	.408	.63	○	4	67	2	33	.408	.63	○

LEVEL 1
N=6
α=0.05

* DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-3. LEVEL 1, RESPONSES TO FLIGHT DATA MESSAGES

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.
FDM	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
	*		*					6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□	*		*				
FCX	*		*					6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□	*		*				
FED	*		*					6	100	0	0	2.04	.0414	□	4	67	2	33	.408	.6312	○	*		*				
FCF	6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□
FSU	6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□	5	83	1	17	1.22	.2224	○	6	100	0	0	2.04	.0414	□
FRR	6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□	6	100	0	0	2.04	.0414	□

LEVEL I
N=6
α=0.05

* DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-4. LEVEL 1, RESPONSES TO WEATHER MESSAGES

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
WSM	ADE. N	ADE. %	N. ADE. N	%	Z	ZP	SIG.	SAT. N	%	UNSAT. N	%	Z	ZP	SIG.	SUFF. N	%	INSUFF. N	%	Z	ZP	SIG.	ADE. N	%	N. ADE. N	%	Z	ZP	SIG.
	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WUA	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WNO	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WFX	*		*					6	100	0	0	2.04	.04	□	*		*					4	67	2	33	.408	.63	○
WSO	*		*					*		*					6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WGF	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WFA	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WWS	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	5	83	1	17	1.22	.22	○
WWA	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WSA	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WWD	5	83	1	17	1.22	.04	○	5	83	1	17	1.22	.22	○	6	100	0	0	2.04	.04	□	5	83	1	17	1.22	.22	○

LEVEL I
N = 6
α = 0.05

* DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

	SEQUENCES						FORMAT						OPTIONS						DATA CONTENT					
WFT	ADE. N	ADE. %	N. ADE. N	%	Z	ZP	SIG.	SAT. N	%	UNSAT. N	%	Z	ZP	SIG.	SUFF. N	%	INSUFF. N	%	Z	ZP	SIG.	ADE. N	%	N. ADE. N	%	Z	ZP	SIG.
	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WSD	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WWX	5	83	1	17	1.22	.22	○	5	83	1	17	1.22	.22	○	5	83	1	17	1.22	.22	○	6	100	0	0	2.04	.04	□
WWL	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□
WWT	6	100	0	0	2.04	.04	□	6	100	0	0	2.04	.04	□	5	83	1	17	1.22	.22	○	6	100	0	0	2.04	.04	□

LEVEL I
N = 6
α = .05

□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-5. LEVEL 1, RESPONSES TO INFLIGHT, PREFLIGHT QUESTION

INFLIGHT QUESTION

Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the INFLIGHT position?

Yes		No		Z	Zp	Significance
5	83%	1	17%	1.22	0.2224	-

PREFLIGHT QUESTION

Do you feel that the type and content of messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the PREFLIGHT position?

Yes		No		Z	Zp	Significance
6	100%	0	0%	2.04	0.0414	+

Note: + Significant at the 0.05 level

- Not significant at the 0.05 level

TABLE A-6. LEVEL 1, RESPONSES TO EFAS, GRAPHICS QUESTION

EFAS QUESTION

Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the EFAS position?

Yes		No		Z	Zp	Significance
5	83%	1	17%	1.22	0.2224	-

GRAPHICS QUESTION

Do you prefer the dual screen graphic capability over the normal configuration of one display for alphanumerics and one display for graphics?

Yes		No		Z	Zp	Significance
4	67	2	33%	0.408	0.6312	+

Note: + Significant at the 0.05 level

- Not significant at the 0.05 level

TABLE A-7. LEVEL 2, RESPONSES TO FLIGHT DATA MESSAGES: MESSAGES WITH MASKS

	SEQUENCE							FORMAT							OPTIONS							DATA CONTENT							MASK						
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.
FFP	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
	7	88	1	12	1.77	.08	O	8	100	0	0	2.47	.01	□	7	88	1	12	1.77	.08	O	7	88	1	12	1.77	.08	O	5	63	3	38	.35	.73	O
FAM	7	88	1	12	1.77	.08	O	7	88	1	12	1.77	.08	O	6	75	2	25	1.06	.29	O	7	88	1	12	1.77	.08	O	6	75	2	25	1.06	.29	O
FAC	•		•					•		•					6	75	2	25	1.06	.29	O	•		•					4	50	4	50	0	1.0	O
WWY	•		•					•		•					8	100	0	0	2.47	.01	□	•		•					6	75	2	25	1.06	.29	O
MDF	8	100	0	0	2.47	.01	□	7	88	1	12	1.77	.08	O	5	63	3	38	.35	.73	O	3	40	5	60	.35	.73	O	6	75	2	25	1.06	.29	O

LEVEL 2
N = 8
α = 0.05

• DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
O NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-8. LEVEL 2, RESPONSES TO FLIGHT DATA MESSAGES

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.
	N	%	N	%				N.	%	N	%				N	%	N	%				N	%	N	%			
FDM	*		*					8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	*		*				
FCX	*		*					8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	*		*				
FED	*		*					8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	*		*				
FCF	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
FSU	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	6	75	2	25	1.06	.29	○
FRR	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□

LEVEL 2
N = 8
α = 0.05

* DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-9. LEVEL 2, RESPONSES TO WEATHER MESSAGES

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.
	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
WSM	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WUA	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WNO	7	88	1	12	1.77	.08	○	7	88	1	12	1.77	.08	○	7	88	1	12	1.77	.08	○	5	63	3	37	.35	.73	○
WFX	*		*					7	88	1	12	1.77	.08	○	*		*					6	75	2	25	1.06	.29	○
WSO	*		*					*		*					8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WGF	8	100	0	0	2.47	.01	□	7	88	1	12	1.77	.08	○	7	88	1	12	1.77	.08	○	6	75	2	25	1.06	.29	○
WFA	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WWS	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WWA	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WSA	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WWD	7	88	1	12	1.77	.08	○	7	88	1	12	1.77	.08	○	7	88	1	12	1.77	.08	○	7	88	1	12	1.77	.08	○

LEVEL 2
N=8
α=0.05

* DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.
	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
WFT	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WSD	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WWX	8	100	0	0	2.47	.01	□	7	88	1	12	1.77	.08	○	7	88	1	12	1.77	.08	○	8	100	0	0	2.47	.01	□
WWL	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□
WWT	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□	8	100	0	0	2.47	.01	□

LEVEL 2
N= 8
α= 0.05

□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-10. LEVEL 2, RESPONSES TO INFLIGHT, PREFLIGHT QUESTION

INFLIGHT QUESTION

Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the INFLIGHT position?

Yes		No		Z	Zp	Significance
4	50%	4	50%	0	1.0	-

PREFLIGHT QUESTION

Do you feel that the type and content of messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the PREFLIGHT position?

Yes		No		Z	Zp	Significance
5	63%	3	37%	0.354	0.73	-

Note: - Not significant at the 0.05 level

TABLE A-11. LEVEL 2, RESPONSES TO EFAS, GRAPHICS QUESTION

EFAS QUESTION

Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the EFAS position?

Yes		No		Z	Zp	Significance
4	50%	4	50%	0	1.0	-

GRAPHICS QUESTION

Do you prefer the dual screen graphic capability over the normal configuration of one display for alphanumerics and one display for graphics?

Yes		No		Z	Zp	Significance
7	88%	1	12%	1.77	0.08	-

Note: - Not significant at the 0.05 level

TABLE A-12. LEVEL 3, RESPONSES TO FLIGHT DATA MESSAGES: MESSAGES WITH MASKS

	SEQUENCE							FORMAT							OPTIONS							DATA CONTENT							MASK						
FFP	ADE. N	ADE. %	N. ADE. N	N. ADE. %	Z	ZP	SIG.	SAT. N	SAT. %	UNSAT. N	UNSAT. %	Z	ZP	SIG.	SUFF. N	SUFF. %	INSUFF. N	INSUFF. %	Z	ZP	SIG.	ADE.		N. AOE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.
	10	100	0	0	2.85	.0044	□	8	80	2	20	1.58	.11	○	8	80	2	20	1.58	.11	○	10	100	0	0	2.85	.0044	□	8	80	2	20	1.58	.11	○
FAM	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.03	□
FAC	*		*					*		*					9	90	1	10	2.21	.03	□	*		*					5	50	5	50	0	1.0	○
WWY	*		*					*		*					7	70	3	30	0.95	.34	○	*		*					7	70	3	30	.95	.34	○
MDF	8	80	2	20	1.58	.11	○	7	70	3	30	.95	.34	○	7	70	3	30	0.95	.34	○	2	20	8	80	−1.58	.11	○	5	50	5	50	0	1.0	○

LEVEL 3
N = 10
α = 0.05

* DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-13. LEVEL 3, RESPONSES TO FLIGHT DATA MESSAGES

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.
	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
FDM	*		*					8	80	2	20	1.58	.11	○	9	90	1	10	2.21	.03	□	*		*				
FCX	*		*					10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.03	□	*		*				
FED	*		*					10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	*		*				
FCF	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□
FSU	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.03	□
FRR	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□

LEVEL 3
N=10
α=0.05

* DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.
	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
WFT	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	.0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□
WSD	8	80	2	20	1.58	.11	○	7	70	3	30	.95	.35	○	8	80	2	20	1.58	.11	○	7	70	3	30	.95	.35	○
WWX	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.03	□	9	90	1	10	2.21	.03	□	10	100	0	0	2.85	.0044	□
WWL	8	80	2	20	1.58	.11	○	8	80	2	20	1.58	.11	○	8	80	2	20	1.58	.11	○	8	80	2	20	1.58	.11	○
WWT	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□

LEVEL 3
N = 10
α= 0.05

□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-14. LEVEL 3, RESPONSES TO WEATHER MESSAGES

	SEQUENCE							FORMAT							OPTIONS							DATA CONTENT						
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.
	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
WSM	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.003	□	10	100			2.85	.0044	□	9	90	1	10	2.21	.03	□
WUA	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	9	90	0	0	2.21	.03	□	10	100	0	0	2.85	.0044	□
WNO	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	1	10	2.85	.0044	□	10	100	0	0	2.85	.0044	□
WFX	*		*					9	90	1	10	2.21	.003	□	*		*					9	90	1	10	2.21	.03	□
WSO	*		*					*		*					10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□
WGF	8	80	2	20	1.58	.11	○	8	80	2	20	1.58	.11	○	9	90	0	0	2.21	.03	□	7	70	3	30	.95	.35	○
WFA	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.003	□	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.03	□
WWS	10	100	0	0	2.85	.0044	□	8	80	2	20	1.58	.11	○	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.03	□
WWA	10	100	0	0	2.85	.0044	□	8	80	2	20	1.58	.11	○	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.03	□
WSA	9	90	1	10	2.21	.003	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□
WWD	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	10	100	0	0	2.85	.0044	□	9	90	1	10	2.21	.03	□

LEVEL 3
N = 10
α = 0.05

* DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-15. LEVEL 3, RESPONSES TO INFLIGHT, PREFLIGHT QUESTION

INFLIGHT QUESTION

Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the INFLIGHT position?

Yes		No		Z	Zp	Significance
6	60%	4	40%	0.32	0.75	-

PREFLIGHT QUESTION

Do you feel that the type and content of messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the PREFLIGHT position?

Yes		No		Z	Zp	Significance
8	80%	2	20%	1.58	0.11	-

Note: - Not significant at the 0.05 level

TABLE A-16. LEVEL 3, RESPONSES TO EFAS, GRAPHICS QUESTION

EFAS QUESTION

Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the EFAS position?

Yes		No		Z	Zp	Significance
5	50%	5	50%	0	1.0	-

GRAPHICS QUESTION

Do you prefer the dual screen graphic capability over the normal configuration of one display for alphanumerics and one display for graphics?

Yes		No		Z	Zp	Significance
9	90%	1	10%	2.21	0.03	+

Note: + Significant at the 0.05 level

- Not significant at the 0.05 level

TABLE A-17. COMBINED RESPONSES TO FLIGHT DATA MESSAGES: MESSAGES WITH MASK

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT						MASK					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.
FFP	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
	23	96	1	4	4.29	0	□	20	83	4	17	3.06	.0022	□	20	83	4	17	3.06	.0022	□	23	96	1	4	4.29	0	□	17	71	7	29	1.84	.0658	○
FAM	23	96	1	4	4.29	0	□	22	92	2	8	3.88	0	□	22	92	2	8	3.88	0	□	23	96	1	4	4.29	0	□	20	83	4	19	3.06	.0022	□
FAC	●		●					●		●					16	67	8	33	.67	.5028	○	●		●					12	50	12	50	0	1.0	○
WWY	●		●					●		●					20	83	4	17	3.06	.0022	□	●		●					18	75	4	25	2.77	.0056	□
MDF	21	88	3	12	3.47	0	□	20	83	4	17	3.06	.0022		17	71	7	29	1.84	.0329	□	9	38	15	63	1.02	.3078	○	15	63	9	38	1.02		○

LEVELS 1,2,3
N = 24
$\alpha = 0.05$

● DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-18. COMBINED RESPONSES TO FLIGHT DATA MESSAGES

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
	ADE.		N. ADE.		Z	ZP	SIG.	SAT.		UNSAT.		Z	ZP	SIG.	SUFF.		INSUFF.		Z	ZP	SIG.	ADE.		N. ADE.		Z	ZP	SIG.
FDM	N	%	N	%				N	%	N	%				N	%	N	%				N	%	N	%			
	●		●					22	92	2	8	3.88	0	□	23	96	1	4	4.29	0	□	●		●				
FCX	●		●					24	100	0	0	4.69	0	□	23	96	1	4	4.29	0	□	●		●				
FED	●		●					24	100	0	0	4.69	0	□	22	92	2	8	3.88	0	□	●		●				
FCF	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□
FSU	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	21	88	3	12	3.47	0	□
FRR	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□

LEVELS 1,2,3
N = 24
α = 0.05

● DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-19. COMBINED RESPONSES TO WEATHER MEASSAGES

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
WSM	ADE. N	ADE. %	N. ADE. N	N. ADE. %	Z	ZP	SIG.	SAT. N	SAT. %	UNSAT. N	UNSAT. %	Z	ZP	SIG.	SUFF. N	SUFF. %	INSUFF. N	INSUFF. %	Z	ZP	SIG.	ADE. N	ADE. %	N. ADE. N	N. ADE. %	Z	ZP	SIG.
	24	100	0	0	4.69	0	□	23	96	1	4	4.29	0	□	24	100	0	0	4.69	0	□	23	96	1	4	4.29	0	□
WUA	24	100	0	0	4.69	0*	□	24	100	0	0	4.69	0	□	23	96	1	4	4.29	0	□	24	100	0	0	4.69	0	□
WNO	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	22	92	2	8	3.88	0	□
WFX	●		●					22	92	2	8	3.88	0	□	●		●					19	79	5	21	2.65	.0080	□
WSO	●		●					●		●					24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□
WGF	22	92	2	8	3.88	0	□	21	88	3	12	3.47	0	□	22	92	2	8	3.88	0	□	19	79	5	21	2.65	.0080	□
WFA	24	100	0	0	4.69	0	□	23	96	1	4	3.47	0	□	24	100	0	0	4.69	0	□	23	96	1	4	4.29	0	□
WWS	24	100	0	0	4.69	0	□	22	92	2	8	3.88	0	□	24	100	0	0	4.69	0	□	23	96	1	4	4.29	0	□
WWA	24	100	0	0	4.69	0	□	22	92	2	8	3.88	0	□	24	100	0	0	4.69	0	□	23	96	1	4	4.29	0	□
WSA	23	96	1	4	4.29	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□
WWD	22	92	2	8	3.88	0	□	22	92	2	8	3.88	0	□	23	96	1	4	4.29	0	□	21	88	3	12	3.47	0	□

LEVELS 1,2,3
N = 24
α = .05

● DENOTES ASPECT NOT EVALUATED
□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

	SEQUENCE						FORMAT						OPTIONS						DATA CONTENT					
WFT	ADE. N	ADE. %	N. ADE. N	N. ADE. %	Z	ZP	SIG.	SAT. N	SAT. %	UNSAT. N	UNSAT. %	Z	ZP	SIG.	SUFF. N	SUFF. %	INSUFF. N	INSUFF. %	Z	ZP	SIG.	ADE. N	ADE. %	N. ADE. N	N. ADE. %	Z	ZP	SIG.
	24	100		0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□
WSD	22	92	2	8	3.88	0	□	21	88	3	12	3.47	0	□	22	92	2	8	3.88	0	□	21	88	3	12	3.47	0	□
WWX	23	96	1	4	4.29	0	□	21	88	3	12	4.29	0	□	21	88	3	12	4.29	0	□	24	100	0	0	4.69	0	□
WWL	22	92	2	8	3.88	0	□	22	92	2	8	3.88	0	□	22	92	2	8	3.88	0	□	22	92	2	8	3.88	0	□
WWT	24	100	0	0	4.69	0	□	24	100	0	0	4.69	0	□	23	96	1	4	4.29	0	□	24	100	0	0	4.69	0	□

LEVELS 1,2,3
N=24
α=0.05

□ SIGNIFICANT AT THE 0.05 LEVEL
○ NOT SIGNIFICANT AT THE 0.05 LEVEL

TABLE A-20. COMBINED RESPONSES TO INFLIGHT, PREFLIGHT QUESTIONS

INFLIGHT QUESTION

Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the INFLIGHT position?

Yes		No		Z	Zp	Significance
15	63%	9	38%	1.02	0.3078	-

PREFLIGHT QUESTION

Do you feel that the type and content of messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the PREFLIGHT position?

Yes		No		Z	Zp	Significance
19	79%	5	21%	2.65	0.0080	+

Note: + Significant at the 0.05 level
- Not significant at the 0.05 level

TABLE A-21. COMBINED RESPONSES TO EFAS, GRAPHIC QUESTIONS

EFAS QUESTION

Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the EFAS position?

Yes		No		Z	Zp	Significance
14	58%	10	42%	0.612	0.5418	-

GRAPHICS QUESTION

Do you prefer the dual screen graphic capability over the normal configuration of one display for alphanumerics and one display for graphics?

Yes		No		Z	Zp	Significance
20	83%	4	17%	0.306	0.0022	+

Note: + Significant at the 0.05 level

- Not significant at the 0.05 level

APPENDIX B

SPECIALISTS' COMMENTS

1. Message types aid briefing
   a) Yes (4)
   b) Yes, definitely (1)
   c) Yes, all information is together, rather than looking through everything. (1)

2. Message Content excessive or redundant
   a) Excessive, or redundant (2)
   b) Detailed weather message contained too much information; I would have to read through it all to determine what is relevant to the pilot's request (2)
   c) Redundancy is inherent in the FSS system; I wouldn't know what to take out; although SR's, MOA, MTR's, IR routes, FDC NOTAMS shouldn't be included in weather message since they're not always needed; access them only as needed perhaps by a separate key. (1)
   d) No, I feel that the information was adequate. (1)

3. Collective Weather Message

   a) Would not give information routinely. Would give summary only of what is relevant to a particular briefing (6)

4. Preduty briefing

   a) Self-briefing effectively using the system (5)
   b) Self briefing effectively using the system, especially with the graphics.(1)

5. Function Keys

   a) Are efficient and speedy information retrieval (6)
   b) Would like to see Weather summary (WSM) as a function key. (1)

6. Quantity of Data Displayed

   a) Adequate, able to scan information easily (3)
   b) Satisfactory (2)
   c) It's all right (1)

FINAL INTERVIEW RESPONSES LEVEL 2

1 Message Types aid briefing

a) Yes (SAS) (3)
b) Yes (AWANS) (1)
c) Yes (NON) (1)
d) Yes, compared to what we have in the field now. (NON) (2)
e) The ability to retrieve so large an amount of information is fantastic; however, the ability to combine more weather messages would be helpful. (NON) (1)

2. Message Content excessive or redundant

a) WSM isn't really a summary; alot of extraneous material that's not necessary is included. Also, WSM and WWD are very similar. (SAS) (1)
b) WWD, WSM are the same' WSM includes too much information; it's not really a summary. (NON) (1)
c) Yes, WWL not necessary with WSM & WWD; WSM & WWD repeat each other. (AWANS) (1)
d) Yes, WWD & WSM contain the same information except that the WSM eliminates some of the detailed weather. (NON) (1)
e) WWD is excessive; i.e., the area forecasts are unnecessary. (NON) (1)
f) FDC NOTAMS were superfluous; also, the WSO message contained too much information. (SAS) (1)
g) The FDC NOTAMS could be summarized; if the FA's are included on detailed weather, then the FDC's could be optional. (NON) (1)
h) No, each message serves a purpose for specific type of briefing.) (NON) (1)

3. Collective Weather Message (Would you give all information...?)

a) No, it would depend on his request. (NON) (4)
b) No, FDC NOTAMS, MTR's wouldn't give unless requested. (SAS) (1)
c) No, I would make a judgement based on the pilots request for information. (SAS) (1)
d) I would not read messages verbatim, just summarize what is pertinent to pilot. (SAS) (2)

4. Preduty Briefing

a) Yes (SAS) (3)
b) Yes (NON) (1)
c) Yes, much better than I can now. (NON) (1)
d) Yes, best tool is the WWL. (NON)
e) Yes, the system is more than adequate. (AWANS)
f) Yes, however, it may be more difficult to get the "big picture". (NON) (1)

5. Function Keys

a) Yes they are an aid once you get used to them (NON) (3)

b) Yes, however, paging function keys are too close to others. It might be a good idea to set them off by themselves to prevent hitting the wrong key. (SAS) (1)

c) Yes, with the following suggestions; have the weather message abbreviation on the key itself; have the return key read enter; some keys could be combined such as WSA and WFT and FFP and amendment key; this would make room for other messages like WWX and WWL; also WUA since they are heavily used. (NON) (1)

d) Most of them, but air-ground contact keys, no. I had to duplicate steps. It would be nice to have a basic button to enter information where it could appear across the screen at all times (esp. at EFAS and Inflight positions) (SAS) (1)

e) Yes, and should be expanded to all one button function keys for messages (AWANS) (1)

f) Yes, and should have function keys for all message; they are time-saving and efficient (NON) (1)

6. Quantity of Data Displayed

a) The amount of information seems about right, no problem reading (NON) (3)

b) Adequate as is (SAS) (2)

c) Adequate (AWANS) (1)

d) All right, but it would be nice to have more information on the screen so that the paging could be reduced (NON) (1)

e) More space between lines would be better; also prefer black and white to green (SAS) (1)

FINAL INTERVIEW RESPONSES LEVEL 3

1. Message types aid briefing

a) Yes (SAS) (5)
b) Yes (AWANS) (2)
c) The messages are an aid but not complete; WWX would be most used key; i.e. combining some messages such as SA's and FT's; multiple requests are more common in the field (SAS) (1)
d) Yes, the weather summary is great. However, it would be nice to include instrument landing information and Airmen's information (SAS) (1)
e) Yes, but the ability to combine more routine information into one request would be helpful. (SAS) (1)

2. Message Content excessive or redundant

a) No, the more data we have access to, the better. (SAS) (3)
b) Yes, some messages are excessive, i.e., the WWD (AWANS) (2)
c) Yes, MTR, MOA, FDC NOTAMS, NAVAIDS shouldn't be included in WWD; should be separate on their own key. Only weather should be included with a weather message (SAS) (2)
d) Yes, would like to see some messages combined like SIGMETS/AIRMETS (SAS) (1)
e) Yes, computer should be able to differentitate between high and low altitude requests as the pilot will be needing different information, or provide a general synopsis for high altitude route; even the WSM message gives SA's which are not entirely necessary (SAS) (1)
f) No, but with WWX, want to obtain requested messages types as needed for specific locations using an imput, i.e., request PHL SA, JFK NOTAMS, output would be same as request, rather than SA's and NOTAMS for PHL and JFK (SAS) (1)

3. Collective Weather Message

a) No, only what is significant or what applies to that particular flight (SAS) (5)

b) Yes, specialist must edit everything, however, if information is available I would give it. (SAS) (2)

c) No, you need to have all of that information, but I would use discretion and give only what's needed. (SAS) (1)

d) Only if pertinent to the pilot request, however, due to the excessive amount of information, a lot of time is lost determining what is pertinent (AWANS) (1)

e) No, only that which is pertinent to his route of flight; I would not read messages verbatim. (AWANS) (1)

4. Preduty Briefing

a) Could self brief effectively using the system (SAS) (8)
b) Yes (AWANS) (2)

5. Function Keys

a) Yes more could be added (SAS) (4)

b) Yes, however, paging functions keys should be by themselves on keyboard configuration to prevent specialist from inadvertently hitting another key (AWANS) (1)

c) No. sytem of retrieval can be streamlined (AWANS) (1)

d) Yes, except that the row of function keys may be more accessible if they were accros the bottom of the keyboard (SAS) (1)

e) It's just as easy to use keys to enter all message types even though function keys are available. I recommend that forward/back page function keys be segregated. I would inadvertantly hit WWD key occasionally (SAS) (1)

f) Yes, I prefer option of both keyboard entry and function keys (SAS) (1)

g) Yes, but not an absolute necessity (SAS) (1)

6. Quantity of data Displayed

a) Adequate (SAS) (6)

b) Adequate (AWANS) (2)

c) No problems at all with size of type; the amount of total dat on the screen at one time is satisfactory; seemed like type was nice and clear compared to SAS (SAS) (1)

d) Amount of information is sufficient but there should be a line for display of aircraft ident, or pilots name. Would prefer line advance rather than page forward or back to avoid splitting data; also prefer black and white display (SAS) (1)

COMMENTS ON WEATHER MESSAGES

WWY PIREP Entry

Level I

1. Field (space) for altitude. (NON)
2. Type field and info together(on one line).(NON)
3. On PIREP mask, type in info at one time with field identifier & info is sorted by computer. (NON)
4. Type in all data given by pilot, out of sequence, then by use of slewball, put the proper data in appropriate fields. (NON)

Level II

1. Mask is difficult to work with. Like to be able to type PIREP in the order the pilot gives it to us, without having to move from one item to another. Computer could be programmed to separate the fields for us.
   Ex: OVR ACY AT 40 MDT TB OCNL RW- TOPS OVC 40 etc. (SAS)
2. Use standard PIREP format. (NON)
3. PIREP info confusion between mask & pilot reports. (SAS)

Level III

1. Should have altitude entry to clarify where it should be entered.(SAS)
2. This is the poorest setup because no pilot will have a PIREP format in front of him when giving you(specialist) a PIREP. This format has to be made flexible. (SAS)
3. Should conform to a recognized PIREP form. (AWANS)
4. Should not have space restrictions on most items, i.e., "OV" might require two lines. (SAS)
5. Pilot report mask simplifies filing. Pilot reports positions either in reference to VFR check points or VOR's & airways. We have to overlay the radar with whichever map is appropriate. (NON)

WUA Pilot Report Request

Level I

1. I would like to add graphic display of pilot reports pertinent to briefing area. (NON)

Level II

1. WUA by states are available one state at a time. Why not program it so we'll be able to obtain more than one state(save time). (SAS)

Level III

1. Need ability to request UA's for TB, IC, etc.; pilots often request turbulence or icing UA's only. (NON)
2. Would like to see a graphic display. (SAS)

WSM Weather Summary

Level I

1. Like clockwise geographic presentation of weather. (NON)
2. Like summary with only significant changes to previous briefing. (NON)
3. Contained too much information. WSM & WWD repeated themselves. (NON)

Level II

1. Needs some additional data like FA. (NON)
2. Same as WWD comment 4 (NON)
3. The WSM format weather reads "departure, destination, then enroute" weather. Would like to see read departure, enroute, & destination weather. (NON)
4. Would rather see SA report format as it is now. Limit content of WSM to weather data only. (SAS)

Level III

1. Very good aid for summarizing. (SAS)
2. Effective for updating. (SAS)
3. This format should include the area forecast. (AWANS)
4. The Weather Summary is great; however, it would be nice to include instrument landing & airmen's information. (NON)
5. Information was sufficient and complete. (NON)

WNO Notice to Airman

Level I

1. Provision for dropping self-cancelling FDC Notams. (NON)
2. FDC Notams need not be written out unless pilot does not have it. (NON)
3. Would summarize data. (Interview) (NON)
4. Abbreviate long FDC Notams until it is determined whether pilot is familiar with info; if pilot requests Notam, ability to retrieve the whole piece of information. (NON)

Level II

1. Sometimes too much. (NON)
2. Get rid of FDC Notams with exception of temporary flight restrictions.(FSU?) (SAS)
3. Would like FDC Notams stored but not put in every weather message.

Level III

1. FDC Notam access excellant; present method is inadequate - local Notams are a pain. (NON)
2. Computer should eliminate Notams not related to flight; i.e., airport Notams for overflight. (SAS)
3. Notam information should be only the most pertinent. FDC Notams are excessive, suggest FDC Notams not be shown, maybe "flagged" and available as on option. (SAS)

WFX Prognostic Map

Level I

1. Prefer just information available for briefing area. (NON)

Level II

1. Expand to include the two upper panels, significant weather prog. (AWANS)
2. Did not use - did not understand map - use somthing besides Map misleading. (SAS)
3. Could be a real help if computer could store, for recall if requested, the past 2-3 surface analysis & national radar. (NON)

Level III

1. Very general; o.k. for self briefing little use for pilot briefing. (SAS)

WSO Severe Weather Outlook

Level I

None

Level II

1. Change name to Convective Outlook (AC). (NON)

Level III

1. Will WAC, WW-A, AWW, WW, WH, etc. be included? (NON)
2. Also very general; little use for pilot briefing. (SAS)
3. Can be incorporated into the WWR key. (AWANS)

WWT Weather Trend

Level I

1. Include synopsis from FA. (NON)

Level II

1. Like this! (SAS)
2. A great option for briefing your self and pilots. (SAS)
3. Liked this also. (NON)

Level III

1. This capability corrects the biggest limitation of the SAS. (SAS)
2. Excellent - numerous SA's are 3 hourlies; missing SA's would no longer be a problem. (NON)
3. Another excellent feature. (SAS)
4. Excellent feature. (SAS)
5. Effective. (SAS)

WSA Surface Observations

Level I

None

Level II

1. Would rather see SA format as it is now. (SAS)

Level III

1. Prefer to have all SA's in order,i.e., destination SA shown following departure SA. (SAS)

WFT Terminal Forecast

Level I

None

Level II

None

Level III

1. Check possibility of dropping outdated portion of FT. (SAS)
2. Would like the ability to call up forecasts that have alternate minimums. (SAS)

WGF Grid Winds Forecast

Level I

None.

Level II

1. Change field identifier to read WFD. (SAS)
2. Need winds higher than 18,000. (NON)
3. Should be able to call up winds for a certain altitude. (NON)
4. Would rather see FD format as it is now I use FD's above 18,000 regularly and would like them displayed through 39,000. (SAS)

Level III

1. Data shown incomplete, need access to winds at all altitudes and varying times; heading not displayed. (NON)
2. Excellant feature. (SAS, SAS)
3. Computer should be able to interpolate winds for specific altitudes and single altitude entered and receive just those winds; would also like ability to call up winds for specific altitude. Field unit should give the capability to go to 2,000 either side of altitude. (SAS)
4. Should be 3-39,000. (SAS)
5. The computer could more accurately give an estimation per the pilot request; ability to determine whch airports have instrument approach & which do not. (NON)

WFA Area Weather Forecast

Level I

1. Add Sigmets. (NON)
2. Prefer old FA format. (Interview) (NON)

Level II

1. Should be included in the detailed forecast. (NON)

Level III

1. FA data as entered by WSFO is inadequate for complete briefings. Information is too generalized and too often not time pertinent. (NON)

WWS Sigmets

Level I

1. Include with Area Forecasts. (NON)
2. Prefer old format as opposed to area description. Ex: FWA to CVG to Etc. (NON)

Level II

None.

Level III

1. Use of VOR locations makes it difficult to plot on chart showing weather idents. Graphic chart would be beneficial; Canadian Sigmets are not available except as a collective from WASE. (NON)
2. Would like to see WA's & WS's appended to FA's since they are issued as amendments, or possibly entered directly into body of FA. (SAS)

WWA Airmets

Level I

None

Level II

1. Combine WWS/WWA into one. (SAS)

Level III

1. No longer received in the field incorporated with Area Forecast; should include Airmets on request. (MAPS)
2. Sigmets and Airmets do not show who issuing NWS outlet is. (NON)
3. Airmets and Sigmets should be included together. (NON)
4. Should include FA report on request. (SAS)

WWL Local Weather

Level I

None

Level II

1. Duplicate feature. Could be eliminated. (AWANS)
2. Good for local pilots staying in area. (NON)
3. The synopsis appears at the end of the local weather. I would like the order of weather brief to remain as follows: Adverse, Synopsis, Current, etc. (SAS)
4. Great idea. (NON)

Level III

1. Good for briefing local area. (SAS)

WWD Detailed Weather

Level I

1. Include MOA's(Military Operations Areas), Flow Control, Fuel Advisory(FAD) info. (NON)
2. Graphic display of the route with the call letters or stations along the route - may be helpful: Sequence WSA & WFT, - Departure. Enroute, Alternate. (NON)
3. Prefer synopsis first. (NON)
4. Contained too much information. Must read through to determine what is relevant to pilot's request. (Interview) (NON)
5. Take out SR's, MOA, MTR's, IR routes, FDC Notams. Access them only as needed by a separate key. (NON)
6. Should include MTR since we are responsible for them. (NON)

Level II

1. Has too much detail; SA, FT, FD, WWS, WWA, Notams(not FDC Notams) should be sufficient. (SAS)
2. Excellant working tool. (SAS)
3. Liked message, needed FA. The portion of FA pertaining to the route should be in the order of the briefing format. (NON)
4. Might suggest that when a station does not report, that computer so advise and then give nearest reporting station, Ex: WWD//ACY K48/R - okay, K48 doesn't report weather but nearest reporting station would be STJ but I as a briefer would not know this and looking at the WWD would not give me this info - response from computer: K48 NO RPT AVBL - STJ. (SAS)
5. Should have the FA included. (NON)
6. Drop FDC Notams and MTR/MOA info. (SAS)

Level III

1. Use of route and areas is excellant. (SAS)
2. Excellent item, should definitely be added to field system. (MAPS)
3. Should have FA included. (SAS)
4. Should be tailored to high level briefs; that is, some of the weather data is not needed on high level briefs. (AWANS)
5. WWD message is excessive; could be streamlined, MTR, MOA, FDC Notams shouldn't be included in WWD; should be separate on their own key. (NON)
6. I see no reason for MTR, MOA, FDC's; should be seperate function feature. (SAS)
7. Would like this tailored to high or low routes. (SAS)
8. The "Detailed Weather" is an excellent briefing devise. (SAS)

WSD Radar Reports

Level I

None

Level II

1. Don't use much, not at all out west. (NON)

Level III

1. WSD is coded and unreadable; radar graphic is sufficient, no need for SD's except for plotting purposes. Don't like method of plotting coordinates; prefer terrain reference. (NON)
2. This should be keyed to display the radar graphic with the same key. (SAS)
3. Unnecessary with live radar and radar summary chart and GOES. (MAPS)
4. Should have MDR report. (SAS)
5. Also need MDR plot for each SD. Also would like graphic for MDR for each radar site. (SAS)

WWX Multiple Weather Selection

Level I

1. Function did not always work in the lab. (NON)
2. Would like to receive in order requested and more combinations. (NON)

Level II

1. Best option of board, good for specific request when entire route not needed. (NON)
2. Would like to be able to request differant weather for differant stations - WWX//WSA WFT/COU MKC STL - will get SA FT for all but I didn't want FT for all. Suggest - WWX//WSA COU MKC STL/WFT/MKC. (SAS)
3. WWX useless; would have made much use of this key if I could have. (SAS)

Level III

1. WWX sufficient and complete. (NON)
2. Excellent. (SAS)
3. Can be accomplished by pushing consecutive keys and then pushing an execute key, such as SA, FT, FD, etc. (AWANS)
4. Ability to request more data - greater flexibility. (MAPS)
5. This selection would be the most widely used in the field. (SAS)
6. Should be able to get single items for different stations in one request; i.e., WSA JFK/WFT EWR. (NON)

continued

WWX continued

7. The messages are an aid but not complete; WWX would be most used key; i.e., combining some messages such as SA's and FT's: multiple requests are more common in the field. (NON)
8. The ability to combine more routine information into one request would be helpful. (NON)
9. Using WWX, would want to obtain requested message types as needed for specific locations using a specific input; i.e., PHL SA JFK Notams rather than SA's & Notams for PHL & JFK. (NON)

Comments on Flight Data Messages

FFP Flight Plan

Level I

1. Enter data single line(s), computer format input. (NON)
2. One digit or a letter to prefix a field entry. (NON)
3. Prefer mask from top to bottom of screen sequence. (NON)
4. Prefer entering aircraft I.D. first, then message type. (NON)
5. Prefer mask the same as flight plan form now being used. (NON)
6. Assign numbers to different fields. (NON)
7. Lost flight plan mask when Encode/Decode message used. (NON)
8. Allow plenty of space for route of flight and pilot data. (NON)
9. On FFP, PIREP mask, type in info all at one time with field identifiers preceding each piece of information, then computer can sort it out. (NON)
10. Allow for plenty of space for route of flight and PD. (NON)

Level II

1. Sequence of data should be typed as pilot gives it to you and have computer put it in proper sequence. (SAS)
2. Use standard flight plan format. (AWANS)
3. I would suggest an "open mask - free mask" or whatever you want to call it. To type in info given you by the pilot and be able to keep it on the screen to refer to. This is a must! (SAS)
4. Need additional lines on FFP FAC: How about multi-leg military flight plan? (SAS)
5. When flight plan mask is on screen I would like the ability to request single items such as FRR FED WGF and still retain FP mask. One way is two tabular data screens instead of one screen for graphics and one for tabular data. Same for the MDF function (see MDF comments). (NON)
6. Combine this function with FAM. (NON)
7. On multi-FP filing of the same aircraft some way of retaining basic data which always remains the same such as AT TS PD CR. (NON)
8. Delete data not required for FSS - BC Beacon Code
   OP Output Routing
   CP Closure Points (NON)
9. Sequence: NB before CR: OP following CR. Format: AE on end of 2nd line, PD on end of 7th line; NB CR OP CP as 8th line. Data content: See no use for BC or TA. OP/CP ambiguous - seem to serve some function. Could be keyed to "new" FAC to save time - is now duplicated function. (SAS)
10. Keep flight plan and get singular bits of info without losing mask. (SAS)

FFP cont.

Level III

1. Simplifies filing immensely. (NON)
2. FFP and other masks - The specialist needs a place to store initial contact information. This information can be put on the appropriate mask later. It should be possible to move the cursor into the mask to type or edit information. (NON)
3. The mask approach is too slow. (NON)
4. No provisions were made for multiple FP's on a single aircraft. (NON)
5. Add place to put "VFR not recommended". (SAS)
6. FFP and other masks - system is too rigid; i.e., entering data on flight plan mask and PIREPS; information will not always be given by pilot in format. (NON)
7. FFP and other masks; would like to eliminate "fill-in" masks and just have a specialist type in various data using 2-letter field identifiers. This would combine PIREP entry, flight plan filing, position reporting, etc. Computer could sort out data and format messages and file as appropriate using a keystroke entry. (NON)
8. Remarks field in mask should accomodate more than one line of data. (NON)
9. Field identifiers were confusing. Should be in simpler terms or have a moveable cursor. (MAPS)
10. Some additional capability has to be incorporated because this function has to be very flexible. (SAS)
11. This should conform to a regular flight plan form. You can eliminate five fields. Also, when a pilot files a flight plan, you should be able to receive it in any order it is given simply by putting the field number at the end of each portion; i.e., VFR 1. Also, all briefing, flight planning can be done from one format. (AWANS)
12. Full line on mask for altitude not needed, more room for route needed and more room for pilot data needed. (NON)

FAC Aircraft Contact

Level I

1. Mask not wanted at Inflight - unrealistic multiple contacts. (NON)
2. Aircraft I.D. lost when weather requested. (NON)
3. Add subsequent contacts to flight monitoring mask without losing data. (NON)
4. Separate masks for progress reports, flight monitoring, and FAC. (NON)
5. Prefer entering aircraft I.D. first, then message type. (NON)
6. Restricts type of contact too much. (NON)
7. Prefer mask in same format as contact strip. (NON)
8. Mask not useful. (NON)
9. (Comment #7)Mask should contain fields for aircraft I.D., type, positon, time, altitude and required information for a VFR positon report. (NON)
10. Prefer aircraft ident displayed on screen. (NON)
11. Combine progress report and flight monitoring masks. (NON)
12. The masks, while orderly, wouldn't suffice in actuality unless it would ber possible to type the contact as it proceeds and then hit return and let computer post the data. (NON)

Level II

1. Too many options for position report. Aircraft I.D., fix, time should be sufficient. (SAS)
2. Could be combined with FFP and FAM. (NON)
3. Aircraft position, time, estimate for next fix should be sufficient, and could be combined with FFP and FAM. (NON)
4. Need more pertinent mask for FSS. (Position report unsuitable-RL). (NON)
5. The two aircraft contact masks could be combined into one. (AWANS)
6. I was limited to what I could do with the mask! Under test conditions it worked but if I had to talk to more than one aircraft I would be down the tube. Need an "open" mask to type aircraft number, it's request, and another aircraft that might call. Then after you have initial request you can choose which mask you will need. Info taken on open mask should remain on CRT to refer back to request. (SAS)
7. Too limited - very few pilots give type info that you have - most just want weather - should have more freedom to expand on pilots request; multi-contact request. (SAS)
8. Need additional lines on FFP FAC: What happens when aircraft contacts you 2 or 3 times? Do you call FAC for each contact or would you be able to have each contact on one FAC? How about showing time of each contact? (NON)

   EX: 1948z RM(1st contact) RQ COU SA
   2005z (2nd contact) RQ new COU SA
   2007z (3rd contact) RQ MKC FT
   2010 (4th contact) AVFP
9. No provisions for recording or issuing ATC clearance. /P or /M should be entered after ascertaining type of radio contact. (NON)

continued

FAC continued

10. Options available re content, etc. are necessary and useful. However, neither will serve for routine FSS contacts. Someone with a working knowledge of the FSS option should design a primary contact mask for basic information normally recorded in FSS air/ground communications. Said mask should remain visible to the specialist for reference until contact is terminated, not erased by additional data which may be called up. There should also be an additional option for those FSS facilities providing Airport Advisory Service. (SAS)
11. Could not get rid of writing on cantact sheet as useful FAC for FSS non-existent & I needed to refer to basic info. Thus losing simplicity. (SAS)

Level III

1. Rather see vertical format. (SAS)
2. The mask for flight monitoring and progress should be combined into one mask format. (AWANS)
3. One mask would be suffcient. (SAS)
4. On bay monitoring when each position report is added, the last is removed. I would like to be able to see each report remain on the mask with each succeeding report added to the end without erasing the previous information. (SAS)
5. Would work with one contact but can cause problems with a series of contacts in a row. We still need flight progress strips. (AWANS)
6. Not efficient during heavy traffic; only one contact is displayed. There's room on the screen for 4 or 5. (NON)
7. The masks P/M could be combined. (SAS)
8. Uncommon field identifiers on mask confusing; no way that time has passed on Bay Monitoring service indicated unless pilot calls. (MAPS)
9. Sequence should be to log aircraft ident first perform svc's to pilot while still retaining AC ident somewhere, then a release or enter key upon completion. (NON)
10. Too restrictive and too slow for intensive operations. (SAS)

MDF Direction Finding

Level I

1. Add wind data and time to station. (NON)
2. Fields for entry of fuel on board and people on board after field AI. (NON)
3. Never used before - anything an improvement. (NON)
4. Computer plot aircraft position on a graph or surface overlay map. (NON)
5. Computer display of closest airport to the aircraft position and all data for that airport. (NON)
6. Add fields for all required data for lost aircraft. (NON)
7. Coupled w/doppler would give you DME readout on first try. Could be improved. (NON)

Level II

1. Data content should include fuel on board. (SAS)
2. An asset to the specialist. (SAS)
3. Data content should be expanded to include all required information - fuel remaining, flight conditions, etc. (AWANS)
4. Liked heading and positon information. (NON)
5. Do not like the MDF. You have enough info to get a fix and heading but that is only the beginning of a DF problem. (SAS)
6. I am afraid that the MDF program will not work. I think you should look for another type of equipment, some type of radar that would lock on to the aircraft and feed data directly to the computer. There are too many variables to work with on a DF lost aircraft problem, such as giving the aircraft a "full approach" to the airfield. The program works good for finding a fix on a aircraft but as far as working the aircraft to the airport, full approach, etc., I have my own thoughts about its success. (SAS)
7. Should be able to retain mask. (NON)
8. Two tabular data screens instead of one screen for graphcis and one for tabular data. The MDF mask should be retained during the time the problem is in progress. Would it be possible to ask the computer for airports that are VFR during DF problem, or airports that meet alternate minimums when a pilot is filing IFR flight plan. (NON)
9. When working a real "DF" problem in the field a need exists for charts of the local area as a minimum. Graphcis whould be included in the system which would show the local area and project the position of the aircraft relative to airports, VOR's, etc. Also, display all required lost aircraft required info:

Acft type:	Nature of Emergency:	Fuel on Board:
Pilots WX:	Heading:	Altitude:
Pilot Request:	Etc.	

   In addition, graphics for track-out assistance. (NON)
10. Mask should have space for all background information and remarks. Great possibilities but needs work. (SAS)
11. Generably favorably impressed. Way it's set up - it's simple to use - cross DF with two fixes would be idel (PS - always used DF in all facilities).

MDF continued

Level III

1. Need to put more items in this program, aircraft heading, fuel remaining, also mask should contain checklist. (SAS)
2. On DF/VOR be able to automatically plot position on graphics from information fed in DF/VOR mask and also be able to overlay weather radar on same screen. (NON)
3. This should be used basically as a back-up because of the inherent computer capabilities of calculating distance, etc. (SAS)
4. No provisions were made in this test for calling up weather and retaining DF emergency information on screen. I feel this information should remain available at all times. Perhaps the DF mask could be placed on the graphics screen thus allowing the other to be available for weather data. No provision is made for other emergencies (VFR on top, low fuel, etc.). (SAS)
5. Mask should be changed to show the background info needed to coordinate with Center. Graphics should be able to plot position with overlay of radar weather possible; also, single VOR or DF orientation with time and distance is a must. (NON)
6. Need more data displayed on this format such as present weather information, minimum information for working aircraft, fuel, emergency information, etc. (AWANS)
7. Ability to request weather info, while keeping DF mask simultaneously. (SAS)
8. Digital readout on doppler for DF system for bearing and distance would be an improvement. (NON)
9. DF should provide for entry of minimum required background information. Would also want graphic addition of an area map with terrain features and capability to zoom in on area lost aircraft is in. (NON)
10. Uncommon field identifiers on mask confusing. Should have altitude info for giving DF's in mountainous area. (MAPS)
11. The DF mask has no provision for the minimum information. This must be written on paper for reference. Airspeed is entered but time to station is not computed. A heading is given but evidently the forecast winds aloft are not figured in for correction. I say this because no altitude is in the mask for the computer to extract wind data for the wind correction angle. The aircraft present heading is not entered. Adding this could be used to establish if a left or right turn is re quired. No provisions are made for a full DF approach. Graphcis for the approach or the procedures could be stored. Weather data is necessary in anmy emergency. Possibly the weather for the destination typed onto the screen for display. The mask could cpme up without having to request it. I would like to be able make one for VFR weather and have the VFR weather appear rather than searching a VFR station to send the pilot. (SAS)
12. Model II DF process is indeed an improvement over what is presently being used; however, in the future the DF mask for Model II should include more information. For example, in addition to present information, the mask should disolay present surrounding weather conditions and even heading to other airports which might be closer to aircrafts position. The headings to other airports are computed from initial data, rather than from new input information. Finally, the mask should have a place for minimum data which is required to work a DF problem, i.e. aircraft type, fuel on board, etc. (AWANS)

MDF continued

13. Should be able to format info in any order received from pilot when necessary. Could give more data such as right/left turn to station, etc.

FED Encode/Decode

Level I

1. Prefer encode manually and decode electronically - spelling of locations. (NON)
2. Obtain all identifiers for state - help. (NON)
3. Like capability using first letter of alphabet to get specific identifiers by letter for a state. (NON)
4. prefer request more than one location at a time. (NON)
5. Include FSS and Center area. (NON)

Level II

1. The loss of flight plans while going to FED should be corrected. (AWANS, SAS)
2. Expand to include tie-in FSS and Center. (AWANS)
3. While formatting a flight plan, should you have to go encode or decode the FP mask is lost if not stored. (NON)

Level III

1. A very useful tool. (NON)
2. Excellent item. (MAPS)
3. Excellent feature. (SAS)
4. Will work as long as you know how to spell every word correctly. (AWANS)
5. Excellent item the same approach could be taken with contractions and aircraft types. (SAS)

FAM Flight Plan Amendment

Level I

None

Level II

1. Not needed. Why not FFP mask. Retrieve FFP, make amendment and restore. (SAS)
2. Use standard flight plan format and combine with FFP. Duplicate feature. (AWANS)
3. We cannot remember everything requested in our heads. How is a multi-route military flight plan going to work? I would like to see some type of recognition that the message has been received by computer - in other words, when I file a FFP mask it does not show that it was accepted. Other masks do show - FCX, FAM, etc. (SAS)
4. Combine this function with FFP. (NON)
5. Sequence: NB before CR; OP following CR. Format: AE on end of 2nd line, PD on end of 7th line; NB CR OP CP as 8th line. Data Content: See no use for BC or TA OP/CP ambiguous - seem to serve some function. Could be keyed to "new" FAC to save time - is now duplicated function. (NON)

Level III

1. This could be combined with the FFP function. (SAS)
2. Prefer moveable cursor for better organization of flight plan info. (MAPS)
3. It would only work if the pilot filed a flight plan with that facility. (AWANS)
4. What happens if aircraft is from a different area? (SAS)

FCF ATC System Command Center

Level I

1. Good aid. (NON)

Level II

1. Did not use - found within WWD. (SAS)

Level III

1. Information useful to long range flight. (NON)
2. Even though not used, is still required function (covered under WWD). (NON)

FSU Special Use Areas/Routes

Level I

1. Include in WWD. (NON)
2. Should include only for FSS area of responsibility, not for entire route. (NON)

Level II

1. Overlay would help especially for lnger routes outside of the area vou're familiar with. (NON)
2. I did not know where the routes were. Perhaps we need to show who protects for the MOA or IR or at least where it is. Very hard to give info to pilot and when he says where is that IR?? Sorry, I don't know. (SAS)
3. MTR/MOA should contain ident of FSS responsible for said. I think FDC NOTAMS on temporary flight restrictions should be included here. (SAS)

Level III

1. Require MTR width. Needs graphics to visualize areas outside local flight plan area. (SAS, SAS)

FCX Flight Plan Cancellation

Level I

None

Level II

1. Could be keyed to "new" FAC to save time - is now duplicated. (SAS)

Level III

1. What happens if we are not the flight plan station for this aircraft being cancelled. (AWANS)
2. What happens when the aircraft is from a different area? (SAS)
3. Should have a way of determining the correct ident when the same ident has been used several times during the day. (AWANS)

FRR Preferred Route Request

Level I

None.

Level II

1. Did not use but has merit. (SAS)
2. Excellant. (NON)

Level III

1. Preferred route is lost when recalling flight plan; should be able to enter it on mask automatically. (SAS)
2. Need this to come up on FFP mask. Otherwise it must be written down until mask is recalled. Should have automatic entry ability to place into route of flight plan mask. (NON)

FDM Departure Message

Level I

None

Level II

1. Could be keyed to "new" FAC to save time - is now duplicated effort. (SAS)

Level III

1. Good function. No way to tell if activated the correct flight plan. (MAPS)
2. Should have a way of determining the correct ident when the same ident has been used several times during the day. (NON)
3. Can be done from one format, simply by calling up the correct ident & entering the departure time. Should be able to determine correct dupe ident. (AWANS)
4. What happens if aircraft is from a different area? (SAS)

Position comments Level I

INFLIGHT

1. Position represented a stumbling block. I can't feature a substitute for contact strips due to myriad of situations that occur,i.e. multiple contacts. A specialist with a pencil could do more. (NON)
2. Aircraft I.D. on screen during Inflight is a must. (NON)
3. There was an excess of data available to many Notams. Military training routes should be for area of responsibility. The format of current & forecast weather should be in a differant sequence; departure, enroute, destination, alternate. (PF coments the same as above). (NON)
4. Need aircraft ident to stay on screen. (NON)
5. Other than the fact that the A/C ID is erased whenever weather info is requested. FP data should be able to be entered out of sequence without having to type in .TP .CR .PD etc. A 1 digit (or letter) field number could do the same job. (PF comments same as above). (NON)
6. The only thing I would prefer is to be able to put in acft ID first, then request what info is needed or contacts to be made. Also, FAC is too limited. (Don't believe capable of handling off-the-wall stuff - RL). (NON)
7. All the information that I use in the field was in the computer. The ability to retrieve the info was the problem. (NON)

PREFLIGHT

1. My complaint is with the graphics. A continuous display of everything available would be more functional and remove some of the frustration from PF. (NON)
2. When filing a FP or just using mask, I tried to use FED key & lost the FP info. Should be able to keep info on mask & use FED key. (NON)
3. It was easier to brief on this position because of the time that one has and also no interruptions by other pilots. (NON)

EFAS

1. Aircraft I.D. on screen during Inflight and EFAS a must. (NON)
2. Position represented a stumbling block. I can't feature a substitute for contact strips due to myriad of situations that occur,i.e.; multiple contacts. A specialist with a pencil could do more. Keeping track of aircraft I.D. was a problem. (NON)
3. A separate message mask for EFAS contacts is needed. The FAC mask is not adequate. (NON)
4. Again out of sequence PIREP info should be able to be entered by a 1 nr. or letter entry. (NON)
5. PIREP mask - would prefer space for altitude alone. (NON)
6. Misc.- What about overdue acft, admin messsages, etc. (NON)
7. After one would become accustom to the computer this position could probably be run more effectively than is currently done. I would like to see changes to the UA format for ease of entry into the computer - enter the info out of sequence & the computer would put it in the correct format.(NON)

continued...

Position Comments cont. . . . Level I

EFAS cont.

8. I liked the system & the goals that it was designed to reach - however, it seems that there must be some other system or program where something besides a typewriter or keyboard could be used for aircraft data. To use this new program & not use a pencil, only the keyboard is awkward, prone to many errors and the ATCS must remember too many facts about the aircraft. I could not brief pilots with this system without writing all aircraft data down and then transfer to the computer. (NON)

9. On UA's - type in all data given by the pilot, out of sequence, then by use of slewball, put the proper data in appropriate fields. (NON)

Position comments Level II

INFLIGHT

1. There was sufficient amount of material but I feel that some of the weather messages such as the WWD could be condensed. (SAS)
2. Everything needed was available but local programming for each facility idiosyncrasies. (NON)
3. See FAC comments, Nr.6. (NON)
4. Provisions for Special Reporting Service(LRS/MRS/SRS0 are not real. The aircraft contact key (FAC/P or /M) is not consistant with Special Reporting Services at my facility. (NON)

PREFLIGHT

1. There was sufficient amount of material but I feel that some of the weather messages such as WWD could be condensed. (SAS)
2. With capabilities for individual facilities programming. (NON)
3. See FAC comments, Nr.6. (NON)
4. The cursor should be more flexible. (NON)
5. Once again much too limited - too restricted. (NON)
6. All required items for PB, FP were available. (NON)

EFAS

1. There was sufficient amount of material but I feel that some of the weather messages such as WWD could be condensed. (SAS)
2. EFAS was the easiest to adapt to. (NON)
3. I have not worked a real EFAS position but I felt sufficient information was available. (NON)

Position comments Level III

INFLIGHT

1. No accomodations made for urgent PIREP entry; PIREP mask needs adjustments for reporting formats. No consideration for overdue aircrafts; need to file statistical data. Equipment limitation to 1 line; 99% of messages don't require more than 1 line usage but it may be needed for UA remarks entries. (NON)
2. The information available was adequate because it was similar to what I have used before. (AWANS)
3. There is a need for storage of initial contact information that can be recalled after FSS specialist furnishes requests. (NON)
4. During heavy traffic with numerous aircraft calling it would be difficult to type in all idents. During weather call-up, have no method of retaining aircraft ident. What do you do with overdue aircraft? (NON)
5. I believe we will still have to use flight progress strips. Also, there are too many keyboard functions for information requested; should be able to do everything from one format. (AWANS)
6. Yes, we had sufficient information but was unable to work the position effectively; without using the contact sheet to write down aircraft ident and requests. I need a constant visual display of that data. (MAPS)
7. Data was sufficient to complete briefing on normal traffic conditions. However, what happens if there is no Flight Data for the aircraft(CX,AM,Dot). (SAS)
8. No memory of the last command is stored. (NON)
9. DF/VOR is adequate, however the mask should be changed to show all background data so coordination with Center can be accomplished while still on initial contact. Graphics should also have a DF/VOR feature that will show FPL area and plot position on graphics. (NON)
10. The mask approach is too slow to handle intensive traffic. I would suggest a "free form" approach in which the specialist designates fields such as /OV, /RM, etc. & allow the computer to process the data according to the fields. (SAS)

PREFLIGHT

1. Standard reply needed to messages requested. Also recommend advance pages by lines feature be inserted. Recommend feature of getting single items for differant stations in one request; i.e., WSA JFK/WFT EWR. (NON)
2. The weather data at this position was pursuant to 7110E. (AWANS)
3. There is a need for storage of initial contact information that you can get on screen after briefing. (NON)
4. Weather summaries and detailed weather were sufficient and complete. Access to single items is also sufficient. (NON)
5. I think all weather requests such as SA's, FT's, WA's, etc. should beon a separate set of keys. That way all you would have to do is program in the aircraft number and route of flight, then you can ask for anv weather requested simply by pushing the requested kev. (AWANS)
6. We had enough information to get a general idea of how this particular system works, esp. the detailed briefing function. "Very good". Provides an excellent brief format in complete order. (MAPS)
7. Content of message data was sufficient to give a positive briefing with all data available. (SAS)
8. Multiple FP messages were not used in the test. Also, no rejection messages were generated to FP's that were entered. (NON)
9. A qualified ves, there's a much more functional way to rev the info requestd. (NON)

Position comments Level III

EFAS

1. Unable to retain aircraft ident, & types of messages requested. Should there be more than one request, you lose aircraft ident for next request unless written down. Same for type of messages requested. Sigmets did not show who issuing NWS outlet was. This is most important. (NON)
2. I think weather information was adequate, but I don't know very much about EFAS needs and format. (AWANS)
3. Pilot report mask simplifies filing. Weather summaries, detailed weather, and single requests adequate and complete. (NON)
4. Should be able to brief, work Inflight, or EFAS from one format; We'll still need flight progress strips. (NON)
5. I think the scenarios should have more contacts with large commercial airliners requesting thunderstorm acitivity and routes to circumnavigate the activity, therefore utilizing live radar and actual conditions or current conditions in flight. EFAS should deal with more real time situations than just route briefings. (MAPS)
6. Should do away with the next day forecast request. Should be real time weather request only. All inbformation was available for the briefing. Several entries had to be made to attain complete information (SAS)
7. Same as Question "1".(Same comment given as Inflight 10.)
8. Two graphic displays at EFAS position. (SAS)

Graphics comments Level I

1. I didn't care for any CRT display when compared with a paper display. I find having to call graphic information frequently was time consuming and an obstacle. My preference would be an improved FAX product available by a glance. (NON)
2. Dual screen capability allows for many useful combinations of graphics. (NON)
3. Some graphics too cluttered, otherwise this capability is very useful; It's good to have all of these type things located in one spot. (NON)
4. Ability to scan all of the charts is more helpful than one at a time or overlaying. (NON)
5. 12-24 and 36-48 hour progs are useful as received on facsimile at times. (NON)
6. Top and bottom of prog maps, lower part shown now. (NON)
7. Add more graphics, especially 12 and 24 hour prog and weather depiction. (NON)
8. Graphic display of pilot reports pertinent to area. (NON)
9. Color enhanced satellite photos. (NON)
10. Some too cluttered. Would probably only use one screen during briefing - would use both screens otherwise especially to compare Prog Chart with Surface Analysis. (NON)
11. Nice to have map displayed all the time. (NON)

Level II

1. Also need to call up some combinations without overlaying. (NON)
2. Ridiculous to have all 5 of these 500mb charts. I am not a meteorologist! One or two would be sufficient - very useful chart but possibly better for FSS use as currently relayed by facsimile. Would like all five if all AFOS products actually available. (SAS)
3. Definitely hope all weather maps useful to FSS will be available. (SAS)
4. Would be nice to have dual screen alphanumeric capability also. (NON)
5. Dual screen capability for graphics might be confusing. (NON)
6. It is possible to get "carried away" and call up too much in the way of graphics(more than 3 overlays). (NON)
7. With the dual screen, the specialist can use both screens at the same time as a briefing tool. (SAS)
8. The dual screen capability is useful for self-briefing and being able to display more graphics combinations. (NON)
9. The upper part of the map is missing which shows areas of IFR, VFR, turbulence. (SAS)

continued

Graphics Level II continued

10. This gives you the capability of having a remote screen(CRT) for the pilot to look at while you're briefing from your own position(CRT). Useful for self briefing and being able to display more combinations. (AWANS)
11. Need the weather depiction chart. (AWANS)
12. Would like to have weather depiction chart, 12/24 hour prog. (SAS)
13. Would like to have radar summary color coded for intensity. (SAS)
14. Would like to see extra graphic screen for radar data only. (NON)
15. Would like to be able to put graphics on either screen or tabular data on either screen. (NON)
16. A method of showing pilot reports in graphics form. Weather depiction chart, 700mb & 850mb. A graphic chart showing location and height of the Jet Stream. (NON)
17. The way it was for testing was adequate; Dual screen capability might be confusing. (NON)
18. Keep aircraft ID on CRT for reference. (NON)
19. The graphics I would like to have, in addition to those shown would be graphics associated with MDF. Graphic presentation of local area to include VOR sites, airports, NDB's as a minimum. Would also like to see aircraft position displayed. (NON)
20. One graphic display of Continental U.S. showing state boundaries & 2 letter state contractions, MI NJ NY etc. (NON)
21. Capability for local programming of MTR/MOA's and restricted areas. (SAS)
22. Definitely would like to see AFOS "slew ball" capability for sectorizing & blowing up areas. (SAS)
23. Possibility of local area terrain features. (SAS)
24. Could make very cool use of LFM panels for weather trends & outlooks & synoptic picture. (NON)
25. Add more graphics. (NON)
26. Expand prog map to include the two upper panels. (NON)

Graphics Comments Level III

1. I think that more than 3 overlays at a particular time detracts and defeats the purpose. (SAS)
2. Did not like accented heights or temp - hard to read. (SAS)
3. Would like recall capability to see last few maps to see frontal movements. (SAS)
4. It's easier to brief with a visual aid when the overlay indicates the direcion of movement along with the associated weather. (NON)
5. Pilot reports indicated on a graphic display should be added to graphics (this comment occurred twice) (NON)
6. Dual screen graphics are nice but unnecessary. (MAPS)
7. A zoom ability should be included at least to the extent of showing your briefing area. (NON)
8. Preduty and inperson briefing would be more complete with dual screen capability. (NON)
9. In regards to dual screen capability, there should not be any limitation because they will replace our weather fac system. (NON)
10. The ability to overlay graphics greatly enhances graphics as a briefing tool. (NON)
11. Excellent capability by making the charts available at each position, more specialists will use the data; much clearer than CCTV presentations. (SAS)
12. Would also like dual alphanumeric capability. (NON)
13. Add more graphics. (NON)
14. Graphics should have the ability to update themselves or notification on screen that additional data is out to clue the briefer. (NON)
15. The ability to get a detail of graphics would be helpful, and unaccented temps are easier to read; differant intensity on overlays to be able to discern one from another. (NON)
16. The graphics available for the test were not complete enough to analyze the weather. (SAS)
17. No graphics were available for pilot reports. At this time, PIREPS are posted on a map by hand for briefing. Also, overlays are necessary for line radar. (SAS)
18. No graphics can be overlayed on the radar therefore another screen may be necessary. (SAS)
19. It's a nice option (dual screen) - can be useful as an aid in pilot briefing. (SAS)
20. Weather graphics excellent. (NON)
21. Severe weather outlook chart, and also Stability Index Chart. (AWANS)
22. Would also like to see:
    1. PIREP graphic display.
    2. 12-24 hour prog.
    3. Weather depiction, etc.
    4. Upper air charts.
    5. DF map.
    6. Low altitude enroute, sectional, TCA, MTR, other local area or local use charts.

    Essentially all FAX maps normally used in FSS now.

    (NON)
23. Should add a 12-24 hour prog to display. (MAPS)
24. Facilities local area display of VFR Sectional Chart, low altitude enroute chart, high altitude enroute chart, MTR chart. (MAPS)
25. Graphic data was used for general knowledge for self briefing. (SAS)

26. In fact in the EFAS position even possibly to add another screen for display. (SAS)
27. It's easier to brief with a visual aid when the overlay indicates the direction of movement along with the associated weather. (SAS)
28. Pilot reports indicated on a graphic overlay. (SAS)
29. Approach plates, local area chart extending outward; i.e., Z2, Z5, Z9, for FSS area for VOR orientation or DF's. (SAS)
30. PIREP display - especially for EFAS. Overlays for local radar, airway maps local maps, graphic MDR plot, overlays for military training routes for specific areas. Some way of knowing if graphics are updated - either automatically or message, etc. (SAS)
32. Ability to get detail of graphic; i.e., zero in on a part, area. Differant intensity on overlay to be able to discern one from another. Ability to have old graphics available - to watch fronts, etc.
33. Graphic display of pilot reports. Two graphic displays at EFAS position.
34. Allows chart comparison and weather radar/chart comparison. (SAS)

System Comments Level I

1. System has potential. (NON)
2. Function keys were most frequently used. (NON)
3. For an updated briefing, some type of function to determine what information was given at an earlier time to that aircraft - (WWD). (NON)
4. Would like WSM as a function key. (NON)
5. Always enter aircraft identification first before request. Make sure encode/decode does not erase any data displayed. Make sure plenty of space is available for route of Flight and PD. (NON)
6. Three letter; i.e., WFT instead of FT - cumbersome; also some abbreviations are unrelated to what's been used before. It would be better to relate to weather handbook. (NON)
7. Learn from AWANS - to improve upon a system that is operationally sound. (NON)
8. Redundancy is inherent in FSS - I wouldn't know what to take out. Redundancy is necessary for clarification. (NON)
9. Aircraft identification on screen during Inflight and others is a must: Add Flight Service Tie-in and Center on Encode/Decode. (NON)
10. Need ACFT identification to stay on screen. (NON)
11. I liked the system and the goals that it was designed to reach. However, it seems that there must be some other system or program where something besides a typewriter or keyboard could be used for the aircraft data. To use this new program and not use a pencil, only the keyboard is awkward, prone to many errors, and the ATCS must remember too many facts about the aircraft. I could not brief pilots with this system without writing all aircraft data down and then transfer to the computer. (NON)

System Comments Level II

1. While formatting a flight plan, should you have to go to Encode or Decode the flight plan mask is lost if not stored. (SAS)
2. Prefer the white screen to the green. (SAS)
3. Have all one button function keys (same comment for all 3 positions tested). (NON)
4. The cursor should be more flexible (preflight position comment RL).
5. How often will cancelled Notams be updated - immediately? Each hour? Need to have current info - old data should be deleted immediately. Not so in SAS. (SAS)
6. Free the cursor so that it can go. (SAS)
7. Clean the CRT. When not in use have clean screen and be able to use the "Free Mask" to type the pilot request and aircraft number. Then often as info is received you can select which mask you will need. (SAS)
8. I would like aircraft ident retained on screen throughout contact or briefing until you enter new ident or name. Also, a way to clear screen after completing request. (NON)
9. Be able to enter aircraft ident (esp. at Inflight) and see it displaved on screen until briefer is through with it. Ability to enter aircraft ident first, then enter requests for info; button that is only used for storage, perhaps separated on keyboard, without shift. (NON)
10. When requesting alternate information - ability to get selected information (display weather based on some criteria) difficult to wade through information that meet minimum requirements.
11. Flexibility in dual screen capability - use both for alpha/numeric data and graphics. (NON)
12. FFP, PIREP mask - computer should be able to put in sequence all info that is entered - faster and less confusing.
13. Combine masks - FFP, FAM, FAC - all serve same purpose; expand fields so that all info could go on FFP. Still need scratch tablets, etc. especially when specialist is busy. Retain contain contact sheets on Inflight. (AWANS)
14. Should be able to display aircraft ident on screen while briefing pilot. (NON)
15. Three letter identifiers (messages) that are the same as the weather or flight data messages void the mask. (AWANS)

System Comments Level III

1. I'd like to see the system hold each aircraft ident unless told not to. Otherwise, I see no problem. (SAS)
2. I do not see why the system should be married to an aircraft ident before you can extract data - otherwise data is O.K. for briefing. You should be able to request and receive anything with only a single button function. (SAS)
3. The incorporation of a cursor into the system for speed and flexibility, particularly if the system will also be used to input data. (SAS)
4. There is a multiplicity of functions which is time consuming and sometimes confusing. Elimination or consolidation of steps should be a priority. (SAS)
5. The following were situations that were not covered:
    1. What about alert feature for WS, WA, WW, etc.
    2. What about entering NOTAMS, SA's into the NAS system.
    3. How are confirmations of messages sent, acknowledged.
    4. Has the transborder and ICAO functions been programmed into the system?
    5. What about service B functions. These are some, but not all of potential problems. (AWANS)
6. I recommend a separate key for almost all requests. I strongly recommend that the AWANS keyboard be studied because once you program in a route, no other programming functions are required normally. (AWANS)
7. I recommend that forward backpage function keys be segregated. I would inadvertently hit the wrong key. (SAS)
8. I prefer option of both keyboard entry and function keys. (SAS)
9. Add local storage capability for local NOTAMS, frequencies, aircraft based locally, sunrise/sunset tables. Graphic display of local area. (NON)
10. Definitely on the right track. (SAS)
11. Would really like to have been able to evaluate the flight data system. Prefer moveable cursor on flight plans and pilot reports. (SAS)
12. I like the overall idea of the system. (NON)
13. I particularly like the manner that this system loads additional pages into a buffer system and does not require you to watch two full screens load before you begin briefing (vice SAS). (SAS)
14. I think that the complete text of FDC Notams could be indicated by a "flag" of some sort that would allow the specialist to view them if he/she desires. (SAS)
15. No provisions were made for recording pilot briefs, VNR, etc. I would like to see AIM info, approach plates. (SAS)
16. I believe we will still have to use flight progress strips. (AWANS)
17. Too many keyboard functions for information requested. (AWANS)
18. Should be able to do everything from one format. (AWANS)
19. I think all weather requests such as SA's, FT's, WA's, etc. should be on a separate set keys. That way all you would have to do is program in the aircraft number and route of flight, then you can ask for any weather requested simply by pushing the requested key. (AWANS)
20. Should be able to do everything from one format. (AWANS)
21. Would like memory capability to recall last weather entry. (SAS)
22. Cursor helps organizations; i.e., in flight plan filing. (SAS)
23. Difficulty with recalling aircraft ident if it's not written down. (SAS)

System Comments continued Level III

24. No memory of the last command is stored. That is, if an incorrect key or an additional key is hit the weather data is lost; for example, if a multiple weather message is called up and displayed with several pages of info and graphics are needed to expand the briefing, hitting the graphics key cancels the ability to page through the information. This required entering the weather request again. If the program could include a memory function this would eliminate calling up again. (SAS)
25. On initial callup from a pilot at the preflight position. the specialist should be able to store a minimum amount of data in order to brief a pilot. This minimum amount of data should be available to the specialist at any time during the call-up. At the conclusion of a call-up a specialist should then be able to recover minimum data without having to enter aircraft identification.

    Nevertherless, high level briefs are very unique. A pilot flying at FL200 or above needs only a minimum amount of weather enroute; that is, present or forecasted. Model II should tailor its format to meet this requirement. This minimum amount of weather should be based upon convective activity actual or forecasted. In addition to the above, NOTAM information should be only the very pertinent.

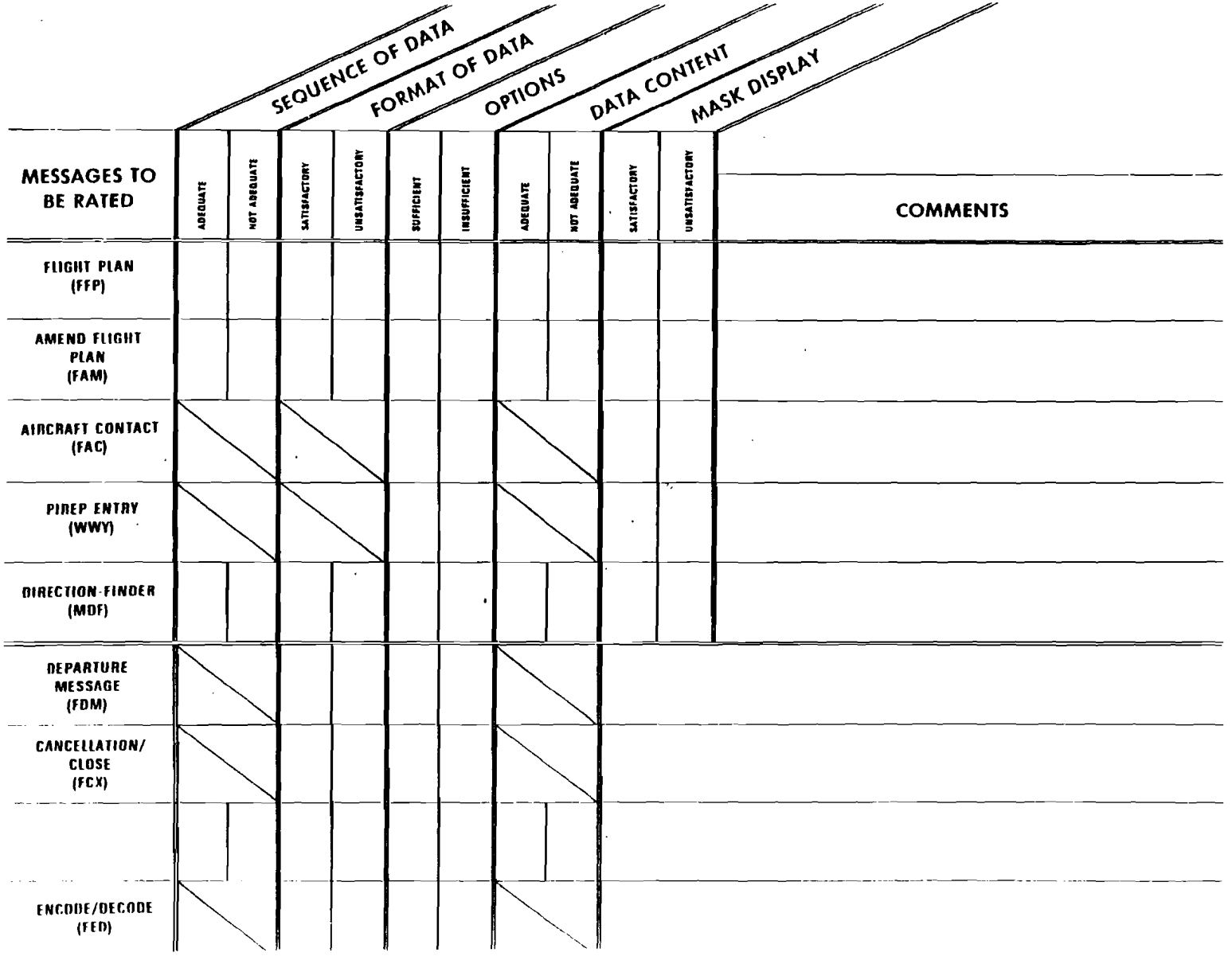
    In addition to the foregoing, a high level brief would be greatly enhanced if it was possible to display the high level significant weather prognosis automatically with a brief.

    Finally, on all positions a specialist needs a place to store initial contact information. This information can be put on the appropriate mask later. Speaking of mask information, it should also be possible to move the cursor, a specialist should be able to revise or edit information and return to starting point without deleting previous typed information.

    Inflight problems seem to be common to preflight; that is, there is a need for storage of initial contact information. (AWANS)
26. First entry should be number. Method of info entry - start with aircraft ident - slash method is good - use multiple function keys. WGF, WSA, etc. simultaneously. (SAS)
27. Ability to store info and recall without re-entering data (on weather data). (SAS)
28. The CRT and keyboard is the only way to go. (AWANS)
29. On the right track. (SAS)
30. Like the way first page of info remains on screen and rest held in buffer until ready (compared to SAS). Very happy with Preflight, quite a bit of trouble with Inflight masks. Period to change field in mask very good idea. Would like to eliminate "fill-in" masks and just have specialist randomly type in various data using 2 letter field identifiers. This would combine PIREP entry, flight plan filing, position reporting, etc. all together. Computer would sort out data and format messages and file them as appropriat using a single keystroke entry. (SAS)
31. Like aircraft I.D. or pilots name to remain on screen during briefing. (NON)
32. At IF, PF, EFAS, prefer space on screen for free format entry of pilots request and retention of free format entry and aircraft I.D. on screen during briefing. (NON)
33. The amount of information is sufficient but there should be a line for display of aircraft ident or pilots name. Would prefer line advance rather than page forward or back to avoid splitting data. (NON)
34. First entry should be AC ident. (2) (SAS)

APPENDIX C

QUESTIONNAIRES


SEQUENCE OF DATA
FORMAT OF DATA
OPTIONS
DATA CONTENT
MASK DISPLAY
MESSAGES TO BE RATED
ADEQUATE
NOT ADEQUATE
SATISFACTORY
UNSATISFACTORY
SUFFICIENT
INSUFFICIENT
ADEQUATE
NOT ADEQUATE
SATISFACTORY
UNSATISFACTORY
COMMENTS
FLIGHT PLAN (FFP)
AMEND FLIGHT PLAN (FAM)
AIRCRAFT CONTACT (FAC)
PIREP ENTRY (WWY)
DIRECTION-FINDER (MDF)
DEPARTURE MESSAGE (FDM)
CANCELLATION/ CLOSE (FCX)
ENCODE/DECODE (FED)

MESSAGES TO BE RATED	SEQUENCE OF DATA		FORMAT OF DATA		OPTIONS		DATA CONTENT		COMMENTS
	ADEQUATE	NOT ADEQUATE	SATISFACTORY	UNSATISFACTORY	SUFFICIENT	INSUFFICIENT	ADEQUATE	NOT ADEQUATE	
ATC SYSTEM COMMAND CENTER (FCF)									
SPECIAL USE AREAS/ROUTES (FSU)									
PREFERRED ROUTE REQUEST (FRR)									
WEATHER MESSAGES									
WEATHER SUMMARY (WSM)									
PILOT REPORT REQUEST (WUA)									
NOTICE TO AIRMEN (WNO)									
PROGNOSTIC MAP (WFX)									
SEVERE WEATHER OUTLOOK (WSO)									
GRID WINDS FORECAST (WGF)									

MESSAGES TO BE RATED	SEQUENCE OF DATA		FORMAT OF DATA		OPTIONS		DATA CONTENT		COMMENTS
	ADEQUATE	NOT ADEQUATE	SATISFACTORY	UNSATISFACTORY	SUFFICIENT	INSUFFICIENT	ADEQUATE	NOT ADEQUATE	
AREA WEATHER FORECAST (WFA)									
SIGMETS (WWS)									
AIRMETS (WWA)									
SURFACE WEATHER OBSERVATIONS (WSA)									
DETAILED WEATHER MESSAGE (WWD)									
TERMINAL FORECAST (WFT)									
RADAR REPORT (WSD)									
MULTIPLE WEATHER SELECTION (WWX)									
WEATHER TREND (WWT)									
LOCAL WEATHER (WWL)									

SPECIALIST EVALUATION QUESTIONNAIRE

Level of Facility_____ Automated_____
Nonautomated_____

1. Do you feel that the type and content of the messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the INFLIGHT position?

a) Yes (explain why)

b) No (explain why)

2. Do you feel that the type and content of messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the PREFLIGHT position?

a) Yes (explain why)

b) No (explain why)

3. Do you feel that the type and content of messages available to you during testing were complete enough to allow you to satisfactorily perform your duties at the EFAS position?

a) Yes (explain why)

b) No (explain why)

SPECIALIST QUESTIONNAIRE

GRAPHICS

Level of Facility_____ Automated_____

Nonautomated_____

1. Do you prefer the dual screen graphic capability over the normal configuration of one display for alphanumerics and one display for graphics?

   a) Yes

   b) No

Comments:

2. Below is a list of graphics available for overlay during the test. Select the graphics combinations which you found most useful. Indicate the combinations by writing the numbers on the lines at the right.

Graphics	Useful combinations
1-Surface analysis (fronts, isobars)	_____
2-Radar summary	_____
3-Hi-level sig. prog.	_____
4-36 hr. surface prog.	_____
5-48 hr. surface prog.	_____
6-Surface analysis, isobars only	_____
7-Surface analysis, fronts	_____
8-500 mb analysis heights	_____
9-500 mb analysis heights accented	
A-500 mb temperature	
B-500 mb temperature accented	
C-500 mb stations	
D-Freezing level	

Graphics Questionnaire (continued)

3. In general, how would you rate the overlay capabilities for the graphic products?

   a) Very Useful

   b) Useful, but some improvements needed

   c) Not useful as is

Comments:

4. What additional types of data would you like to see included with the graphics products?

QUESTIONNAIRE FOR FINAL INTERVIEW

1 Do you feel that the various weather messge types are an aid to efficient briefing?

2. Do you think that any weather message types are excessive or redundant?

3. Would you give a pilot all of the information provided in the collective weather message on al daily or routine basis?

4. Could you effectively conduct a self pre-duty briefing using the system?

5. Do you feel that the function keys are an aid to efficient and speedy information retrieval?

6. What comments, if any, would you make regarding the amount of information that is displayed on the screen at one time?

7. Would you add or delete anything from the FSAS system, based on what you have worked with here?

8. Is there anything you want to add or comment on?

APPENDIX D

SAMPLE SPECIALIST TEST GUIDE

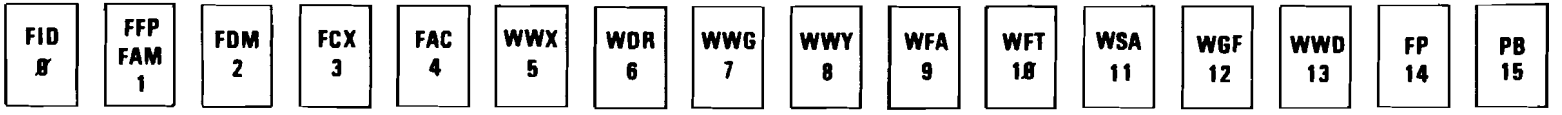
SPECIALISTS TEST GUIDE

INTRODUCTION

The information contained in this guide is for your convenience during testing. If you have any questions during the test, please feel free to ask any one of the people monitoring the test.

The main purpose of the test is to allow you to evaluate some Model 2 functional capabilities. Specifically, you will evaluate several types of flight data messages and weather messages. You will be able to do this as you brief "pilots" who call requesting information. You will be seated at the three positions, Inflight, Preflight and EFAS. The main feature of these positions is the keyboard, which will enable you to access all the messages and graphics, and the screen (CRT) on which the information you request will appear. As you can see in Figure 1, the keyboard has 16 function keys in addition to the normal range of keys. You can access specific messages via the function keys, and these are described in Section I, entitled Message Processing. All remaining messages must be accessed by typing in the message abbreviation, i.e., WWD for detailed weather. Again, these are more fully explained in the following section.

Five of the messages, whether accessed by function key or by typing in their abbreviation, are displayed in a mask format. These are all messages in which you must input information from a pilot, such as flight plan filing. The information is entered on a "form" which is displayed on the screen. Examples of messages with masks are illustrated in Figure 3 and Figures 5 and 6. Their processing is more fully described in Section II entitled Messages With Masks.



FUNCTION SWITCH ARRAY (DETAIL)

LEGEND

0 Aircraft Ident
1 Flight Plan and Amend FP
2 Departure Message
3 Cancel Flight Plan
4 Aircraft Contact
5 Multiple Weather Message
6 Radar
7 Graphics
8 PIREP entry
9 Area Forecast
10 Terminal Forecast
11 Surface Observations
12 Winds Aloft
13 Detailed Weather
14 Forward Page
15 Back Page

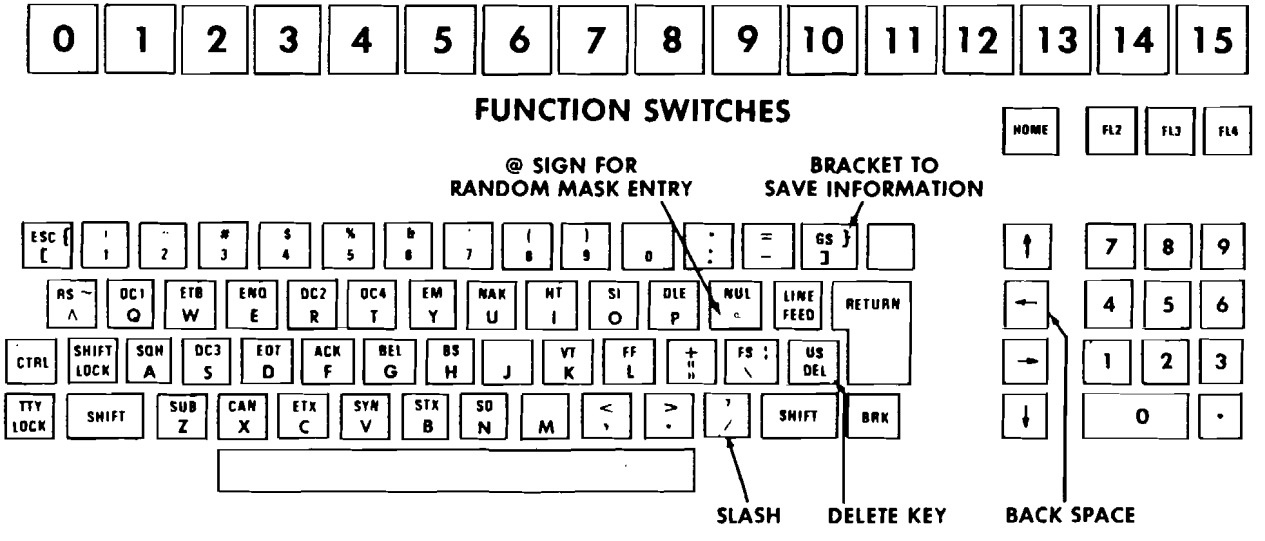


FIGURE D-1. GENISCO KEYBOARD

I. MESSAGE PROCESSING

This section describes sample tasks to illustrate how you will be able to obtain the necessary information for briefing, flight plan filing, etc., from the data base. Following is a list of function key messages, and the messages that must be typed in. To begin processing, press the key.

To access the system:

(1) Type in the message abbreviation or:

(2) Hit the function key that corresponds to that message.

Only sixteen (16) messages have function key assigned to them. They are:

FUNCTION KEYS	EXPLANATION	WHAT TO TYPE
FFP	Flight Plan Mask	-Hit FPP key and type AC ident -Hit the return to skip a field -To select a particular field, type a period (.) and two letter field identifier-type appropriate information in and hit the return (i.e. .TM1930) no spaces needed -Type ! to save information.
FAM	Amend Flight Plan (mask)	-Hit FAM key and type AC ident -Hit the return -Hit return to skip a field
FDM	Departure Message	-Hit FDM key -Type AC ident/departure/time and hit the return Include slashes (/)
FCX	Cancel Flight Plan	-Hit FCX key -Type AC ident/depart/destination and hit the return Include slashes (/)
FAC	Aircraft Contact (mask)	-Hit FAC key -Type AC ident/P or M and hit (CR) -Hit the return to skip fields -Type . and two letter field identifier to enter information in a specific field. P=flight progress M=flight monitoring

Function Keys (continued)

FUNCTION KEYS	EXPLANATION	WHAT TO TYPE
FED	Encode/Decode	-Hit FED key -Type AC ident/location ID or name, state/E and hit return (for encode) If you don't type E, computer defaults to decode option. i.e. N710TK/M, CA/E gives you a list of airports in California that start with M, with their location identifier.
WDR	Radar	-Hit WDR key
WWG	Graphic Display	-Hit WWG key -Type AC ident/graphic ID char/ over (opt)/A and hit the return.
WWY	PIREP entry	-Hit WWY key and Type AC ident -Hit the return to skip fields -Type . and two letter field identifier to enter information in any field.
WFA	Area Forecast	-Hit WFA function key -Type AC ident/loc ident/R,S,Z5 (or)Z9. -Hit the return
WFT	Terminal Forecast	-Hit WFT function key -Type AC ident/loc ident/R,S,Z5 (or)Z9. -Hit the return
WSA	Surface Observations	-Hit WSA function key -Type AC ident/loc ident/R,S,Z5 (or)Z9. -Hit the return
WGF	Wind Aloft	-Hit WGF key -Type AC ident/loc ident/R,S,Z5 (or)Z9. -Hit the return
WWD	Detailed Weather	-Hit WWD key -Type AC ident/route of flight/R -Hit the return
FP	Forward Page	-Hit FP key A "C" appears at the bottom of the page if more information is contained in the message. An "E" signals the last page of information.
PB	Back Page	-Hit PB key

MESSAGES TO BE TYPED

MESSAGE TYPE	EXPLANATION	WHAT TO TYPE
FRR	Preferred Route Request	-Type FRR AC ident/departure/destination -Hit return
FSU	Special Use areas/ routes	-Type FSU AC ident/route of flight/R -Hit the return
WSM	Weather Summary	-Type WSM AC ident/route of flight/R -Hit the return
WWX	Multiple Weather Selection	-Type WWX AC ident/message types/loc id/S, Z5(or)Z9 -Hit the return
WUA	Pilot Report Request	-Type WUA AC ident/loc ident/R,S,Z5(or)Z9 -Hit the return
WNO	NOTAMS (Notices to Airmen)	-Type WNO AC ident/loc ident/R,S,Z5(or)Z9 -Hit the return
WWL	Local Weather	-Type WWL AC ident/loc ident/R,S,Z5(or)Z9 -Hit the return
WFX	Prognostic Map	-Type WFX AC ident -Hit the return
WSO	Severe Weather	-Type WSO AC ident -Hit the return
WWT	Weather Trend	-Type WWT AC ident/loc ident/S,Z5(or)Z9 -Hit the return
WWS	Sigments	-Type WWS AC ident/loc ident/R,S,Z5(or)Z9 -Hit the return
WWA	Airmets	-Type WWA AC ident/loc ident/R,S,Z5(or)Z9 -Hit the return

MESSAGES TO BE TYPED (continued)

MESSAGE TYPE	EXPLANATION	WHAT TO TYPE
WWD	Detailed Weather	-Type WWD AC ident/route of flight/R -Hit the return
MDF	Direction-Finder	-Type MDF AC ident -Hit the return
WSD	Radar Report	-Type WSD AC ident/loc ident/R,S,Z5(or)Z9 -Hit the return

II. DETAIL OF ONE WEATHER MESSAGE TYPE

WSA MESSAGE

(local) Type WSA/N1234/ACY MIV Hit (CR)

SA's for Atlantic City and Millville appear on screen

(state) Type WSA/N1234/NJ/S Hit (CR)

All SA's for State of N.J. appear

(route) Type WSA/N1234/ACY PHL PIT/R Hit (CR)

SA's along route of flight from Atlantic City to Pittsburgh via Phila. appear

(zone) Type WSA/N1234/ACY/Z5 Hit (CR)

SA's in a 50 mile radius of Atlantic City appear

Type WSA/N1234/ACY/Z9 Hit (CR)

SA's in a 90 mile radius of Atlantic City appear

WFA MESSAGE

Type WFA/N1234/ACY MIV PHL/R Hit (CR)

Area forecasts along that route appear

Type WFA/N1234/ACY/Z5 Hit (CR)

Boston area forecasts appear

Type WFA/N1234/NJ/S Hit (CR)

Boston area forecasts appear

Type WFA/N1234/BOS Hit (CR)

Boston area forecasts appear

*Type WFA/ACY

ERROR: DATA NOT CURRENTLY AVAILABLE

Note: ACY has no area forecasts

The WWS and WWA messages work the same way since they are both generated in Boston.

LIST OF SOME POSSIBLE ERROR MESSAGES

-INVALID AIRCRAFT IDENT

-TOO MANY CHARACTERS

-INVALID COMMAND FIELD

-PLEASE ENTER VALID LOCATION IDENTIFIER-TRY AGAIN

-INVALID SELECTION

-ERROR! PLEASE ENTER A VALID OPTION

-ERROR! PLEASE ENTER A VALID LOCATION IDENTIFIER

-N1234 (example) AIRCRAFT IDENT IS NOT IN DF SYSTEM
CHECK AIRCRAFT ID AND REINITIATE DF MESSAGE

-I AM SORRY BUT YOUR REQUEST CANNOT BE FOUND

III. MESSAGES WITH MASKS

The following messages all have masks when displayed:

*Flight Plan (FFP)

*Amend Flight Plan (FAM)

*Aircraft Contact (FAC)

*PIREP Activity (WWY)

Direction-Finder (MDF)

* indicates messages with function keys

They are all processed in a similar way. The Direction-Finder (MDF) message is used as an example.

The Direction Finding Message function is initiated by entering the message type and aircraft identification (e.g. MDF/N7772F).

A mask will be displayed showing six field identifiers:

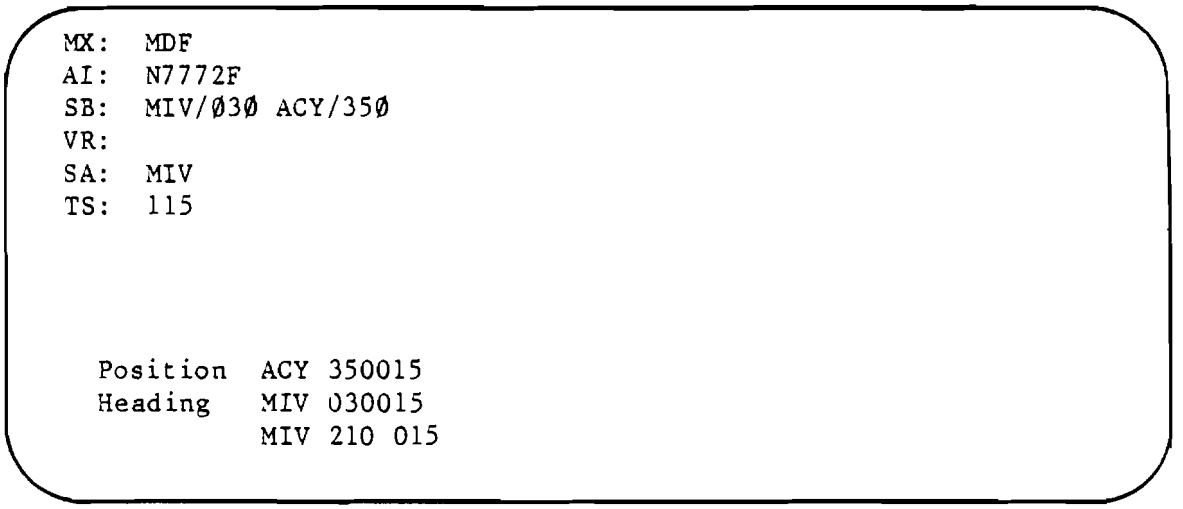
MX: (Message Type)
AI: (Aircraft Identification)
SB: (Site & Bearing)
VR: (VOR & Radial)
SA: (Selected Airport)
TS: (True Airspeed)

The message type (MX) field and aircraft identification (AI) field will have the appropriate data inserted, following the field identifiers, when the mask is displayed. Since the required entries will vary, depending on the type of output data needed, an entry is not required for all fields. If an entry is not required for a specific field, simply depress the return key without typing any data. Note that while all the fields are optional, data must be entered in either the "SB" or "VR" fields to obtain output.

The data entered by the user, in response to the individual prompts, will be displayed immediately following the appropriate field identifier in the mask.

The last data entry must be followed by an exclamation point (!), to cause the output to be displayed. For example, if the last required entry is "Selected Airport" and this location is Atlantic City, the appropriate response would be: ACY! followed by a carriage return. Following the entry of an exclamation point, the DF output will be displayed below the field identifiers in the mask.

FIGURE 2 MDF MASK



-To display output, type an ! following final data entry.
-SB enter site and bearing:
-VR enter VOR(s) and radial:
-SA enter selected airport:
-TS enter true airspeed

To file a flight plan, the procedure is similar. Hit the FFP function key and enter aircraft ID. A flight plan mask with aircraft ID in place, will appear on the screen. See Figures 3 and 4.

After entering data always hit the return key. Unless otherwise indicated, the flight plan mask is a fixed format. That is, all information is entered in sequence. If you desire the random access option to the flight plan mask, type a period (.) and two letter id field.

After entering all the necessary data, type an ! to save the information on the screen. To recall the flight plan you saved, hit either the flight plan or flight plan amendment function key and enter aircraft ID. The mask with previously entered information will appear on the CRT.

The aircraft contact mask is illustrated in Figures 5 and 6. Figure 5 shows the monitor option, with accompanying explanation of field identifiers. The progress option is shown in Figure 6.

Important: You must always save the mask by entering an (!) if you wish to return to it at any time. Hit the shift key and strike the appropriate key for the exclamation point.

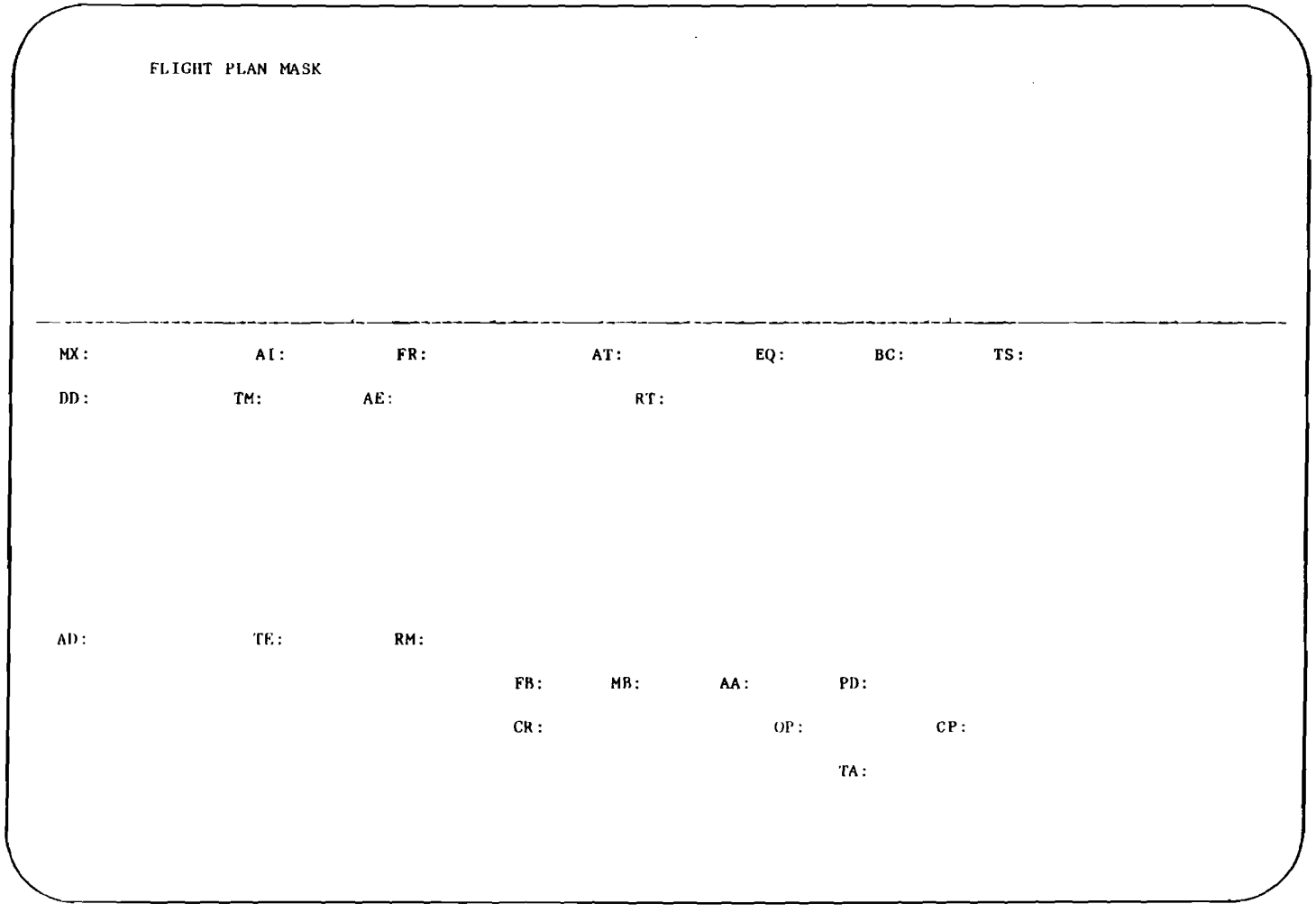

FLIGHT PLAN MASK
MX:
AI:
FR:
AT:
EQ:
BC:
TS:
DD:
TM:
AE:
RT:
AD:
TE:
RM:
FB:
MB:
AA:
PD:
CR:
OP:
CP:
TA:

FIGURE 3

FLIGHT PLAN MASK LEGEND

Field Identifier	Explanation
MX	Message type
AI	Aircraft Identification
FR	Type of Flight
AT	Number and type of aircraft
EQ	Communications equipment
BC	Beacon code
TS	True airspeed or Mach number
DD	Departure point
TM	Departure time
AE	Requested altitude
RT	Route of Flight
AD	Destination
TE	ETE
RM	Remarks
FB	Fuel on board
NB	Number of persons on board
AA	Alternate destination
PD	Pilot data
CR	Color of aircraft
OP	Output routing
CP	Closure points
TA	Estimate time of arrivals

FIGURE 4

FIGURE 5 MONITOR OPTION FOR AIRCRAFT CONTACT MESSAGE

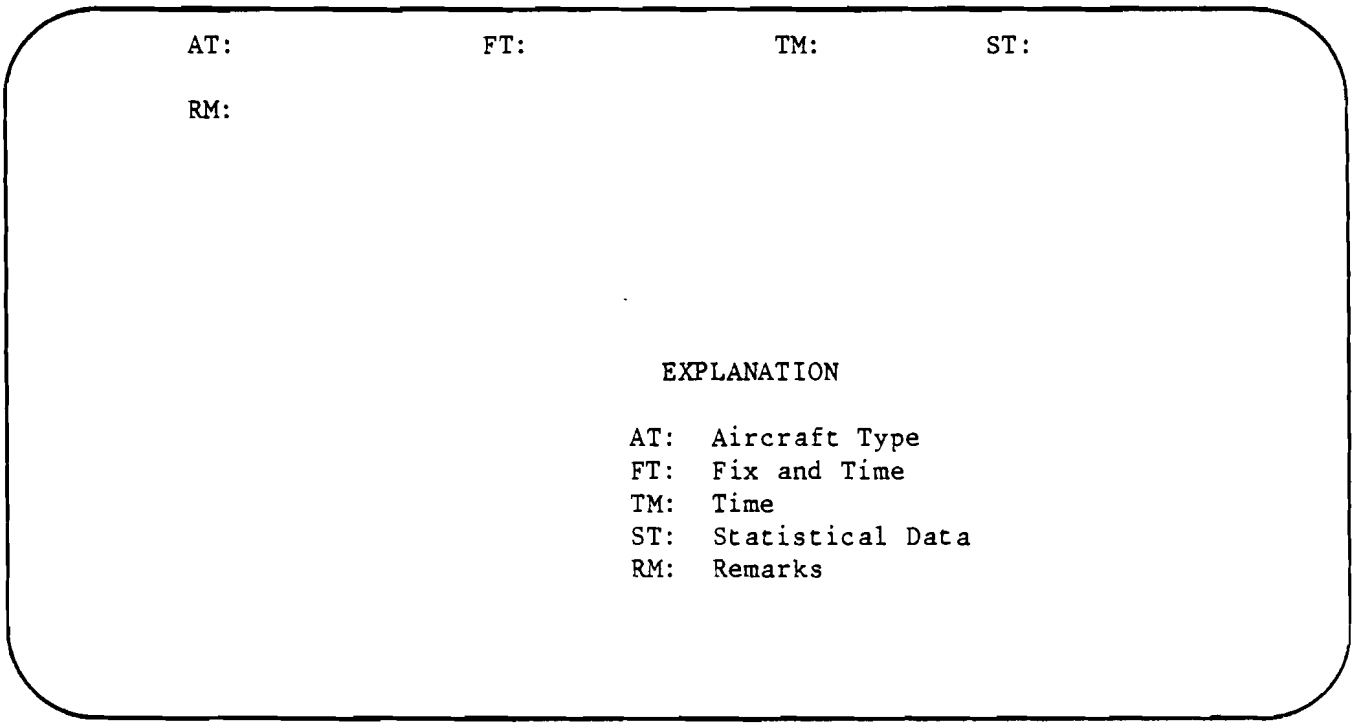


FIGURE 6 PROGRESS OPTION FOR AIRCRAFT CONTACT MESSAGE

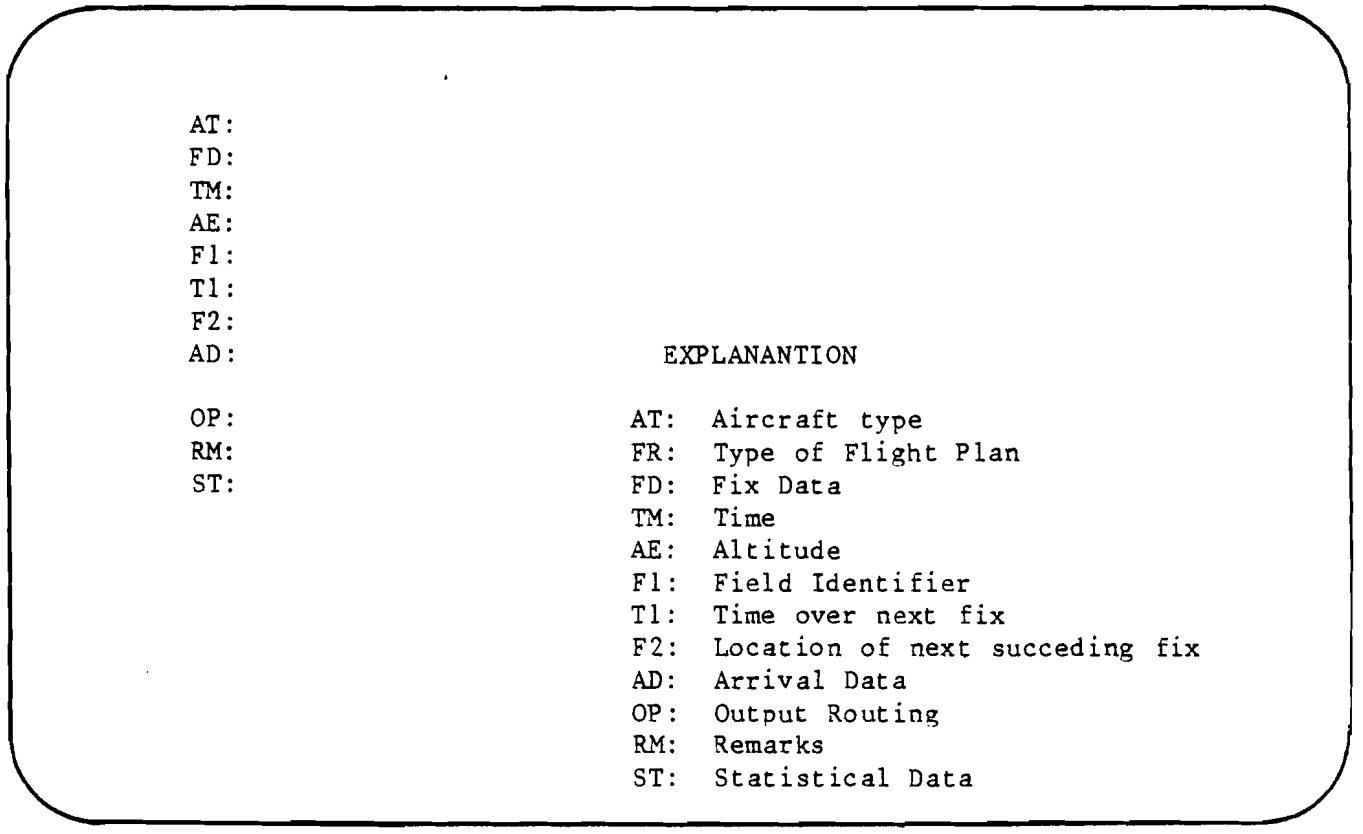
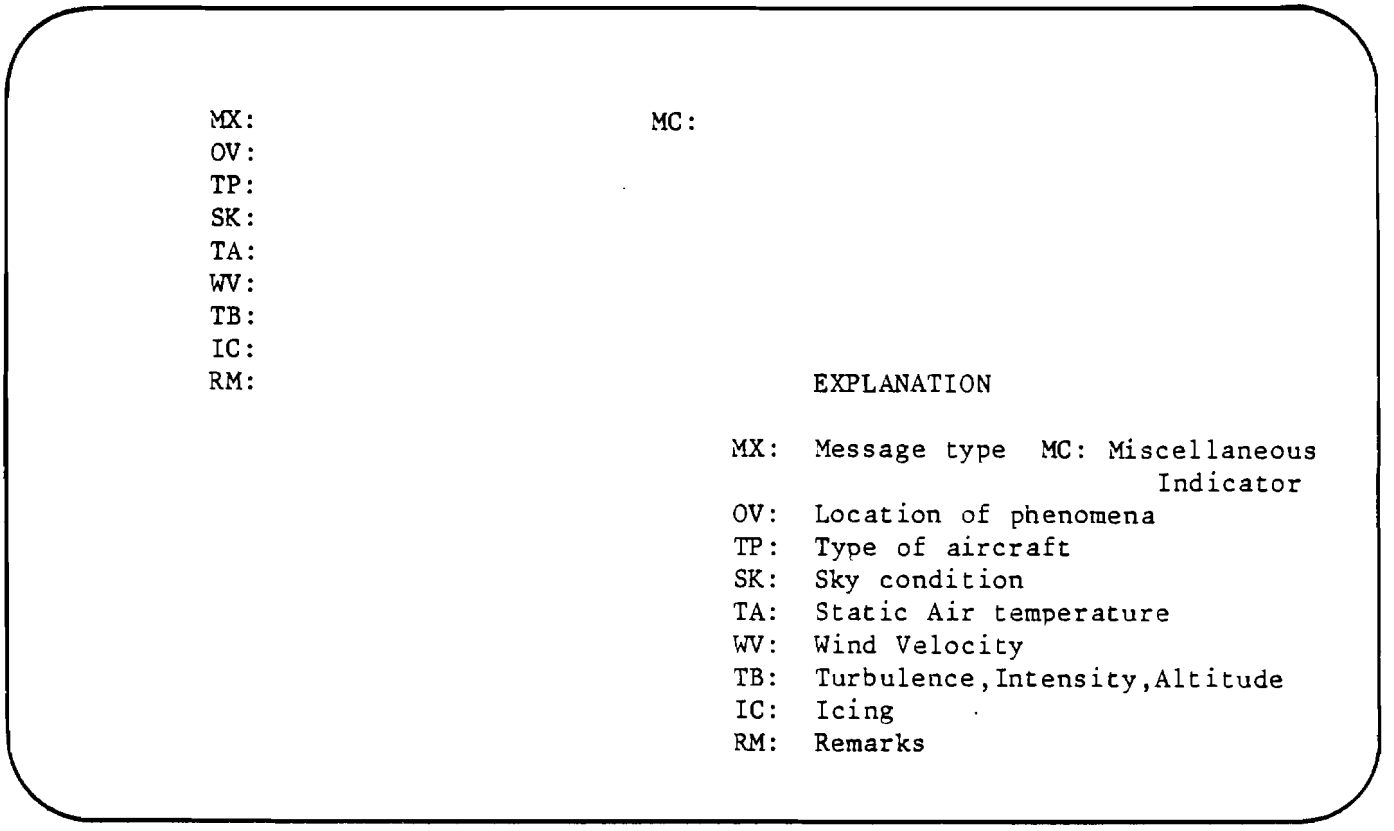


FIGURE 7 PIREP DISPLAY



Appendix A contains a list of field identifiers and their meanings. These field identifiers are used in many of the messages, and all the messages with masks. Three columns appear. The first column lists the actual field identifier. The column entitled Field Reference explains the identifier. The column entitled Meaning describes the field identifier in greater detail.

Appendix B contains a list of message types, that will be available with the options that are available in each message type. It's a good idea to become very familiar with them in advance of testing.

If you have any questions regarding the above information or any test procedure, please ask one of the test monitors.

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LIST OF FIELD INDENTIFIERS AND THEIR MEANINGS

AIRCRAFT CONTACT MESSAGE (FAC)

MONITOR OPTION

AT: Aircraft Type
FT: Fix and Time
TM: Time
ST: Statistical Data
RM: Remarks

PROGESS OPTION

AT: Aircraft Type
FD: Fix Data
TM: Time
AE: Altitude
F1: Field Identifier
T1: Time over next Fix
F2: Location of next succeeding
AD: Arrival Data
OP: Output Routing
RM: Remarks
ST: Statistical Data
FR: Type of Flight Plan

PIREP DISPLAY (WWY)

MX: Message type
MC: Miscellaneous indicator
OV: Location of phenomena
TP: Type of aircraft
SK: Sky condition
TA: Static air temperature
WV: Wind velocity
TB: Turbulence
IC: Icing
RM: Remarks

DIRECTION-FINDING MESSAGE (MDF)

MX: Message type
AI: Aircraft identification
SB: Site and bearing
VR: VOR & Radial
SA: Selected airport
TS: True airspeed