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Rod:

REF: Letter to you dated July 12, 1956.

The purpose of this letter is to further provide you with the drift sight test results to date and to indicate a modification program which we wish you to follow in correcting the drift sight malfunctions. It is also to provide Headquarters with the current drift sight status.

The flight test program for determining the operational suitability of the drift sight has been attempted between the dates of May 29th, to June 29th. During this time, nine flights were specifically organized to gather drift sight data. Of these nine flights, only four brought back enough data for analysis. Enclosure 1 indicates the numbers and types of flights flown. These tests were made in accordance with the report made by the writer and submitted to the Ranch and P.E. in January, 1956. The data was obtained on the data cards defined in that report. A sample data card for flight number 8 is included as enclosure 2. Copies of all of the data cards obtained during these flight tests have been given to P.E. The pilots' comments shown in enclosure 1, made with regard to the several drift sight flights, indicate that they are having the same types of malfunctions and troubles that have been with the drift sight almost from its inception.

The data obtained was enough to permit thirty-one separate calculations of drift and tracking errors. The random errors due to instrumentation external to the drift sight system are probably within 2%. This would account for errors of more than 1000 feet in elevation over terrain. These external errors may be positive or negative and should cancel out. A summary of the drift and tracking errors is shown in enclosure 3. Referring to this enclosure, it will be noted that the test results may be broken up into those runs which had drift exceeding 2 degrees and those runs which had drifts of less 2 degrees. The significant thing here is that the runs wherein the drift was less than 2 degrees resulted in much more accurate tracking. This fact prompted our inclusion of a drift card on the face of the scope. This drift card is to permit the pilot to measure drift independently of the drift sight hand control. This drift is then entered into the drift sight hand control and then the pilot has only to manipulate the track knob in order to stop the terrain. It is apparent from the results, that when we had little or no drift the pilot was able to much more accurately calibrate the tracking knob.

The summary indicates that the tracking errors at present are too great for navigation purposes or for use with the C equipment. A crude analysis of tracking errors versus the C equipment has been made and is submitted as enclosure 4. This analysis was based on the assumptions listed on page 1 of that enclosure, all of which I believe are on the optimistic side.

The graph of the tracking error versus the angle of the line of sight from the aircraft to the target at store time indicates that, using the over-all average errors as collected in enclosure 3, if a target is more than 18 degrees from the aircraft vertical at store time then it probably will not be within the frame of the C equipment at the time of snap. In other words, the C equipment will snap either too early or too late because of the tracking error multiplied by the time involved in moving the target from its store position to directly under the aircraft. Further, even the inclusion of the drift plate which we propose will probably not increase this critical line of sight angle too much more than 30 degrees as indicated.

An even more overriding consideration than the foregoing tracking problem is that the tracking output of the hand control is used to determine the IMC action of the C equipment. This IMC, in order to provide 40 lines per millimeter, must be on the order of .3 milli~~meters~~ [RADIADS] per second if the shutter speed is 1/50th of a second or it must be .5 milli~~meters~~ [RADIANS] per second if the shutter speed is on the order of 1/100th of a second. This indicates that even by use of the drift card, we still may have tracking errors which are more than double that of the IMC requirement for C.

The above data indicates that the drift sight is presently unsuitable for navigation in that dead reckoning is much more accurate. It is also presently unsuitable for use with the C equipment from both a basic target tracking standpoint and the IMC requirements.

In order to attempt to make the drift sight an operational unit, the following program will be continued next week, July 23rd.

1. Lockheed will continue tests with drift sights which have the drift cards installed

upon them. These tests will not be made in aircraft 351 because it is presently being used for other systems' tests, but the hand control that has been used in 351 will be shifted to another aircraft and used in order to get additional controlled data. Also, a new hand control will be used, which on the bench at least does not have any of the idiosyncrasies exhibited by the hand control in 351. These tests will be conducted by both Lockheed and the training people in order to get an over-all estimate of the effect of individual pilots' abilities.

2. During this time, P.E. is to provide engineering help for both analysis of the data and careful maintenance and trouble shooting on the hand controls according to the pilots' comments. No hand control is to be sent back for flight test unless all flight squawks are completely worked out.

P.E. is to begin a modification program for correcting the malfunctions we know about presently. In the interest of saving time, this modification program must be accomplished concurrently with the flight tests. As a result of the foregoing flight tests, these items at present include the following:

A The prisms, which are causing the

blurry scopes and eye discomfort, are to be replaced with prisms that have much sharper corners. This particular item may be done by factory rework on a replacement basis.

B. The drift card assembly and installation is to be designed and sent out for inclusion on drift sights presently in the field.

C. New flexible cable connections are to be manufactured which will prevent individual mechanics from tightening up on these connections and causing too much friction in the cable. These also are to go on drift sights in the field.

D. Any other items that arise as a result of this current flight test must be corrected by the kit or factory rework method.

The hand controls that we are presently receiving are very smooth in their action and are a vast improvement over the early models. The force required by the pilot to move the hand control in our present units is as follows:

		Force-lbs.
1.	Normal travel no flexible cable connection.	.25
2.	Normal travel with flexible cable connected.	.50-.75
3.	To pull from vertical detent.	1.00

The servo system will probably not reduce the above forces; they are hardly noticeable to the operator. The prime comment with regard to the hand control action concerns the bale ring null points at top center. These must be avoided at times by moving the hand control around in back of them. Since these are caused by the basic arrangement of the bale rings, the servo driven system will have this same peculiarity.

The servo system presently being designed for the follow-on articles may not correct the unsatisfactory conditions noted during the flight tests. This servo method must be carefully examined in order to be sure that we are getting an improved system. It is understood that at present the servo system is being designed to be powered by 100 to 200 watts of single phase 400 cycle power. The aircraft alternator is three phase. The frequency is unregulated and varies with engine RPM. In turn, the engine RPM varies with altitude as shown on enclosure 5. It is understood that the servo system for the drift sight will probably not be satisfactory below 350 cycles, which indicates that in terms of altitude the drift sight will not operate below 45,000 feet. This is not a desirable feature and so the next step would have to be the addition of an inverter for this use. Such an inverter of the desired power rating weighs approximately 15 pounds. As you know, it was this consideration which prompted the use of the flexible shafting in the first place. Before committing the whole program to the use of a servo system, it seems that perhaps we should build only one of these and examine it with respect to the flexible drive system presently used.

I am not pessimistic with regard to making the present system operational, but it does appear that a concerted effort on our respective parts is required to do it.

Copies of this letter and its enclosures have been forwarded to Headquarters and [redacted] STAT

Best regards,

ENCLOSURE 1

FT SIGHT OPERATION - S/l

FLT.	DATE	PILOT	DATA OBTAINED	PILOT COMMENTS	ACTION
1	5-29		None	Blurry scope PRISM EDGES?	Not checked ouSTAT before flight.
2	5-30		No drift sight tests		NOTE— NO AVAILABLE COMMENTS OR REASONS FOR ERRATIC D.S. ACTIONS
3	5-30		No drift sight tests		
4	5-31		No drift sight tests		
5	6-5		No drift sight tests		
6	6-6		No drift sight tests		
7	6-6		No drift sight tests		
8	6-7		3 Runs - 45M' - 120° between headings	None	Drift sight checked out and boresighted before flight.
9	6-8		7 runs - 66M' to 70,300' different flight legs during cruise climb.	None	
10	6-12		1 run - 70M'. Data not complete.	AGAIN Drift knob turns when using hand controller. Couldn't get tracking adjusted for proper operation.	Checked & boresighted drift sight after flight.
11	6-13		None DRIFT KNOB FIXED? TRACKING MOTOR? PRISM EDGES	Drift knob loose. Tracking erratic. It speeds up & slows down. T & D knobs would be easier to use if there were detents or clicks about every 1/8". Sight so blurry it causes eye strain after about 5 min. This varies with airplanes, some are real good and some real poor. DRIFT KNOB REQ'S LOCK)	

FLT.	DATE	PILOT	DATA OBTAINED	PILOT COMMENTS	ACTION
12	6-14		No drift sight tests		
13	6-15		No drift sight tests		STAT
14	6-19		6 runs - 65M' to 70,500'. Different flight legs during cruise climb.	None	Checked and bore-sighted drift sight before flight.
15	6-20		None	Moving the hand controller fore and aft moves the target across the sight at about a 60° angle. FLEX CABLES MISALIGNED?	
16	6-21		No drift sight tests		
17	6-25		No drift sight tests		
18	6-26		No drift sight tests		
19	6-27		None	DRIFT KNOB MALFUNCTION? Drift was same regardless of drift knob position. <u>Hand controller moved drift knob</u>. (WHY DOES THIS HAPPEN?) Tracking jerks & didn't go full travel. Scope causes eye strain. PRISM EDGES	Checked and bore-sighted before flight.
20	6-28		No drift sight tests		
21	6-29		4 runs - no drift data on 3 runs, 69M' to 69,600'.	Drift not working properly. Tracking is irregular with changes in rate.	Checked & bore-sighted before flight.

DRIFT MALFUNCTION OR DIFFICULTY IN SETTING KNOB?

TRACKING MOTOR DRIVE MALFUNCTIONS

ENCL 2

LOCKHEED AIRCRAFT CORPORATION
CALIFORNIA DIVISION

REPORT

FLIGHT TEST PROGRAM FOR
DRIFT SIGHT & WIND EVALUATION

1/12/56

STAT

Form 5767-1

ABSTRACT

A program is defined for obtaining and assessing the type of in-flight data which can be obtained with the drift sight. This data will be used for evaluating the operational functions of the drift sight and the winds at upper altitudes.

PURPOSE

The purpose of this program is to gather specialized tactical training and data during normal high altitude training flights. This program is planned to:

1. Train pilots to become proficient in the tactical use of the drift sight.
2. Gather data on the velocity and direction of the upper winds at several altitudes and various locations.
3. Assess the operations and functions of the drift sight.

The drift sight and its associated controls are new developments designed especially for this project and an operational shakedown of the equipment must be made in order to determine the level of proficiency to be expected of the pilots while using and operating it. Allied to this are the requirements for determining whether the drift sight operates correctly and what level of maintenance will be required to keep it in tactical operation.

A very real related problem is that of determining the winds at the expected operational altitudes. The present data on this subject is very meager; estimates have had to be made of the magnitude of these winds in order to complete some of the new equipment designed for this project. The data that is necessarily gathered in order to assess the pilot abilities and the drift sight functions will also suffice to allow computation of the upper wind velocities and directions.

FLIGHT PLANNING

The required flight patterns for this program have been designed to accomplish the program objectives entirely separate from the engineering flight test program and without interrupting the normal altitude training missions. It is desirable to perform the programmed functions and have the pilots record data on every possible flight in the early stages in order to quickly accummulate data and comments for immediate use in conjunction with drift sight modifications and current equipment design. There are basically three phases to the flight test work which should be exploited in order to obtain the full benefit of the program.

Phase 1

The Phase 1 flights may occur during early pilot training and are comparatively unregulated with respect to exact courses and altitudes. Experience should be gained in the manipulation and critical evaluation of the drift sight operation as follows:

1. The drift sight hand control and power changer is used to search out and identify objects on the terrain.
2. The drift knob is used to cause the terrain to move vertically down the drift sight display when the aircraft is drifting or purposely yawed.
3. The track knob is used to cause the terrain to stop on the drift sight display.

This phase is primarily useful in determining pilot comments as to the practical application of the drift sight to operational use. There may arise modifications to the system in order to permit easier and more proficient manipulation of the drift sight. Specific current questions which should be answered during this phase are as follows:

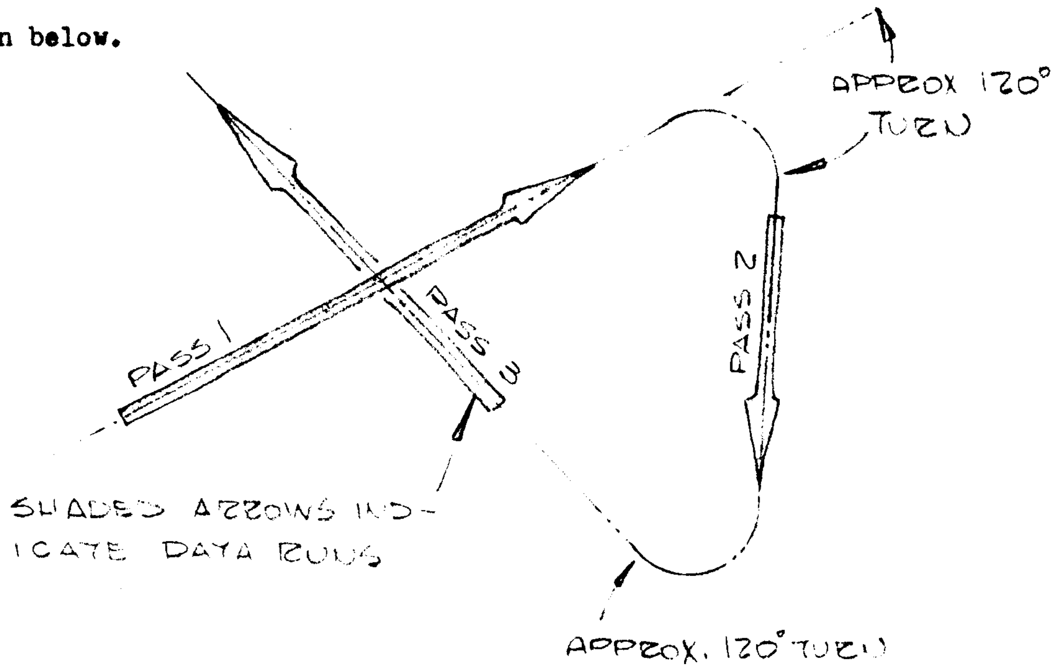
1. How much time is required to permit a pilot to stabilize the drift sight presentation in drift and track?
2. What optical power is best used when orienting and stabilizing the presentation?
3. Is the presentation better for operational use with or without the haze filter?

Phase 2

This phase is a more explicit one in that the pilot is required to fly a generally required pattern. During this phase the drift sight is required to be manipulated for drift only, so that the terrain moves directly down the face of the drift sight. The data accummulated in this phase permits the calculation and evaluation of:

1. The drift function of the drift sight.
2. The upper winds velocity and direction.

A typical flight pattern which would yield the required data is shown below.



The compass orientation and the changes of heading of the total flight path are unimportant as the calculations will cancel these variables out. This type of pattern should be accomplished whenever bumpy air is encountered at high altitudes, indicating wind shear and the possible presence of jet streams. Other than that, this pattern should be flown as often as possible and under the most variable extremes possible in order to permit correlating the wind data obtained with the many variables of altitude, location, time of day and season.

It is not necessary to schedule flights specifically for this purpose, and the inclusion of some of these data gathering patterns in each training flight would suffice. During the straight legs of the data runs indicated by the shaded arrows the pilot will record the data required for calculation of the upper winds. The pattern shown above has three data legs which are desirable, although any two legs with different headings will permit a wind calculation to be made. Thus perhaps any time a change of heading is made during a training flight, the required data should be noted. This would be most useful if the data is obtained on the straight leg just prior to turning and immediately thereafter.

To obtain the data required to permit wind calculations, the pilot will fill out the appropriate squares in the Pilot Data Card while making his runs. These Pilot Data Cards are furnished as part of this report.

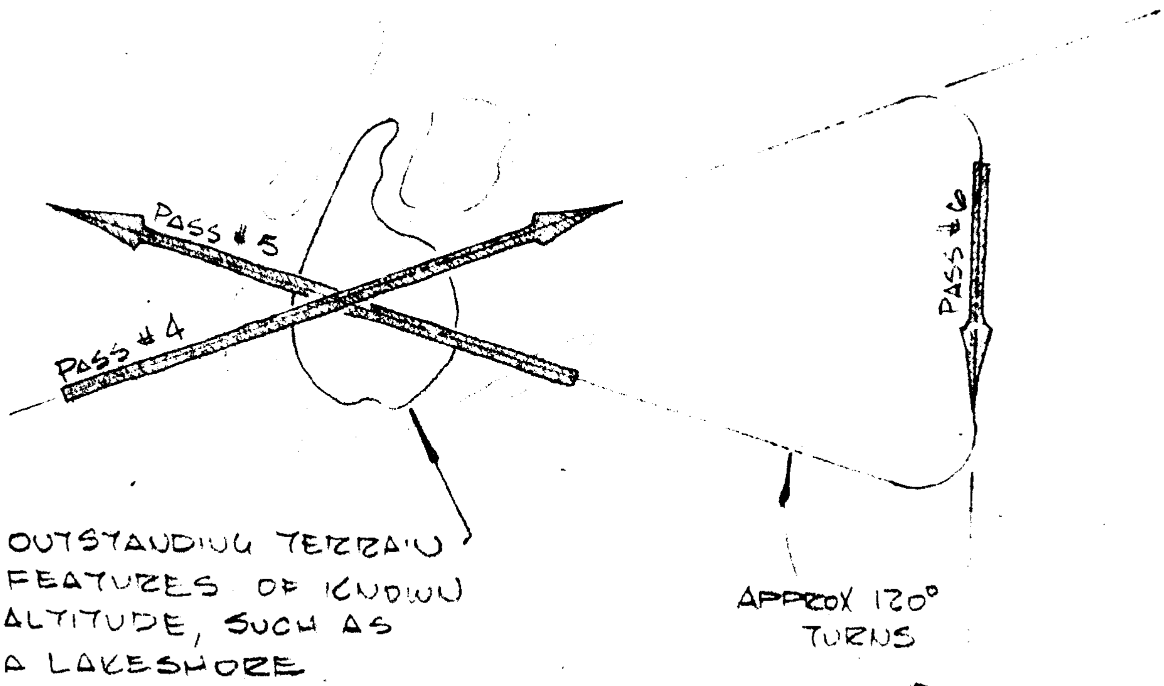
As may be noted, there are no apparent restrictions on aircraft course or flight conditions except for altitude during this Phase 2. Data is primarily desired at top cruising altitudes, but for interpolation purposes, data gathered at other altitudes is required and will be used.

Phase 3

This phase is the most exact in that the pilot is required to fly over known terrain and to cause the terrain to stand stationary on the drift sight by proper drift and track adjustments. The data gathered during this phase permits the evaluation of:

1. The track and drift functions of the drift sight.
2. The upper winds velocity and direction.
3. The pilot's proficiency in drift sight operation.

A typical flight path to permit such evaluation would be as shown:



Shaded arrows show that part of the flight during which data should be recorded.

Note that this flight path is very similar to Phase 2 conditions except that a known terrain feature, such as the lake, must be tracked and held stationary in the drift sight. With this exception, Phase 2 comments apply to Phase 3.

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In summary, the flights for the three phases can be generally planned as follows:

Phase 1	As required for pilot training and early drift sight operation.
Phase 2	Whenever wind shear conditions are encountered, and otherwise as much as practical under varied conditions of time, place, season and altitude.
Phase 3	As required to check drift and track functions and pilot proficiency.

FLIGHT DATA REQUIRED

The data required for each flight in this program may be categorized as pilot data, aircraft data and weather. The pilot data is to be entered on the Pilot Data Card during and after the flight program. The aircraft data will be gathered from ground sources and filed for future use with flight data obtained with the particular aircraft. The weather data required is obtained from Engineering Flight Test for the day in question and entered on the Pilot Data Card.

For Phase 1 the only actual data required consists primarily of post flight pilot comments which will answer the specific questions noted previously and bring new problems, if any, to the fore.

For Phase 2 the data required must be gathered on the pilot data card, an example of which is shown on Figure 1. These cards are provided in the rear envelope of this report. Note on this card that the following data for a Phase 2 flight is required.

From the pilot during each pass:

1. Altitude.
2. Indicated Air Speed.
3. Compass Course.
4. Drift Angle.

From the pilot post flight:

1. Approximate geographical location and time of passes.
2. Comments.

PILOT DATA CARD -
EXAMPLES OF TYPICAL FLIGHT DATA SHOWN ENTERED. BACK OF CARD TO BE USED FOR POST FLIGHT COMMENTS.

DATE 1/3	A/c 344	PILOT BALDWIN			
PASS	ALT	IAS	COMPASS (TRACK)	DRIFT	PASS
1	55	142	72	7R	1
2		146	193	10L	2
3		148	326	9R	3
4	57	136	81 6	12R 400	4
5		132	192	0	5
6		133	308 7	13L 500	6
7		136	253	10L	7
FAT					

INDICATED ALTITUDES

TRACK KNOB MATCHING INDEX NUMBERS. (NOT NECESSARY TO USE CORRECT ALTITUDE NUMBERS)

INDICATED AIR SPEEDS

COMPASS HEADINGS

DRIFT KNOB SETTINGS

From Engineering Flight Test:

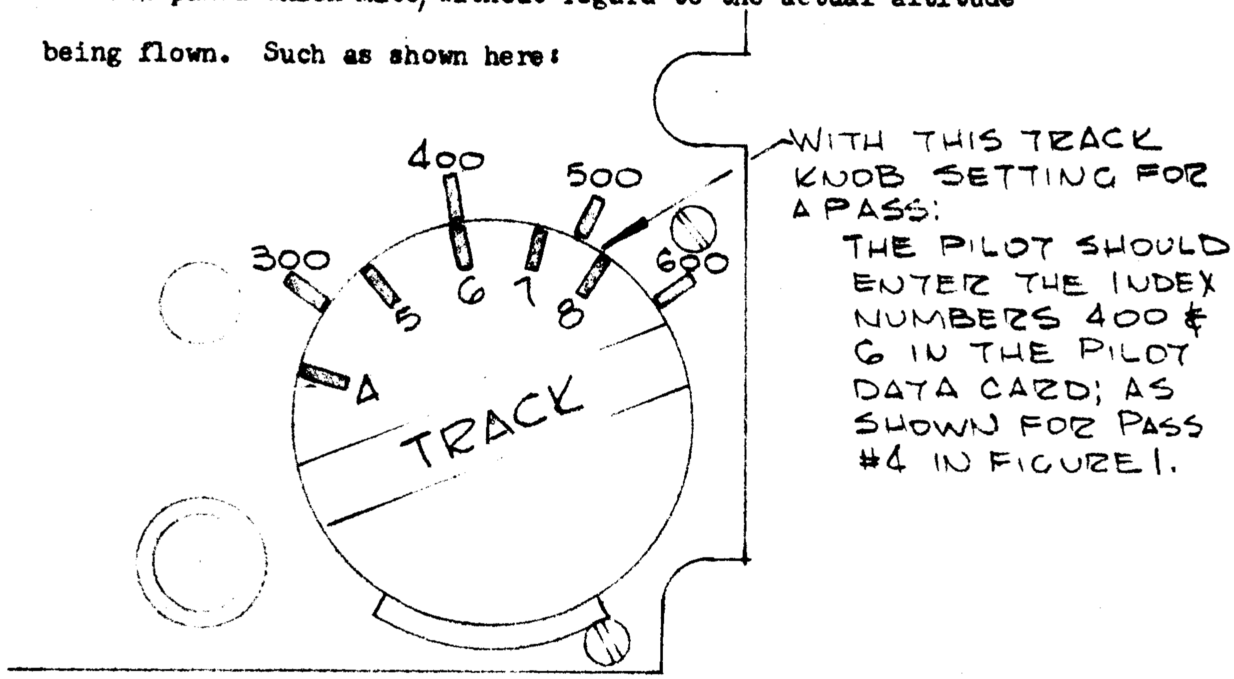
1. Free air temperature at altitude for date of Phase 2 flight.

From ground maintenance, for the aircraft flown:

1. Altimeter calibration.
2. Compass deviation.

The example Pilot Data Card shows the data entered on a typical flight during the passes. The lines drawn between some consecutive passes indicate those passes made on the same pattern at the same approximate geographical location and time.

Phase 3 data required is essentially the same as that for Phase 2 with the additions of tracking function values. Typical tracking function additions are indicated in passes 6 and 4 on the Pilot Data Card. To simplify in-flight recording of the Track Knob data, it is only necessary for the pilot to record graduated numbers on the knob and control panel which mate, without regard to the actual altitude being flown. Such as shown here:



These numbers can be translated into an accurate knob position and consequently a track value for calculating True Ground Speed.

The correlation and assessment of all of the data obtained as above will be handled by the engineering group for this project. They will produce the analysis of the drift and track functions of the drift sight and the values of the velocities and directions of the upper winds.

CALCULATIONS

The calculations involved in assessing the flight data gathered in this program have been made rather simple; only involving one chart and vector wind diagrams. Sample diagrams and the use of the chart are shown for the flight data listed on the sample Pilot Data Card.

The Pilot Data Card as received from the flight should have some corrected data entered onto it as shown in Figure 2 . This data is obtained as follows:

1. Free air temperature from Engineering Flight Test for date and approximate altitude.

2. Correct indicated altitude by using altimeter calibration for the aircraft flown.

3. Enter true airspeeds as read from Figure 3 for corresponding indicated airspeeds, corrected altitude, and free air temperature.

4. Enter true headings for corresponding compass courses by correcting for aircraft deviations and magnetic variations.

When the pilot data card has been completed as shown in Figure 2 , the data included thereon can be used for vector diagrams and assessment of drift and track.

PILOT DATA CARD -

NECESSARY GROUND SUPPLIED DATA REQUIRED FOR WIND, DRIFT & TRACK CALCULATIONS SHOWN ENTERED UNDER PILOT'S DATA. (SAME PILOT DATA AS SHOWN IN FIGURE 1.)

DATE 1/3	A/C 344	PILOT BALDWIN			
PASS	ALT.	IAS	COMPASS (TRACK)	DRIFT	PASS
1	55 (56)	142 (423)	72 (62)	7R	1
2		146 (433)	193 (183)	10L	2
3		148 (438)	326 (316)	9R	3
4	57 (58)	136 (423)	81/6 (71)	12R 400	4
5		132 (412)	192 (182)	0	5
6		133 (415)	308/7 (298)	13L 500	6
7		136 (423)	253 (243)	10L	7
FAT	-55 C				

CORRECTED ALTITUDES

FREE AIR TEMP

TRUE AIR SPEEDS

TRUE HEADINGS

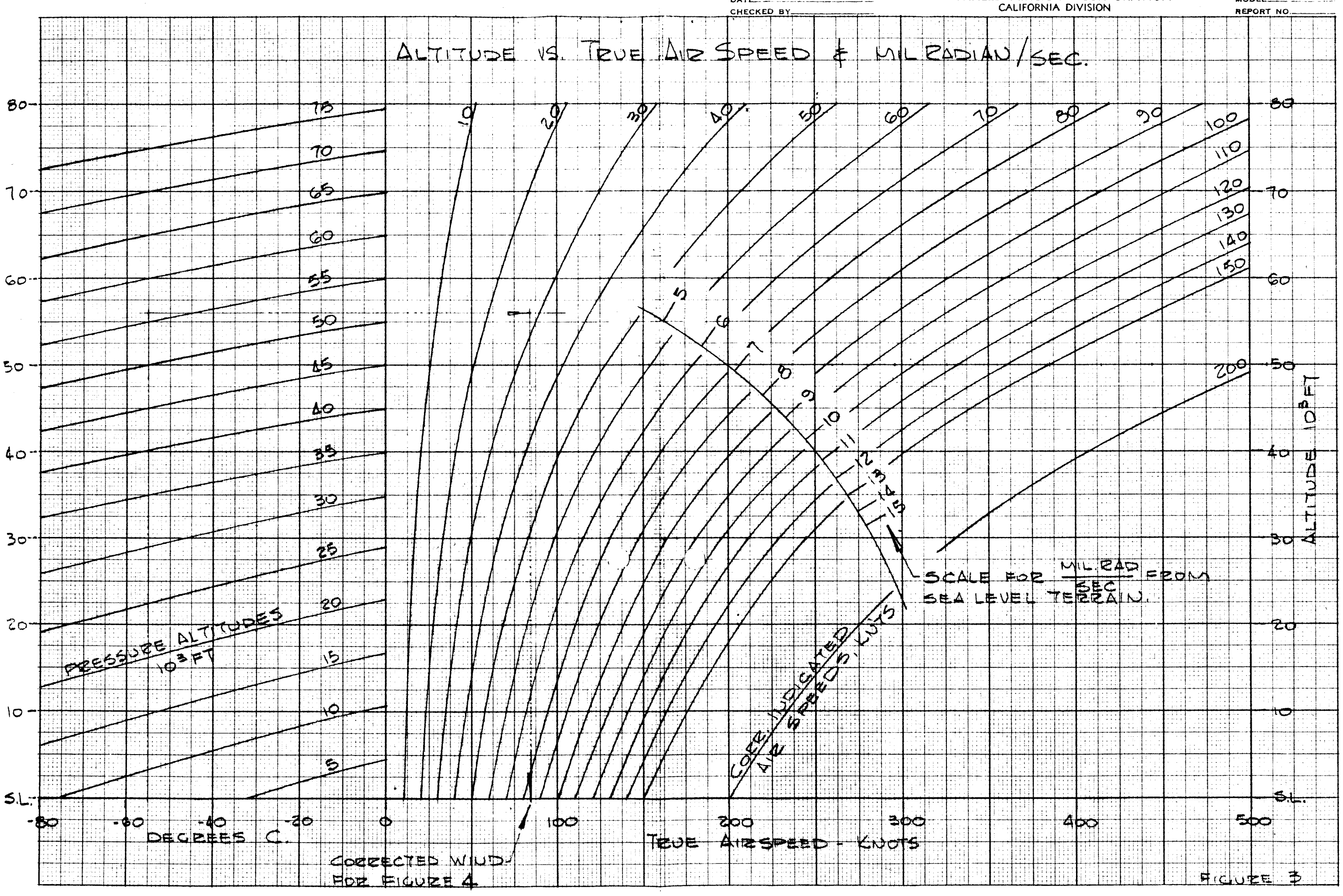

ALTITUDE VS. TRUE AIR SPEED & MIL RADIAN/SEC.
PRESSURE ALTITUDES 10³FT
DEGREES C.
TRUE AIRSPEED - KNOTS
ALTITUDE 10³FT
SCALE FOR MIL.RAD/SEC FROM SEA LEVEL TERRAIN.
CORR. INDICATED AIR SPEEDS, KNOTS
CORRECTED WIND FOR FIGURE 4

FIGURE 3

For a Phase 2 operation, a typical vector diagram for obtaining true wind velocity and heading is shown on Figure 4 for passes 1, 2 & 3 on the Pilot Data Card. While it is true that two passes are enough to define a wind vector; the use of three passes is preferred for a basic calculation as these will generally locate an error triangle as shown. The wind vector then locates from the center of the diagram to the center of the error triangle. It is apparent from this type of diagram that it is helpful if the indicated airspeed is the same for each group of passes, but this is not a necessary condition.

The accuracy of the data and the method of vector diagrams used for obtaining the final data indicate that the wind velocity data can be known to ±5 knots and the wind heading is good to ±10°.

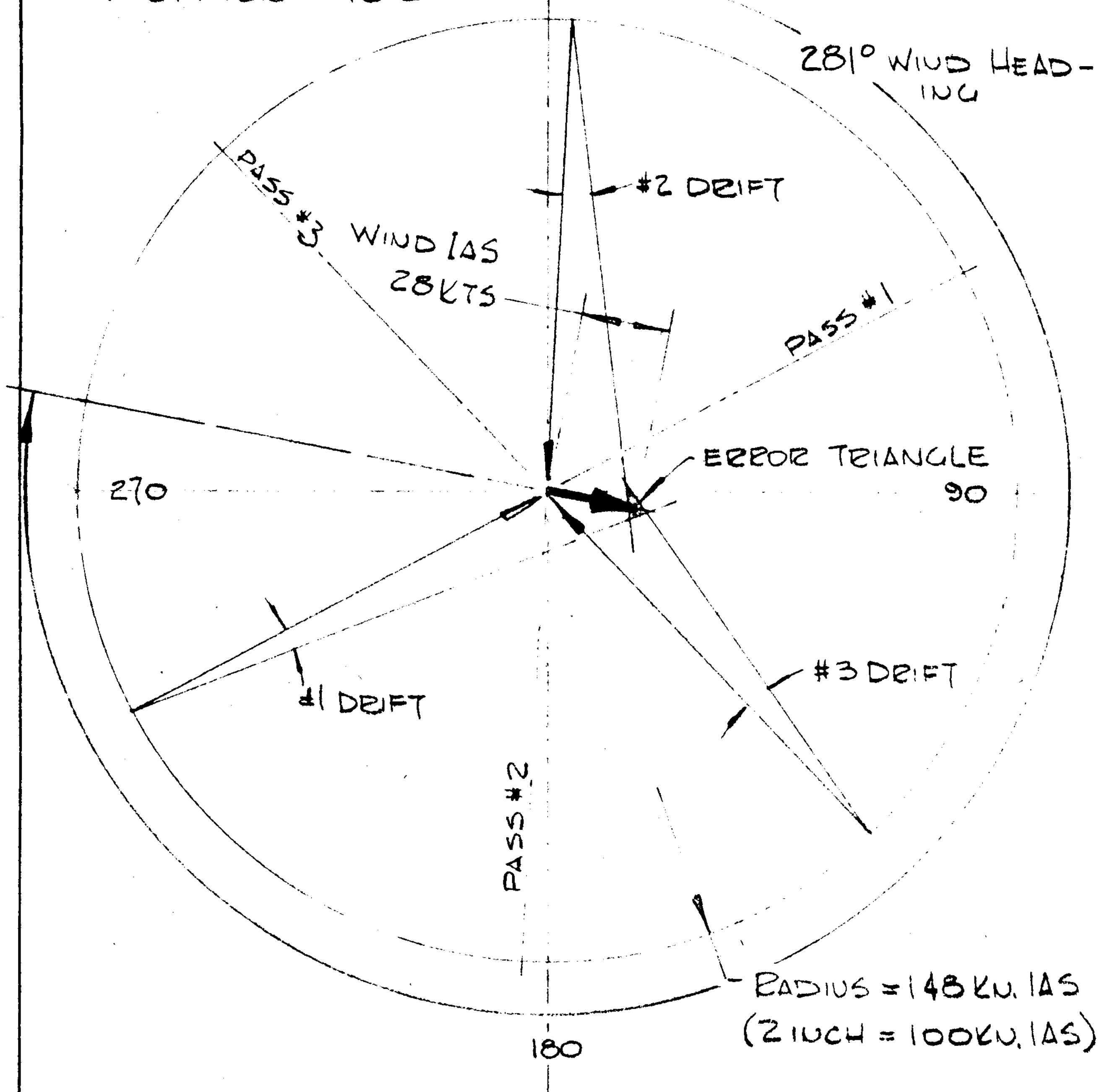
The calculations for a Phase 3 group of passes are essentially identical to those for Phase 2 passes except that in addition, an evaluation of the pilot and/or drift sight tracking efficiency is possible. A vector diagram for passes 4, 5 and 6 on the pilot data card is shown on Figure 5. The additions here are the true ground speeds obtained by using the track knob settings which provide a check of the tracking function.

To obtain the true ground speeds from the track knob settings, the following procedure is required:

1. Calculate actual clearance over terrain. (This is the reason why the pilot must make the Phase 3 passes over ground objects of known altitude).

TYPICAL DIAGRAM FOR WIND CALCULATIONS FOR PASSES 1, 2 & 3 SHOWN ON PILOT DATA CARD, FIGURE .

COMPASS ASSUMPTIONS,
DEVIATIONS = NONE
VARIATION = 10°E

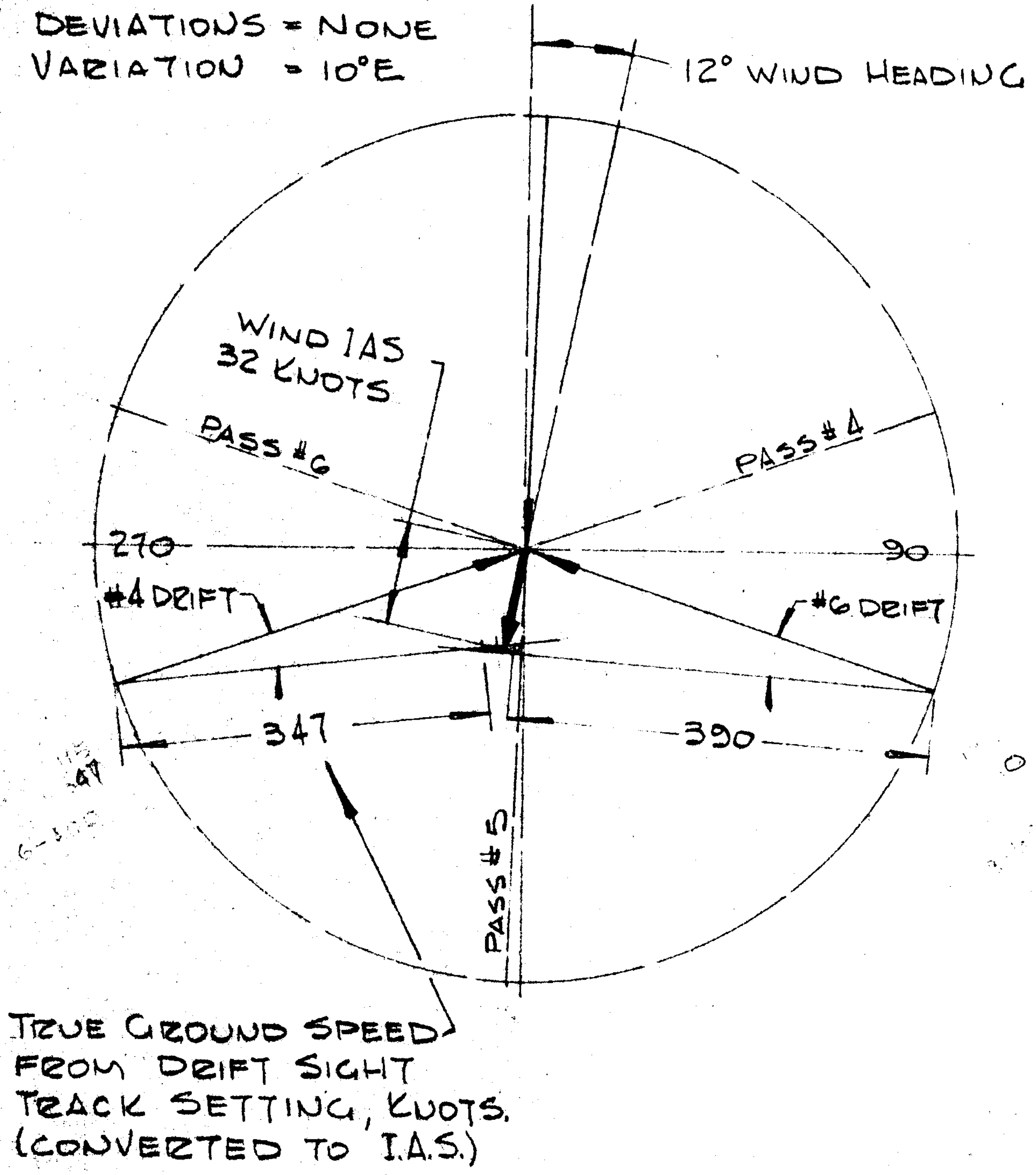


WIND VELOCITY = 28 KNOTS INDICATED AIRSPEED
(ACTUAL) = 84 KNOTS CORRECTED FOR ALT. & F.A.T.

FIGURE 4

TYPICAL DIAGRAM FOR DRIFT & TRACK ANALYSIS FROM PASSES 4, 5 & 6 SHOWN ON PILOT DATA CARD, FIGURE .

COMPASS ASSUMPTIONS - 0
DEVIATIONS = NONE
VARIATION = 10°E



WIND VELOCITY = 28 KNOTS INDICATED AIR SPEED (ACTUAL) = 100 KNOTS CORR. FOR ALT. & F.A.T.

FIGURE 5

Corrected test altitude	57,000
Terrain altitude	5,000
Terrain clearance	52,000

2. The Track Knob index numbers that the pilot has noted on the Pilot Data Card are then used in the following manner to obtain true ground speed as given by the drift sight computer. Pass #4 is used as an example:

$$\frac{\text{Terrain clearance}}{10000} \times \frac{400}{6} = \text{true ground speed}$$

$$5.2 \times \frac{400}{6} = \underline{347 \text{ knots}}$$

This true ground speed can then be used on the vector diagram as shown in Figure 5 . This will yield a close check on the drift sight operations of both drift and track.

RESULTS

This program will yield data which may be used for checking pilot skills, equipment operation and winds. The calculations and assessing of the flight data must be kept current with the flight program in order to gain the maximum utilization of the program.

The data reflecting pilot and equipment performance will have immediate use in the training and equipment evaluation program. The data reflecting winds at altitude will be constantly accumulated for the varying conditions previously listed. This wind data will be correlated and filed so that it will be immediately available as required for equipment design or tactical mission parameter decisions.

 ENCL 3

SCALE OF DRIFT AND TRACK ERRORS

		ERROR DRIFT DEG'S.	ERROR TRACK MIL/SEC	ERROR TRACK %TRUE GROUND SPEED (@ 70M)
A. OVER-ALL (All Tests To Date)				
	Max.	15	5.9	57%
	Ave.	2.8	1.4	13%
	Min.	0	.3	2.9%
(Sets of Data 31)				
B. TESTS WHEREIN DRIFT EXCEEDS 2°				
6/7/56	Max.	15	5.9	57%
6/8/56	Ave.	5.1	2.0	19%
	Min.	3	.3	2.9%
(Sets of Data 15)				
C. TESTS WHEREIN DRIFT EQUAL TO OR LESS 2°				
6/19/56	Max.	2	2.0	19%
6/29/56	Ave.	.7	.8	7.7%
	Min.	0	.3	2.9%
(Sets of Data 16)				

SUMMARY

TEST, RUN		MEASURED DRIFT	CORRECTED DRIFT	ERROR	MEASURED MILS/SEC	CORRECTED MILS/SEC	ERROR
6/7/56							
	1	2R	5R	3L	9.8	12.3	-2.5
	2	1L	2R	3L	9.1	15.0	-5.9
	3	9L	6L	3L	11.8	13.4	-1.6
6/8/56							
(Imposs. Drifts)	1	13R	—	—	—	—	—
	2	1R	3L	4R	14.8	10.6	+4.2
	3	10R	5R	5R	14.4	12.8	+1.6
	4	2R	6R	4L	14.6	12.0	+2.6
	3	10R	4R	6R	14.4	13.4	+1.0
	4	2R	7R	5L	14.6	12.5	+1.1
( )	5	10L	5R	15L	10.2	12.7	-2.5
(Almost Imp. Drifts)	4	2R	1L	3R	14.6	14.3	+0.3
	5	10L	15L	5R	10.2	11.5	-1.3
	6	8L	5L	3L	12.7	14.1	-1.4
	5	10L	3L	7L	10.2	8.6	+1.6
	6	8L	14L	6R	12.7	11.1	+1.6
	7	6L	2L	4L	12.7	13.9	-1.2
6/19/56							
	1	1L	1L	0	13.0	12.6	+ .4

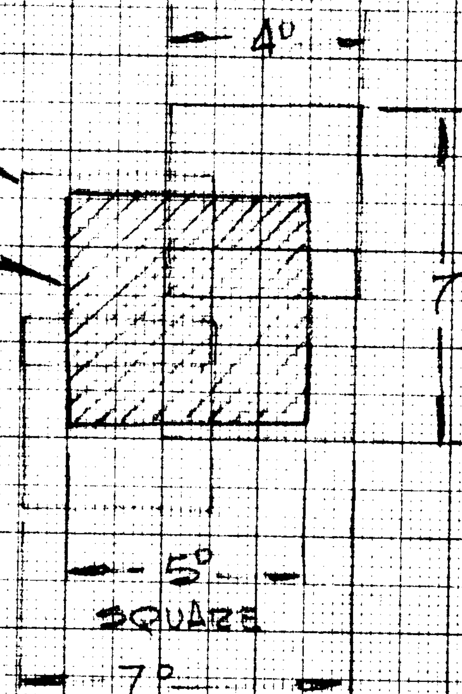
TEST, RUN	MEASURED DRIFT	CORRECTED DRIFT	ERROR	MEASURED MILS/SEC	CORRECTED MILS/SEC	ERROR
2	0	1R	1R	12.1	11.9	+ .2
3	2L	1L	1L	12.7	11.6	+1.1
2	0	1R	1R	12.1	11.7	+ .4
3	2L	1L	1L	12.7	11.7	+1.0
4	1L	1L	0	12.7	12.1	+ .6
3	2L	0	2L	12.7	11.7	+1.0
4	1L	0	1L	12.7	11.9	+ .8
5	1R	0	1R	9.9	10.7	- .8
4	1L	0	1L	12.7	11.4	+1.3
5	1R	0	1R	9.9	11.0	-2.0
6	2R	3R	1L	10.4	10.7	- .3

6/29/56

TEST, RUN	MEASURED DRIFT	CORRECTED DRIFT	ERROR	MEASURED MILS/SEC	CORRECTED MILS/SEC	ERROR
1	0	—	—	11.8	12.1	- .3
2	0	—	—	10.3	12.1	-1.8
3	0	—	—	11.7	12.0	- .3
4	0	—	—	11.6	12.0	- .4

EFFECT OF TRACK ERRORS ON C' CONFIG —

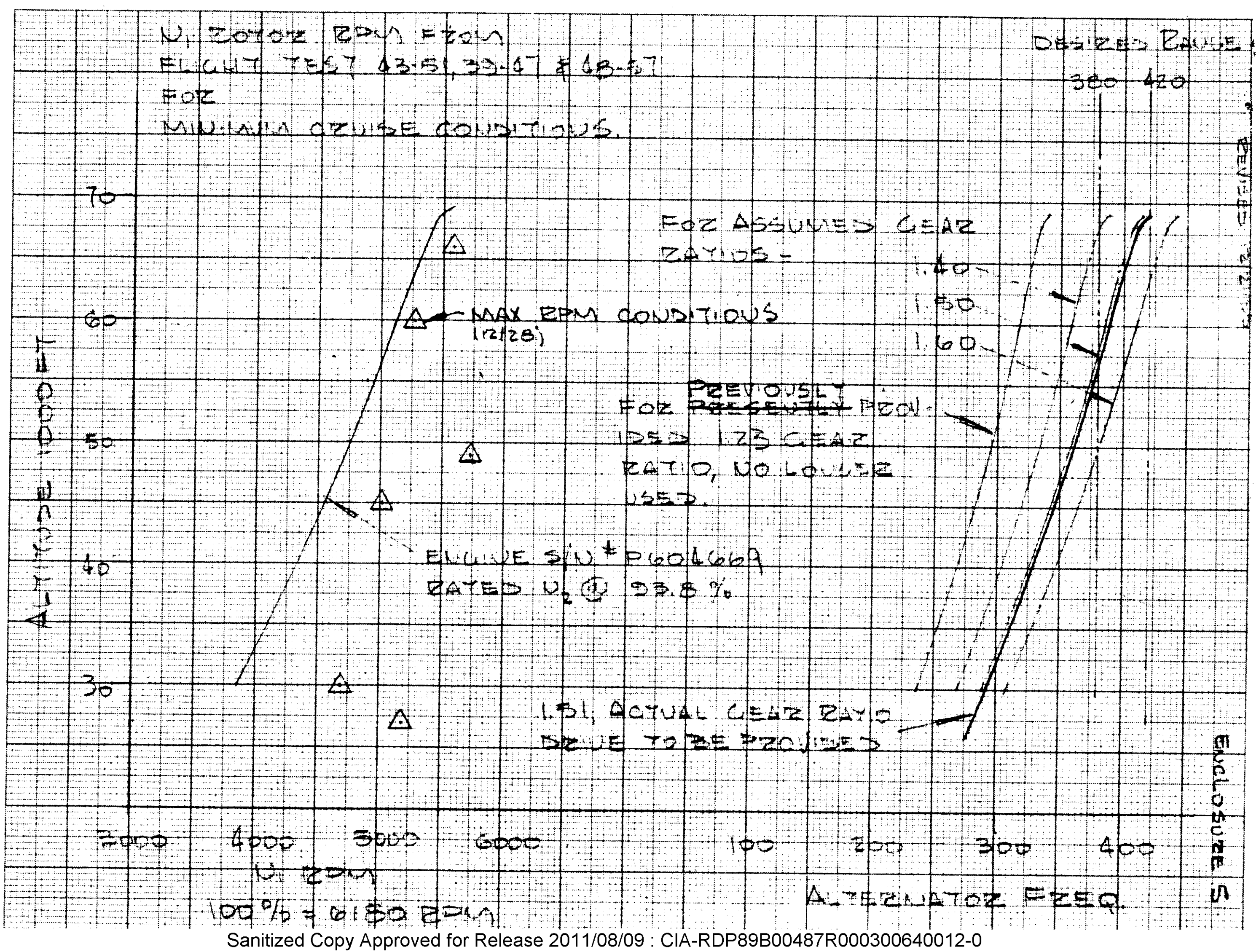
ASSUME —



1. C' SPOTTING MODE IS
2. TARGET SELECTED & STORED MUST FALL IN THIS AREA AT TIME OF SNAP
3. TARGET EXACTLY IN CENTER OF SCOPE AT TIME OF STORE.
4. ALTITUDE = 70M
5. TRUE GROUND SPEED = 430 KNOTS
6. TARGETS ARE IN VERTICAL LONGITUDINAL PLANE OF AIRCRAFT.
7. NO ERRORS IN C COMPUTER OR EQUIPMENT.
8. ALLOWABLE ERROR FOR IMC FOR C —
   LINES PER MM 40
   EXPOSURE 1/100 & 1/50 SECOND
   FOCAL LENGTH 180 INCHES

IMC REQ'S FOR 1/100 $= \frac{1}{40} \times 100 \times \frac{1}{180 \times 25.4} = .55 \frac{MIL}{SEC}$

IMC REQ'S FOR 1/50 $= \frac{1}{40} \times 50 \times \frac{1}{180 \times 25.4} = .28 \frac{MIL}{SEC}$


N1 ROTOR RPM FROM
FLIGHT TEST 43-51, 33-47 & 48-57
FOR
MINIMUM CRUISE CONDITIONS.
DESIRED RANGE
380 420
70
60
50
40
30
FOR ASSUMED GEAR RATIOS -
1.40
1.50
1.60
MAX RPM CONDITIONS
(12/28)
FOR PREVIOUSLY RECOM. USED 1.73 GEAR RATIO, NO LOUVER USED.
ENGINE S/N # P604669
RATED N2 @ 93.8 %
1.51 ACTUAL GEAR RATIO
DUE TO BE PROVIDED
ALTITUDE 1000 FEET
3000 4000 5000 6000
N1 RPM
100% = 6180 RPM
100 200 300 400
ALTERNATOR FREQ.
ENCLOSURE 5