KOREAN WAR PROJECT

1ST MAW OEG MEMORANDUM NO. 4-53: F3D NIGHT INTERCEPT OPERATIONS

Headquarters
1st Marine Aircraft Wing, FMF
c/o Fleet Post Office, San Francisco

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SECURITY INFORMATION

1STMAW OEG MEMORANDUM)
: F3D Night Intercept Operations
NUMBER.....4-53)

Encl: (1) 1stMAW OEG Rep Study "F3D Night Intercept Operations"

1. Enclosure (1) is a report of F3D night intercept operations.

BY COMMAND OF MAJOR GENERAL MEGEE

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F3D Night Intercept Operations

1. This memorandum is written to record the current results of F3D night intercepts and the operability of the F3D's radar system.

2. During the period 19 October through 31 January, out of roughly 450 effective F3D night CAP and escort sorties, six kills were claimed, or 1.3% kills per sortie. (These aircraft were 4 MIG-15s, 1 YAK-15, and 1 PO-2, also 1 probable PO-2.) For the following reasons, however, this value is not fully indicative of F3D effectiveness:

a. The primary mission of the F3D is a defensive one to protect night attack and bomber aircraft and keep enemy aircraft away from friendly territory. Its success in this role is not necessarily measured in terms of kills. Indeed, it now appears that fewer MIG's are being encountered and in consequence percent kills may fall.

b. The principal F3D target is the MIG-15, an aircraft of superior performance which is protected by enemy ground control radar that can alert it against attacks.

c. Enemy aircraft, being pursued, have only to cross the Yalu River to escape. (And they sometimes attempt to decoy the F3D into flak traps while doing so.)

d. It is apparently true that the F3D is not given as good close control as it could expect, and it frequently has poor altitude information. This factor, if true, not only limits intercepts but slows the operation down to the extent that many possible contacts escape.

e. Often the possibility, that a bogie is a friendly aircraft, requires positive visual identification before firing thus reducing the opportunity for a kill.

3. On the average (during the typical period studied - 19 Oct to 23 Dec) 30% of the F3D sorties report being vectored after a bogie, with a somewhat higher preponderance reported for escort sorties. (There seems to be no significant correlation between time of night and percent sorties utilized.) Given a reported vector, 73% of these failed to end in contact for the following reported reasons:

a.	GC Plot Faded	28%
b.	F3D couldn't find bogie	28%
c.	Bogie left area	18%
d.	No altitude information	9%
e.	F3D's radar went out	5%
f.	Poor communications	5%
g.	F3D low on fuel	5%
h.	GC went out	2%

The 28% of the instances where the F3D was unable to make contact, although apparently vectored into position to do so, are those for which no specific reason for failure is known and ones which hold the

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potential of increasing the incidence of kills. At least part of the cause for failure here is lack of adequate altitude information.

4. Of the 27% attempted intercepts which resulted in contact (21), 14% resulted in claimed kills. The reason for failure to convert a contact to a kill was reported to be as follows:

a.	Bogie lost in turn	5
b.	Lock-on failed	3
c.	F3D low on fuel	2
d.	Bogies had superior speed	2
e.	F3D fired but failed to hit	2
f.	Altitude was wrong	2
g.	Heavy flak broke up attack	1
h.	Bogie lost in ground return	1

On the whole, these items simply reflect the difficulty of converting a contact to a successful kill in a situation where frequently the enemy aircraft have the advantage of protection from their own ground radar (which alert them prior to attack).

5. In addition to the contacts described above, intercepts were also completed on what proved to be friendly aircraft (6) and clouds (2). In seven instances, enemy aircraft intercepted the F3D but, with one exception, the F3D discovered the enemy aircraft by tail warning at a range of two to three miles and evaded it. In the one exception, the tail warning equipment was out but the F3D, warned by the ground control station and enemy guns firing, escaped in a dive.

6. Another factor of interest in F3D operations is the operability of the radar system. It will be noted above, that of the attempted intercepts which failed to establish contact, only 5% of these were due to radar failure. (But some intercepts may have failed because the radar was not at peak effectiveness.) Radar aborts amounted to 12% of the total number of sorties taking off. However, as long as the APS 21 radar component operates, the mission is not aborted even though both tail warning and gun-laying system are out. The fact is that the tail pipe of an enemy jet is sufficient aiming point for visual firing. Indeed, the F3Ds tail pipes are undoubtedly used for homing by the enemy interceptors, after being positioned by ground control.

7. It appears that the APQ-35 radar system is operating considerably better than experience with earlier radar models would suggest. OEG study 480 predicted that the failure rate of this system would amount to 0.666 per hour if the jet installation sustained the same failure tendencies as an installation in propeller-driven aircraft. This rate for VMF(N)-513 F3D aircraft was found to be less than half the predicted one, or 0.29 per hour. This difference suggests that the relative freedom from vibration in jet installations reduces radar failures. It also points up the excellent maintenance VMF(N)-513 provides its gear despite the handicap of field operations. (Preventive maintenance, incidentally, is only performed at the time the radar is reported inoperative; which, in view of the theory, below, of radar failures, seems to be a wise procedure.)

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8. The theory of radar failures developed in OEG Study 480 was based on the fact that failures are due to chance and not to wear-out. For such failures, a linear relation exists between the logarithm of the fraction of sets surviving, and time. That this same relationship exists for the APQ-35 in the F3D is shown in figure 1, where the ordinate is a logarithmic scale and the linear curve gives the fraction of sets surviving for a given total operating time. Thus for a normal 2½ hour mission, there is a 40% chance that the system will fail. But as was noted above, as long as the APS-21 component functions, the mission can normally be consummated. Indeed only 14% of the sorties reported that inoperable radar prevented them from accomplishing their missions, although this does not imply that 86% of the sorties could in all cases have done so. (In addition, trouble of all kinds, including such things as minor instances of improper adjustment of the system by the radar operator, occurred at the rate of 0.39 per hour.)

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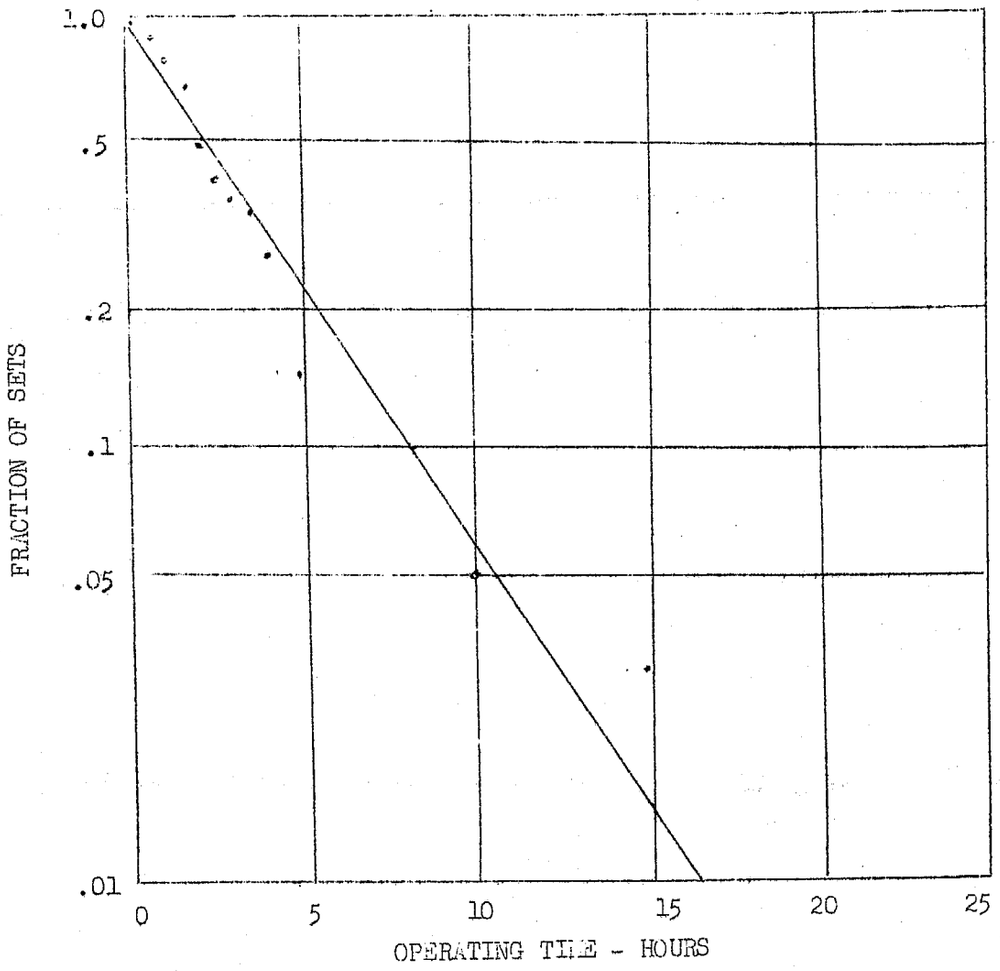

Figure 1: Fraction of Sets without Parts replacement as a function of total operating time.