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file 7311

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on orbit are designed to collect data for both location and rise time.

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Mission 7311 could be flown on a P-11 early in 1966. It is understood that the COMOR SIGINT working group is reviewing the requirements forwarded to the NRO in April 1965. It is requested that the requirement for intrangulse modulation intercept on the ABM radar signals be consisted and forwarded to the NRO by 1 September 1965.

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## DEPARTMENT OF THE AIR FORCE WASHINGTON

OFFICE OF THE ASSISTANT SECRETARY

8 Sept 1965

MEMORANDUM FOR GENERAL STEWART

SUBJECT: Mission 7310

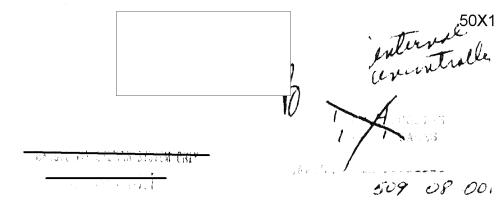
Mission 7310, DF TAKI, renamed LIEGE, is planned to be flown on P-11 number 4404 in early 1966 along with PLICAT. This payload covers the frequency range from 166 to 177 mcs and is designed to optimize EOB coverage of TALL KING early warning radars. This frequency range is in both the top priority EOB and GENERAL SEARCH bands and thus LIEGE techniques once proven on known targets have a much wider application.

Our present spinning DF capability for P-11 subsatellite payloads is in the 4000-8000 mc band. This same location technique is not practical below about 500 mc because of required antenna size. Therefore, for VHF frequencies, a different technique must be used for P-11's.

however, this is presently limited to only a few target emitters. DF TAKI uses a phase measuring system which, with sun and horizon sensors, will allow determination of the should permit location accuracies on the order of the required Ground processing techniques for DF TAKI are being developed by NSA. The entire collection system will be compared with the technique.

Coverage of the TALL KING band is presently being provided by the 698BK Mission 7159 would also have provided TALL KING coverage later this year with much less location accuracy. The fact that the LIEGE/PLICAT P-11 is planned was one of the factors influencing the recommendations for cancellation 7159.

In summary, LIEGE will give us a P-11 VHF emitter location technique and provide TALL KING coverage prior to the faunch of the first MULTIGROUP next summer.



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## DEPARTMENT OF THE AIR FORCE WASHINGTON

E Sept 65

OFFICE OF THE UNDER SECRETARY

MEMORANDUM FOR DR. MCMILLAN

P-11 Missions 7310, 7311 for EOB and ABM Radar SUBJECT: DIRECTED COVERAGE

A P-11 vehicle with two VHF ELINT missions is proposed based on SAFSP studies of two new ELINT satellite collection techniques. R&D Mission 7310, now called LIEGE, was approved. It will test a VHF spinning interferometer location finding system against the known TALL KING EOB environment.

The proposed Mission 7311 called PLICAT would test a new predetection recording technique in satisfaction of the USIB requirement for intrapulse modulation determination on the suspected ABM radars. This requirement recently has been reconfirmed by the CSWG and is beyond that which is being satisfied by the presently active P-11 Mission 7312. The technique utilizes a folded stectrum concept thoroughly studied for SAFSP by Stanford Electronic Laboratories and tested for processing by NSA. A multiple local oscillator using a frequency synthesizer divides the 9 mc wide intercepted RF spectrum into IF bands all of which can be superimposed and recorded on two channels of a 150 kc recorder. The relatively sparse RF environment in which the USSR ABM frequency scanned array radar has been intercepted allows such processing of these unique signal characteristics. A satellite platform is the only means for intercepting the Sary Shagan radar with predetection data quality capable of resolving intrapulse modulation.

The LIEGE payload is in final stages of fabrication. PLICAT could be built at a cost of \$129,000 for launch on the same P-11 vehicle. This has been coordinated with

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It is recommended that the attached message be released to SAFSP to approve Missions 7310, 11.

> JAMES T. STEWAPT Brigadier General, USAF

Difector, NRO Staff

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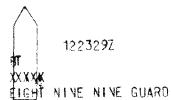
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FARPOP FOR

THE FOLLOWING PAYLOAD FOR VEHICLE P-11 4404 IS PROPOSED AS A COMPANION TO LIEGE. THIS PAYLOAD WAS FORMERLY KNOWN AS LONG JOHN

A. RECEIVING EQUIPMENT WILL CONSIST OF A DUAL CHANNEL. ZEROIF. SUPERHETER ODYNE RECEIVER WITH PREDETECTION OUTPOUTS FOR RECORDING ON TWO TRACKS OF A TAPE RECORDER WITH A 150 KC FREQUENCY RESPONSE: AN FM RECEIVER CHANNEL WITH A 9 MC RF BANDWIDTH FOR COARSE FREQUENCY MEASUREMENT: AND AN AM RECEIVER CHANNEL COMBINED WITH HORIZON SENSOR MARKERS FOR COARSE DIRECTION-FINDING MEASUREMENTS. DESIGN GOALS ARE:

1. RF BANDPASS: 153.5 MC TO 162.5 MC.

- SENSITIVITY: SIGNAL-TO-NOISE RATIO EQUALS 1 AT MINUS 90 DBM.
- 3. RF DYNAMIC RANGE: 55 DB WITH ONE 20 DB STEP OF ATTENUATION.
- 4. IF DYNAMIC RANGE: 33 DB.
- 5. NO. OF LO'S: 30.
- 6. LO FRED STABILITY: 1 PART PER MILLION PER DEGREE C.
- 7. REFERENCE OSC FREO: 25 KC.
- 8. REF OSC STABILITY: SHORT TERM: 1 PART PER MILLION PER DEGREE C.
- 9. RECOGNITION CRITERION:
  - (A) THRESHOLD ADJUSTABLE FROM MINUS 78 DBM TO MINUS 65 DBM.
  - (B) PULSEWIOTH QUAL .- GREATER THAN 25 MICROSEC.
  - (C) PRF QUAL. GREATER THAN 20 PPS.
- 10. FM CHANNEL DEVIATION SENSITIVITY: 0.55 VOLTS/MC OVER A 9 MC RANGE.
- 11. AM CHANNEL: PROVIDE LEFT OR RIGHT OF GROUND TRACK INFORMATION
- B. THE PRESENT LEACH 100 KC TAPE RECORDER WILL BE MODIFIED TO
- INCREASE ITS BANDWIDTH TO 150 KC. C. THE ANTENNA WILL CONSIST OF TWO MONOPOLES SPACED ONE-FOURTH
- WAVELENGTH APART AND COMBINED BY USING A 90-DEGREE PHASE SHIFT IN 10 de note ONE FEEDLINE.
- D. PRESENT PLANS CALL FOR A DEC FLIGHT SUBJECT TO APPROVAL OF THIS SYSTEM. SUGGEST MISSION NUMBER 7310 BE ASSIGNED. EARLY APPROVAL IS REQUIRED TO MEET THIS FLIGHT DATE. SECRET

OFN: WILL RERUN ON REQUEST

DISTRIBUTION

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SS-10

SS-11

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JOINT MESSAGEFORM	•	OMMUNICATION CENTER
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DNEO HAS APPROVED 1	THE LIEGE/PLICAT PROPOSAL	4. RF#1
LINED IN REF WITH THE	CHANGES AS DISCUSSED AT T	D MTG
18 AUG TO IMPROVE THE I	COCATION FINDING CAPABILITY	TY AND
INCLUDE AN XTAL VIDEO	CHANNEL FOR THE DF DATA SO	O AS NOT
TO MODULATE THE PRE DET	RECORD WITH A DEEP NULL	. PUNDS
WILL BE ABSORBED WITHIN	PROGRAM APPROVALS. MIS	SION NUMBER
7310 WAS ASSIGNED TO LI	REGE; PLICAT WILL BE MISS	ION 7311.
WITH THE CANCELLATION (	OF MISSIN 7159, THE EARLI	est
POSSIBLE FLIGHT DATE W	OR 7310, 11 IS REQUESTED.	PLEASE
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