PLANNING and FLYING the Mission

with the AN/APQ-102A SIDE-LOOKING RADAR

GOODYEAR AEROSPACE

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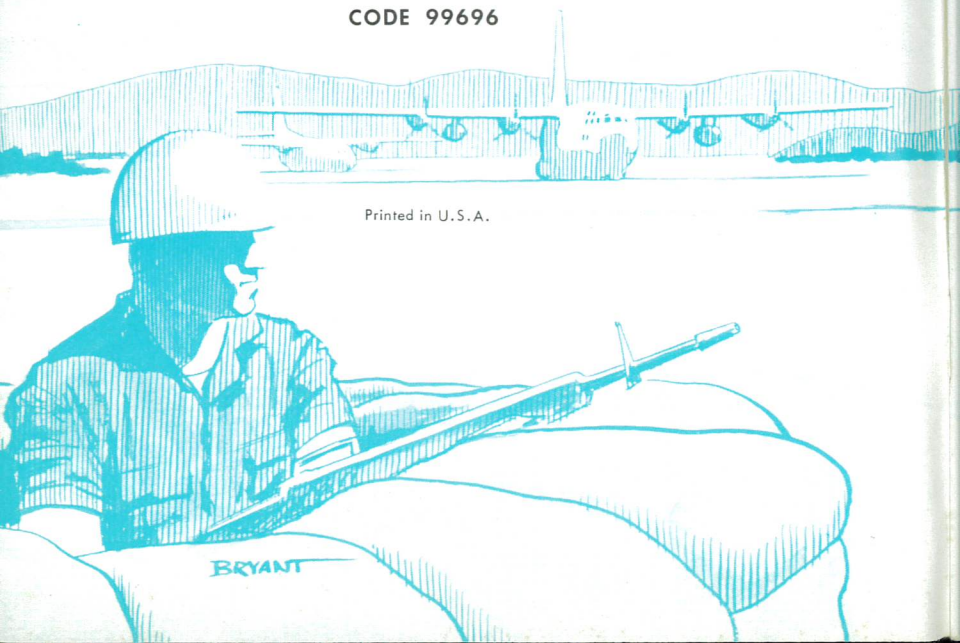
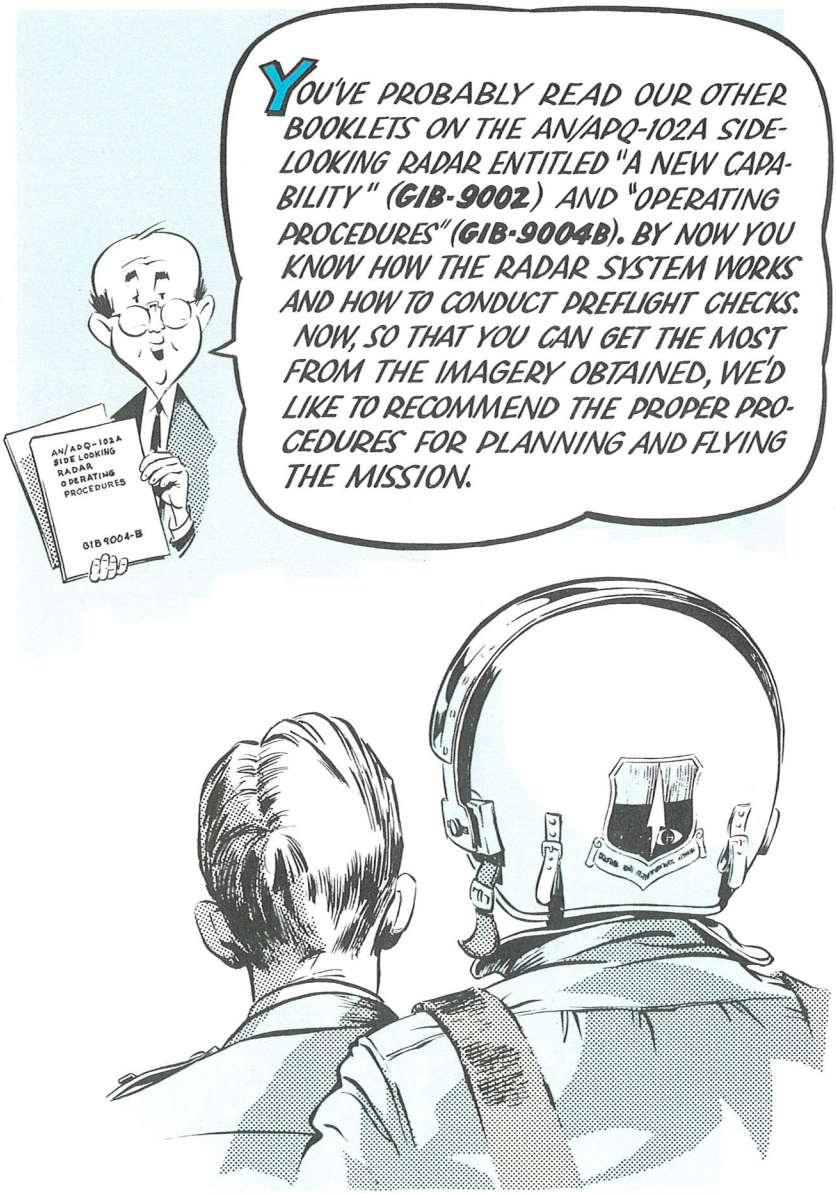


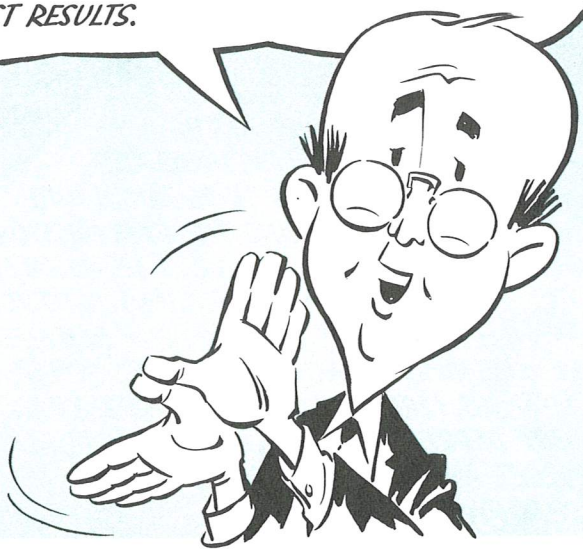
PLANNING *and* FLYING *the Mission*

with the AN/APQ-102A SIDE-LOOKING RADAR


YOU'VE PROBABLY READ OUR OTHER BOOKLETS ON THE AN/APQ-102A SIDE-LOOKING RADAR ENTITLED "A NEW CAPABILITY" (GIB-9002) AND "OPERATING PROCEDURES" (GIB-9004B). BY NOW YOU KNOW HOW THE RADAR SYSTEM WORKS AND HOW TO CONDUCT PREFLIGHT CHECKS. NOW, SO THAT YOU CAN GET THE MOST FROM THE IMAGERY OBTAINED, WE'D LIKE TO RECOMMEND THE PROPER PROCEDURES FOR PLANNING AND FLYING THE MISSION.
AN/APQ-102A SIDE LOOKING RADAR OPERATING PROCEDURES
GIB 9004-B

BY FAR, THE GREATEST MAJORITY OF POOR IMAGERY IS CAUSED EITHER BY IMPROPER MISSION PLANNING OR BY DIFFICULTY IN HOLDING THE AIRCRAFT WITHIN THE STABILIZATION LIMITS OF THE RADAR DURING MANUALLY CONTROLLED FLIGHT. LET'S TAKE FIRST THINGS FIRST, AND BEGIN WITH MISSION PLANNING. SPECIFIC INFORMATION ON PROPER FLIGHT AND MISSION PLANNING IS CONTAINED IN OUR BOOKLET ENTITLED "AN/APQ-102A SIDE-LOOKING RADAR MODE SELECTION CONSIDERATIONS FOR VARIOUS MISSION REQUIREMENTS" (GIB-9040A), A CLASSIFIED DOCUMENT.

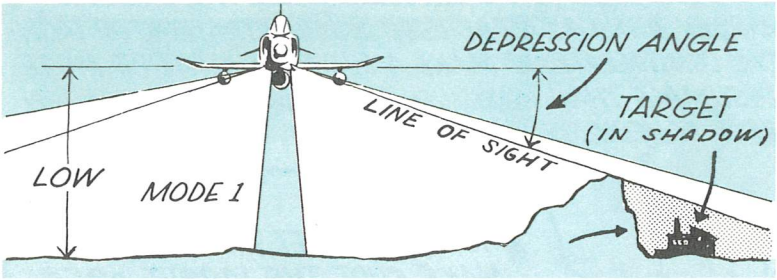
IT IS THE PRIMARY PURPOSE OF THE BOOKLET YOU ARE NOW READING TO EMPHASIZE THE IMPORTANCE OF CAREFUL FLIGHT PLANNING BEFORE EACH MISSION, AND TO RECOMMEND HOW TO FLY THE MISSION FOR BEST RESULTS.

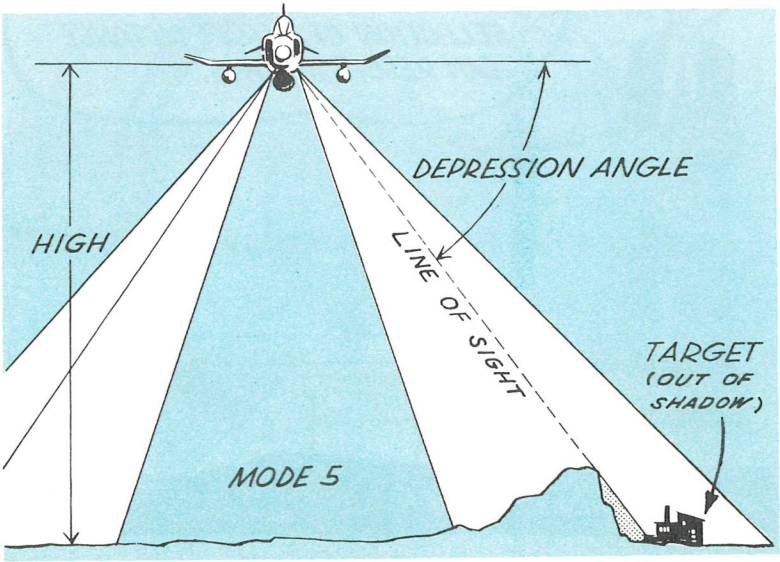


PLANNING the MISSION

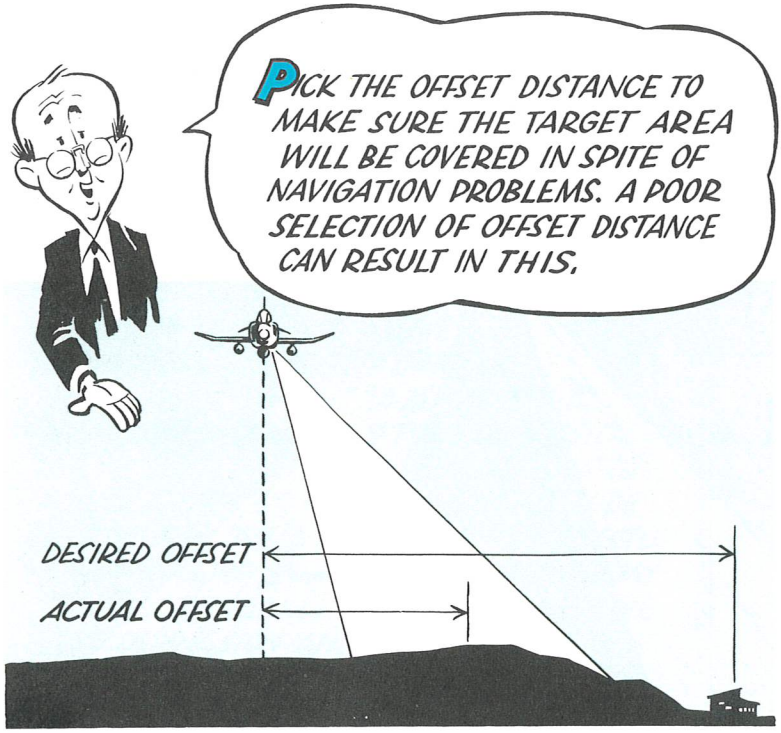
AS YOU CAN SEE FROM OUR HARRIED AND OVERWORKED FRIENDS AT THE FLIGHT PLANNING BOARD, THERE ARE MANY CONSIDERATIONS TO BE TAKEN INTO ACCOUNT WHEN PLANNING THE **SLR** MISSION. WHEN A TARGET AREA HAS BEEN DESIGNATED FOR RECONNAISSANCE, THE FLIGHT ALTITUDE AND DESIRED OFFSET DISTANCE CAN BE SELECTED BY CONSIDERING KNOWN OR SUSPECTED ENEMY DEFENSES, TERRAIN CLEARANCE PROBLEMS, THE BEST DEPRESSION ANGLE FOR THE TYPE OF TARGET, AND THE PROBLEMS OF RADAR SHADOWING.

DEPRESSION ANGLE CONSIDERATIONS ARE ALSO COVERED IN BOOKLET **GIB-9040A**. RECONNAISSANCE OVER MOUNTAINOUS TERRAIN OR THICKLY FORESTED AREAS IS BEST ACCOMPLISHED WITH A MODE 5 SETTING AT HIGH ALTITUDES. THIS PROVIDES A LARGER DEPRESSION ANGLE AND EFFECTIVELY REDUCES RADAR SHADOWS.

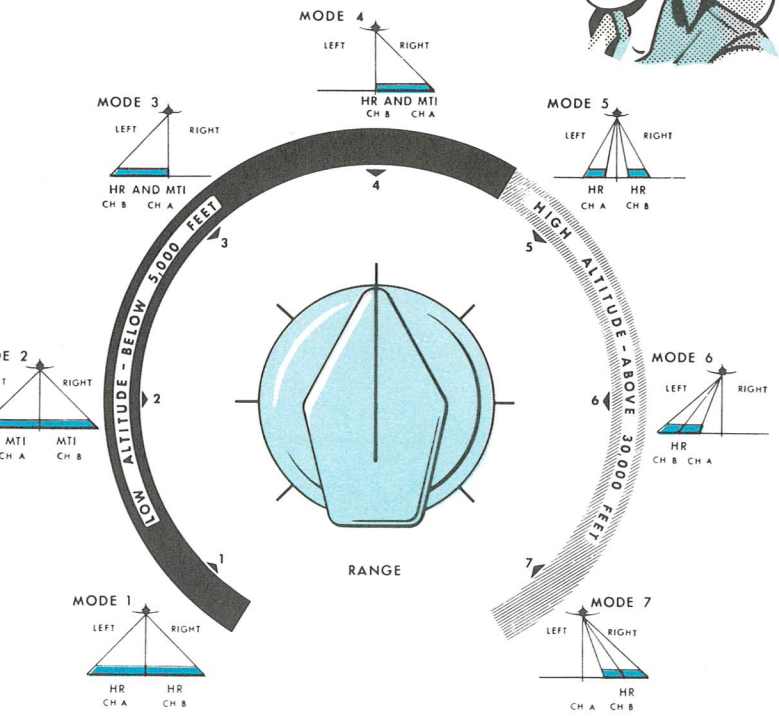




THE HIGH-ALTITUDE MODES 6 AND 7 ARE BEST SUITED FOR COASTAL SURVEILLANCE MISSIONS, BUT A GROUND TRACK SHOULD BE SELECTED THAT WILL PUT THE AIRCRAFT OVER THE WATER WITH THE RADAR BEAM LOOKING TOWARD THE COAST. SUCH A GROUND TRACK AVOIDS THE POSSIBILITY OF TERRAIN FEATURES CASTING RADAR SHADOWS OVER THE COASTLINE IF THE RADAR LOOKS SEAWARD. SUCH SHADOWS WILL OFTEN OBSCURE CLOSE-IN TARGETS AND BLEND WITH NO-RETURNS FROM THE WATER. MODES 3 AND 4 CAN BE USED WHERE STRATEGIC OR TACTICAL CONSIDERATIONS MAKE A MINIMUM ALTITUDE MORE DESIRABLE THAN MAXIMUM OFFSET DISTANCE, OR WHEN **MTI** IS DESIRED.

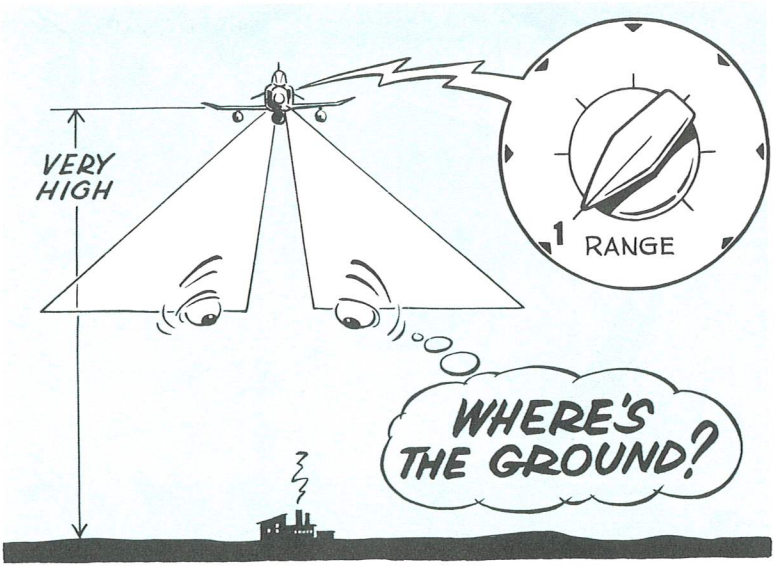


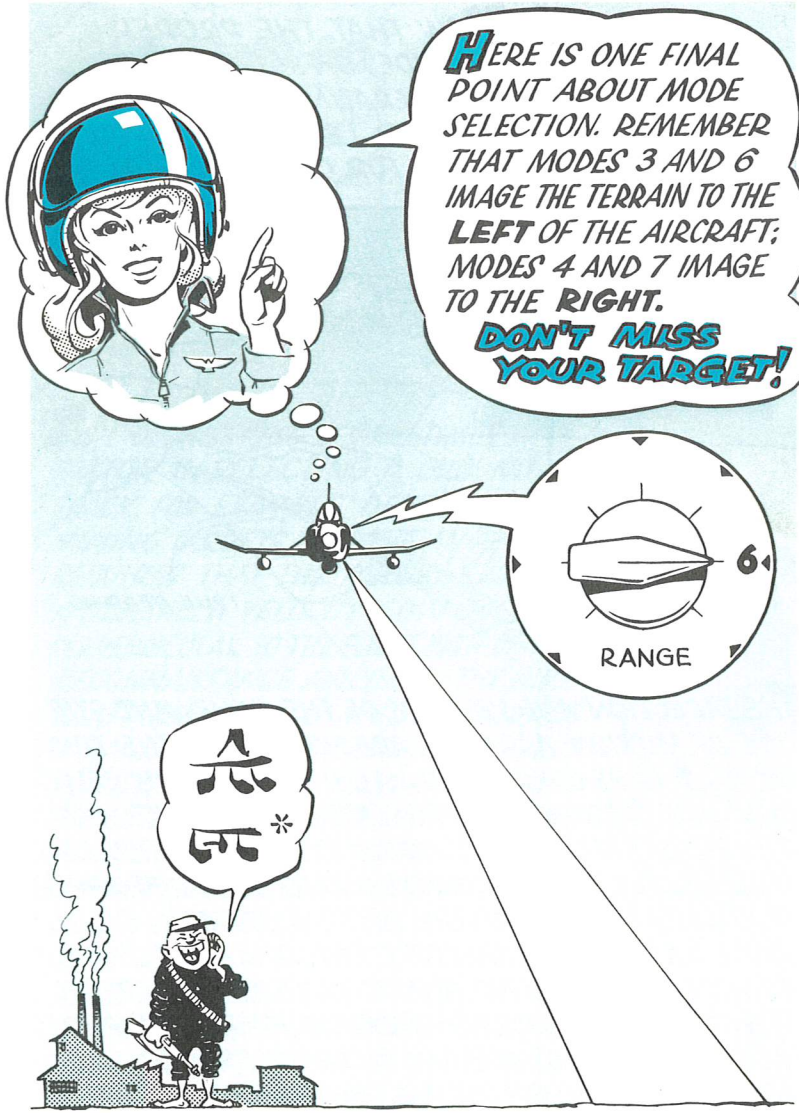
NEXT, I'D LIKE TO MAKE SOME RECOMMENDATIONS ON MODE SELECTION. HERE IS A DIAGRAM OF THE **SLR** MODES NORMALLY FLOWN AND THE RECOMMENDED ALTITUDES FOR EACH. BECAUSE OF CLASSIFICATION, HOWEVER, MODE NUMBERS ARE SUBSTITUTED FOR THE SYMBOLS SHOWN ON THE COCKPIT **SLR** CONTROL PANEL.



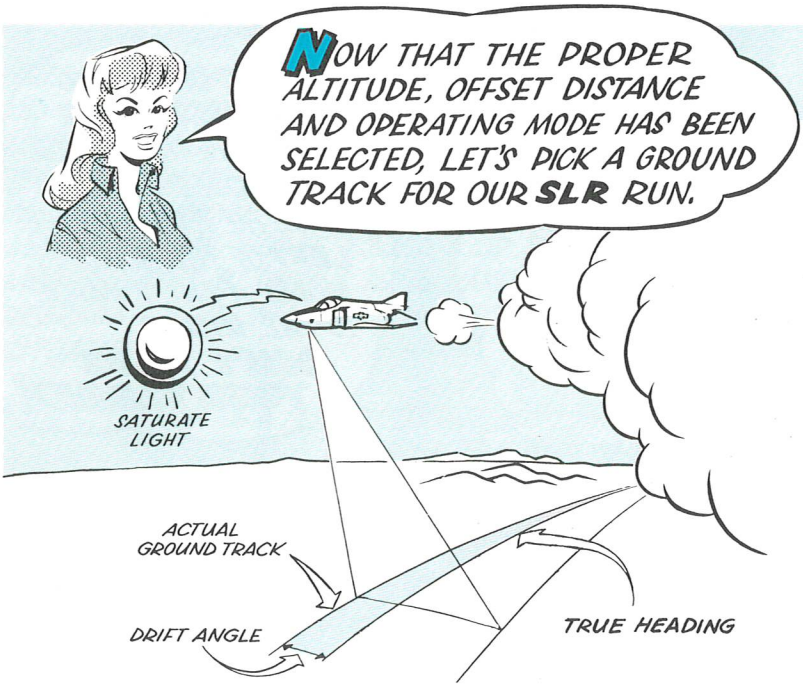
THE DESIGN ALTITUDE PARAMETERS OF THE RADAR AS SHOWN ON THE FOREGOING DIAGRAM ARE: BELOW 5,000 FEET FOR MODES 1,2,3, AND 4; AND ABOVE 30,000 FEET FOR MODES 5,6, AND 7. RADAR RECONNAISSANCE MISSIONS OUTSIDE THESE LIMITS SHOULD NOT BE PLANNED OR EXECUTED UNLESS REQUIRED BY OVERRIDING TACTICAL CONSIDERATIONS. WHEN OPERATING AT INTERMEDIATE ALTITUDES, USE MODES 1,3, OR 4 UP TO 16,500 FEET AND MODES 6 OR 7 BETWEEN 16,500 AND 30,000 FEET. SOME DEGRADATION OF IMAGERY SHOULD BE EXPECTED IN THIS SITUATION.

YOUR SELECTION OF A FLIGHT ALTITUDE AND OFFSET DISTANCE WILL DICTATE THE MODE IN WHICH YOU WISH TO OPERATE. FOR INSTANCE, IF YOU HAVE SELECTED A HIGH ALTITUDE AND A LARGE OFFSET, YOU WILL UNDOUBTEDY USE EITHER MODE 6 OR 7. A SMALLER OFFSET AT A HIGH ALTITUDE WILL PERMIT THE USE OF MODE 5. AT ANY RATE, **DO NOT** USE A LOW ALTITUDE MODE WHEN FLYING AT HIGH ALTITUDE, OR YOU'LL GET THIS ?

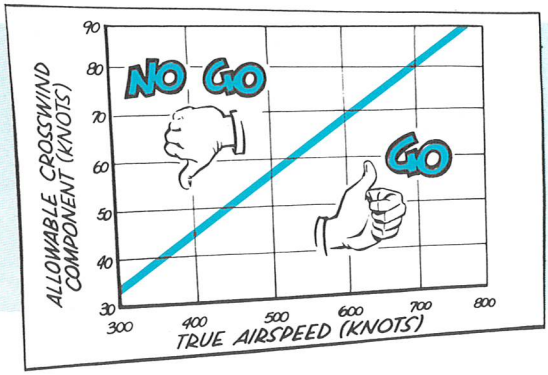




* HO CHI MINH REALLY LOVES THIS GUY!



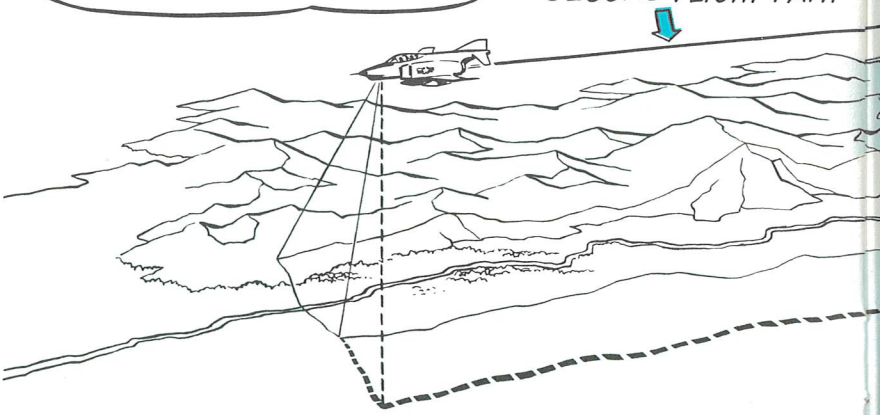
THE DIRECTION AND VELOCITY OF THE WIND, AND THE TYPE OF MISSION ASSIGNED ARE NORMALLY THE TWO FACTORS TO BE CONSIDERED WHEN MAKING THIS SELECTION. HIGH CROSS-WIND COMPONENTS, FOR INSTANCE, CAN CAUSE DRIFT ANGLES THAT EXCEED THE STABILIZATION LIMITS OF THE RADAR. THE RADAR WILL CORRECT FOR DRIFT ANGLES UP TO ±6.75 DEGREES. IF THE DRIFT IS GREATER, THE ANTENNAS WILL HIT THE YAW STOPS AND CAUSE THE SYSTEM TO SATURATE, RESULTING IN POOR IMAGERY. BY CAREFUL SELECTION OF THE GROUND TRACK AND BY TAKING EXPECTED WIND INTO ACCOUNT, YOU CAN DECREASE DRIFT TO ALLOWABLE LIMITS. THE FOLLOWING CHART SHOWS ALLOWABLE CROSS-WIND COMPONENT VERSUS AIRCRAFT TRUE AIRSPEED.

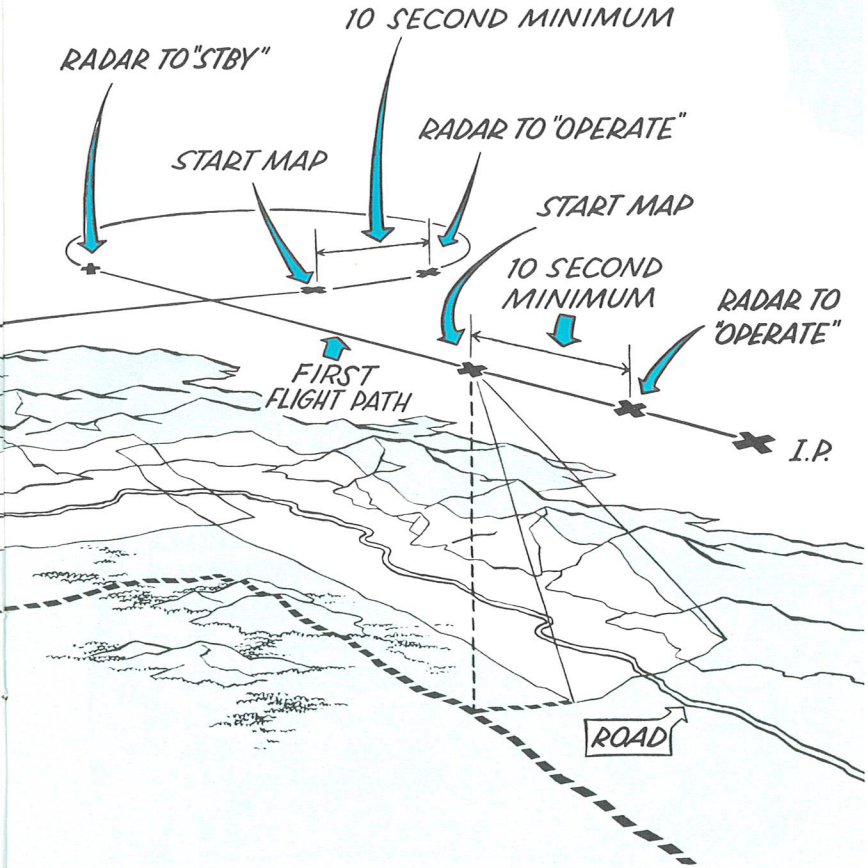


TYPE OF MISSIONS IS SOMETIMES A FACTOR IN SELECTING A GROUND TRACK. FOR EXAMPLE, DETECTION OF MOVING TARGETS WITH THE AN/APQ-102A REQUIRES THAT THE TARGET EXCEED A THRESHOLD VELOCITY COMPONENT PERPENDICULAR TO THE FLIGHT PATH OF THE RECONNAISSANCE AIRCRAFT. THE AIRCRAFT **CANNOT** FLY A GROUND TRACK PARALLEL TO A HIGHWAY AND EXPECT TO PICK UP MOVING TARGETS ON **MTI** CHANNELS. HOWEVER, IF A GROUND TRACK IS SELECTED TO INTERSECT THE HIGHWAY AT A CERTAIN MINIMUM ANGLE, θ_{min}, MOVING TARGETS WILL BE DETECTED DEPENDING ON TARGET AND AIRCRAFT SPEEDS. IN OUR BOOKLET ON "MODE CONSIDERATIONS" (**GIB-9040A**), AN ILLUSTRATION IS GIVEN (FIG. 6) FOR θ_{min} VERSUS TARGET VELOCITY FOR SEVERAL AIRCRAFT SPEEDS.

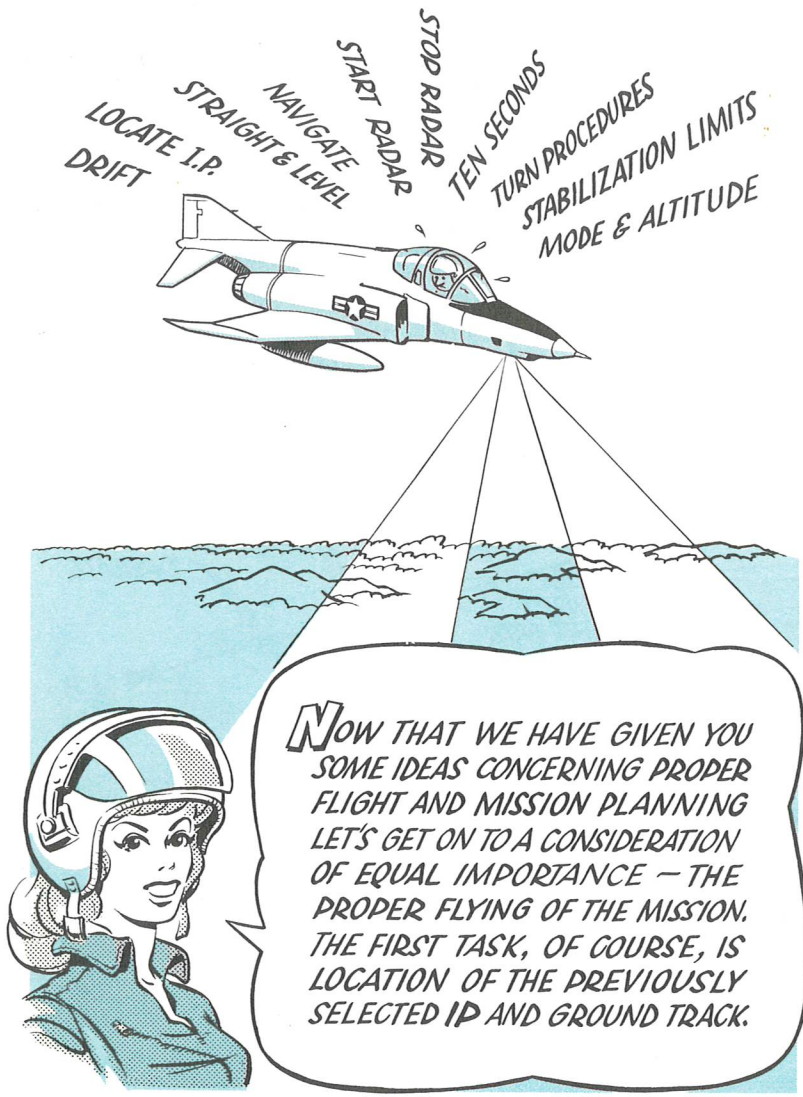
ANOTHER CONSIDERATION IN SELECTING A SUITABLE GROUND TRACK IS THE TARGET ORIENTATION ANGLE. **GIB-9040A** GIVES SPECIFIC DETAILS ON THIS SUBJECT, TOO.

AFTER THE PROPER GROUND TRACK HAS BEEN SELECTED, YOU SHOULD PICK THE **IP** AND THE EXACT POINTS WHERE YOU WILL SWITCH THE RADAR TO "OPERATE" TO BEGIN IMAGING, AND THE POINT WHERE YOU WILL SWITCH BACK TO STANDBY CONDITION AFTER COMPLETION OF THE RUN. IT IS IMPORTANT THAT YOU ALLOW AT LEAST 10 SECONDS FROM "TURN ON" TO THE START OF YOUR DESIRED MAP. 10 SECONDS IS THE MINIMUM TIME. ALLOW MORE TIME IF YOU CAN.

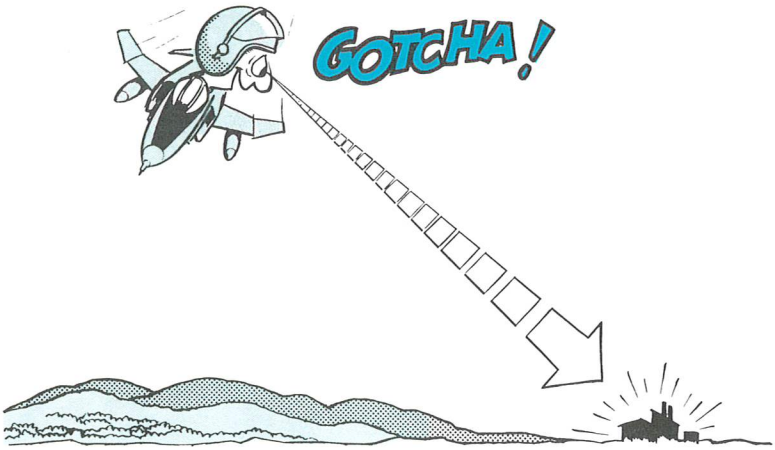


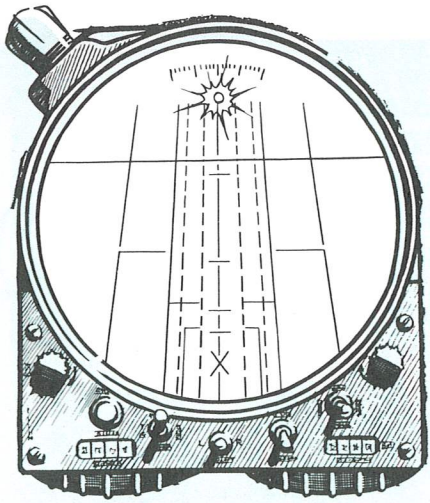

10 SECOND MINIMUM
RADAR TO "STBY"
RADAR TO "OPERATE"
START MAP
START MAP
10 SECOND MINIMUM
RADAR TO "OPERATE"
FIRST FLIGHT PATH
I.P.
ROAD

FLYING the MISSION

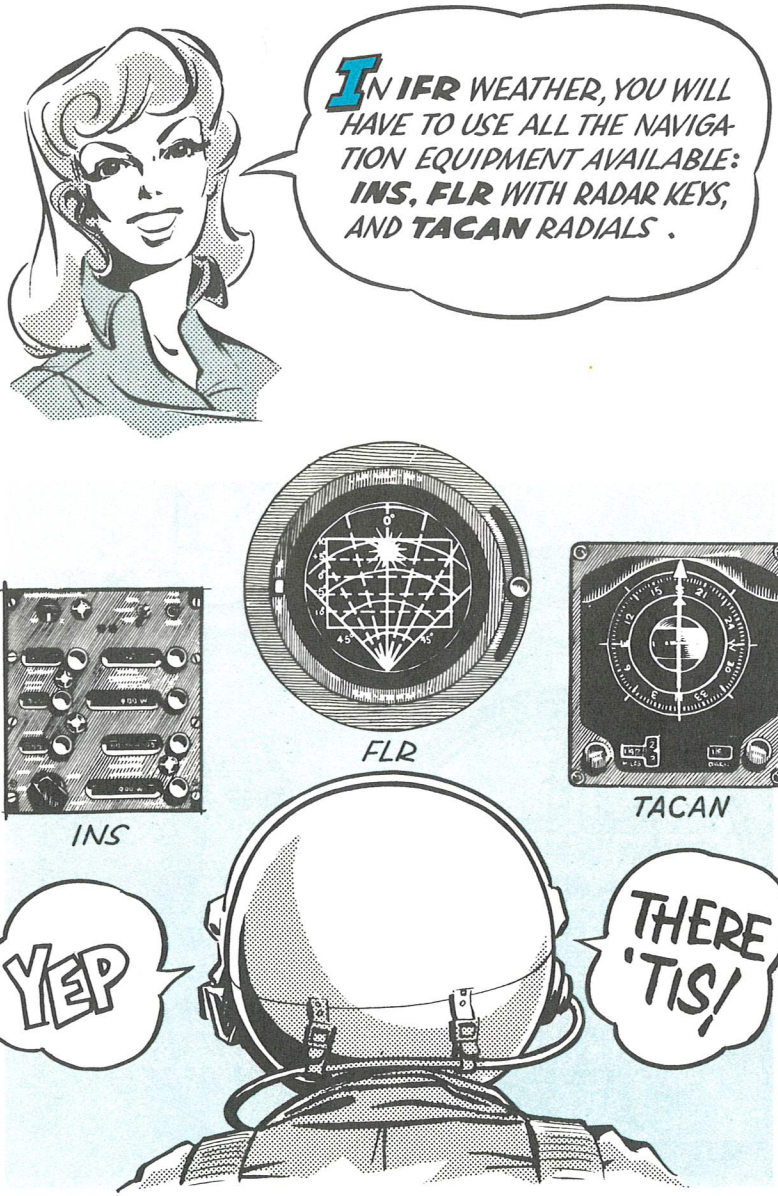


IN **VFR** WEATHER, LOCATION OF THE PROPER **IP** AND DETERMINATION OF THE GROUND TRACK SHOULD PRESENT NO PROBLEM. DEAD RECKONING NAVIGATION AND THE OLD EYEBALL CAN DO THE TRICK.

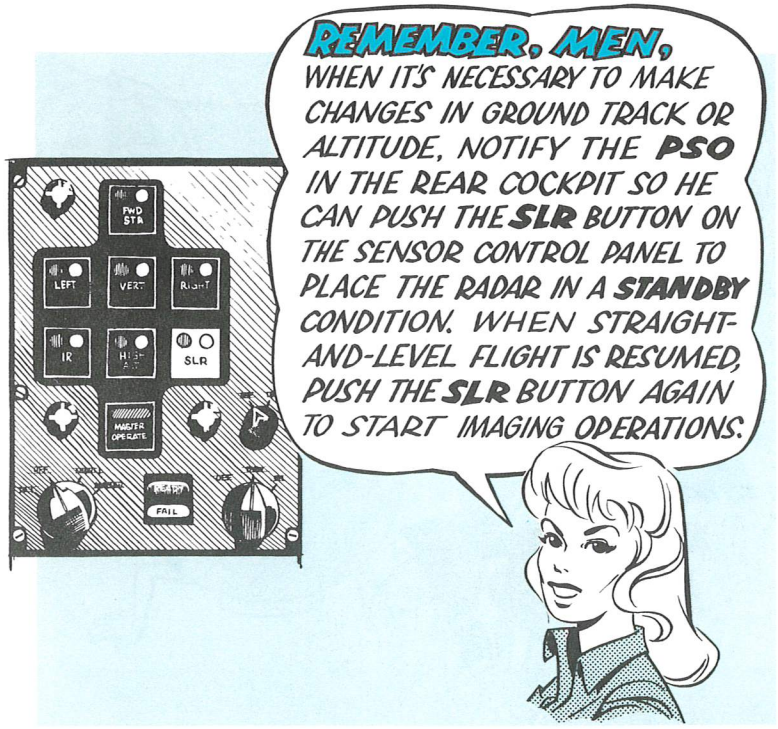




THE **VF-57 OPTICAL VIEW FINDER** NORMALLY USED TO LOCATE PHOTOGRAPHIC TARGETS, IS AN IDEAL INSTRUMENT FOR **IP** SPOTTING. IT CAN ALSO PROVIDE DRIFT ANGLE DETERMINATIONS UP TO ±10 DEGREES.


IN IFR WEATHER, YOU WILL HAVE TO USE ALL THE NAVIGATION EQUIPMENT AVAILABLE: INS, FLR WITH RADAR KEYS, AND TACAN RADIALS.
INS
FLR
TACAN
YEP
THERE 'TIS!

HIT YOUR STARTING POINT PRECISELY, REMEMBERING THAT 10 SECONDS IS REQUIRED AFTER THE **SLR** BUTTON IS PUSHED TO **"OPERATE"** BEFORE THE RADAR IS LOCKED ON AND OPERATING WITHIN SPECIFICATIONS. COURSE CORRECTIONS **SHOULD NEVER** BE MADE DURING A MOSAIC RUN.
ALTHOUGH NOT RECOMMENDED, COURSE CORRECTIONS CAN BE MADE DURING ALL OTHER TYPES OF MISSIONS IF IT IS EVIDENT THAT THE DESIRED TARGET AREA WILL NOT BE IMAGED. **DO NOT** TURN OFF TRACK TOO SOON. REMEMBER, A 10-MILE RUN ONLY MAKES 2 INCHES OF IMAGE FILM.



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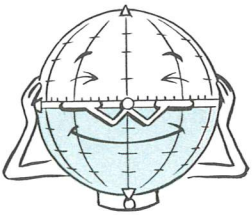
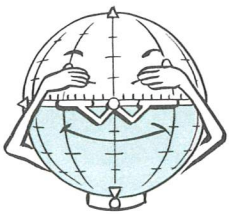
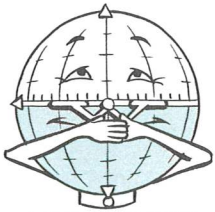


PITCH +1°-6°

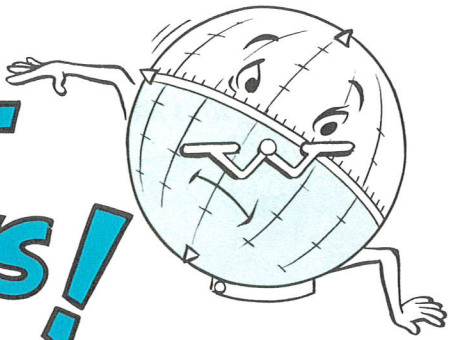


ROLL ±3°

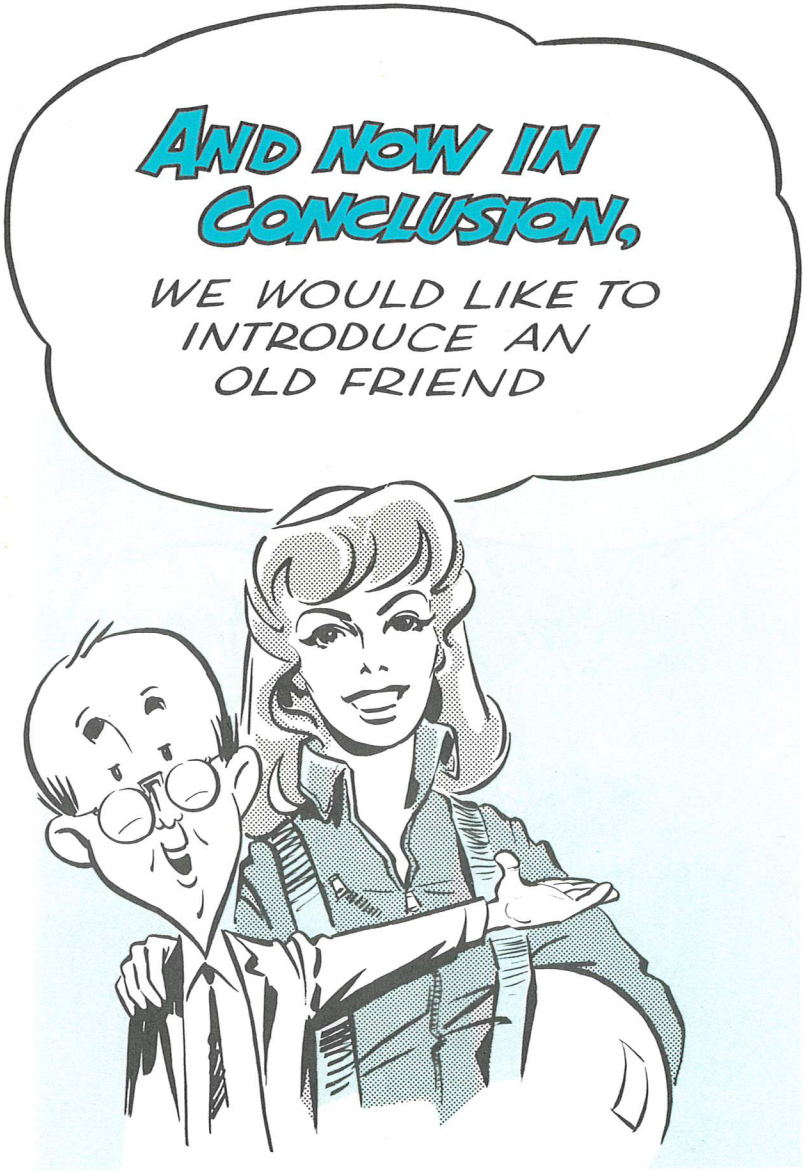


YAW ±6.75°

NOT THIS!




IT IS CONSIDERED DIFFICULT TO REMAIN WITHIN THESE STABILIZATION LIMITS WHEN FLYING THE AIRCRAFT MANUALLY.
THEREFORE WE **STRONGLY** RECOMMEND THAT THE **AFCS** BE UTILIZED AT ALL TIMES WHEN MAKING **SLR** RUNS EXCEPT WHEN ENEMY ACTION IS INVOLVED.


AND NOW IN CONCLUSION,
WE WOULD LIKE TO INTRODUCE AN OLD FRIEND

Uncle Sam Wants YOU..

to

- ☆ THINK RIGHT!
- ☆ FLY RIGHT!
- ☆ BE RIGHT!


BRYANT