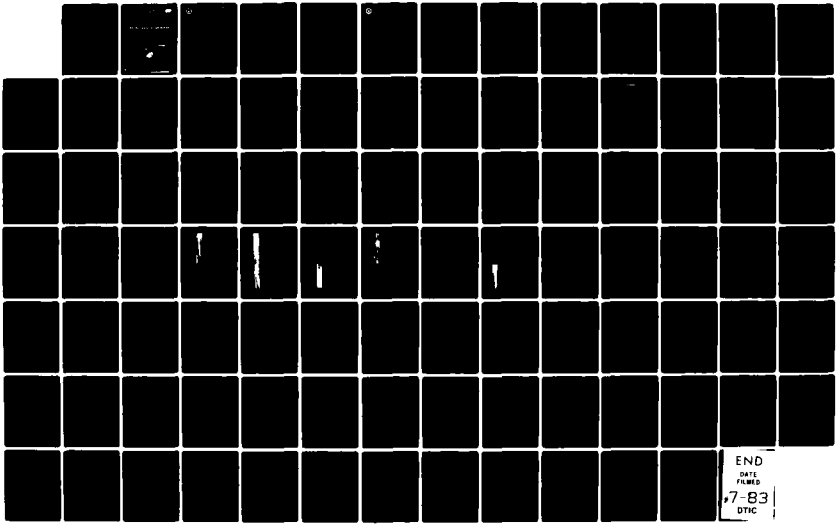
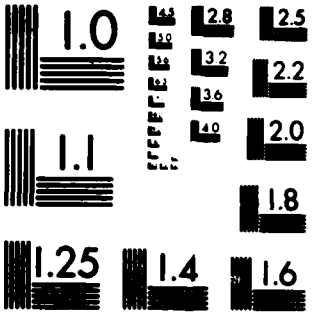
AD-A129 143 TRACALS EVALUATION REPORT SOLID STATE INSTRUMENT LANDING SYSTEM AN/GRN-29..(U) FACILITY CHECKING SQUADRON (1866TH) (AFCS) SCOTT AFB IL 1/1

UNCLASSIFIED M D CONLEY ET AL. 07 APR 83 81/66S-245 F/G 17/7 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

(9) Final Rept.

LEVEL II

[redacted]

(1)

AD A129143

AIR FORCE COMMUNICATIONS COMMAND

RACALS EVALUATION REPORT

SOLID STATE INSTRUMENT LANDING SYSTEM

AN/GRN-29(V)

SPECIAL EVALUATION REPORT

Tinker AFB, Oklahoma

[redacted]

8-20 December 1980

DTIC
ELECTE
MAY 18 1981
S D
E

(10) Marvin D. Conley
David E. Thibodeau

(11) [redacted]

(12) 74

updated 7 Apr 83

Supersedes AD-A098957

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DEPARTMENT OF THE AIR FORCE
1866 FACILITY CHECKING SQUADRON (AFCC)
SCOTT AIR FORCE BASE, ILLINOIS 62225

2

REPLY TO ATTN OF: TE (NAVAIDS Evaluation Section, AV 638-6384) 7 April 1983

SUBJECT: TRACALS letter 82/66L-347 to amend TRACALS Evaluation Report, 80/66S-244

TO: See Distribution

1. The 1866th Facility Checking Squadron was tasked to perform a special evaluation of the Solid State Instrument Landing System (SSILS) at Tinker AFB, Oklahoma, and produce an amendment to the TRACALS Evaluation Report 80/66S-244. Authority for this action was HQ AFCC/FFNM (now ATTE) letter dated 27 September 1982 referencing CCD/LGM message 232110Z September 1982. The purpose of the evaluation was to update the last TRACALS Evaluation Report after a frequency change of the SSILS and to look at a localizer scalloping problem.

2. The results of the ground equipment checks indicated the localizer was operating within technical order (TO) specifications. The phasing of the course and clearance systems of both transmitters was optimized prior to the flight evaluation. Analysis of the localizer facility siting reconfirmed that line of sight coverage of the runway threshold was limited. The hump in the ground elevation immediately in front of the antenna array reduces the signal strength in the area of the restriction. The flight evaluation conducted by the 1866 FCS reconfirms that the on-course signal begins a gradual bend outside the middle marker and becomes scalloped as the aircraft flies inbound. The severe scalloping on the localizer crosspointer trace results from localizer signal reflections off the buildings along the east side of the runway. Sideband energy transmitted from the antenna array strikes the flat vertical surfaces of these buildings and is reflected at an angle equal to the incident angle. This results in sideband energy being present where a sideband null should exist on centerline; this is approximately in the area from one nautical mile beyond the middle marker to touchdown. This energy, depending on the path length, adds in phase or out of phase to the C+SB component to produce an alternating condition of predominating 90 or 150 hertz, resulting in the observed scalloping. The terrain conditions amplify the reflection problem. The terrain immediately in front of the localizer array rises, which causes screening to become a factor. The Runway 17 threshold is approximately 30 feet below the localizer line of sight coverage. The terrain is relatively flat in the direction of the buildings that cause the reflections; therefore, the energy from the reflective surfaces that combines with the direct energy on course is higher in magnitude than would be the case if the intervening terrain allowed line of sight coverage of the Runway 17 threshold. Excursions on the crosspointer trace exceed AFM 55-8 tolerances as can be seen from Attachment 5. The reflection off of the large hangar doors on building 3102 are most likely the cause of the localizer alignment measurements exceeding these tolerances. Analysis of reflection cancellation methods such as cancellation wires and corrective "cosmetic" panels indicate the cost of such methods would be greater than their benefits, especially since the Runway 17 SSILS is a Catagory I system. The restriction "localizer unusable from middle marker inbound" should remain. As mentioned in the original report, an approximate 30 percent reduction in the severity of the scalloping can be accomplished by widening the course width from 3.3 to 5.0 degrees. This non-tailored course width would be in accordance with AFM 55-8, Change 32, para 217.3206.

83 06 01 063

83 05 09 165

3. The glide slope was operating within TO specifications, as revealed by the facility ground equipment checks. The flight evaluation indicated the glide slope met AFM 55-8 flight inspection requirements as a Category I facility. A step, at times, was noted above path which made determination of a repeatable path width difficult. No significant glide slope performance deficiencies were detected. A fly down indication was noted from Point B to threshold. Terrain in the first Fresnel zone is the most likely cause. The original report provides further discussion of this.

4. Attachments 4 through 8 of this letter reflect the current changes in equipment operating conditions due to the frequency change. The SSILS frequency change did not change any of the narrative of the previous TRACALS Evaluation Report. Please ensure the contents of this amendment are disseminated to all users of this report within your unit. This letter should be attached to the previous report for future reference.

Robert B. Nicholson

ROBERT B. NICHOLSON, Lt Col, USAF
Commander

8 Atchs:
1. Distribution
2. HQ AFCC/FFNM ltr dated 27 September 1982
3. CCD/LGM msg 232110Z September 1982
4. SSILS Localizer Performance Checklist
5. Localizer Ground Check Record
6. Null Reference SSILS Glide Slope Performance Checklist
7. Flight Inspection Report-Instrument Landing System
8. Runway 17 SSILS Localizer Alignment

DISTRIBUTION

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A

Atch 1

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE COMMUNICATIONS COMMAND
SCOTT AIR FORCE BASE, ILLINOIS 62225

2

REPLY TO ATTN OF: FFNM

SUBJECT: Special TRACALS Evaluation, Tinker AFB OK, AN/GRN-29 (CCD/LGM 232110 Sep 82)

TO: 1866 FCS/TE

Request you provide a team to support the subject evaluation. Team should be available to gather and assemble data during the flight check which is tentatively scheduled for 26 or 27 Sep 82. Data should be gathered which will allow you to amend Report No. 80/66-244.

FOR THE COMMANDER

Richard C. Davis

RICHARD C. DAVIS, Col, USAF
Director, TRACALS Management
DCS/Air Traffic Services

Atch 2

28 SEP 82

(11)

MSG MSB727

ROUTINE 267 0205

AFCC AFCC 1866
FF-5 LG-4 2

RTTUZYUW RUEDBJA2993 2662119-UUUU--RHCUABA. 4742
ZNR UUUUU
P 232110Z SEP 82
FM CCD GRIFFISS AFB NY//LGM//
TO RHCUABA/HQ AFCC SCOTT AFB IL//FFN/LGMK//
INFO RHCUABA/1866FCS SCOTT AFB IL//TE//
RUVOAAA/1985CS TINKER AFB OK//LGM/FFN//
BT
UNCLAS
SUBJ: SPECIAL TRACALS EVALUATION TINKER AFB AN/GRN-29
REQUEST A SPECIAL TRACALS EVALUATION BE CONDUCTED DURING THE WEEK OF 27 SEP-3 OCT 82 ON THE TINKER AFB AN/GRN-29 TO UPDATE THE DEC 80 EVALUATION REPORT AND RESTORE THE FACILITY TO SERVICE. PRESENTLY THE ILS IS OUT OF SERVICE DUE TO MAINTENANCE CHANGING THE FREQUENCY TO PROVIDE TINKER AFB WITH DISCRETE FREQUENCIES. THIS LOCALIZER HAS A RESTRICTION FROM THE MIDDLE MARKER IN DUE TO SEVERE SCALLOPING. WE FEEL IT IMPERATIVE TO GET A FRESH LOOK AT THE LOCALIZER TO DETERMINE THE OPERATIONAL CAPABILITIES AND LIMITATIONS OF THE SYSTEM AT THE NEW FREQUENCY AND PUBLISH AN UPDATED REPORT FOR FUTURE REFERENCE. THIS CONFIRMS TELECON WITH MR. CONLEY AFCC/FFN, MR. SMITH 1985CS AND MR. BARNES THIS OFFICE.
BT
#2993

NNNN

ROUTINE

MLN 9931

27 SEP 1982

Atch 3

SSILS LOCALIZER PERFORMANCE CHECKLIST						MONTH AND YEAR September 1982
FACILITY LOCATION/RUNWAY Tinker AFB Rwy 17		EQUIPMENT AND SERIAL NUMBER AN/GRN-30 S/N 77007				TECHNICIANS TSgt Miller
CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	FINAL	INITIAL	FINAL	
CRS CARRIER PWR			15W		15W	
CRS SIDEBAND PWR			310mW		310mW	
CLR CARRIER PWR			3.9W		4W	
CLR SIDEBAND POWER			120mW		120mW	
COURSE % MODULATION			40%		40%	
90Hz % MODULATION			20%		20%	
150Hz % MODULATION			20%		20%	
CLEARANCE % MOD			40%		40%	
90Hz % MODULATION			20%		20%	
150Hz % MODULATION			20%		20%	
CRS PWR SUPPLY 1		(METER INDICATION)				
Q5 DC OUT	0.75 TO 3.5A		1.4		2.7	
Q4 DC OUT	0.75 TO 3.5A		1.4		2.7	
DC OUT	26.5 TO 29.5 V		29.0		29.0	
PRE REG	30 TO 38V		36.0		36.0	
CRS PWR SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5A		1.7		2.9	
Q10 DC OUT	0.75 TO 3.5A		1.6		2.9	
DC OUT	26.5 TO 29.5V		29.0		29.0	
PRE REG	30 TO 38V		36.0		36.0	
CRS XMTR						
OSC TUNE	0.5 MIN		1.1		1.1	
EXCTR OUTPUT	0.85 TO 3.0		1.25		1.95	
CSB PA	1.0 TO 3.25		2.3		2.5	
SBO PA	0.75 TO 1.95		1.3		1.0	
CSB PWR OUT	0.50 TO 2.0		1.75		1.85	
DC IN	2.2 TO 3.5 x10		27.0		27.5	
DC IN	1.0 TO 6.7		4.6		4.8	
SBO PWR OUT	0.5 TO 2.5		1.1		0.85	
CLR PWR SUPPLY 1						
Q5 DC OUT	0.75 TO 3.5A		1.2		2.2	
Q4 DC OUT	0.75 TO 3.5A		1.2		2.2	
DC OUT	26.5 TO 29.5V		29.0		29.0	
PRE REG	30 TO 38		36.5		36.0	
CLR PWR SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5A		1.7		2.9	
Q10 DC OUT	0.75 TO 3.5A		1.7		2.3	
DC OUT	26.5 TO 29.5V		29.0		29.0	
PRE REG	30 TO 38		37.0		36.5	
CLR XMTR						
OSC TUNE	0.5 MIN		1.2		1.5	
EXCTR OUTPUT	0.85 TO 3.0		1.95		1.9	
CSB PA	1.0 TO 3.25		1.5		1.4	
SBO PA	0.50 TO 2.0		1.2		1.1	
CSB PWR OUT	0.20 TO 1.95		0.75		0.75	
DC IN	2.2 TO 3.5 x10		28.0		27.0	
DC IN	1.0 TO 6.7		3.4		3.2	
SBO PWR OUT	0.20 TO 2.5		0.75		0.85	

REMARKS

AFCC FORM JUN 82 5157 ONE TIME

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	FINAL	INITIAL	FINAL	
CRS MONITOR 1						
TEST DDM	0.500 ± 0.02		.505		.505	
COURSE DDM	0.000 ± 0.011		.006		.005	
WIDTH DDM	0.141 TO 0.175		.155		.156	
RF LEVEL	100.0 ± 10.0		100.6		100.0	
% MOD	LAST FC ± 4.0%		40.9%		41.1%	
ID% MOD	005.0 ± 2.0		4.7		4.8	
CRS MONITOR 2						
TEST DDM	0.500 ± 0.02		.503		.504	
COURSE DDM	0.000 ± 0.011		.006		.005	
WIDTH DDM	0.141 TO 0.175		.155		.155	
RF LEVEL	100.0 ± 10.0		101.3		100.7	
% MOD	LAST FC ± 4.0%		41.4%		41.7%	
ID% MOD	005.0 ± 2.0		4.9		5.1	
CLR MONITOR 1						
TEST DDM	0.500 ± 0.02		.498		.498	
COURSE DDM	0.000 ± 0.026		.000		.000	
WIDTH DDM	0.129 TO 0.181		.157		.155	
RF LEVEL	100.0 ± 10.0		101.2		101.7	
% MOD	LAST FC ± 4.0%		41.9%		43.4%	
ID % MOD	005.0 ± 2.0		4.8		5.0	
FREQ SEP	9.5 ± 1.0		9.4		10.0	
CLR MONITOR 2						
TEST DDM	0.500 ± 0.02		.502		.502	
COURSE DDM	0.000 ± 0.026		.007		.005	
WIDTH DDM	0.129 TO 0.181		.157		.156	
RF LEVEL	100.0 ± 10.0		101.9		102.5	
% MOD	LAST FC ± 4.0%		42.4%		43.9%	
ID % MOD	005.0 ± 2.0		5.0		5.2	
FREQ SEP	9.5 ± 1.0		9.5		10.1	
CRS ALARM LIMITS						
COURSE MONITOR		MONITOR 1		MONITOR 2		
ID % MOD LOWER	003.0 ± 0.5					
UPPER	18.40 ± 3.0					
% MOD LOWER	004.0 BELOW NORMAL					
UPPER	004.0 ABOVE NORMAL					
RF LEVEL LOWER						SEE NOTE #1
WIDTH DDM LOWER	0.141 ± 0.002					
UPPER	0.175 ± 0.002					
COURSE DDM						
UPPER	0.011 ± 0.004					
TEST DDM LOWER	0.426 ± 0.03					
UPPER	0.557 ± 0.03					
CLR ALARM LIMITS						
FREQ SEP LOWER	5.000 ± 0.2					
UPPER	14.00 ± 0.2					
ID % MOD LOWER	003.0 ± 0.5					
UPPER	018.4 ± 3.0					
% MOD LOWER	4.0 BELOW NORMAL					
UPPER	4.0 ABOVE NORMAL					
RF LEVEL LOWER						SEE NOTE #1
WIDTH DDM LOWER	0.129 ± 0.002					
UPPER	0.181 ± 0.002					
COURSE DDM						
UPPER	0.026 ± 0.004					
TEST DDM LOWER	0.426 ± 0.03					
UPPER	0.557 ± 0.03					

NOTE 1. REFERENCE READINGS MAY VARY AS PER FACILITY, CHECK TO 31R4-2GRN30-2.

FAR FIELD MONITOR 1 TESTS	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	FINAL	INITIAL	FINAL	
DDM	0.000 ± 0.005		.004/150			
DDM ALARM	0.011 ± 0.004		.011			
% MOD	40.0 ± 10.0		43.0			
% MOD ALARM	20.0 ± 1.0		20.0			
FAR FIELD MONITOR 2 TESTS						
DDM	0.000 ± 0.005		.005/150			
DDM ALARM	0.011 ± 0.004		.011			
% MOD	40.0 ± 10.0		46.0			
% MOD ALARM	20.0 ± 1.0		20.0			

SUBSYSTEM MEASUREMENTS

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2	
		INITIAL	FINAL	INITIAL	FINAL
CARRIER FREQUENCY					
COURSE	0.002%				
CLEARANCE	0.002%				
MODULATION BALANCE					
COURSE	CENTERLINE		.000		.000
CLEARANCE	NEARFIELD 30°		.000		.000
PHASING					
COURSE 150Hz	FARFIELD 3°		.006/150		.008/150
COURSE 90Hz			.020/150		.018/150
CLEARANCE 150Hz	NEARFIELD 30°		.018/150		.024/150
CLEARANCE 90Hz			.012/90		.016/90
COURSE IN-LINE					
CLEARANCE IN-LINE					
DISTANCE TO COURSE FARFIELD PHASING POINT					

ANTENNA VSWR

CHECK	SPECIFICATION	dB	VSWR	CHECK	SPECIFICATION	dB	VSWR
1L	>20.85dB/<1.2:1			1R			
2L				2R			
3L				3R			
4L				4R			
5L				5R			
6L				6R			
7L				7R			

REMARKS

DISTRIBUTION UNIT CHECKS *(CONTINUED)*

COURSE DU C+SB AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
7L (J9)	0.147 – 0.173		7R(J16)		7L–7R	±0.010	
6L (J8)	0.147 – 0.173		6R(J15)		6L–6R	±0.010	
5L (J7)	0.483 – 0.530		5R(J14)		5L–5R	±0.030	
4L (J6)	REF ± 0.030		4R(J13)	0.491	4L–4R	±0.030	
3L (J5)	0.657 – 0.771		3R(J9)		3L–3R	±0.040	
2L (J4)	0.920 – 1.080		2R(J8)		2L–2L	±0.060	
1L (J3)	0.821 – 0.964		1R(J7)		1L–1R	±0.054	

COURSE DU C+SB SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
7L (J9)	+82			7R(J16)	0			
6L (J8)	+82			6R(J15)	0			
5L (J7)	+82			5R(J14)	0			
4L (J6)	+82			4R(J13)	0			
3L (J5)	+82			3R(J9)	0			
2L (J4)	+82			2R(J8)	0			
1L (J3)	+82			1R(J7)	0			

COURSE DU SBO AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
7L (J9)	0.330 – 0.404		7R(J16)		7L–7R	±0.012	
6L (J8)	0.443 – 0.599		6R(J15)		6L–6R	±0.018	
5L (J7)	0.818 – 0.960		5R(J14)		5L–5R	±0.029	
4L (J6)	REF + 0.033		4R(J13)	1.000	4L–4R	±0.033	
3L (J5)	0.940 – 1.060		3R(J9)		3L–3R	±0.033	
2L (J4)	0.614 – 0.720		2R(J8)		2L–2R	±0.022	
1L (J3)	0.204 – 0.240		1R(J7)		1L–1R	±0.014	

COURSE DU SBO SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
7L (J9)	–98			7R(J16)	0			
6L (J8)	–98			6R(J15)	0			
5L (J7)	–98			5R(J14)	0			
4L (J6)	–98			4R(J13)	0			
3L (J5)	–98			3R(J9)	0			
2L (J4)	–98			2R(J8)	0			
1L (J3)	–98			1R(J7)	0			

COURSE PHASE ERROR

CHECK	CSB ERR	SBO ER	DIFF	CHECK	CSB ERR	SBO ER	DIFF	REMARKS
7L (J9)				7R(J16)				
6L (J8)				6R(J15)				
5L (J7)				5R(J14)				
4L (J6)				4R(J13)				
3L (J5)				3R(J9)				
2L (J4)				2R(J8)				
1L (J3)				1R(J7)				
SPREAD								

REMARKS

Measurements indicated on this page were spot checked but not recorded.

DISTRIBUTION UNIT CHECKS *(CONTINUED)*

CLR DU C+SB AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
3L (J5)	0.184 – 0.216		3R (J9)		3L – 3R	±0.012	
1L (J3)	REF ± 0.060		1R (J7)	1.000	1L – 1R	± 0.060	

CLR C+SB SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
3L (J5)	+82			3R (J9)	0			
1L (J3)	+82			1R (J7)	0			

CLR DU SBO AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
3L (J5)	0.121 – 0.157		3R (J9)		3L – 3R	±0.005	
2L (J4)	0.306 – 0.360		2R (J8)		2L – 2R	±0.010	
1L (J3)	REF ±0.033		1R (J7)	1.000	1L – 1R	±0.033	

CLR SBO SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
3L (J5)	–98			3R (J9)	0			
2L (J4)	–98			2R (J8)	0			
1L (J3)	–98			1R (J7)	0			

CLR PHASE ERROR

CHECK	CSB ERR	SBO ERR	DIFF	CHECK	CSB ERR	SBO ERR	DIFF	REMARKS
3L (J5)				3R (J9)				
2L (J4)				2R (J8)				
1L (J3)				1R (J7)				
SPREAD								

ANTENNA NULLS

PAIR	SPECIFICATION	INITIAL	FINAL	PAIR	SPECIFICATION	INITIAL	FINAL
1	10" at the nearfield ck pts.		2"/150	5			0
2			2"/150	6			2"/90
3			0	7			4"/90
4			0	COMP			0

RECOMBINING UNIT NULLS

PAIR	SPECIFICATION ~~TONE~~	INITIAL	FINAL	PAIR	SPECIFICATION	INITIAL	FINAL
1	CLR ± 0.020/CRS ± 0.006		.004/90	5	CRS ± 0.006		.002/90
2	CRS ± 0.003		.000	6	CRS ± 0.006		.000
3	CRS ± 0.003		.002/90	7	CRS ± 0.006		.001/150
4	CRS ± 0.006		.000	COMP	CRS ± 0.003		

CABLING PHASE SHIFTS

ANTENNA FEEDLINES				MONITOR RETURN			
CHECK		INITIAL	FINAL	CHECK		INITIAL	FINAL
7L				7L			
6L				6L			
5L				5L			
4L				4L			
3L				3L			
2L				2L			
1L				1L			
1R				1R			
2R				2R			
3R				3R			
4R				4R			
5R				5R			
6R				6R			
7R				7R			

REMARKS

DISTRIBUTION UNIT CHECKS *(CONTINUED)*

PHASE AT ANTENNA INPUT (COURSE)						
ANTENNA	C+SB	SBO	ANTENNA	C+SB	SBO	REMARKS
7L	REF (0°)	REF (0°)	7R			
6L			6R			
5L			5R			
4L			4R			
3L			3R			
2L			2R			
1L			1R			

PHASE AT ANTENNA INPUT (CLEARANCE)						
ANTENNA	C+SB	SBO	ANTENNA	C+SB	SBO	REMARKS
3L	REF (0°)	REF (0°)	3R			
2L	–		2R	–		
1L			1R			

MONITOR OFFSETS IN MOD BALANCE		TRANSMITTER NO. 1	TRANSMITTER NO. 2	REMARKS
COURSE MON #1	COURSE DDM	.002/150	.002/150	
COURSE MON #1	WIDTH DDM	.006/150	.005/150	
COURSE MON #2	COURSE DDM	.002/150	.002/150	
COURSE MON #2	WIDTH DDM	.006/150	.005/150	
CLEAR MON #1	COURSE DDM	.001/90	.001/90	
CLEAR MON #1	WIDTH DDM	.003/90	.004/90	
CLEAR MON #2	COURSE DDM	.001/90	.000	
CLEAR MON #2	WIDTH DDM	.005/90	.007/90	
WIDTH MONITOR INDICATION IN QUADRATURE				
COURSE MON #1	WIDTH DDM	.005/150	.005/150	
COURSE MON #2	WIDTH DDM	.006/150	.005/150	
CLEAR MON #1	WIDTH DDM	.019/90	.018/90	
CLEAR MON #2	WIDTH DDM	.021/90	.020/90	
MONITOR COMBINING NETWORK IN NORMAL				
COURSE WIDTH DDM				
CLEAR WIDTH DDM				
MONITOR COMBINING NETWORK IN QUADRATURE				
COURSE WIDTH DDM				
CLEAR WIDTH DDM				

REMARKS

RECORD OF FLIGHT EVALUATION

CONFIGURATION	INDICATION	TX 1	TX 2
POWER RATIO	COURSE C+SB POWER		
	AIRBORNE MEASUREMENT		
	CLEARANCE C+SB POWER		
	AIRBORNE MEASUREMENT		
	dB DIFFERENCE		
COURSE MODULATION	DIAL INDICATION	20.2	20.2
	MONITOR READING	41.1	41.1
	AIRBORNE MEASUREMENT	20.2	20.2
MODULATION BALANCE	DIAL INDICATION	5.0	5.0
	AIRBORNE MEASUREMENT	0	0
CLEARANCE MODULATION	DIAL INDICATION		
	MONITOR READING		
	AIRBORNE MEASUREMENT		
MODULATION BALANCE	DIAL INDICATION		
	AIRBORNE MEASUREMENT		
CLEARANCE WIDTH	DIAL INDICATION		
	SBO POWER		
	MONITOR READING		
	AIRBORNE MEASUREMENT		
COURSE NORMAL WIDTH	DIAL INDICATION	25	
	SBO POWER	300mW	
	MONITOR READING	.155	
	AIRBORNE MEASUREMENT	3.2	
MONITOR ALARMS			
COURSE WIDE	DIAL INDICATION	N/A	N/A
	SBO POWER	260mW	260mW
	MONITOR READING	.141	.141
	AIRBORNE MEASUREMENT	3.8	3.6
COURSE NARROW CLEARANCE WIDE	COURSE DIAL INDICATION	N/A	N/A
	COURSE SBO POWER	390mW	380mW
	COURSE MONITOR READING	.175	.175
	CLEARANCE DIAL INDICATION	N/A	N/A
	CLEARANCE SBO POWER	100mW	100mW
	CLEARANCE MONITOR READING	.129	.126
	AIRBORNE MEASUREMENT	2.9	3.0
COURSE ADVANCE ALARM	SIDEBAND PHASER NORMAL		
	SIDEBAND PHASER ALARM		
	MONITOR READING		
	AIRBORNE MEASUREMENT		
COURSE RETARD ALARM	SIDEBAND PHASER NORMAL		
	SIDEBAND PHASER ALARM		
	MONITOR READING		
	AIRBORNE MEASUREMENT		
CLEARANCE ADVANCE ALARM	SIDEBAND PHASER NORMAL		
	SIDEBAND PHASER ALARM		
	MONITOR READING		
	AIRBORNE MEASUREMENT		
CLEARANCE RETARD ALARM	SIDEBAND PHASER NORMAL		
	SIDEBAND PHASER ALARM		
	MONITOR READING		
	AIRBORNE MEASUREMENT		

REMARKS

CONFIGURATION	INDICATION	TX 1	TX 2
USEABLE DISTANCE			
CLEARANCE CARRIER NORMAL	CLEARANCE POWER	4W	4W
	RF MONITOR READING	.153	.153
CLEARANCE RF ALARM	CLEARANCE POWER	3.2W	3.2W
	RF MONITOR READING	89.5	90.0
COURSE CARRIER NORMAL	COURSE POWER	15W	15W
	RF MONITOR READING	.155	.155
COURSE RF ALARM	COURSE POWER	12W	12W
	RF MONITOR READING	89.6	89.4
FINAL ALIGNMENT			
MODULATION BALANCE CONTROL	DIAL INDICATION	5.0	5.0
	MONITOR READING	.007/150	
	AIRBORNE MEASUREMENT	7uA/150	
ALIGNMENT MONITOR ALARM			
90 HZ	DIAL INDICATION	6.7	
	MONITOR READING	.011	.011
	AIRBORNE MEASUREMENT		
150 HZ	DIAL INDICATION	4.6	
	MONITOR READING	.011	.011
	AIRBORNE MEASUREMENT		

REMARKS

LOCALIZER GROUND CHECK RECORD

FACILITY LOCATION/RUNWAY	EQUIPMENT SERIAL NO	YEAR
Tinker AFB Rwy 17	77007	1982

DATE														29 Sept
FUNCTION	INITIAL COMPOSITE		COURSE ONLY		CLEARANCE ONLY		COURSE QUAD		CLEARANCE QUAD		WORST CASE		FINAL COMPOSITE	
XMTR NO.	1	2	1	2	1	2	1	2	1	2	1	2	1	2
90HZ 35													.380	.385
30													.375	.380
25													.380	.385
20													.420	.430
15													.420	.420
10													.380	.390
9													.380	.385
8													.380	.390
7													.390	.400
6													.395	.400
5													.390	.390
4													.365	.370
3													.280	.280
2													.180	.185
W/P													.145	.150
1													.090	.090
0													.006 150	.006 150
1													.100	.100
W/P													.155	.155
2													.190	.190
3													.290	.285
4													.380	.395
5													.420	.400
6													.420	.420
7													.410	.410
8													.400	.380
9													.390	.355
10													.400	.390
150HZ 15													.420	.420
20													.420	.435
25													.405	.420
30													.380	.380
35													.400	.400

DEGREES FROM EXTENDED RUNWAY CENTERLINE

REMARKS

Atch 5

82-67011

NULL REFERENCE SSILS GLIDE SLOPE PERFORMANCE CHECKLIST

MONTH AND YEAR: September 1982

FACILITY LOCATION/RUNWAY: Tinker AFB RWY 17

EQUIPMENT AND SERIAL NUMBER: AN/GRN-31

TECHNICIANS: TSgt Miller

CHECK	SPECIFICATION	TRANSMITTER NO. 1 INITIAL	TRANSMITTER NO. 1 FINAL	TRANSMITTER NO. 2 INITIAL	TRANSMITTER NO. 2 FINAL	REMARKS
CARRIER PWR			3W		3W	
SIDEBAND PWR			31mW		31mW	
COURSE & MODULATION			80.6		79.2	
90Hz % MODULATION			40.3		39.7	
150Hz % MODULATION			40.3		39.5	
CRS PWR SUPPLY 1		(METER INDICATION)				
Q5 DC OUT	0.75 TO 3.5A		1.4		1.4	
Q4 DC OUT	0.75 TO 3.5A		1.5		1.6	
DC OUT	26.5 TO 29.5 V		28.0		28.0	
PRE REG	30 TO 38 V		35.5		35.0	
CRS PWR SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5 A		1.4		1.5	
Q10 DC OUT	0.75 TO 3.5 A		1.4		1.4	
DC OUT	26.5 TO 29.5		28.0		28.0	
PRE REG	30 TO 38 V		35.0		35.0	
CRS XMTR						
XTAL DRIVE	0.5 MIN		1.45		1.45	
TRIPLER INPUT	0.2 TO 3.8		3.75		2.90	
EXCTR OUTPUT	0.5 TO 3.0		1.80		1.85	
EXCTR ALC	0.7 TO 3.0		2.30		2.90	
SBO DRIVER	0.2 TO 0.59		0.35		0.33	
CSB DRIVER	0.49 TO 1.50		0.70		0.70	
CSB PWR OUT	0.50 TO 3.90		2.10		2.35	
DC IN	22 TO 35		26.5		27.0	
DC IN	1.0 TO 3.0		1.80		1.80	
SBO PWR OUT	0.50 TO 4.0		1.60		1.95	
CRS MONITOR 1						
TEST DDM	0.500 ± 0.020		.496		.496	
PATH (Int mon)	0.000 ± 0.050		.006/150		.003/150	
PATH (Near field)	0.000 ± 0.050		.007/90		.010/90	
WIDTH DDM	0.175 OPTIMUM		.168		.173	
RF LEVEL	100.0 ± 5.0		102.4		103.3	
% MOD			77.8		76.4	SEE NOTE #1
CRS MONITOR 2						
TEST DDM	0.500 ± 0.020		.501		.501	
PATH (Int mon)	0.000 ± 0.050		.006/150		.004/150	
PATH (Near field)	0.000 ± 0.050		.008/90		.011/90	
WIDTH DDM	0.175 OPTIMUM		.169		.174	
RF LEVEL	100.0 ± 5.0		104.5		105.6	
% MOD			80.1		78.7	SEE NOTE #1
CRS ALARM LIMITS						
COURSE MONITOR		MONITOR 1		MONITOR 2		
TEST DDM LOWER	0.426 ± 0.040		.413			
UPPER	0.557 ± 0.040		.544			
PATH (Int) UPPER	.050 ± 0.002		.050			
PATH (Near) UPPER	.050 ± 0.002		.050			
WIDTH DDM LOWER			.155			SEE NOTE #1
UPPER			.195			SEE NOTE #1
RF LEVEL LOWER			72.1			SEE NOTE #1
% MOD LOWER	NORMAL -004.0		73.8			
UPPER	NORMAL + 004.0		81.8			

AFCC FORM SEP 82 5167 ONE TIME

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CHECK	SPECIFICATION	TRANSMITTER #1		TRANSMITTER #2	
		INITIAL	FINAL	INITIAL	FINAL
RADIO FREQUENCY	±.002%		332.291731		332.296492
GROUND CHECK		FINAL		FINAL	
ZERO DDM		11'5½" .000		11'6" .000	
ABOVE PATH		14'8" .175		14'6" .175	
BELOW PATH		8'2" .175		8'5½" .175	
BELOW PATH QUAD		8'2" .004/150		8'5½" .010/150	
PHASING					
SNIFFER MOD BALANCE					
MOD BALANCE FARFIELD		.002/90		.006/90	
FARFIELD		.110/90		.115/90	
RF COMBINING UNIT WIDTH OUTPUTS					
MOD BALANCE					
QUADRATURE					
NORMAL					
MONITOR OFFSETS MOD BALANCE		MONITOR 1	MONITOR 2	MONITOR 1	MONITOR 2
PATH (Im) INTERNAL		.000	.001/90	.003/90	.002/90
PATH (NF) NEARFIELD		.000	.001/90	.003/90	.004/90
WIDTH		.004/90	.001/90	.007/90	.003/90
IN QUADRATURE READING					
WIDTH		.004/150	.007/150	.007/150	.010/150
ANTENNA VSWR		dB		VSWR	
UPPER ANTENNA	>−20.85 dB (1.2:1)	−32		1.05:1	
LOWER ANTENNA		−33		1.05:1	

REMARKS

NOTE 1 REFERENCE READINGS MAY VARY AS PER FACILITY. CHECK TO 31R4-2GRN31-2.

RECORD OF FLIGHT EVALUATION

CONFIGURATION	INDICATION	TX 1	TX 2
COURSE MODULATION	DIAL INDICATION	40.0	
	MONITOR READING (%MOD)	77.9	
	AIRBORNE INDICATION	80.9%	79.0%
COURSE MODULATION BALANCE	DIAL INDICATION	5.00	5.0
	AIRBORNE MEASUREMENT	0uA	0uA
NORMAL WIDTH & ANGLE	NORMAL ANGLE	2.5	2.49
	WIDTH	0.67	0.70
	STRUCTURE BELOW PATH		
	CLEARANCES		
	SBO DIAL INDICATION	33.5	36.0
	SBO POWER	32mW	32mW
	MONITOR READING (WIDTH)	.175	.173
NARROW ALARM	ANGLE		
	WIDTH		
	STRUCTURE BELOW PATH		
	SBO DIAL INDICATION		
	SBO POWER		
	MONITOR READING (WIDTH)		
WIDE ALARM	ANGLE	2.51	2.49
	WIDTH	0.89	0.79
	STRUCTURE BELOW PATH		
	SBO DIAL INDICATION		
	SBO POWER	22mW	26mW
	MONITOR READING (WIDTH)	.155	.154
ADVANCE PHASE TO ALARM	SIDEBAND PHASER NORMAL		
	SIDEBAND PHASER ALARM		
	DEGREES TO ALARM		
	ANGLE		
	WIDTH		
	STRUCTURE BELOW PATH		
	CLEARANCES		
	MONITOR READING (WIDTH)		
RETARD PHASE TO ALARM	SIDEBAND PHASER NORMAL		
	SIDEBAND PHASER ALARM		
	DEGREES TO ALARM		
	ANGLE		
	WIDTH		
	STRUCTURE BELOW PATH		
	CLEARANCES		
	MONITOR READING (WIDTH)		
USEABLE DISTANCE	COURSE RF POWER	1.5W	1.5W
	COURSE MONITOR READING (RF)	72.9	71.4
NORMAL WIDTH & ANGLE	NORMAL ANGLE		
	WIDTH		
	STRUCTURE BELOW PATH		
	CLEARANCES		
	SBO DIAL INDICATION		
	SBO POWER		
	MONITOR READING (WIDTH)		

REMARKS

FLIGHT INSPECTION REPORT—INSTRUMENT LANDING SYSTEM

Reports Identification Symbol FS8071-19

1. STATION	2. IDENT	3. DATE/DATES OF INSPECTION
Tinker AFB, OK RWY 17	FRJ	9/28/82

4. TYPE OF INSPECTION

	SITE EVALUATION		PERIODIC	X	SPECIAL FX
	COMMISSIONING		SURVEILLANCE		INCOMPLETE

5. COMMON SYSTEM

	YES
	NO

6. OWNER

	FAA		U.S. ARMY	PRIVATE (Indicate actual owner)
			U.S. NAVY	
	INTER-NATIONAL	X	U.S.A.F.	OTHER (Indicate actual owner)
			U.S.C.G.	

7. FACILITY/COMPONENT INSPECTED

X	LOCALIZER		COMPASS LOCATORS	X	75 mHz MARKERS
X	GLIDE SLOPE		DME	X	LIGHTING SYSTEM

8. LOCALIZER

COMMISSIONED WIDTH 3.30

FRONT COURSE TX 1 OT	INIT	FINAL	TX 2 OT	INIT	FINAL	CATEGORY I	BACK COURSE TX 1 OT	INIT	FINAL	TX 2 OT	INIT	FINAL
		3.20			3.20	COURSE WIDTH						
		20.5			20.8	MODULATION						
						CLEARANCE 150						
						CLEARANCE 90						
		1/9.2			1/6.3	COURSE STRUCTURE—Z1						
		11/0.6			12/0.7	COURSE STRUCTURE—Z2						
		11/0.2			8/0.2	COURSE STRUCTURE—Z3						
		7ual			7ual	ALIGNMENT						
						VOICE						
		S			S	IDENTIFICATION						
		18			18	USABLE DISTANCE						
						MONITOR						
		2.90			2.85	COURSE WIDTH (Narrow)						
		3.80			3.60	COURSE WIDTH (Wide)						
		245/10			260/29	CLEARANCE 150						
		240/28			250/29	CLEARANCE 90						
		7			7	ALIGNMENT 150						
		13			12	ALIGNMENT 90						

9. GLIDE SLOPE

TX 1 OT	INIT	FINAL	TX 2 OT	INIT	FINAL	COM'D ANGLE 2.50 CATEGORY I
		80.0			79.0	MODULATION
		2.46			2.42	ANGLE
		0.68			0.71	WIDTH
						CLEARANCE BELOW PATH
		1.53			1.52	STRUCTURE BELOW PATH
		2/5.4			3/4.6	PATH STRUCTURE—Z1
		13/1.7			14/2.9	PATH STRUCTURE—Z2
		11/0.2			21/0.3	PATH STRUCTURE—Z3
		10			10	USABLE DISTANCE
						MONITOR
						ANGLE (Low)
						ANGLE (High)
		0.89			0.78	PATH WIDTH (Wide)
						CLEARANCE BELOW PATH

10. GENERAL

	SAT	UNSAT
75 mHz MARKERS	X	
COMPASS LOCATORS		
DME (TIK TACAN)	X	
LIGHTING SYSTEMS	X	

11. FACILITY STATUS

	F/C	G/S	B/C
UNRESTRICTED		X	
RESTRICTED	X		
UNUSABLE			

NOTAM:

HI/LO ILS RWY-17
NOTE: Loc unuseable MM inbound.

12. REMARKS

1. Special inspection for frequency and identification change of RWY 17 ILS.
2. All periodic with monitor requirements met during this inspection.
3. Localizer remains restricted as per reported dated 5/19/80.
4. Published frequency 111.3.
5. Simultaneous operation of ILS systems not authorized.

REGION	FIELD OFFICE	FLIGHT INSPECTOR'S SIGNATURE
	1866 FCS	EARL R. JOBSON, Major, USAF Earl R Jobson

60 KS BU

FAA Form 8240-7 (5-76) FORMERLY FAA FORM 3488 U.S.G.P.O.: [illegible] Atch 7

FLIGHT INSPECTION REPORT—INSTRUMENT LANDING SYSTEM
SUPPLEMENT SHEET

1. STATION	2. IDENT.	3. DATE/DATES OF INSPECTION
Tinker AFB, OK RWY 17	FRJ	9/28/82

4. LOCALIZER

	TX-1		TX-2	
4a. VERTICAL POLARIZATION	0 ua		ua	
4b. SYMMETRY	50 % 90 Hz	50 % 150 Hz	53 % 90 Hz	47 % 150 Hz

5. GLIDE PATH

		PATH ANGLE		PATH WIDTH		STRUCTURE BELOW PATH	
		TX-1	TX-2	TX-1	TX-2	TX-1	TX-2
5a. DEPHASE	ADVANCE 0						
	RETARD 0						
5b. PATH ANGLE LOWERED TO ALARM							
5c. PATH ANGLE RAISED TO ALARM							
5d. PATH WIDTH NARROWED TO ALARM							
5e. PATH WIDTH WIDENED TO ALARM		2.51	2.49	0.89	0.78	1.26	1.40
5f. CLEARANCE TX MODULATION DECREASED TO ALARM							
5g. ATTENUATE MIDDLE ANT. TO ALARM							
5h. ATTENUATE UPPER ANT. TO ALARM							

	TX-1		TX-2	
5i. SYMMETRY →	44 % 90 Hz	56 % 150 Hz	52 % 90 Hz	48 % 150 Hz
5j. MODULATION BALANCE →	TX-1 0ua		TX-2 0ua	
5k. PHASING →	TX-1		TX-2	
5l. FRONT COURSE AREA WHERE PHASING CONDUCTED →			0	Hz SIDE
5m. STRUCTURE BELOW PATH—CAPTURE EFFECT *(Special procedures)* →			TX-1	TX-2

6. REMARKS

6. FAA AVN 231, Judy Barksdale, notified at 1445Z 9/30/82.

FAA Form 8240-16 (10-76)

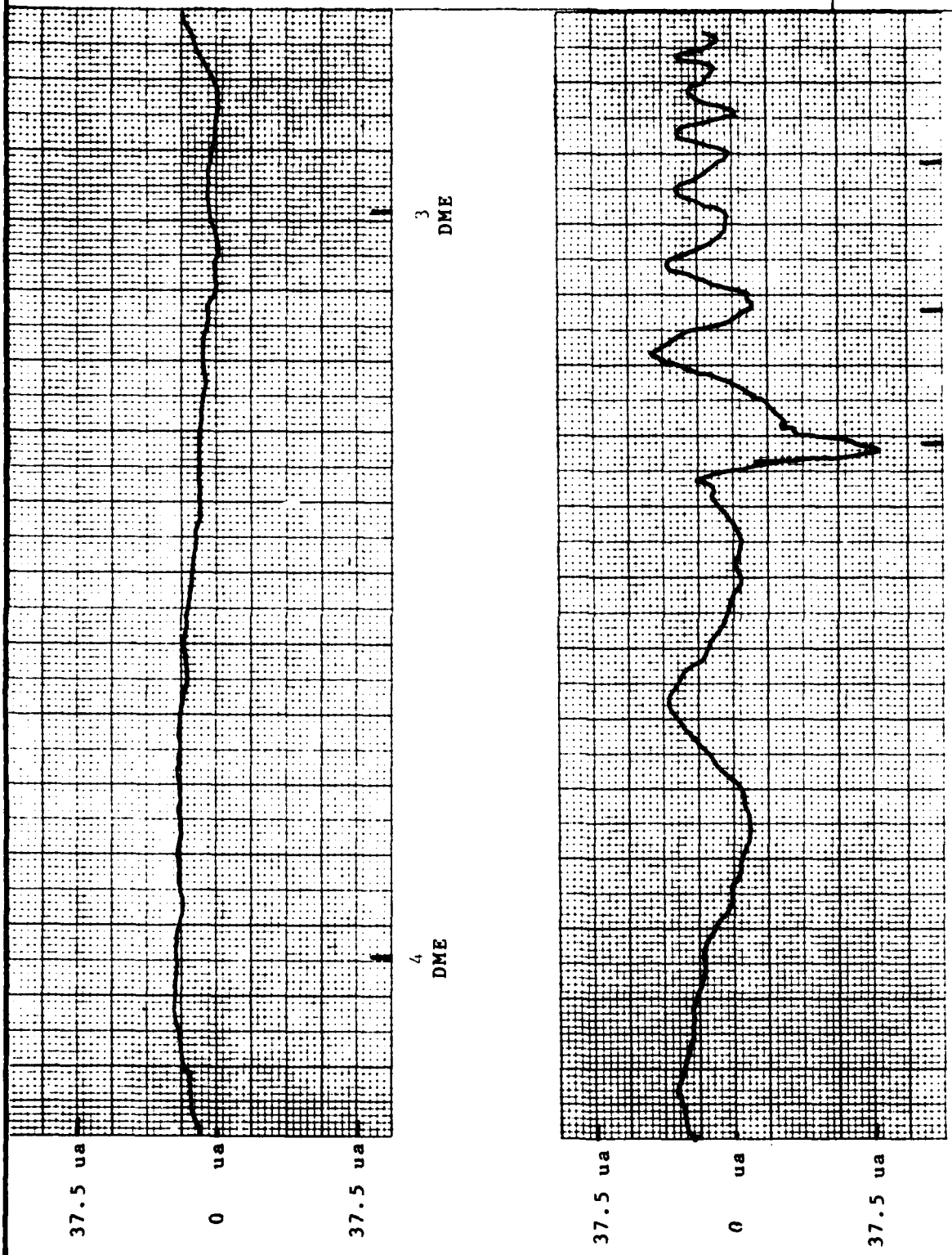
Atch 7

TITLE

RUNWAY 17 SSILS LOCALIZER ALIGNMENT

LOCATION
Tinker AFB Rwy 17

DATE
September 1982



REMARKS

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Atch 8

DEPARTMENT OF THE AIR FORCE
1866 Facility Checking Squadron
Scott AFB, Illinois

6 April 1981

SOLID STATE INSTRUMENT LANDING SYSTEM

AN/GRN-29(V)

SPECIAL EVALUATION REPORT

Tinker AFB, Oklahoma

80/66S-244

8-20 December 1980

Prepared by:

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Commander

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 81/66S-245	2. GOVT ACCESSION NO. [redacted]	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SOLID STATE INSTRUMENT LANDING SYSTEM AN/GRN-29(V) SPECIAL EVALUATION REPORT Tinker AFB, Oklahoma		5. TYPE OF REPORT & PERIOD COVERED FINAL 8-20 December 1980 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) MARVIN D. CONLEY, GS-13 DAVID E. THIBODEAU, MSgt, USAF		8. CONTRACT OR GRANT NUMBER(s)
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11. CONTROLLING OFFICE NAME AND ADDRESS HQ Air Force Communications Command/FFNM Scott AFB, Illinois 62225		12. REPORT DATE 6 April 1981 13. NUMBER OF PAGES 74
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18. SUPPLEMENTARY NOTES

None.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Traffic Control and Landing Systems (TRACALS)
Solid State Instrument Landing System (SSILS)
AN/GRN-29(V)
Tinker AFB Oklahoma

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report presents the results of the 8-20 December 1980 Special TRACALS Evaluation of the Tinker AFB AN/GRN-29 SSILS. The evaluation was conducted to determine the capabilities and limitations of the system in its installed environment and determine the cause of the present localizer restriction. Results presented in this report can be used as a guide for anticipated performance until there is a significant change in ground equipment, siting environment, screening, or operational use.

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6. Runway and Building Layout
7. Glide Slope Contour Study
8. Skyline Graph
9. SSILS Localizer Initial Performance Checklist
10. SSILS Localizer Subsystem Performance Checks
11. Localizer Ground Check Record
12. Localizer Ground Check Data
13. SSILS Glide Slope Initial Performance Checklist
14. A.C. Power
15. SSILS Loc. Pre-Post Airborne Evaluation Checklist
16. SSILS G/S Pre-Post Airborne Evaluation Checklist

SUBJECT

ATTACHMENTS (Continued)

17. Flight Inspection Report-Instrument Landing System
18. Localizer Flight Inspection Data
19. Glide Slope Flight Inspection Data
20. Glide Slope Fresnel Zone Information

1. SUMMARY

1-1. Background. Wilcox Electric, Inc., began the installation of the AN/GRN-29 SSILS at Tinker AFB in December 1977. An official Federal Aviation Agency (FAA) flight inspection was requested to commission the facility in November 1978. The glide slope was commissioned as an unrestricted Category I facility. However, the localizer was restricted and declared "unusable below 300 feet within 1.0 nautical mile (NM) due to localizer reversals." The DD Form 250, Material Inspection and Receiving Report, was signed by Electronic Systems Division (ESD) since Wilcox Electric, Inc., had met their contractual obligation. The commander of Tinker AFB was hesitant to accept the AN/GRN-29 Solid State Instrument Landing System (SSILS) since its operation was not consistent with the base operational requirements. ESD requested the Traffic Control and Landing Systems (TRACALS) Engineering Branch of Southern Communications Area (SCA) to do an engineering analysis of the localizer at Tinker AFB. This analysis was completed in May 1979 and concluded the cause of the restriction was reflections from buildings 3001, 3102, and 3105. The effects of these reflections were minimized by positioning the antenna nulls using the stacking method and rephasing the system in the far field. The facility remained unrestricted from May 1979 to July 1980. The distribution unit was replaced in June 1980 and the FAA restoral flight inspection restricted the facility "unusable from the middle marker inbound." SCA/FFN then requested the 1866 FCS perform a special TRACALS Evaluation of the Runway 17 localizer.

1-2. Evaluation Profile. A Special TRACALS Evaluation was conducted during the period 8-20 December 1980 on the Tinker AFB AN/GRN-29 SSILS. The purpose of the evaluation was to determine the operational capabilities and limitations of the system in its installed environment and determine the exact nature and cause of the restriction to the Runway 17 localizer. The special evaluation was requested by SCA to determine why the facility was restricted inbound from the middle marker. To define the entire system capabilities, the glide slope facility was also evaluated. The evaluation consisted of three phases: ground equipment checks, facility siting, and flight evaluation. The ground equipment checks determine if the facility is operating within technical order (TO) specifications and what actions are necessary to optimize the system. The facility siting was evaluated to identify any possible interference to the radiated signal. The flight evaluation determines the exact nature of the radiated pattern and defines the flyability of the system.

1-3. Localizer:

a. Siting. The AN/GRN-30 localizer is sited at the south end of Runway 17/35. The antenna array is situated on a wooden trestle. The elevation of the antennas is just above the crest of the runway overrun, which lies 1000 feet north of the antennas (see page A5-1). Large buildings are located east of the localizer and are oriented parallel to the runway. Although these buildings are not specifically in violation of AN/GRN-29 siting criteria, it is generally accepted that they should not be within 10° of the runway centerline. These buildings are less than 1000 feet from the runway at an angle of about 4° to the localizer centerline. The terrain in the direction of the buildings does not slope up as much as in the direction of the runway. A drawing depicting the building locations is on page A6-1.

b. Evaluation Results. The results of the ground equipment checks indicated, for the most part, the localizer was operating within TO specifications. The phasing of the course and clearance systems of both transmitters was optimized prior to

the flight evaluation. Transmitter two requires additional cable cutting to center the course and clearance sideband phasers. Analysis of the facility siting indicates all antennas do not have line of sight to the threshold. A rise in the ground elevation immediately in front of the antenna array causes a reduced signal strength in the area of the restriction. The flight evaluation revealed that the on-course signal begins a gradual bend outside the middle marker and becomes scalloped as the aircraft flies inbound.

c. Conclusions. Severe scalloping on the localizer crosspointer trace results from reflections off the buildings along the east side of the runway. Siting conditions amplify the reflection problem. The terrain immediately in front of the localizer array rises, causing a reduced signal strength on course. However, the terrain conditions in the direction of the reflections are relatively flat. This means the reflected energy is higher in magnitude than would be the case if the terrain slope were consistent. Excursions on the crosspointer trace do not exceed AFM 55-8 tolerances, but as occurred in the past, slight variations in equipment performance, variations in flight inspection measurement, and position of the large hangar doors on building 3102 will likely result in exceeding these tolerances. The restriction "localizer unusable from middle marker inbound" should remain. An approximate 30% reduction in the severity of the scalloping can be accomplished by widening the course width from 3.3° to 5.0°. This non-tailored course width would be in accordance with AFM 55-8, Change 32, para 217.3206. Other actions involving antenna relocation would require some trial and error, with the cost benefits being questionable.

1-4. Glide Slope:

a. Siting. The glide slope is installed on the east side of the runway 935 feet from the threshold of Runway 17 and 412 feet from the runway centerline. The terrain in the first Fresnel zone is profiled on page A7-1. Some upslope occurs north of Interstate 40, which crosses the approach. A contour study encompassing the first Fresnel zone terrain is presented on page A7-2. Horizon screening for the glide slope is shown on pages A8-4 thru A8-6 and indicates no significant areas of concern.

b. Evaluation Results. With the exception of the width monitor alarm points, the ground equipment checks revealed the facility was operating within TO specifications. A recent change to the TO tightened the width monitor alarm points but the work cards were not changed. Since a disparity existed between the work cards and the TO, the alarm points were adjusted to TO specifications. The siting of the facility was satisfactory for Terminal Instrument Approach Procedures (TERPS) requirements. The flight evaluation indicated the glide slope met AFM 55-8 flight inspection requirements as a Category I facility. A step, at times, was noted above path which made determination of a repeatable path width difficult.

c. Conclusions. The results of the glide slope evaluation indicate the facility can provide satisfactory Category I operation. To obtain Category II operation would require optimizing the antenna offset and modifying the near field terrain to improve the structure in Zone 3.

1-5. Power Systems. The primary and backup power systems of both the localizer and glide slope were checked during the evaluation period. The backup power appeared adequate and reliable. The primary power at the glide slope appeared slightly high and the local maintenance personnel were advised to notify the base CE.

2. RECOMMENDATIONS

2-1. Localizer:

(1) Prior to the next periodic flight inspection, the new cabling for transmitter two should be cut to center the course and clearance sideband phasers.

(2) The 1985th Communications Squadron should explore the operational consequences of increasing the localizer course width to 5.0°.

2-2. Glide Slope. No recommendations.

3. GENERAL INFORMATION

3-1. Primary Using Agencies/Aircraft Supported. The primary using agencies are the 552nd Airborne Warning and Control Systems Wing with E-3A aircraft, and the 507th Tactical Fighter Group with F-4 aircraft. Additionally, there are a large number of transient aircraft of all types, civilian and military transport aircraft, and various aircraft undergoing overhaul by the Oklahoma City Air Logistics Center. An aeronautical chart showing the location of Tinker AFB is on page A1-1.

3-2. Air Traffic Control Facilities. The Air Traffic Control systems supporting the Tinker AFB operation are an AN/FPN-47 radar owned and operated by the FAA, an AN/GRN-19A TACAN, an AN/GRN-27 SSILS serving Runway 35, an AN/GRN-29 SSILS serving Runway 17, and a VFR control tower. The AN/GRN-29 SSILS provides Category I instrument approaches to Runway 17. These procedures are outlined on pages A2-1 and A2-2.

3-3. Terminal Instrument Approach Procedures. Information concerning the TERPS are contained in the facility data sheets on pages A3-1 thru A3-4. The method used to calculate the TCH, GPI, and RPI are shown on page A4-1. These calculations are based on a rapid decrease in elevation toward the runway.

4. ANALYSIS OF EVALUATION RESULTS

4-1. Localizer:

a. Ground Equipment Checks. The results of the localizer initial performance and subsystem checks are on pages A9-1 thru A10-4. A record of the ground checks accomplished during the evaluation is on pages A11-1 and A11-2. Graphs of the ground checks are on pages A12-1 thru A12-8.

(1) Course Phasing. The course phasing of both transmitters was less than optimum. The phasing was adjusted at the far field 3° phasing points for as close to 0 DDM as possible, balanced between the 90 Hz and 150 Hz sides. Following this adjustment, the sideband phasers indicated 10° and 20° delay, respectively, for transmitters one and two. To center the phaser on transmitter one, two inches was cut from the C+SB cable (6W29) at the distribution unit. The phaser for transmitter two now indicated 10° delay while transmitter one was approximately 0°. To center the phaser on transmitter two, a longer transmitter SBO cable is required. This was not accomplished during the evaluation because the cable and connectors were unavailable. The local maintenance personnel should fabricate and install a longer SBO cable prior to the next periodic flight inspection.

(2) Clearance Phasing. The clearance phasing of both transmitters was significantly less than optimum (see pages A12-3 and A12-4). To center the phaser of transmitter one, eight inches was cut from the SBO cable (6W32) at the distribution unit. The sidebance phaser of transmitter two was still about 10° advanced and will require a longer C+SB transmitter cable. The fabrication and installation of this cable should be done in conjunction with the course cable. Final results of the clearance phasing can be seen on pages A12-5 and A12-6.

(3) Antenna Nulls. Some difficulty was encountered in determining the placement of the antenna RF nulls. Several methods were employed during the evaluation.

(a) TO Procedures. The single tone DDM method was attempted using the GRM-112 Portable ILS Receiver (PIR) with little success. A dip in the DDM indication could be seen for pairs six and seven, but no change for any other pair.

(b) RF Null. The traditional method of determining the null placement is to find the RF minimum. This was attempted using the GRM-112 PIR, again with little success. The meter sensitivity of the GRM-112 makes it extremely difficult to see an RF dip. The RF level meter indication from 10 to 50 represents signal strengths from -80 dBm to +10 dBm with a nonlinear response. The RF minimum was only one meter movement division or less. Where no dip was observed, an attempt was made to measure the null using the bracket method. The PIR was moved until the meter movement increased to some reference level. The PIR was then moved to the other side of the runway centerline until the same reference level was found. One half the distance between these two locations was considered the null position. Displacement was calculated by measuring from this point to the runway centerline. The results of the RF null checks are on page A10-1.

(c) Null Stacking. SCA Engineering used a method called null stacking in March 1979. They recommended all future null placements required at Tinker AFB be accomplished using this method. Pair seven is radiated separately, both C+SB and SBO, and the null adjusted to 0 DDM using the far field monitor indication. Pair six is then added and its cabling adjusted for a combined reading of 0 DDM. This process is repeated for each antenna pair until all seven pairs are radiating. The local maintenance personnel used this method following the replacement of the distribution unit in June 1980. During the TRACALS Evaluation, this procedure was followed but no adjustments were made. The DDM on centerline and the distance to the DDM null were also recorded at the 1000 feet ground check point (see page A10-4). This test indicated pairs seven, four, and probably three could all be further adjusted. Positioning the null to centerline would not have significantly improved the overall course signal and no action was taken by the TRACALS team.

b. Flight Evaluation. Severe scalloping on the localizer crosspointer trace (see page A18-9) results from reflections from buildings along the east side of the runway. Sideband energy transmitted from the antenna array strikes the flat vertical surfaces of these buildings and is reflected at an angle equal to the incident angle. This energy results in sideband energy being present where a sideband null should exist on centerline, approximately in the area from 1 NM beyond the middle marker to touchdown. This energy, depending on the path length, adds in phase or out of phase to the C+SB component to produce an alternating condition of predominating 90 Hz or 150 Hz, resulting in scalloping. The terrain conditions amplify the reflection problem. The

terrain immediately in front of the localizer array rises, which causes a reduced signal strength on course. In fact, the Runway 17 threshold is approximately 30 feet below line of sight from the localizer. However, the terrain is relatively flat in the direction of the buildings that cause the reflections. This means that the energy from the reflective surfaces that combines with the direct energy on course is higher in magnitude than would be the case if no upslope existed.

4-2. Glide Slope:

a. Ground Equipment Checks. With the exception of the width monitor alarm points, the ground equipment checks indicated the facility was operating within TO specifications. Change 3 to TO 31R4-2GRN31-2 changed the width alarm points from 0.145 DDM to 0.155 DDM and 0.205 DDM to 0.195 DDM. This change was required because some facilities were having difficulty meeting the advance and retard to alarm tolerance during flight checks. The workcards, TO 31R4-2GRN-6WC-1, have not been changed to reflect the new alarm points. Since a conflict exists between the TO and the workcards, the TO tolerances were applied during the evaluation. The local maintenance personnel should submit an AFTO Form 22 to correct this discrepancy.

b. Flight Evaluation. No significant glide slope performance deficiencies were detected. A fly down indication was noted from Point B to threshold. Terrain in the first Fresnel zone (see page A20-1) is the probable cause. As the aircraft approaches the threshold and the Fresnel zone swings in that direction and shortens, the terrain that develops the glide angle slopes downward more rapidly which results in driving the glide angle down. The deviation in phasing is probably also caused by the same terrain condition. That could be corrected by adjusting the antenna offset. It was not considered necessary since the deviation is inside Point B. The facility was evaluated with the theodolite positioned in line with the RPI and an elevation angle of 2.5 $^{\circ}$. The straight line structure (except for the fly-down indication in close) indicates the facility is properly sited and aligned to meet the 45.4 feet TCH.

TITLE

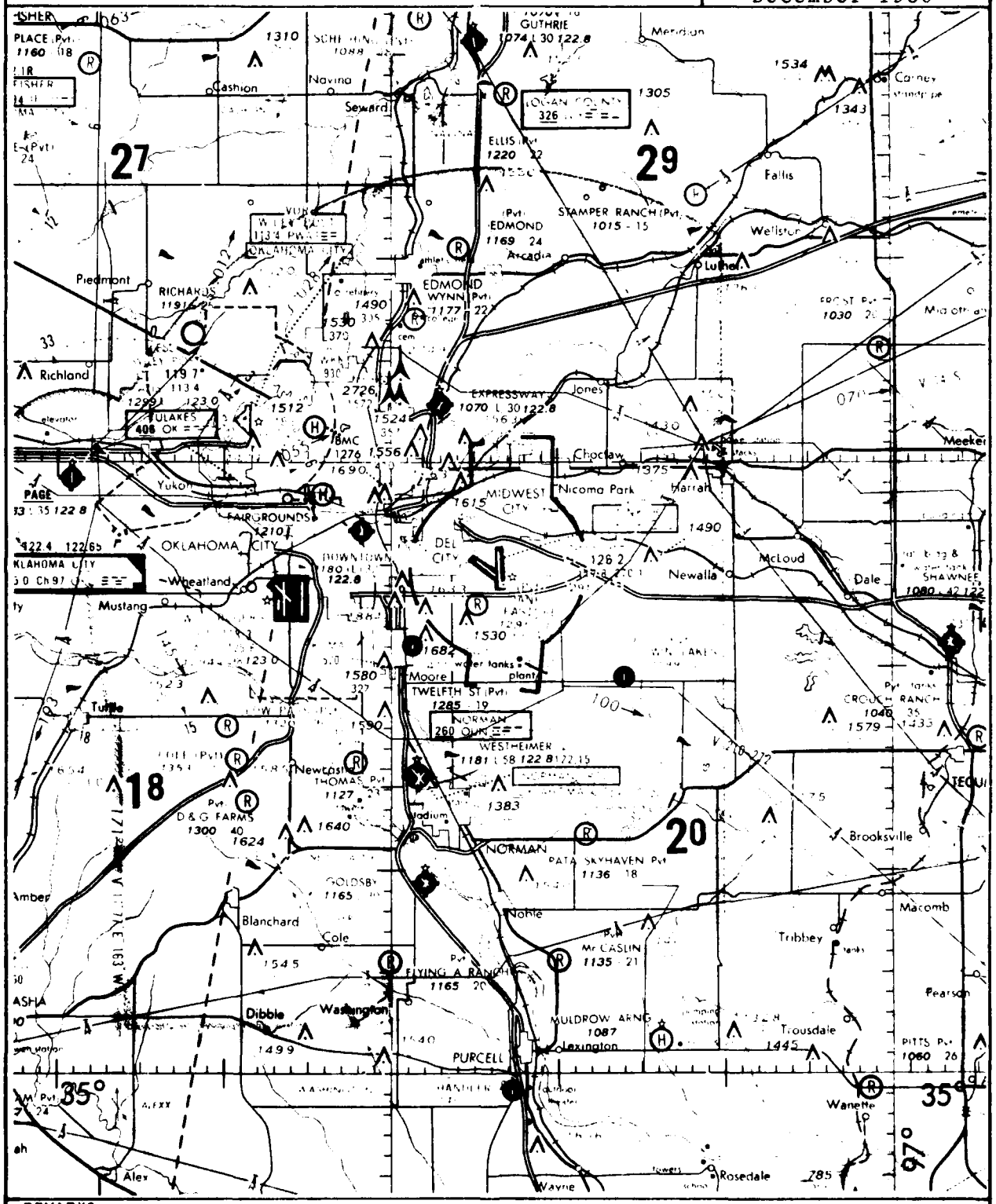
LOCATION MAP

LOCATION

Tinker AFB

DATE

December 1980



REMARKS

Scale 1:500,000

Base coordinates: 35° 25" 5.729' N
97° 22" 59.607' W

AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

INSTRUMENT APPROACH PROCEDURES

LOCATION: Tinker AFB

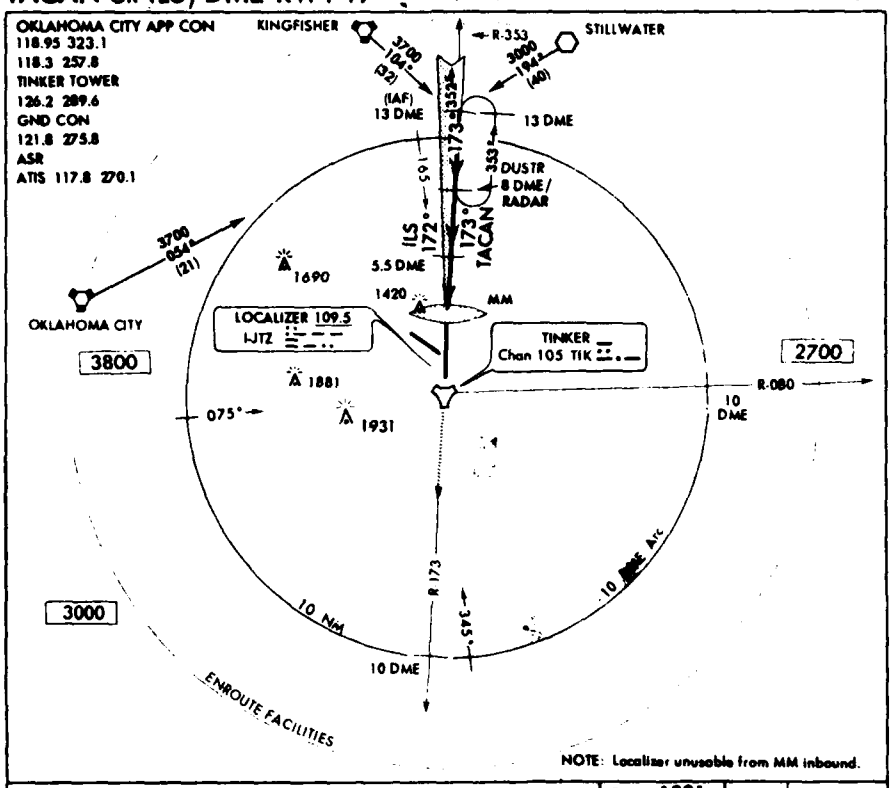
DATE: December 1980

371

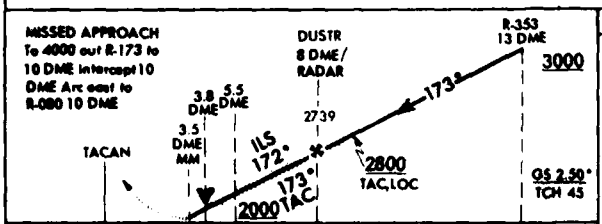
TACAN OR ILS/DME RWY 17

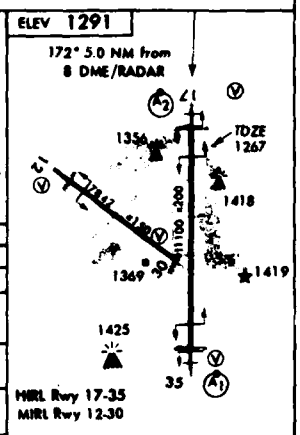
AL-299 (USAF)

TINKER AFB
OKLAHOMA CITY, OKLAHOMA



MISSED APPROACH
To 4000 out R-173 to 10 DME intercept 10 DME Arc east to R-080 10 DME





CATEGORY	A	B	C	D
S-ILS 17	1467/24 200 (200-½)		1467/40 200 (200-⅝)	
S-LOC/DME 17	1600/40 333 (400-⅝)			
S-TAC 17	1680/40 413 (400-⅝)		1680/50 413 (400-1)	
CIRCLING	1740-1 449 (500-1)	1760-1 469 (500-1)	1760-1½ 469 (500-1½)	1920-2 629 (700-2)

LOC FAF to MAP 4.5 NM					
Knots	60	90	120	150	180
Min: Sec	4:30	3:00	2:15	1:48	1:30

TACAN OR ILS/DME RWY 17

35°25'N-97°23'W

OKLAHOMA CITY, OKLAHOMA
TINKER AFB

371

REMARKS

TITLE:

INSTRUMENT APPROACH PROCEDURES

LOCATION	DATE
Tinker AFB	December 1980

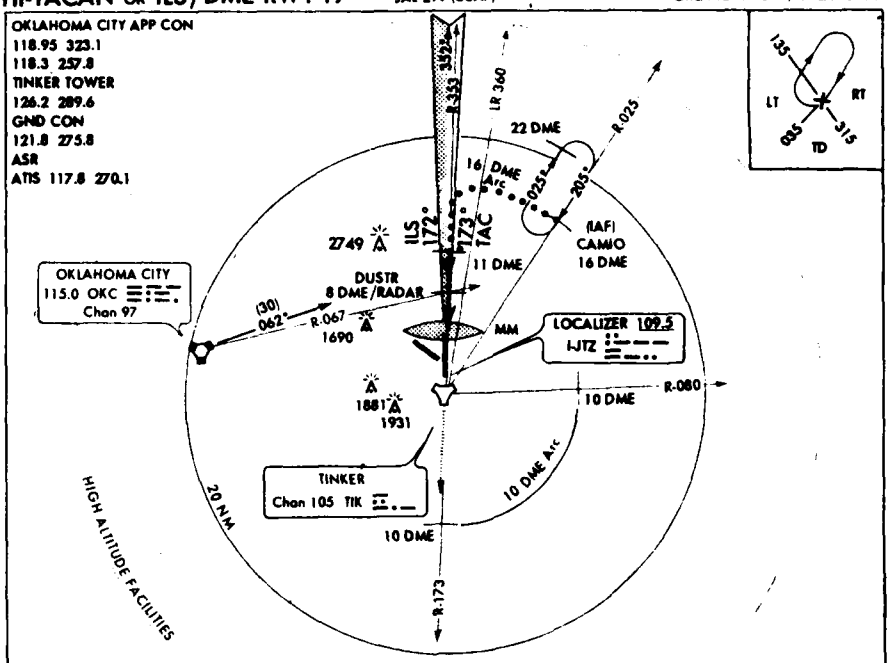
165

HI-TACAN OR ILS/DME RWY 17

JAL-299 (USAF)

TINKER AFB
OKLAHOMA CITY, OKLAHOMA

OKLAHOMA CITY APP CON
118.95 323.1
118.3 257.8
TINKER TOWER
126.2 289.6
GND CON
121.8 275.8
ASR
ATIS 117.8 270.1

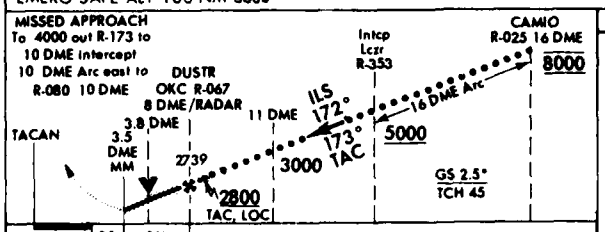


NOTE: Localizer unusable from MM inbound.

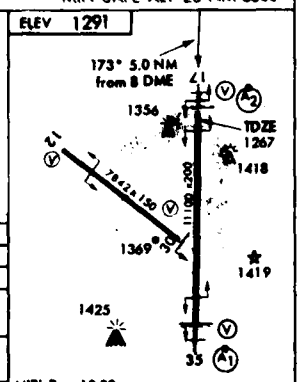
EMERG SAFE ALT 100 NM 3800

MIN SAFE ALT 25 NM 3800

MISSED APPROACH
To 4000 out R-173 to 10 DME intercept
10 DME Arc east to R-080 10 DME



ELEV 1291



CATEGORY	C	D	E
S-ILS 17	1467/40 200 (200-½)		
S-LOC DME 17	1600/40 333 (400-½)		1600/50 333 (400-1)
S-TAC 17	1680/50 413 (400-1)		1680/60 413 (400-1½)
CIRCLING *	1760-1½ 469 (500-1½)	1920-2 629 (700-2)	1920-2¼ 629 (700-2¼)
S-ASR 17	1680/50 413 (400-1)	1680/60 413 (400-1½)	

* Cat E circling not authorized W of Rwy 17-35

LOC FAF to MAP 4.5 NM					
Knots	120	140	160	180	200
Min: Sec	2:15	1:56	1:41	1:30	1:21

HI-TACAN OR ILS/DME RWY 17 35°25'N-97°23'W

OKLAHOMA CITY, OKLAHOMA
TINKER AFB

165

REMARKS

FACILITY DATA

I. AIRPORT

1. AIRPORT (City or AFB, State or Country)	2. ICAO IDENT	3. MAG VARIATION	4. AIRPORT REFERENCE POINT (Degrees, Minutes, Seconds to nearest hundredth)
Tinker AFB, Oklahoma	KTIK	8°E (1975)	LATITUDE 35-25-05.73N LONGITUDE 97-22-59.61W

5. OPERATING AGENCY	6. OWNER	7. FIELD ELEVATION (MSL)
1985 Comm SQ AV 735-5232 Tinker AFB, OK 73145	USAF	1291

II. GENERAL

8. TYPE FACILITY	9. FREQ/CHANNEL	10. IDENTIFICATION	11. CLASS/CATEGORY	12. COMMON SYSTEM	13. DATE COMMISSIONED
LOCALIZER	109.5	I-JTZ	CAT I	[ ] YES [X] NO	060179

14. EQUIPMENT TYPE	15. TYPE ANTENNA	16. SITE ELEVATION (MSL)	17. ANTENNA HEIGHT (FT AG)	18. CONTROL STATION AND FREQUENCY
[illegible]-30	OE-271/G Capture Effect	1281.46	17	Tinker Tower 229.6 126.2

19. ANTENNA LOCATION (Degrees, Minutes, Seconds to nearest hundredth)	20. PRIMARY POWER	21. STANDBY POWER	22. STANDBY EQUIP	23. MONITOR
LATITUDE 35-23-43.995N LONGITUDE 97-22-54.5365W	[X] COMMERCIAL [ ] ENGINE	[X] ENGINE [ ] COMMERCIAL [ ] NONE	[X] YES [ ] NO	[X] YES [ ] NO [ ] SINGLE [ ] DUAL

24. RUNWAY NUMBER	25. ILS/PAR RUNWAY TRUE BEARING	26. MAG VARIATION	27. VOICE	28. MONITOR RADIAL	29. POWER OUTPUT
17	180.21°	08°E	NA	NA	15 Watts

30. RUNWAY DIMENSIONS	31. DISPLACED THRESHOLD	32. COMMISSIONED	33. ASR VERTICAL COVERAGE RADIAL AND OPERATIONAL REQUIREMENT
LENGTH 11100.84 FEET WIDTH 200 FEET	[ ] YES [X] NO	WIDTH 3.30 ° ANGLE NA °	RADIAL DISTANCE ALTITUDE NA

34. THRESHOLD ELEVATION (MSL)	35. TCH FT (AG)	36. ILS/PAR/VASI ANGLE COINCIDENCE ILS (°)	PAR (°)	VASI (°)	37. RESTRICTED
1260.95	45.4	2.5		2.5	[ ] YES [XX] NO

III. LOCALIZER AND SDF DATA

38. DISTANCE TO OM	39. DISTANCE TO MM	40. DISTANCE TO C/L RUNWAY ABEAM GLIDE PATH ANTENNA (Feet)	41. DIRECTION (Right or Left) AND DISTANCE LOC OFFSET FROM RUNWAY C/L
NM 7.30 FEET 44370.84	NM 2.55 FEET 15514.94	11196.53	On Center Line

42. DISTANCE TO THRESHOLD	43. DISTANCE TO STOP END RWY	44. USABLE DISTANCE	45. OFFSET LOC TRUE BEARING	46. LOC CK MONITOR
12150	1050	18 NM AT See Rmks FT (MSL/MAA) 18 NM AT See Rmks FT (MSL/MRA)	NA	WIDE 3.86 NARROW 2.74

47. LOCALIZER COURSE TAILORED	48. BACK COURSE USABLE DISTANCE	49. BACK COURSE TRUE BEARING	50. OMKR WIDTH (Feet)
[ ] YES [X] NO WIDTH AT THRESHOLD (Feet)	NA NM AT NA FT (MSL/MAA) NA NM AT NA FT (MSL/MRA)	NA	NA

51. MMKR WIDTH (Feet)	52. IMKR WIDTH (Feet)	53. FRONT COURSE CHECK POINT	54. BACK COURSE CHECK POINT
780	NA	8DME TIK TACAN	NA

IV. GLIDE PATH DATA (ILS/PAR/VASI)

55. DISTANCE TO O.M.	56. DISTANCE TO M.M.	57. DISTANCE TO I.M.	58. DISTANCE TO POINT "C"	59. DISTANCE TO THRESHOLD (Feet)	60. RUNWAY ELEV ABEAM G/S ANT (MSL)
(NM) (Feet)	(NM) (Feet)	(NM) (Feet)	(NM) (Feet)	(NM) (Feet)	

61. DIRECTION (Right or Left) AND DISTANCE FROM ANTENNA TO RUNWAY C/L	62. ELEVATION TD ZONE (MSL)	63. DISTANCE - THRESHOLD TO GPI ILS (Feet)	PAR (Feet)	VASI (Feet)

64. ALTITUDE OVER O.M. OR CK. PT. (Feet) TAPELINE	E.C.	MSL	65. ALTITUDE OVER M.M. TAPELINE	E.C.	MSL	66. ALTITUDE OVER I.M. TAPELINE	MSL

67. DISTANCE O.M. TO THRESHOLD (Feet)	68. DISTANCE M.M. TO THRESHOLD (Feet)	69. TYPE APPROACH LIGHTING	70. TYPE RUNWAY LIGHTING	71. GLIDE PATH MONITOR
				ANGLE (High) ANGLE (Low)

AFCS FORM 1446 [illegible] OBSOLETE

V. VOR VORTAC TACAN DME NDB

72 REFERENCE RADIAL ___ CHECK POINT DESCRIPTION

73 THEODOLITE POSITION

74 GROUND RECEIVER CHECK POINTS

RADIAL	DISTANCE	DESCRIPTION

75 THEODOLITE REFERENCE POINTS

BEARING	DESCRIPTION

76 FIXES AND RECEIVER CHECK POINTS

NAME	RADIAL	DISTANCE	ALTITUDE	DESCRIPTION

77 IFR RADIAL DATA

RADIAL	RADIAL USE	AIRPORT

VI. AIR TRAFFIC CONTROL SYSTEM (ASR-ARSR-CENTER-FAR-TOWER-VHF-DF-UHF-DF-STATION)

78 TYPE SECONDARY

79 MTI BLIND SPEED

80 VIDEO MAPPING ☐ YES ☐ NO

81 ANT TILT (Degrees) FIXED ___ VAR. ___

82 FREQUENCIES

83 NON-PRECISION APPROACHES

AIRPORT	RUNWAY

84 FIXES AND ROUTES

ROUTE	BEARING	FROM/TO	FACILITY	DISTANCE	ALTITUDE

REMARKS (Include all facility or airspace restrictions.)

Threshold Coordinates:	35-25-44.17N	97-22-54.00W	Elev:	1260.95
Stop End Coordinates:	35-23-54.38N	97-22-54.49W	Elev:	1291.23
MM	35-26-17.45N	97-22-53.85W	Elev:	1242

Item 39: FAF is 8 DME, Tinker TACAN
Item 44: Information not indicated on Flight Check Report.

RWY C/L ABEAM GP ANT COORD 35° 25' 34.74"N 97° 22' 54.04"W

CIVIL ENGINEERING VERIFICATION (SIGNATURE) [signature]

GAINING UNIT	AREA	FACILITY IDENT	FACILITY TYPE
1985 Comm SQ	SCA	I-JTZ	LOCALIZER

DATE PREPARED	TYPED NAME AND GRADE	SIGNATURE
14 January 1980	JAMES G. NEWMAN, Lt Col, USAF	James G. Newman

FACILITY DATA

I. AIRPORT

1. AIRPORT (City or AFB, State or Country)	2. ICAO IDENT	3. MAG VARIATION	4. AIRPORT REFERENCE POINT (Degrees, Minutes, Seconds-to nearest hundredth)
Tinker AFB, Oklahoma	KTIK	8°E(1975)	LATITUDE 35-25-05.73N LONGITUDE 97-22-59.61W

5. OPERATING AGENCY	6. OWNER	7. FIELD ELEVATION (MSL)
1985 Comm SQ AV 735-5232 Tinker AFB OK 73145	USAF	1291.23

II. GENERAL

8. TYPE FACILITY	9. FREQ/CHANNEL	10. IDENTIFICATION	11. CLASS/CATEGORY	12. COMMON SYSTEM	13. DATE COMMISSIONED
GLIDESLOPE	332.6	I-JTZ	CAT I	☐ YES ☒ NO	060179

14. EQUIPMENT TYPE	15. TYPE ANTENNA	16. SITE ELEVATION (MSL)	17. ANTENNA HEIGHT FT (AG)	18. CONTROL STATION AND FREQUENCY
[illegible]-31	AS-3229/G Null Reference	1264.74	30.33	Tinker Tower 299.6 126.2

19. ANTENNA LOCATION (Degrees, Minutes, Seconds-to nearest hundredth)	20. PRIMARY POWER	21. STANDBY POWER	22. STANDBY EQUIP	23. MONITOR
LATITUDE 35-25-34.7285N LONGITUDE 97-22-49.058	☒ COMMERCIAL ☐ ENGINE	☒ ENGINE ☐ COMMERCIAL ☐ NONE	☒ YES ☐ NO	☒ YES ☐ NO ☐ SINGLE ☐ DUAL

24. RUNWAY NUMBER	25. ILS/PAR RUNWAY TRUE BEARING	26. MAG VARIATION	27. VOICE	28. MONITOR RADIAL	29. POWER OUTPUT
17	180.21°	NA	NO	NA	4 Watts

30. RUNWAY DIMENSIONS	31. DISPLACED THRESHOLD	32. COMMISSIONED	33. ASR VERTICAL COVERAGE RADIAL AND OPERATIONAL REQUIREMENT
LENGTH 11100.84 FEET WIDTH 200 FEET	☐ YES ☒ NO	WIDTH .72 ° ANGLE 2.5 °	RADIAL DISTANCE ALTITUDE NA

34. THRESHOLD ELEVATION (MSL)	35. TCH FT (AG)	36. ILS/PAR/VASI ANGLE COINCIDENCE			37. RESTRICTED
		ILS (°)	PAR (°)	VASI (°)	
1260.95	45.4	2.5		2.5	☐ YES ☒ NO

III. LOCALIZER AND SDF DATA

38. DISTANCE TO O.M. (NM) (FEET)	39. DISTANCE TO M.M. (NM) (FEET)	40. DISTANCE TO C/L RUNWAY ABEAM GLIDE PATH ANTENNA (Feet)	41. DIRECTION (Right or Left) AND DISTANCE LOC OFFSET FROM RUNWAY C/L

42. DISTANCE TO THRESHOLD	43. DISTANCE TO STOP END RWY	44. USABLE DISTANCE	45. OFFSET LOC TRUE BEARING	46. LOC CW MONITOR
		NM AT FT (MSL/MAA) NM AT FT (MSL/MRA)		WIDE NARROW

47. LOCALIZER COURSE TAILORED	48. BACK COURSE USABLE DISTANCE	49. BACK COURSE TRUE BEARING	50. OVKR WIDTH (Feet)
☐ YES ☐ NO WIDTH AT THRESHOLD (Feet)	NM AT FT (MSL/MAA) NM AT FT (MSL/MRA)		

51. IMKR WIDTH (Feet)	52. IMKR WIDTH (Feet)	53. FRONT COURSE CHECK POINT	54. BACK COURSE CHECK POINT

IV. GLIDE PATH DATA (ILS/PAR/VASI)

55. DISTANCE TO O.M.	56. DISTANCE TO M.M.	57. DISTANCE TO I.M.	58. DISTANCE TO POINT "C"	59. DISTANCE TO THRESHOLD (Feet)	60. RUNWAY ELEV ABEAM G/S ANT (MSL)
(NM) 5.46 (Feet) 33173.1	(NM) .71 (Feet) 4318.04	(NM) NA (Feet) NA	(NM) .36 (Feet) 2203.57	(NM) .16 (Feet) 953.1	1263.70

61. DIRECTION (Right or left) AND DISTANCE FROM ANTENNA TO RUNWAY C/L	62. ELEVATION TD ZONE (MSL)	63. DISTANCE - THRESHOLD TO GPI		
		ILS (Feet)	PAR (Feet)	VASI (Feet)
Left 412.5	1267	GPI 1039.91 RPI 975.44		GPI 957.63 RPI 900

64. ALTITUDE OVER O.M. OR CK. PT. (Feet)			65. ALTITUDE OVER M.M.			66. ALTITUDE OVER I.M.	
TAPELINE	E.C	MSL	TAPELINE	E.C.	MSL	TAPELINE	MSL
1448.37	26.32	2739.43	188.53	.45	1453.72	NA	NA

67. DISTANCE O.M. TO THRESHOLD (Feet)	68. DISTANCE M.M. TO THRESHOLD (Feet)	69. TYPE APPROACH LIGHTING	70. TYPE RUNWAY LIGHTING	71. GLIDE PATH MONITOR
32220	3364.94	SSALS A2	HIRL	ANGLE (High) 2.69 ANGLE (Low) 2.31

V. VOR VORTAC TACAN DME NDB

72 REFERENCE RADIAL ☐ CHECK POINT DESCRIPTION

73 THEODOLITE POSITION

74 GROUND RECEIVER CHECK POINTS

RADIAL	DISTANCE	DESCRIPTION

75 THEODOLITE REFERENCE POINTS

BEARING	DESCRIPTION

76 FIXES AND RECEIVER CHECK POINTS

NAME	RADIAL	DISTANCE	ALTITUDE	DESCRIPTION

77 IFR RADIAL DATA

RADIAL	RADIAL USE	AIRPORT

VI. AIR TRAFFIC CONTROL SYSTEM (ASR-ARSR-CENTER-PAR-TOWER-VHF-DF-UHF-DF-STATION)

78 TYPE SECONDARY

79 MTI BLIND SPEED

80 VIDEO MAPPING ☐ YES ☐ NO

81 ANT TILT (Degrees) FIXED ___ VAR. ___

82 FREQUENCIES

83 NEAREST PRECISION APPROACHES

AIRPORT	RUNWAY

84 FIXES AND ROUTES

ROUTE	BEARING	FROM/TO	FACILITY	DISTANCE	ALTITUDE

REMARKS (Include all facility or airspace restrictions.)

Threshold Coordinates:	35-25-44.17N	97-22-54.00W	Elev:	1260.95
Stop Brg Coordinates:	35-23-54.38N	97-22-54.49W	Elev:	1291.23
MM	35-26-17.45N	97-22-53.85W	Elev:	1242

AFM 55-9, Fig 129 (Block 16) used to compute TCH, GPI, RPI, PTC & MSL.
Item 55, 67: FAF is 8 DME Tinker TACAN.

CIVIL ENGINEERING VERIFICATION (SIGNATURE) Brian W. Lobb

CAMING UNIT	AREA	FACILITY IDENT	FACILITY TYPE
1365 Comm SQ	SCA	T-JTZ	GLIDESLOPE

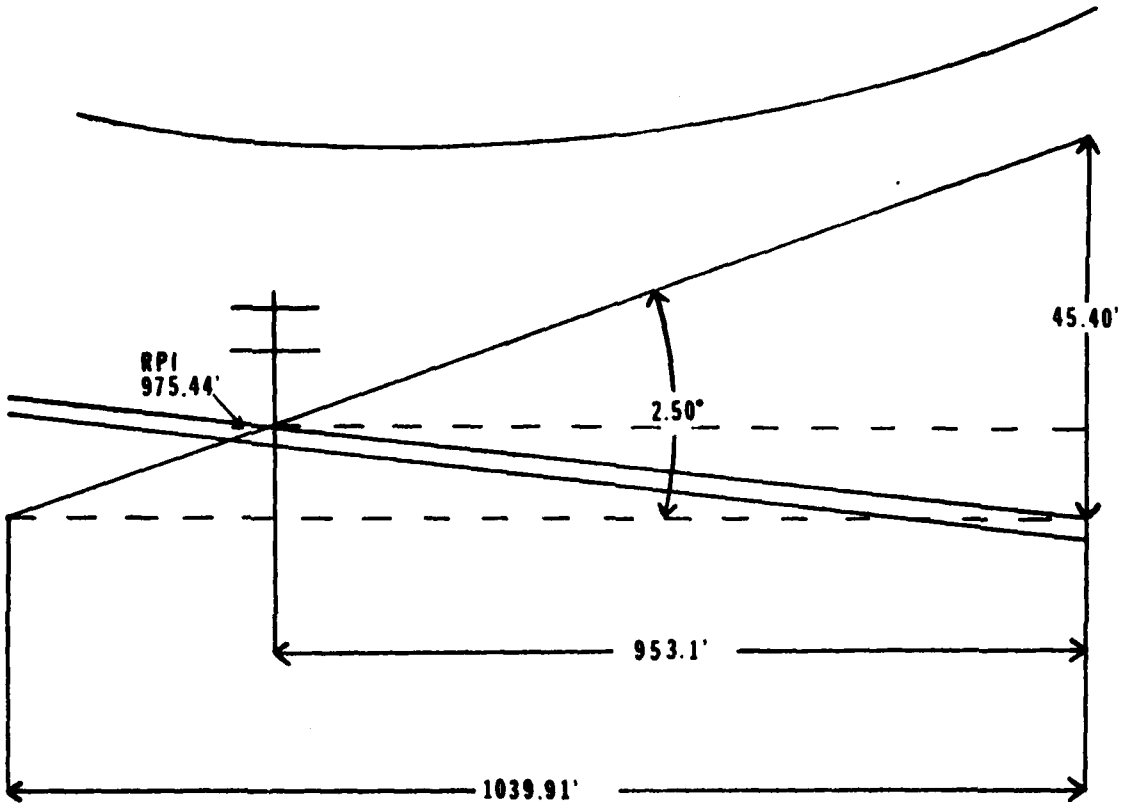
DATE PREPARED	TYPED NAME AND GRADE	SIGNATURE
14 [illegible] 1980	JAMES G. NEWMAN, Lt Col, USAF	James G. Newman

TITLE:

TERPS CALCULATIONS

LOCATION	DATE
Tinker AFB	December 1980

RAPIDLY DROPPING TERRAIN



TCH = (TAN GS)(DIST ANT TO TH)-(TH EL-ANT EL)
= (.044)(953.1)-(1260.95-1264.74)
= 45.40'

GPI = TCH / TAN GS
= 45.40 / .044
= 1039.91'

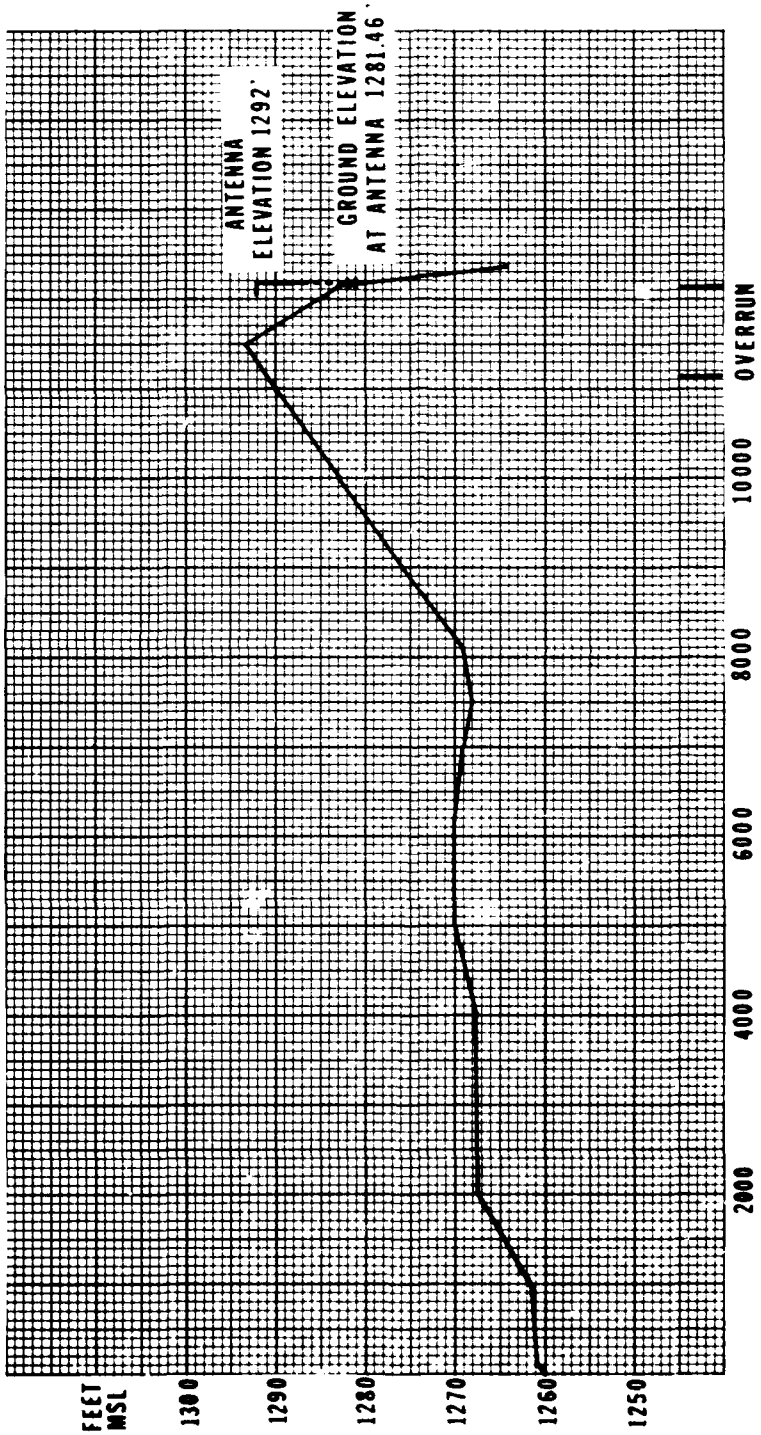
RPI = (TCH)(DIST ANT TO TH) / TCH + (RWY CRWN EL-ANT EL)
= (45.40)(953.1) /(45.40+(1263.70-1264.74))
= 975.44'

REMARKS

TITLE:

RUNWAY CONTOUR

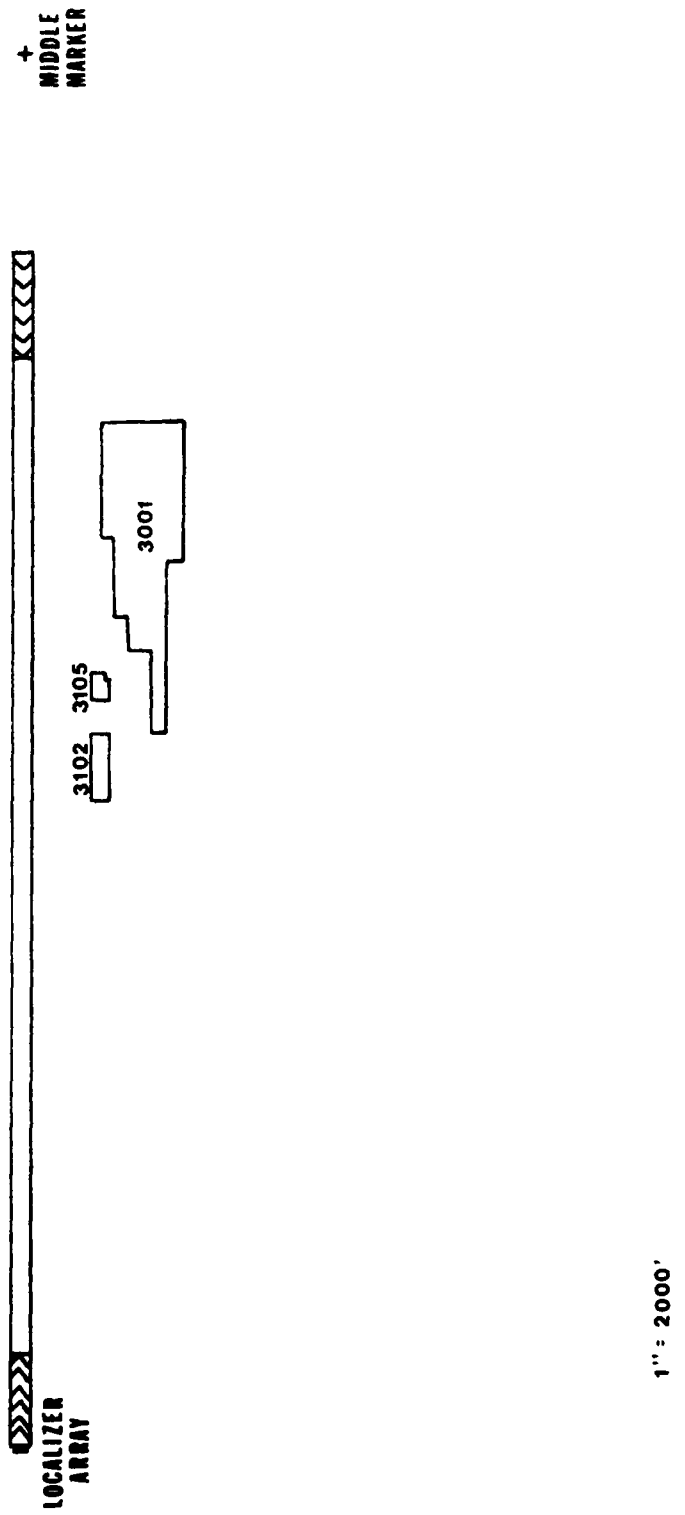
LOCATION	DATE
Tinker AFB	December 1980



TITLE:

RUNWAY AND BUILDING LAYOUT

LOCATION	DATE
Tinker AFB	December 1980



78-50781

TITLE

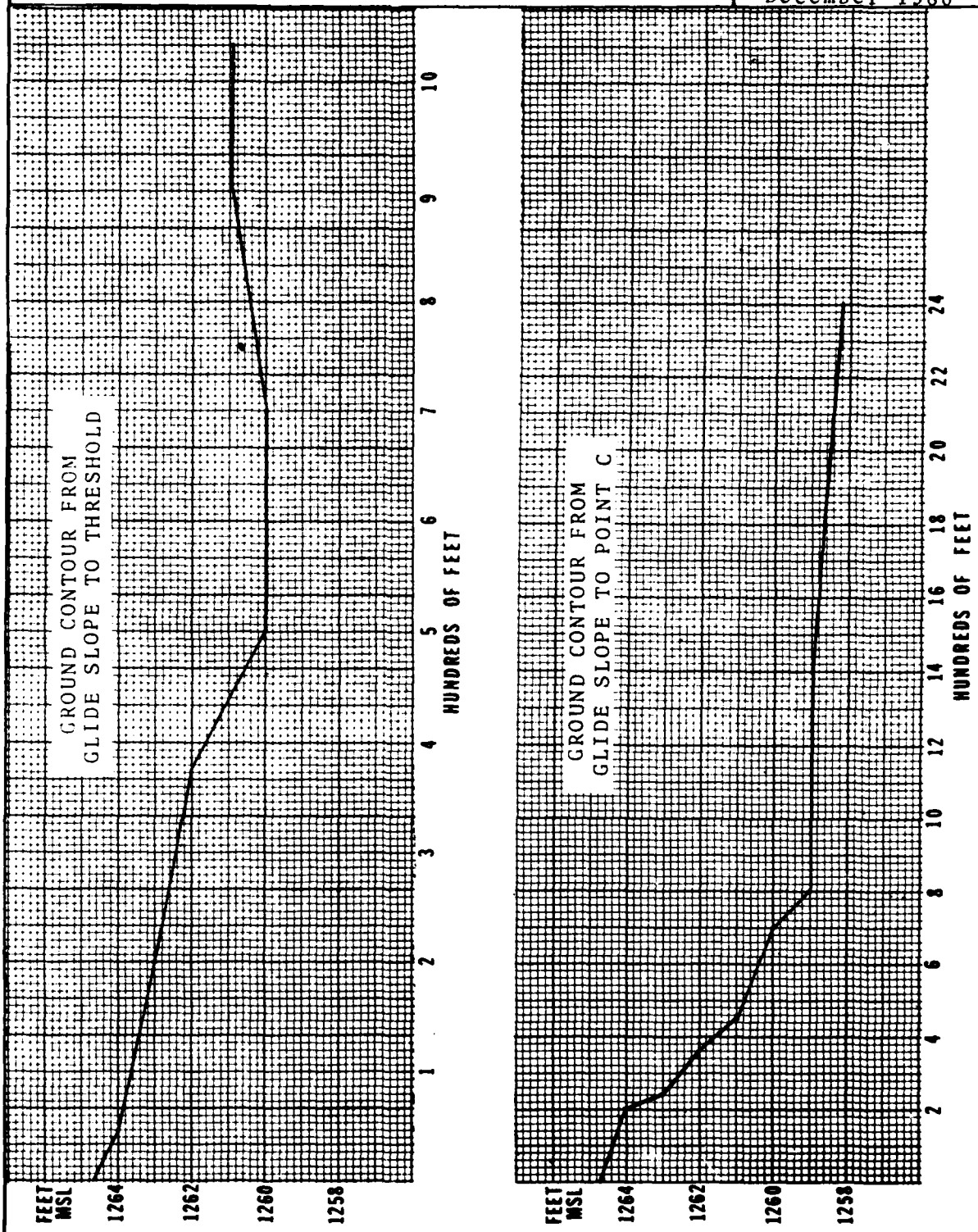
GLIDE SLOPE CONTOUR STUDY

LOCATION

Tinker AFB

DATE

December 1980



REMARKS

TITLE

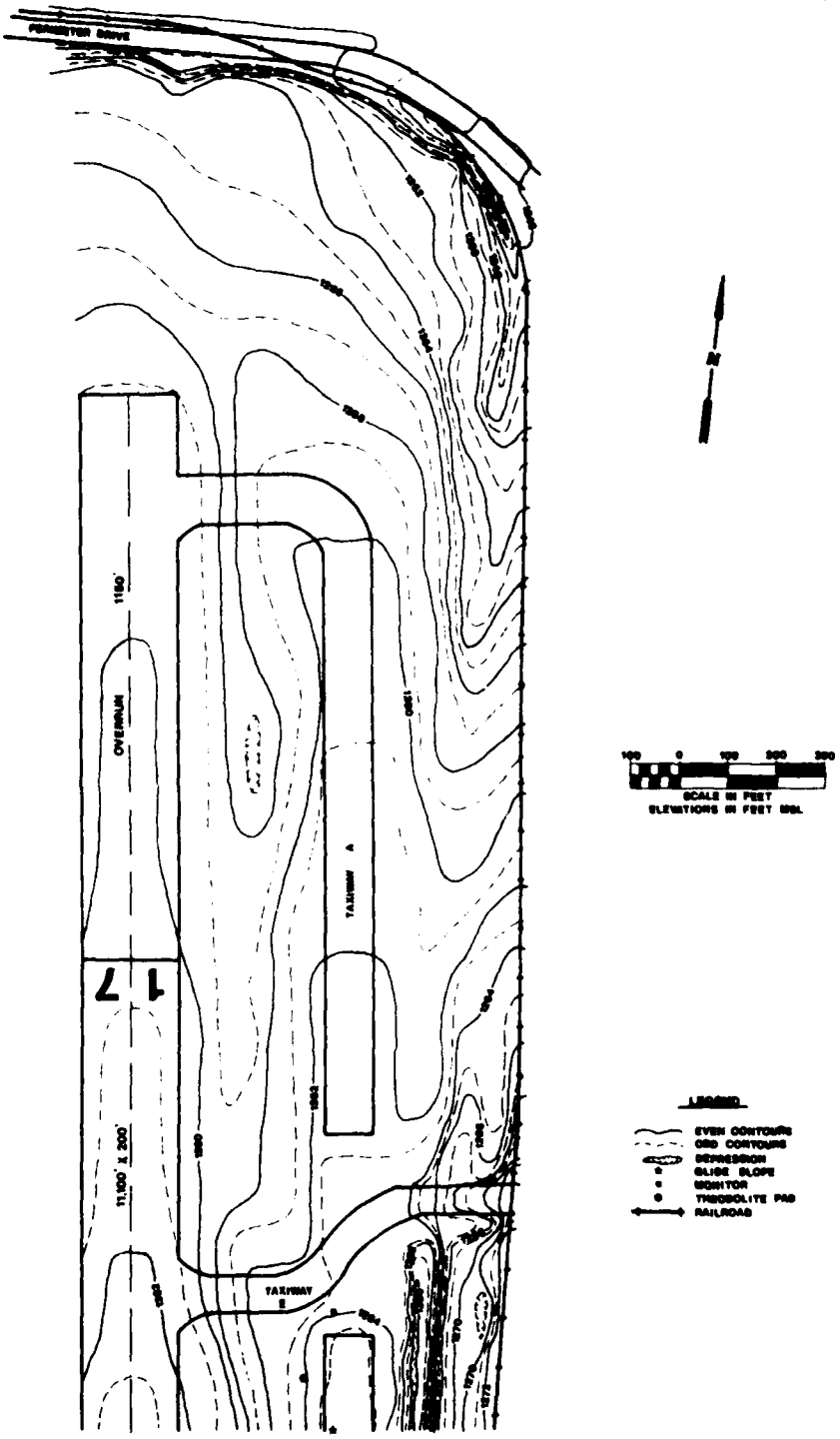
GLIDE SLOPE CONTOUR STUDY

LOCATION

Tinker AFB

DATE

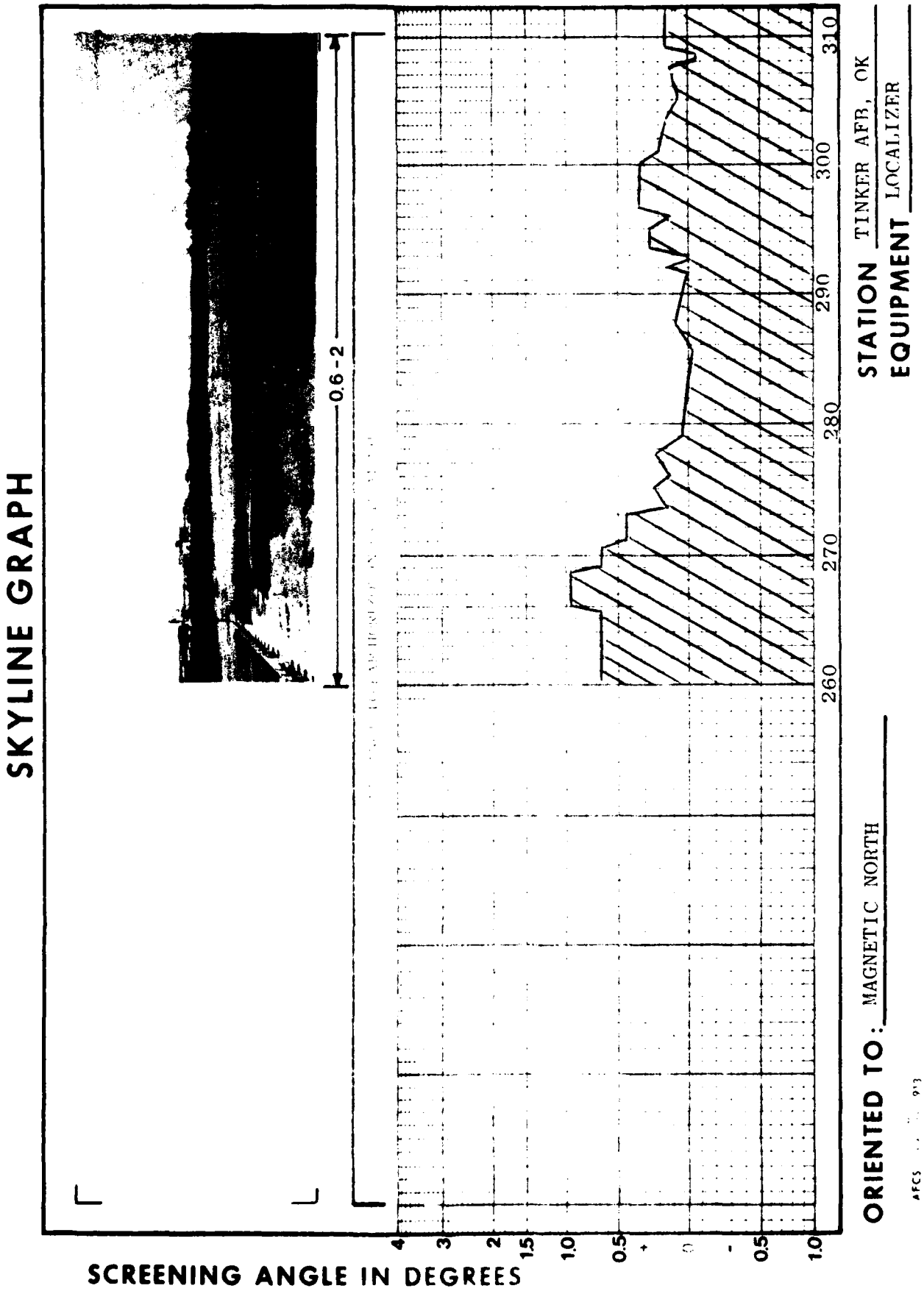
21 July 1978

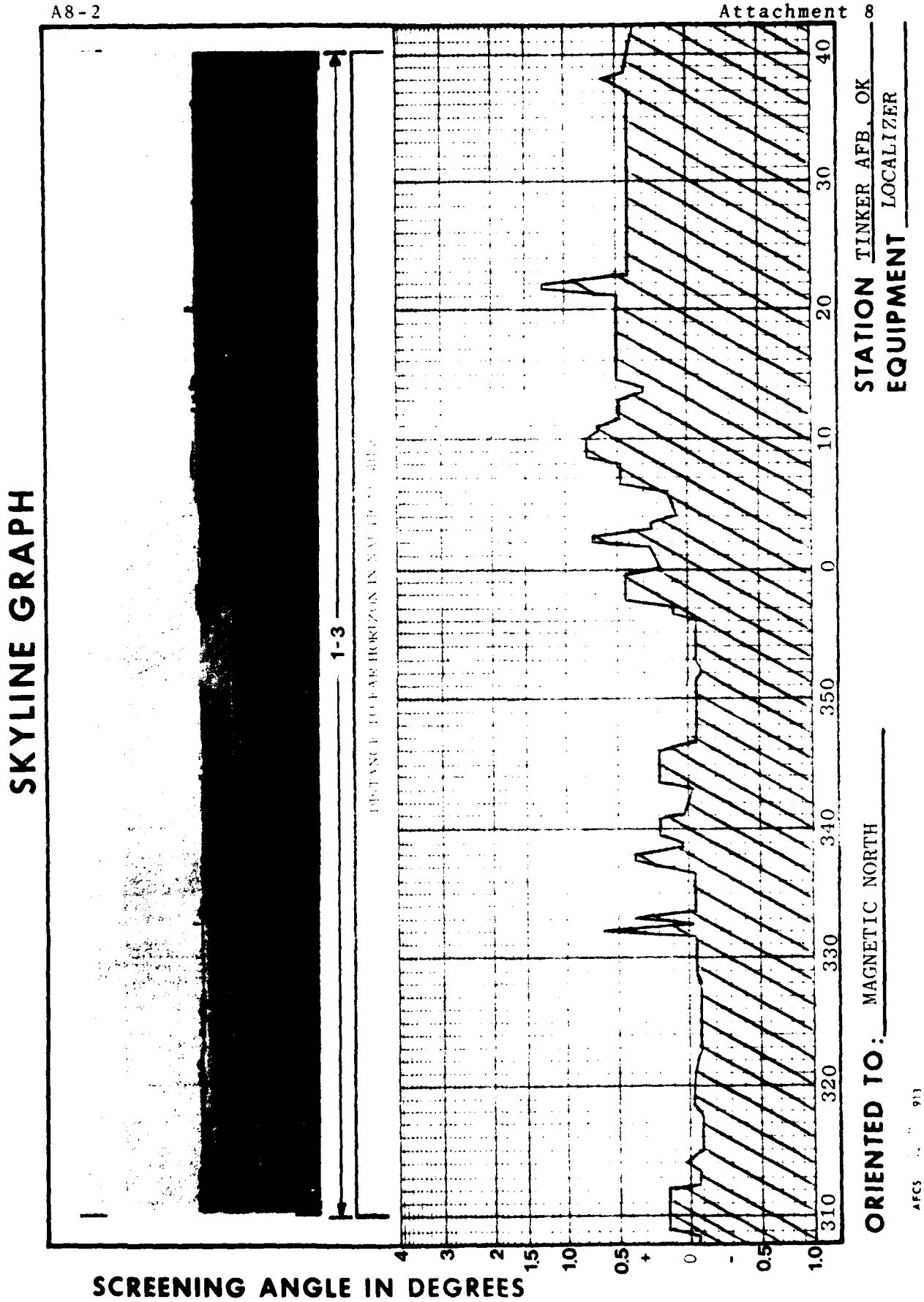


REMARKS

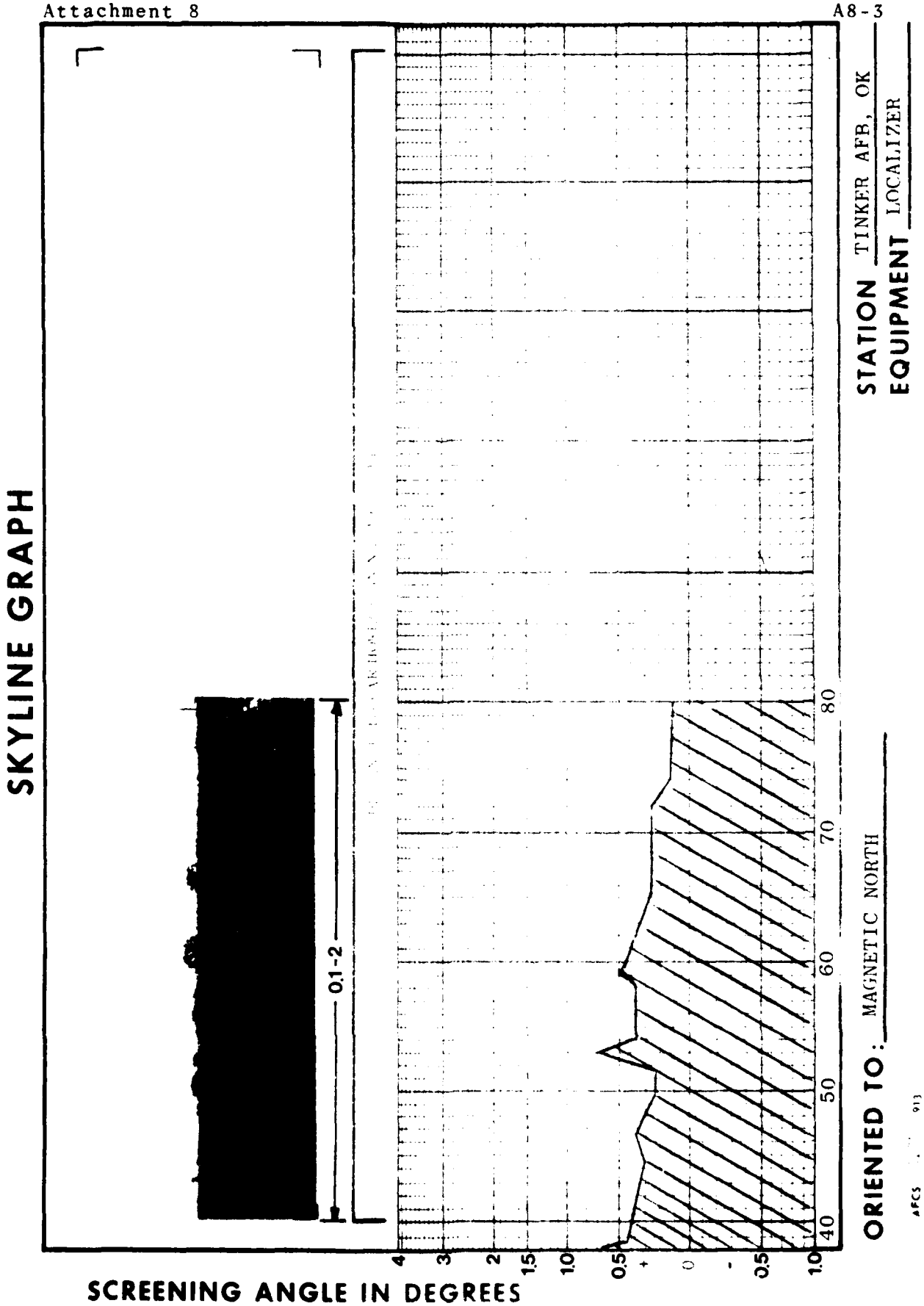
AFCS FORM MAY 73 906

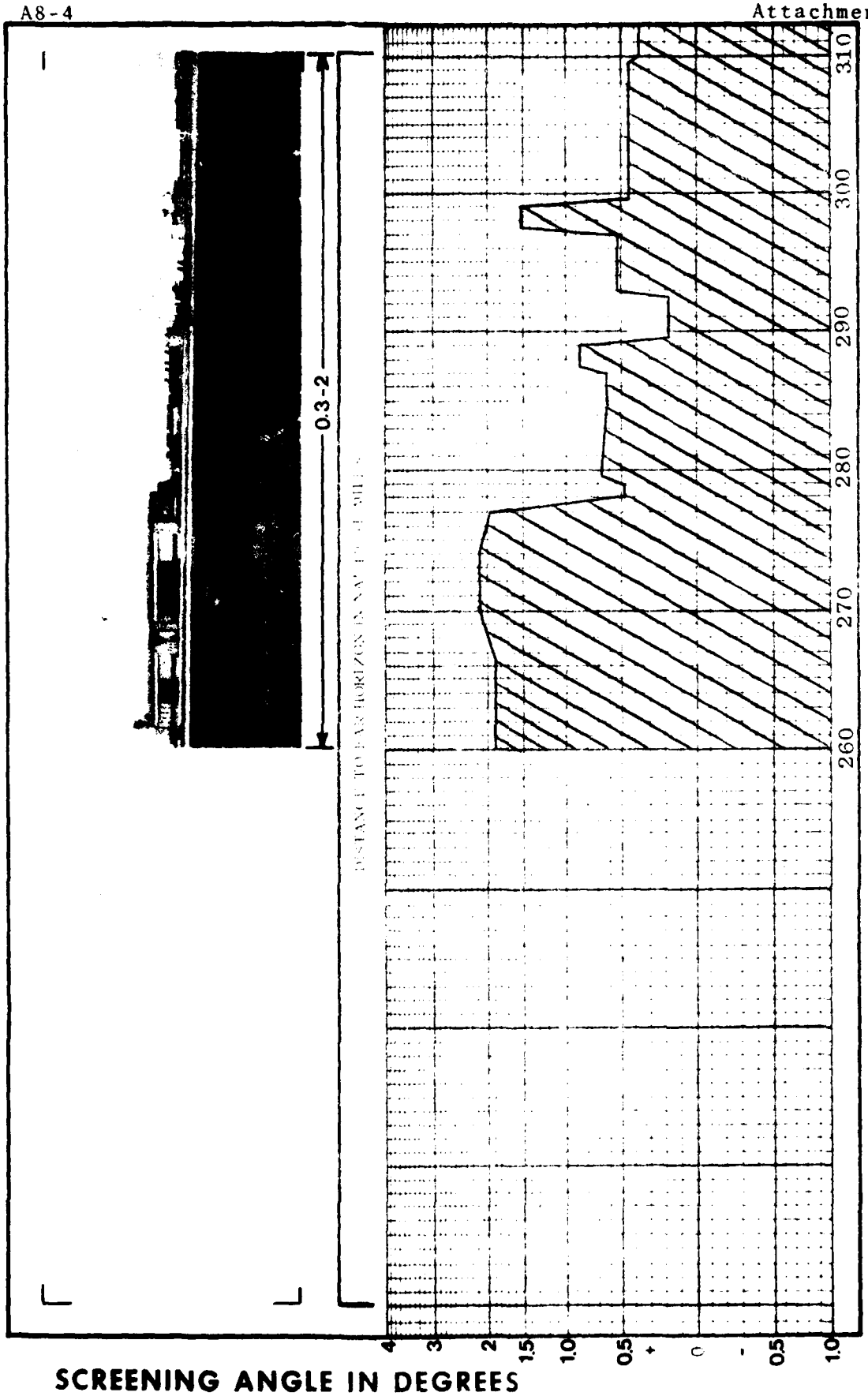
78-50781

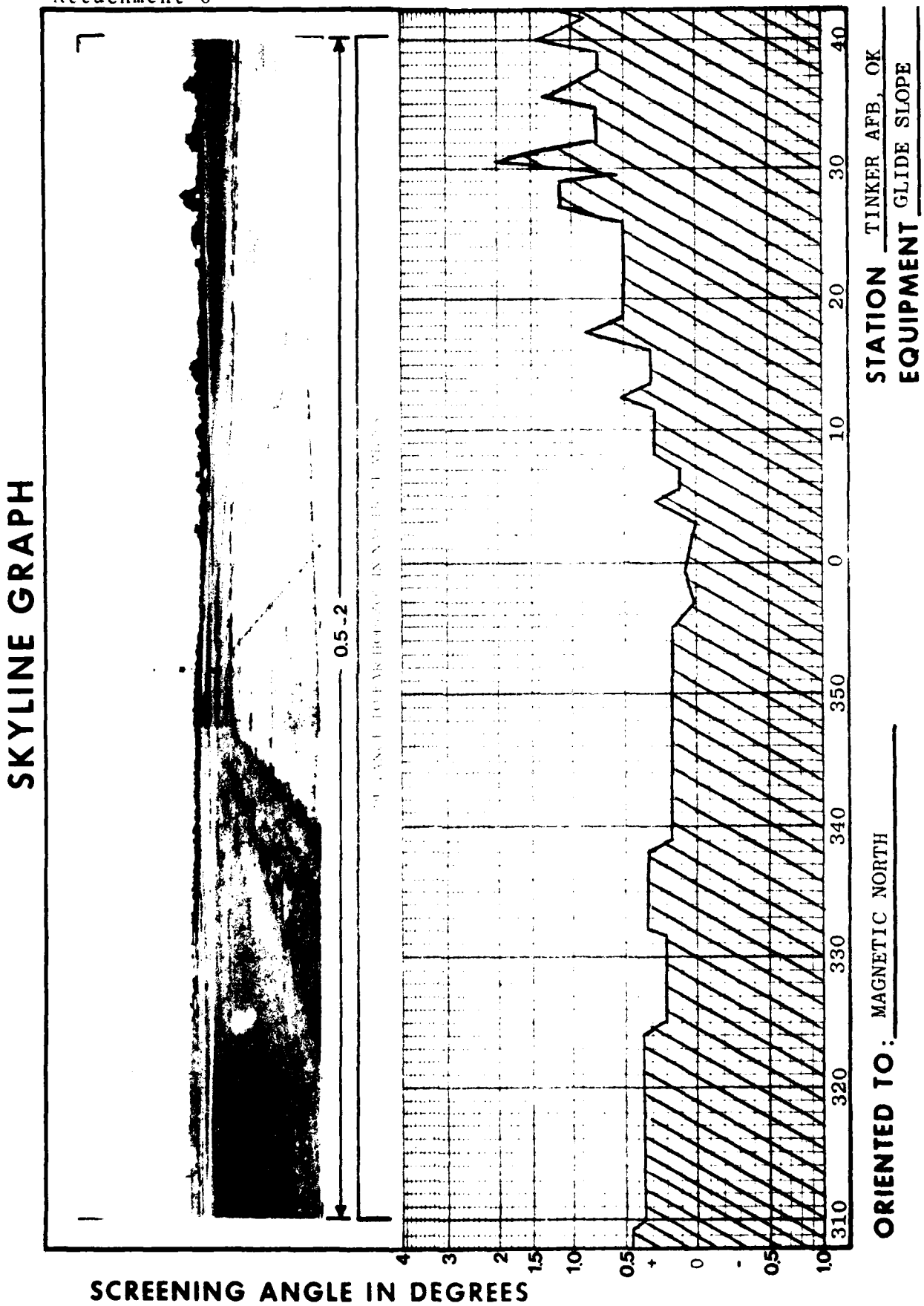

SKYLINE GRAPH
0.6-2
4
3
2
1.5
1.0
0.5
+
0
-
0.5
1.0
260
270
280
290
300
310
STATION TINKER AFB, OK
EQUIPMENT LOCALIZER
ORIENTED TO: MAGNETIC NORTH
SCREENING ANGLE IN DEGREES


SKYLINE GRAPH
1-3
310
320
330
340
350
0
10
20
30
40
4
3
2
1.5
1.0
0.5
+
0
-
0.5
1.0
SCREENING ANGLE IN DEGREES
ORIENTED TO: MAGNETIC NORTH
STATION TINKER AFB, OK
EQUIPMENT LOCALIZER

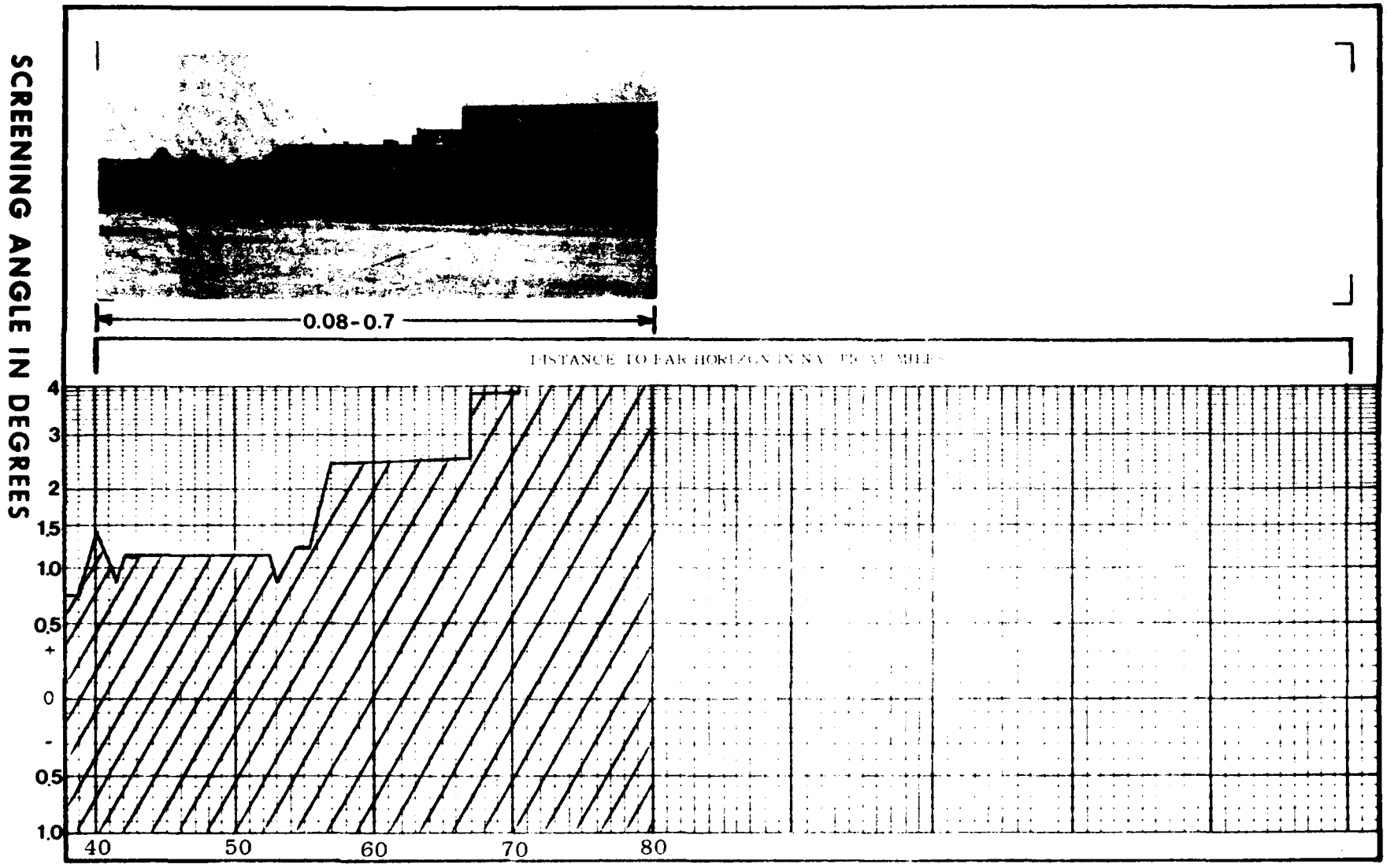
AFCS 913


SKYLINE GRAPH
0.1-2
4
3
2
1.5
1.0
0.5
+
0
-
0.5
1.0
40
50
60
70
80
SCREENING ANGLE IN DEGREES
ORIENTED TO: MAGNETIC NORTH
STATION TINKER AFB, OK
EQUIPMENT LOCALIZER


SKYLINE GRAPH
0.3-2
260
270
280
290
300
310
4
3
2
1.5
1.0
0.5
+
0
-
0.5
1.0
SCREENING ANGLE IN DEGREES
STATION TINKER AFB, OK
EQUIPMENT GLIDE SLOPE
ORIENTED TO: MAGNETIC NORTH


SKYLINE GRAPH
0.5-2
310
320
330
340
350
0
10
20
30
40
4
3
2
1.5
1.0
0.5
+
0
-
0.5
1.0
SCREENING ANGLE IN DEGREES
ORIENTED TO: MAGNETIC NORTH
STATION TINKER AFB, OK
EQUIPMENT GLIDE SLOPE

SKYLINE GRAPH



ORIENTED TO: MAGNETIC NORTH

STATION TINKER AFB, OK

EQUIPMENT GLIDE SLOPE

AFCS 913

SSILS LOCALIZER INITIAL PERFORMANCE CHECKLIST

DATE: 8 December 1980

LOCATION: Tinker AFB, OK

EQUIPMENT AND SERIAL NUMBER: AN/GRN-30 SN: 77007

TECHNICIAN: Mr. Conley, MSgt Thibodeau

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
COURSE CARRIER POWER	SAME AS LAST FLIGHT CHECK	14W	15W	14.8W	15W	
COURSE SIDEBAND POWER	SAME AS LAST FLIGHT CHECK	290mW	310mW	285mW	310mW	
CLEARANCE CARRIER POWER	SAME AS LAST FLIGHT CHECK	3.25W	4W	3.3W	4W	
CLEARANCE SIDEBAND POWER	SAME AS LAST FLIGHT CHECK	150mW	142mW	150mW	142mW	
COURSE % MODULATION	±4% OF LAST FC	37.5%	40%	37.5%	40%	
90Hz % MODULATION	±2% OF LAST FC	20%		21.2%		
150Hz % MODULATION	±2% OF LAST FC	20%		21.2%		
CLEARANCE % MOD	±4% OF LAST FC	37.5%	42.5%	40%	42.5%	
90Hz % MODULATION	±2% OF LAST FC	20%		21.2%		
150Hz % MODULATION	±2% OF LAST FC	20%		20%		
COURSE POWER SUPPLY 1						
Q5 DC OUT	0.75 TO 3.5A	1.76		1.9		
Q4 DC OUT	0.75 TO 3.5A	1.8		2.0		
DC OUT	26.5 TO 29.5 V	28.8		28.5		
PRE REG	30 TO 38V	35.5		39.2		
COURSE POWER SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5A	1.88		2.1		
Q10 DC OUT	0.75 TO 3.5A	1.8		2.0		
DC OUT	26.5 TO 29.5V	28.8		28.5		
PRE REG	30 TO 38V	35.5		35.2		
COURSE TRANSMITTER						
OSC TUNE	0.5 MIN	1.11		1.2		
EXCTR OUTPUT	0.85 TO 3.0	1.43		2.06		
CSB PA	1.0 TO 3.25	2.32		2.21		
SBO PA	0.75 TO 1.95	1.32		1.4		
CSB PWR OUT	0.50 TO 2.0	1.65		1.85		
DC IN	2.2 TO 3.5	2.72		2.72		
DC IN	1.0 TO 6.7	4.84		5.2		
SBO PWR OUT	0.5 TO 2.5	1.12		1.31		
CLEARANCE POWER SUPPLY 1						
Q5 DC OUT	0.75 TO 3.5A	1.12		1.2		
Q4 DC OUT	0.75 TO 3.5A	1.12		1.2		
DC OUT	26.5 TO 29.5V	28.6		28.2		
PRE REG	30 TO 38	35.8		35.5		
CLEARANCE POWER SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5A	1.4		1.5		
Q10 DC OUT	0.75 TO 3.5A	1.2		1.3		
DC OUT	26.5 TO 29.5V	28.5		28.2		
PRE REG	30 TO 38	36.1		36.0		
CLEARANCE TRANSMITTER						
OSC TUNE	0.5 MIN	1.25		1.58		

REMARKS

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
EXCTR OUTPUT	0.85 TO 3.0	2.5		2.2		
CSB PA	1.0 TO 3.25	1.28		1.38		
SBO PA	0.50 TO 2.0	1.25		1.18		
CSB PWR OUT	0.20 TO 1.95	0.69		0.58		
DC IN	2.2 TO 3.5	2.8		2.7		
DC IN	1.0 TO 6.7	3.36		3.3		
SBO PWR OUT	0.20 TO 2.5	0.84		1.1		
COURSE MONITOR 1						
TEST DDM	0.500 ± 0.02	.510		.510		
COURSE DDM	0.000 ± 0.011	.004/90	.001/150	.004/90	0	
WIDTH DDM	0.141 TO 0.175	.159	.155	.155	.155	
RF LEVEL	100.0 ± 10.0	100.8	100.0	102.6	101.0	
% MOD	LAST FC ± 4.0%	40.4	40.5	38.8	40.4	
ID% MOD	005.0 ± 2.0	4.7	4.1	4.6		
COURSE MONITOR 2						
TEST DDM	0.500 ± 0.02	.511		.512		
COURSE DDM	0.000 ± 0.011	.002/90	.001/150	.003/90	.001/90	
WIDTH DDM	0.141 TO 0.175	.158	.156	.154	.155	
RF LEVEL	100.0 ± 10.0	100.3	100.1	102.0	101.0	
% MOD	LAST FC ± 4.0%	41.1	41.3	39.9	41.2	
ID% MOD	005.0 ± 2.0	4.6	4.5	5.1	5.1	
CLEARANCE MONITOR 1						
TEST DDM	0.500 ± 0.02	.511		.510		
COURSE DDM	0.000 ± 0.026	.005/90	0	.005/90	.001/90	
WIDTH DDM	0.129 TO 0.181	.151	.154	.146	.155	
RF LEVEL	100.0 ± 10.0	101.1	100.4	101.0	101.2	
% MOD	LAST FC ± 4.0%	38.3	41.6	38.5	41.5	
ID % MOD	005.0 ± 2.0	4.1	4.0	4.0		
FREQ SEP	9.5 ± 1.0	9.3		9.1	9.2	
CLEARANCE MONITOR 2						
TEST DDM	0.500 ± 0.02	.513		.512		
COURSE DDM	0.000 ± 0.026	.006/90		.006/90		
WIDTH DDM	0.129 TO 0.181	.149	.155	.145	.155	
RF LEVEL	100.0 ± 10.0	101.2	100.1	100.9		
% MOD	LAST FC ± 4.0%	39.4	42.9	39.6	42.8	
ID % MOD	005.0 ± 2.0	4.5		4.4		
FREQ SEP	9.5 ± 1.0	9.3		9.0	9.1	
ALARM LIMITS						
COURSE MONITOR		MONITOR 1		MONITOR 2		
ID % MOD LOWER	003.0 ± 0.5	2.9		2.9		
UPPER	18.40 ± 3.0	16.8		16.8		
% MOD LOWER	004.0 BELOW NORMAL	35.1	36.5	35.7	37.1	
UPPER	004.0 ABOVE NORMAL	43.0	44.5	43.5	45.2	
RF LEVEL LOWER	90.0 ± 0.5	89.9		90.0		
WIDTH DDM LOWER	0.141 ± 0.002	.141		.141		
UPPER	0.175 ± 0.002	.175		.175		
COURSE DDM						
UPPER	0.011 ± 0.004	.010		.011		
TEST DDM LOWER	0.426 ± 0.03	.416		.412		
UPPER	0.557 ± 0.03	.544		.540		

REMARKS

MONITOR ALRAMS *(CONTINUED)*

CHECK		SPECIFICATION	MONITOR 1 INITIAL	MONITOR 1 ADJUSTED	MONITOR 2 INITIAL	MONITOR 2 ADJUSTED	REMARKS
CLEARANCE MONITOR ALARM LIMITS							
FREQ SEP	LOWER	5.000 ± 0.2	4.9		4.9		
	UPPER	14.00 ± 0.2	13.9		14.1		
ID % MOD	LOWER	003.0 ± 0.5	2.9		3.0		
	UPPER	018.4 ± 3.0	17.2		18.3		
% MOD	LOWER	4.0 BELOW NORMAL	34.6	37.6	36.1	38.8	
	UPPER	4.0 ABOVE NORMAL	42.6	45.5	44.2	46.8	
RF LEVEL	LOWER	90.0 ± 0.5	90.0		90.2		
WIDTH DDM	LOWER	0.129 ± 0.002	.129		.129		
	UPPER	0.181 ± 0.002	.181		.181		
COURSE DDM							
	UPPER	0.026 ± 0.004	.026		.026		
TEST DDM	LOWER	0.426 ± 0.03	.403		.417		
	UPPER	0.557 ± 0.03	.527		.548		

FAR FIELD MONITOR 1 TESTS	SPECIFICATION	TRANSMITTER NO. 1 INITIAL	TRANSMITTER NO. 1 ADJUSTED	TRANSMITTER NO. 2 INITIAL	TRANSMITTER NO. 2 ADJUSTED	REMARKS
DDM	0.000 ± 0.005	.002/90	0	.003/90	0	
DDM ALARM	0.011 ± 0.004	.010		.010		
% MOD	40.0 ± 10.0	45		44	45	
% MOD ALARM	20.0 ± 1.0	19		20		
FAR FIELD MONITOR 2 TESTS						
DDM	0.000 ± 0.005	.003/90	0	.004/90	0	
DDM ALARM	0.011 ± 0.004	.011		.010		
% MOD	40.0 ± 10.0	46	47	46	47	
% MOD ALARM	20.0 ± 1.0	19		20		

REMARKS

* - The "ADJUSTED" readings were recorded following the flight evaluation.

Attachment 10

SSILS LOCALIZER SUBSYSTEM PERFORMANCE CHECKS

DATE: 10 December 1980

LOCATION	EQUIPMENT AND SERIAL NUMBER	TECHNICIAN
Tinker AFB, OK	AN/GRN-30 SN:77007	Mr. Conley MSgt Thibodeau

CHECK	SPECIFICATION	TRANSMITTER NO. 1 INITIAL	TRANSMITTER NO. 1 ADJUSTED	TRANSMITTER NO. 2 INITIAL	TRANSMITTER NO. 2 ADJUSTED	REMARKS
CARRIER FREQUENCY						
COURSE	0.002% 109+	.504182		.50450		109.5025-109.5069
CLEARANCE	0.002% 109+	.494729		.49517		109.4930-109.4974
MODULATION BALANCE						
COURSE	Centerline	.001/90		.001/90		
CLEARANCE	30° Gnd Ck Pt	.010/90	0	.010/90	0	
PHASING						
COURSE 150Hz	Far Field 3°	.027/90	.010/150	.009/150	.008/150	
COURSE 90Hz	Far Field 3°	.050/150	.010/150	.005/150	.002/150	
CLEARANCE 150Hz	30° Gnd Ck Pt	.185/90	.001/90	.155/90	.001/150	
CLEARANCE 90Hz	30° Gnd Ck Pt	.155/150	.002/90	.145/150	.013/90	

ANTENNA VSWR

CHECK	SPECIFICATION	dB	VSWR	CHECK	SPECIFICATION	dB	VSWR
1L		-34.9	1.037:1	1R		-38.6	1.024:1
2L		-34.5	1.038:1	2R		-37.3	1.028:1
3L		-37	1.029:1	3R		-34.8	1.037:1
4L		-28.4	1.079:1	4R		-31.9	1.052:1
5L		-27.2	1.091:1	5R		-32.5	1.049:1
6L		-32.3	1.050:1	6R		-36.1	1.032:1
7L		-31.1	1.057:1	7R		-31.8	1.053:1

CABLING PHASE SHIFTS

ANTENNA FEEDLINES				MONITOR RETURN			
CHECK		INITIAL	ADJUSTED	CHECK		INITIAL	ADJUSTED
1L		-115		1L		-13.5	
2L		-117		2L		-11	
3L		-110		3L		-12	
4L		-109.5		4L		-14	
5L		-110		5L		-13	
6L		-110.5		6L		-14	
7L		-112		7L		-18	
1R		-41		1R		-14	
2R		-36		2R		-14	
3R		-33		3R		-14	
4R		-28		4R		-22	
5R		-22		5R		-19	
6R		-26		6R		-22.5	
7R		-19		7R		-27	

ANTENNA RF NULLS

PAIR	SPECIFICATION	INITIAL	ADJUSTED	PAIR	SPECIFICATION	INITIAL	ADJUSTED
1		3' 150		5		6" 90	
2		2' 90		6		0	
3		2' 90		7		8" 150	
4		1'6" 90		COMP		5" 90	

REMARKS

SSILS LOCALIZER SUBSYSTEM PERFORMANCE CHECKS

DATE: 10 December 1980

LOCATION: Tinker AFB, OK

EQUIPMENT AND SERIAL NUMBER: AN/GRN-30 SN: 77007

TECHNICIAN: Mr. Conley, MSgt Thibodeau

COURSE DU C+SB AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
7L(J9)	0.147 – 0.173	0.167	7R(J16)	0.162	7L–7R	±0.010	0.005
6L(J8)	0.147 – 0.173	0.165	6R(J15)	0.163	6L–6R	±0.010	0.002
5L(J7)	0.452 – 0.530	0.518	5R(J14)	0.514	5L–5R	±0.030	0.004
4L(J6)	REF ± 0.030	0.489	4R(J13)	0.491	4L–4R	±0.030	0.002
3L(J5)	0.657 – 0.771	0.718	3R(J9)	0.700	3L–3R	±0.043	0.018
2L(J4)	0.920 – 1.080	1.008	2R(J8)	0.980	2L–2L	±0.060	0.028
1L(J3)	0.821 – 0.964	0.887	1R(J7)	0.872	1L–1R	±0.054	0.015

COURSE DU C+SB SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
7L(J9)	+82	80.6	-1.4	7R(J16)	0	0	0	
6L(J8)	+82	81.2	-0.8	6R(J15)	0	0.2	+0.2	
5L(J7)	+82	81.0	-1.0	5R(J14)	0	-0.8	-0.8	
4L(J6)	+82	81.1	-1.1	4R(J13)	0	0	0	
3L(J5)	+82	84.1	+2.1	3R(J9)	0	+1.9	+1.9	
2L(J4)	+82	84.0	+2.0	2R(J8)	0	+0.7	+0.7	
1L(J3)	+82	80.1	-1.9	1R(J7)	0	-0.8	-0.8	

COURSE DU SBO AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
7L(J9)	0.330 – 0.404	0.362	7R(J16)	0.371	7L–7R	±0.012	0.009
6L(J8)	0.443 – 0.599	0.560	6R(J15)	0.562	6L–6R	±0.018	0.002
5L(J7)	0.818 – 0.960	0.923	5R(J14)	0.932	5L–5R	±0.029	0.009
4L(J6)	REF + 0.033	0.998	4R(J13)	1.000	4L–4R	±0.033	0.002
3L(J5)	0.921 – 1.060	0.980	3R(J9)	1.011	3L–3R	±0.033	0.031
2L(J4)	0.614 – 0.720	0.667	2R(J8)	0.683	2L–2R	±0.022	0.016
1L(J3)	0.204 – 0.240	0.205	1R(J7)	0.220	1L–1R	±0.014	0.015**

COURSE DU SBO SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
7L(J9)	-98	-100.0	-2.0	7R(J16)	0	-1.2	-1.2	
6L(J8)	-98	-97.0	+1.0	6R(J15)	0	+0.5	+0.5	
5L(J7)	-98	-97.3	+0.7	5R(J14)	0	+0.5	+0.5	
4L(J6)	-98	-99.0	-1.0	4R(J13)	0	0	0	
3L(J5)	-98	-97.6	+0.4	3R(J9)	0	+2.5	+2.5	
2L(J4)	-98	-99.2	-1.2	2R(J8)	0	+0.6	+0.6	
1L(J3)	-98	-102.3	-4.3	1R(J7)	0	+0.3	+0.3	

COURSE PHASE ERROR

CHECK	CSB ERR	SBO ER	DIFF	CHECK	CSB ERR	SBO ER	DIFF	REMARKS
7L(J9)	-1.4	-2.0	+0.6	7R(J16)	0	-1.2	+1.2	
6L(J8)	-0.8	+1.0	-1.8	6R(J15)	+0.2	+0.5	-0.3	
5L(J7)	-1.0	+0.7	-1.7	5R(J14)	-0.8	+0.5	-1.3	
4L(J6)	-1.1	-1.0	-0.1	4R(J13)	0	0	0	
3L(J5)	+2.1	+0.4	+1.7	3R(J9)	+1.9	+2.5	-0.6	
2L(J4)	+2.0	-1.2	+3.2	2R(J8)	+0.7	+0.6	+0.1	
1L(J3)	-1.9	-4.3	+2.4	1R(J7)	-0.8	+0.3	-1.1	
SPREAD	5.0°							

REMARKS

AFCC FORM 938C

DISTRIBUTION UNIT CHECKS *(Continued)*

CLEARANCE DU C+SB AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
3L(J5)	0.134 – 0.216	0.197	3R(J9)	0.199	3L–3R	±0.012	0.002
1L(J3)	REF ±0.060	0.998	1R(J7)	1.000	1L–1R	±0.060	0.002

CLEARANCE C+SB SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
3L(J5)	+82	80.9	-1.1	3R(J9)	0	-6.7	-6.7	
1L(J3)	+82	78.8	-3.2	1R(J7)	0	0	0	

CLEARANCE DU SBO AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
3L(J5)	0.121 – 0.157	0.138	1R(J9)	0.135	3L–3R	±0.005	0.003
2L(J4)	0.306 – 0.360	0.337	2R(J8)	0.337	2L–2R	±0.010	0
1L(J3)	REF ±0.033	0.998	1R(J7)	1.000	1L–1R	±0.033	0.002

CLEARANCE SBO SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
3L(J5)	-98	-101.7	-3.7	3R(J9)	0	-1.0	-1.0	
2L(J4)	-98	-99.0	-1.0	2R(J8)	0	-0.1	-0.1	
1L(J3)	-98	-99.1	-1.1	1R(J7)	0	0	0	

CLEARANCE PHASE ERROR

CHECK	CSB ERR	SBO ERR	DIFF	CHECK	CSB ERR	SBO ERR	DIFF	REMARKS
3L(J5)	-1.1	-3.7	+2.6	3R(J9)	-6.7	-1.0	-5.7	
2L(J4)	----	-1.0	+1.0	2R(J8)	----	-0.1	+0.1	
1L(J3)	-3.2	-1.1	-2.1	1R(J7)	0	0	0	

REMARKS

Clearance DU Error Spread = 8.3°

TITLE:

SSILS SUBSYSTEM PERFORMANCE CHECKS

LOCATION: Tinker AFB

DATE: 10 December 1980

ADDITIONAL CHECKS

RESULTS OF ANTENNA PAIR STACKING

PAIR #	DDM ON C/L	DISTANCE TO DDM NULL	FFM INDICATIONS
7	.018/90	10" /150	.002 / 90
6 & 7	.003/90	2" /150	.005 / 90
5 - 7	.003/150	1" /90	.005 / 90
4 - 7	.008/150	5" /90	.005 / 90
3 - 7	.009/150	7" /90	.003 / 90
2 - 7	.004/150	5" /90	.003 / 90
1 - 7	.003/150	5" /90	.004 / 90

MEASUREMENTS MADE AT THE CENTERLINE 1000' GROUND CHECKPOINT

FINAL CHECKS
MONITOR READINGS 19 December 1980

FUNCTION	TRANSMITTER ONE	TRANSMITTER TWO
COURSE MOD BALANCE		
COURSE ONE	0	.001 / 90
WIDTH ONE	.002 / 150	.001 / 150
COURSE TWO	0	.001 / 90
WIDTH TWO	.004 / 150	.003 / 150
CLEARANCE MOD BALANCE		
CLEAR COURSE ONE	.005 / 90	.007 / 90
CLEAR WIDTH ONE	.007 / 90	.008 / 90
CLEAR COURSE TWO	.005 / 90	.007 / 90
CLEAR WIDTH TWO	.009 / 90	.011 / 90
COURSE QUARATURE		
WIDTH ONE	.003 / 150	.007 / 90
WIDTH TWO	.004 / 150	.005 / 90
CLEARANCE QUADRATURE		
CLEAR WIDTH ONE	.007 / 90	.008 / 90
CLEAR WIDTH TWO	.009 / 90	.010 / 90

REMARKS

LOCALIZER GROUND CHECK RECORD

FACILITY LOCATION	EQUIPMENT SERIAL NO.	MONTH AND YEAR
Tinker AFB, OK	AN/GRN-30 SN77007	December 1980

	DATE	8 Dec		8 Dec		9 Dec		9 Dec		9 Dec		9 Dec	
	FUNCTION	COMPOSITE		COURSE ONLY		CLEAR ONLY		COURSE QUAD		CLEAR QUAD		CRS NAR CLR WIDE	
	XMTR NO.	1	2	1	2	1	2	1	2	1	2	1	2
90HZ	35	.380	.380			.420	.420		.190*	.210*	.200*	.365	.380
	30	.345	.340			.420	.400		.030	.155*	.145*	.305	.310
	25	.365	.360			.420	.420		.065*	.170*	.155*	.355	.360
	20	.405	.390			.420	.420	.060	.038	.240*	.225*	.380	.390
	15	.375	.375			.415	.420	.120*	.220*	.295*	.270*	.365	.370
	10	.365	.365		.110*	.380	.390	.080	.150	.240*	.330*	.345	.360
	9	.365	.370	.240	.195	.365	.370	.185*	.090*	.225*	.215*	.350	.360
	8	.370	.370	.350	.355	.350	.360	.300*	.140*	.210*	.195*	.360	.360
	7	.405	.405	.410	.405	.300	.300	.295*	.175*	.190*	.180*	.410	.400
	6	.410	.400	.420	.395	.255	.260	.235*	.145*	.170*	.160*	.415	.410
	5	.390	.380	.395	.390	.210	.210	.180*	.110*	.145*	.140*	.390	.410
DEGREES FROM EXTENDED RUNWAY CENTERLINE	4	.370	.360	.380	.370	.165	.165	.135*	.085*	.120*	.115*	.380	.370
	3	.285	.290	.300	.305	.125	.120	.095*	.060*	.090*	.085*	.320	.340
	2	.180	.190	.195	.195	.080	.080	.060*	.035*	.055*	.055*	.205	.215
	W/P	.155	.155	.160	.160	.065	.065	.050*	.030*	.048*	.046*	.170	.175
	1	.095	.090	.095	.095	.039	.040	.032*	.020*	.026*	.025*	.105	.105
	0	.003/150	.001/150	.002/150	0	.002/150	.001/150	.005/150	.002/150	.009/90	.008/90	.002/150	.002/150
	1	.095	.090	.105	.095	.044	.045	.024*	.012*	.044*	.041*	.105	.110
	W/P	.155	.160	.165	.160	.070	.075	.042*	.027*	.065*	.060*	.175	.180
	2	.190	.190	.205	.195	.085	.090	.055*	.033*	.075*	.070*	.210	.220
	3	.300	.300	.320	.310	.125	.130	.085*	.055*	.110*	.100*	.325	.330
	4	.380	.390	.395	.395	.170	.175	.125*	.080*	.135*	.125*	.410	.380
	5	.405	.395	.420	.390	.215	.215	.215*	.115*	.160*	.145*	.410	.400
	6	.400	.395	.410	.400	.260	.265	.285*	.220*	.180*	.165*	.400	.400
	7	.380	.380	.400	.385	.305	.310	.275*	.210*	.200*	.180*	.375	.370
	8	.350	.355	.295	.270	.340	.360	.250*	.185*	.215*	.195*	.345	.350
	9	.355	.360		.065*	.375	.360	.075*	.002	.235*	.220*	.310	.360
	10	.360	.365		.320*	.375	.390	.145*	.155*	.310*	.225*	.310	.320
150Z	15	.365	.370			.365	.390	.225*	.200*	.315*	.300*	.350	.360
	20	.365	.375			.365	.380	.085	.095	.305*	.280*	.370	.380
	25	.375	.375			.370	.390	.008	.017	.260*	.165*	.350	.350
	30	.300	.295			.380	.390	.022	.022	.185*	.155*	.280	.280
	35	.360	.365			.365	.380	.215*	.210*	.295*	.260*	.360	.370

* - INDICATES REVERSE SENSING

LOCALIZER GROUND CHECK RECORD

FACILITY LOCATION	EQUIPMENT SERIAL NO	MONTH AND YEAR
Tinker AFB, OK	AN/GRN-30 SN:77007	December 1980

DATE		15 Dec		15 Dec		15 Dec		17 Dec					
FUNCTION		COMPOSITE		COURSE QUAD		CLEAR QUAD		FINAL COMPOSITE					
XMTR NO.		1	2	1	2	1	2	1	2				
90HZ	35	.380	.380			.017*	.001	.395	.390				
	30	.315	.315			.002	.013	.325	.320				
	25	.360	.360			.006*	.007	.365	.375				
	20	.410	.385			.048*	.034*	.400	.405				
	15	.380	.380			.085*	.075*	.385	.395				
	10	.370	.375	.110	.210	.090*	.095*	.380	.385				
	9	.370	.375	.140*	.070*	.080*	.080*	.380	.385				
	8	.375	.380	.185*	.125*	.080*	.075*	.380	.390				
	7	.410	.405	.185*	.165*	.070*	.065*	.410	.420				
	6	.400	.410	.145*	.135*	.055*	.050*	.395	.400				
	5	.390	.385	.110*	.105*	.042*	.036*	.390	.395				
DEGREES FROM EXTENDED RUNWAY CENTERLINE	4	.375	.370	.075*	.075*	.027*	.022*	.375	.380				
	3	.295	.300	.055*	.055*	.013*	.008	.295	.300				
	2	.190	.195	.038*	.038*	.002*	0	.190	.195				
	W/P	.155	.160	.031*	.031*	0	.002	.155	.155				
	1	.095	.100	.020*	.019*	0	.002	.095	.095				
	0	.002/150	.002/90	.004/150	0	.001/150	.001/150	.001/150	001/150				
	1	.095	.095	.012*	.018*	.002	.004	.095	.095				
	W/P	.155	.155	.022*	.030*	.002	.004	.160	.155				
	2	.190	.190	.028*	.038*	.002	.003	.185	.180				
	3	.310	.305	.050*	.060*	.008*	.006*	.305	.300				
	4	.380	.370	.075*	.085*	.025*	.010*	.380	.405				
	5	.410	.390	.105*	.120*	.035*	.034*	.410	.410				
	6	.405	.395	.145*	.225*	.050*	.048*	.415	.405				
	7	.395	.380	.205*	.250*	.062*	.060*	.400	.395				
	8	.370	.375	.195*	.170*	.068*	.065*	.385	.390				
	9	.380	.385	.003*	.008*	.075*	.070*	.395	.360				
	10	.385	.395	.220*	.095*	.080*	.075*	.400	.370				
150Z	15	.400	.400			.070*	.068*	.410	.420				
	20	.400	.405			.036*	.031*	.415	.425				
	25	.365	.375			.003*	0	.380	.375				
	30	.295	.300			.001*	.001	.315	.305				
	35	.385	.395			.010*	.005	.400	.410				

* - INDICATES REVERSE SENSING

TITLE

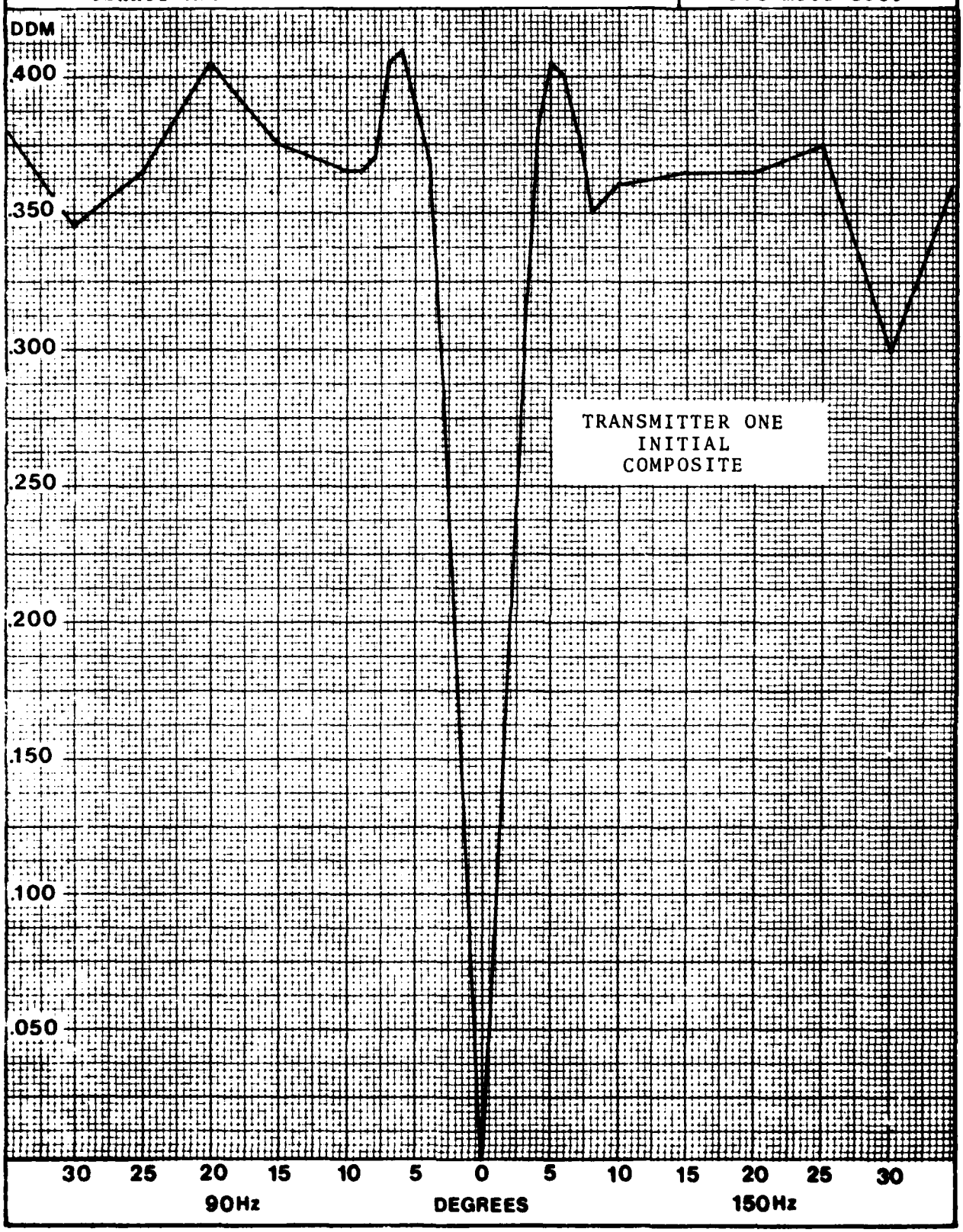
LOCALIZER GROUND CHECK DATA

LOCATION

Tinker AFB

DATE

8 December 1980



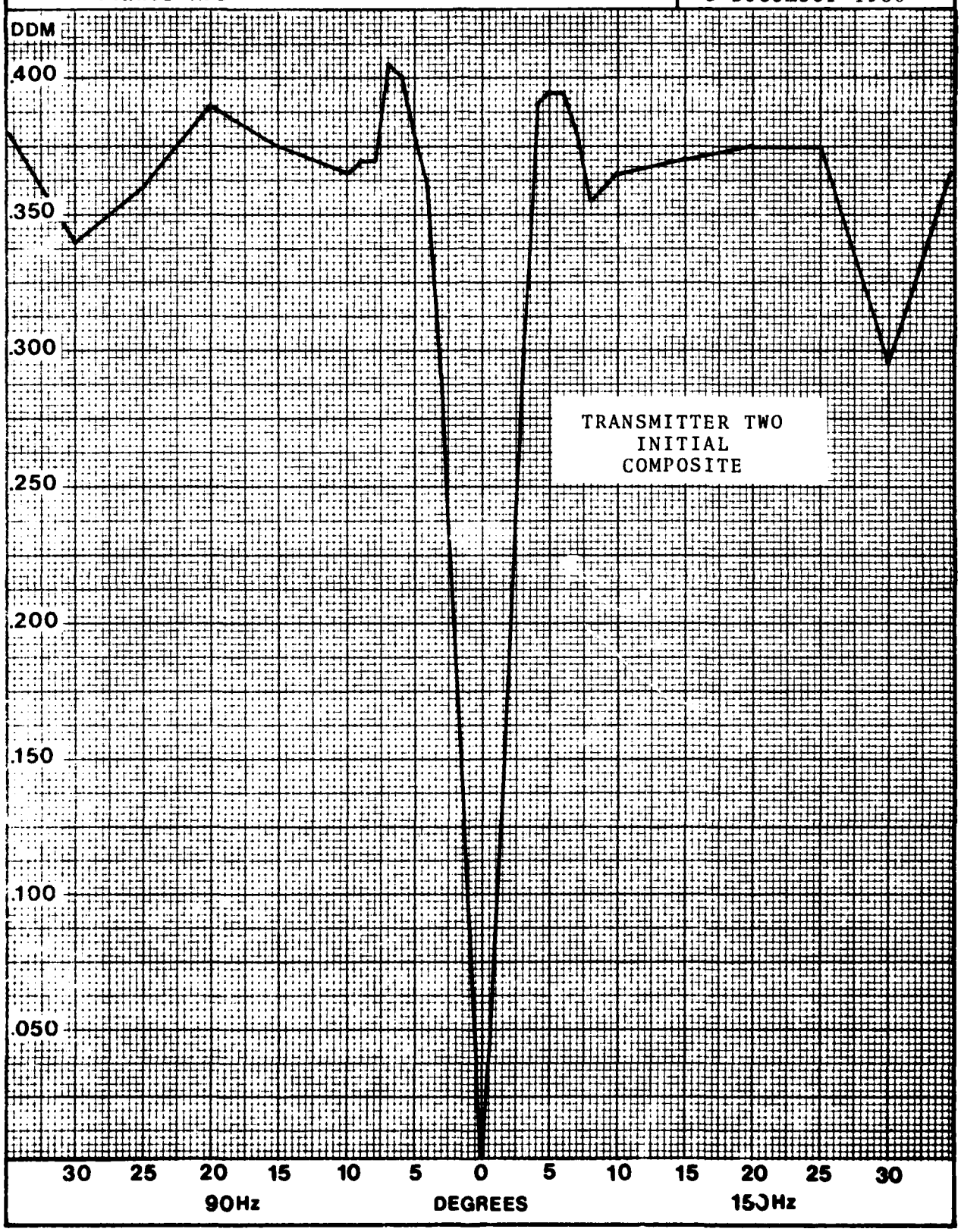
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

LOCALIZER GROUND CHECK DATA

LOCATION Tinker AFB

DATE 8 December 1980



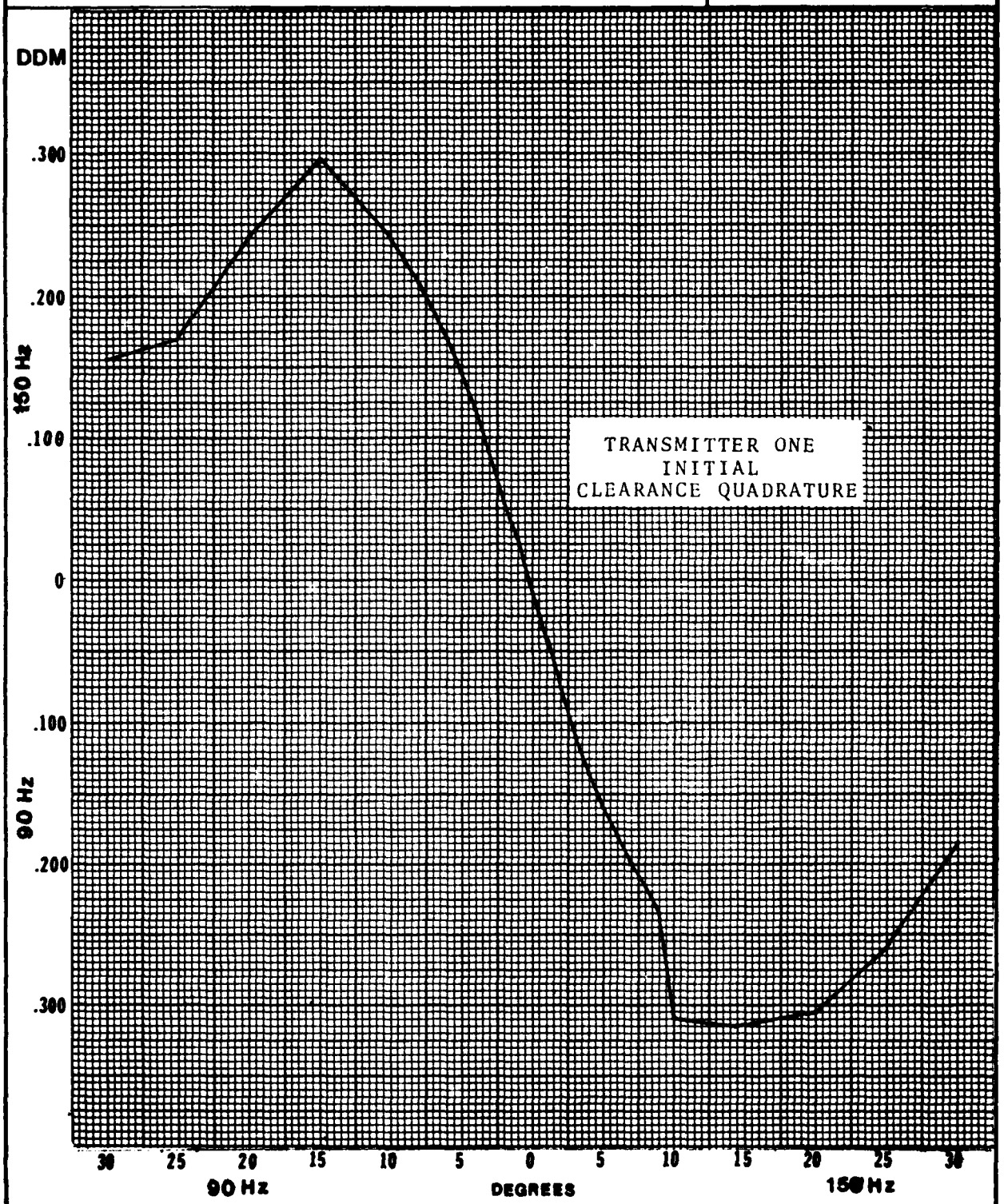
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

LOCALIZER GROUND CHECK DATA

LOCATION: Tinker AFB

DATE: 9 December 1980



REMARKS

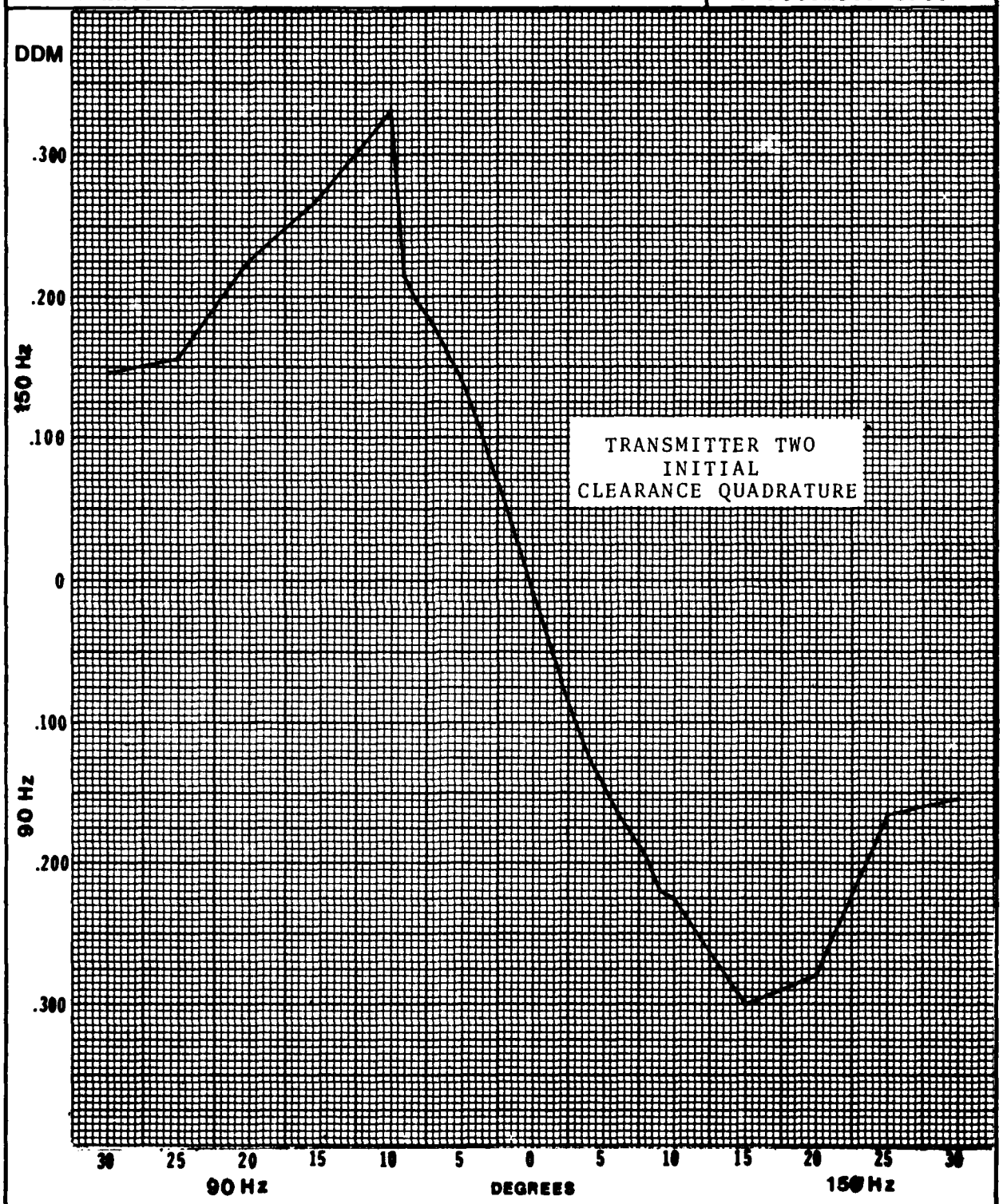
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

LOCALIZER GROUND CHECK DATA

LOCATION: Tinker AFB

DATE: 9 December 1980



REMARKS

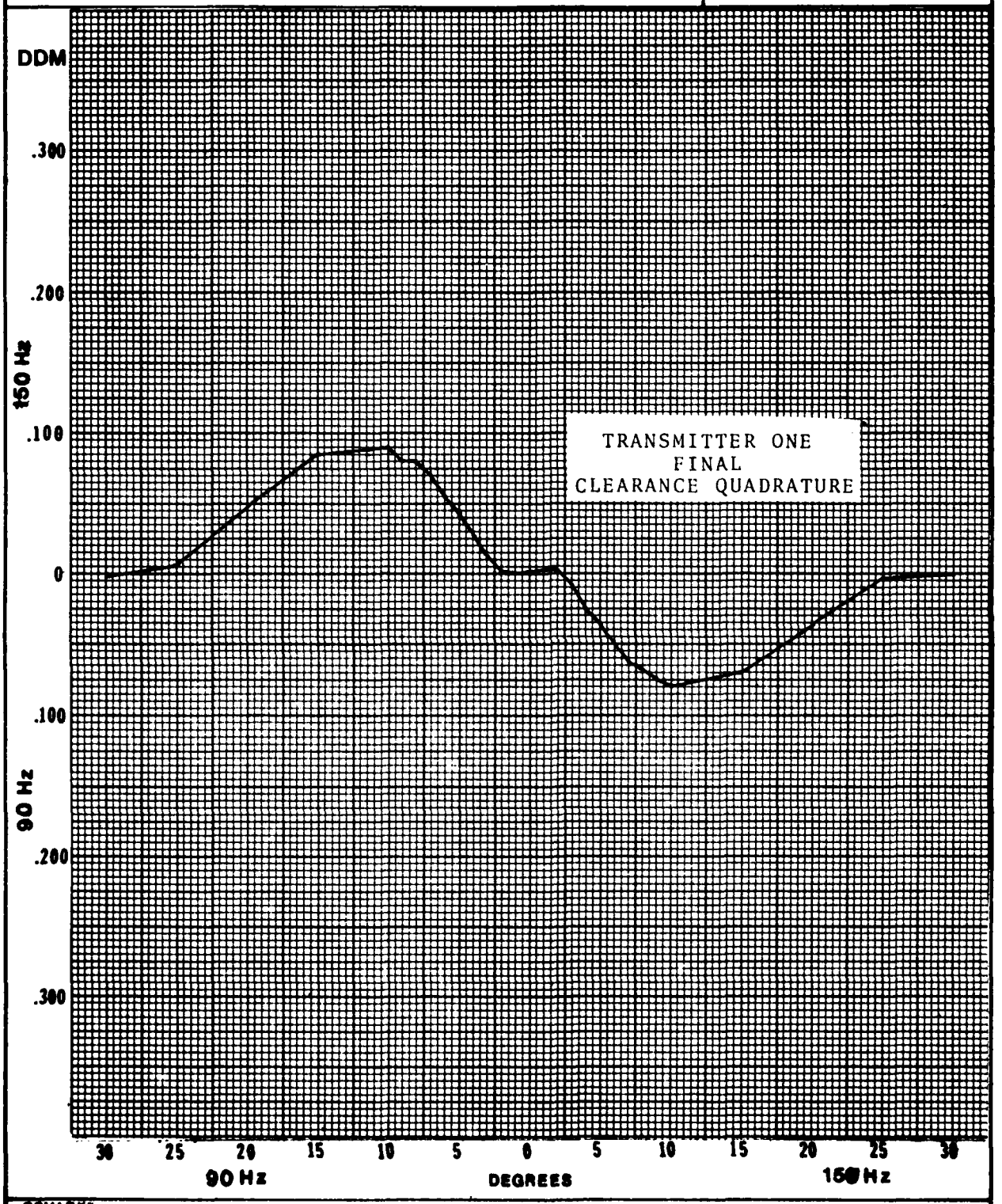
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

LOCALIZER GROUND CHECK DATA

LOCATION: Tinker AFB

DATE: 15 December 1980



REMARKS

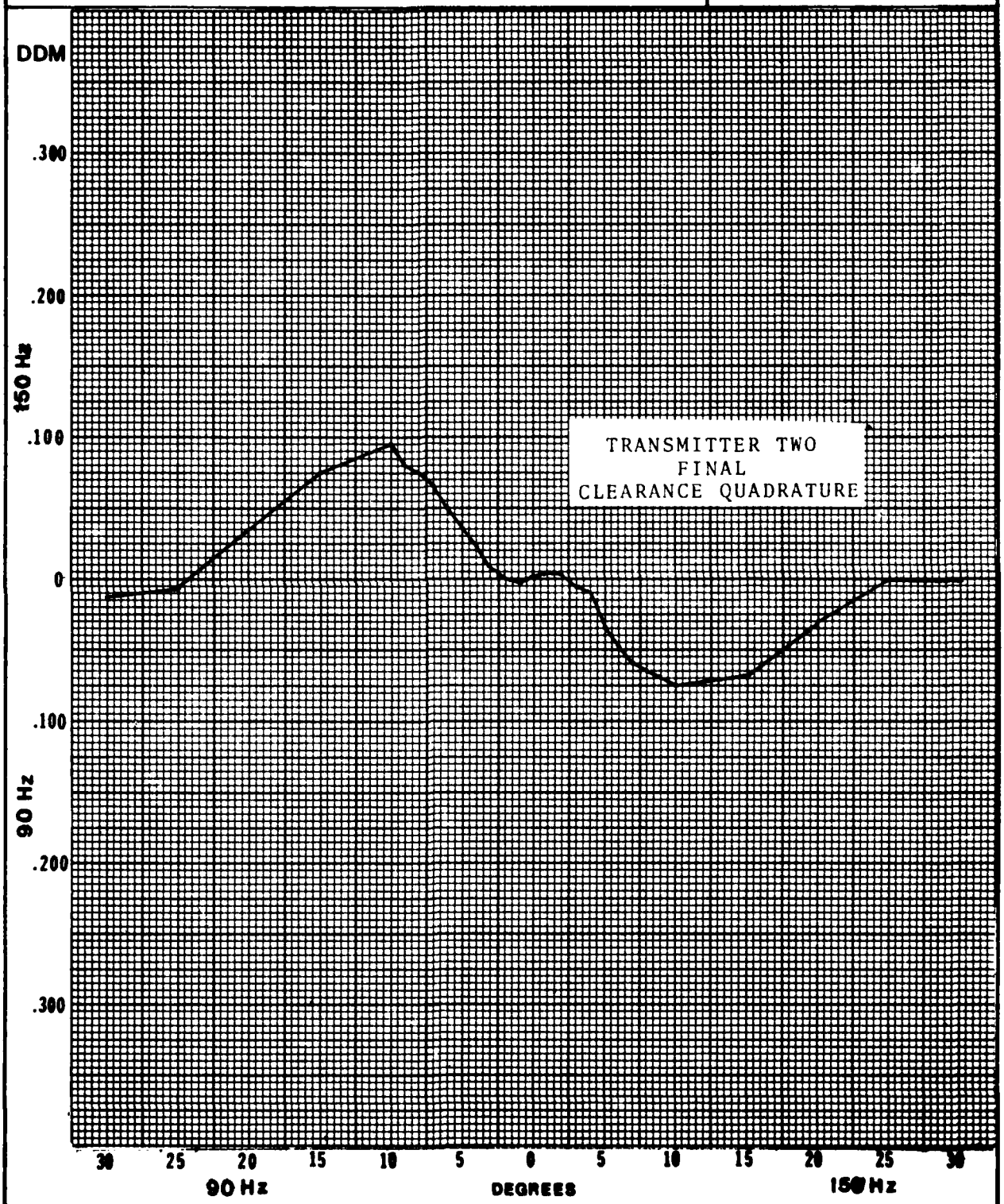
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

LOCALIZER GROUND CHECK DATA

LOCATION Tinker AFB

DATE 15 December 1980



REMARKS

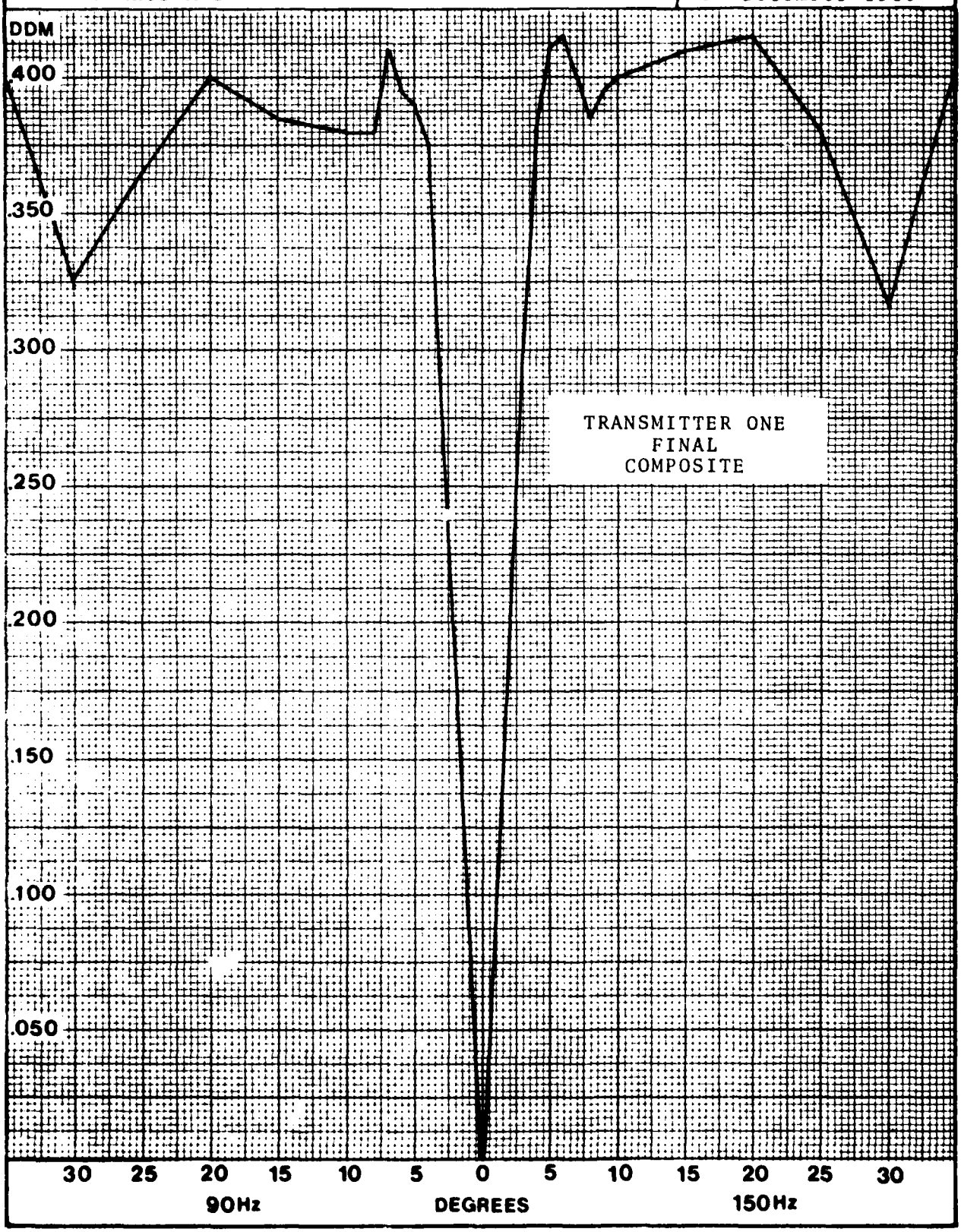
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

LOCALIZER GROUND CHECK DATA

LOCATION: Tinker AFB

DATE: 17 December 1980



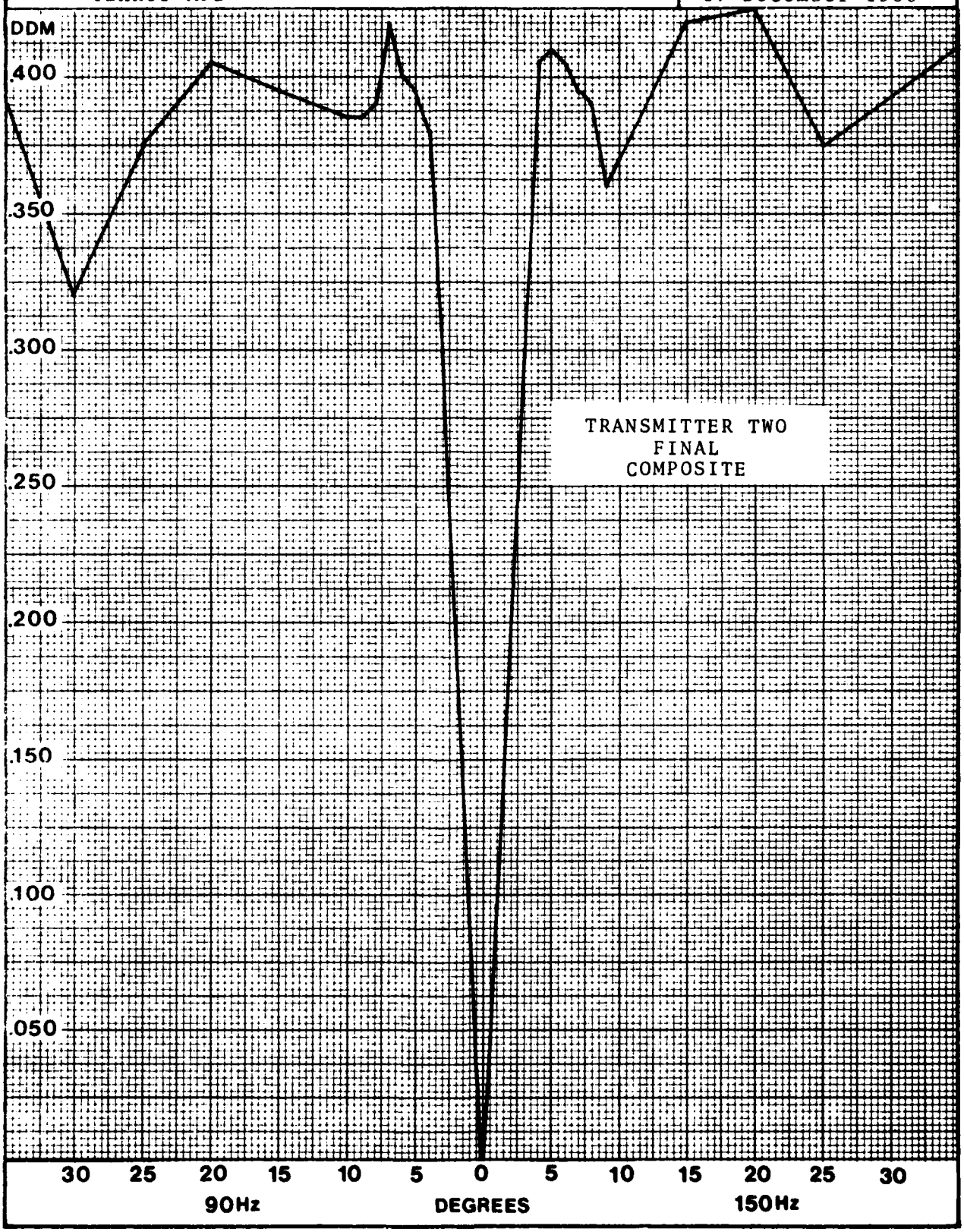
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

LOCALIZER GROUND CHECK DATA

LOCATION: Tinker AFB

DATE: 17 December 1980



AFCS FORM MAY 73 906 GENERAL INFORMATION

SSILS GLIDE SLOPE INITIAL PERFORMANCE CHECKLIST

DATE: 8 December 1980

LOCATION: Tinker AFB, OK

EQUIPMENT AND SERIAL NO.: AN/GRN-31 SN: 77007

TECHNICIAN: Mr. Conley, MSgt Thibodeau

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
POWER						
COURSE CARRIER IN						
LOWER ANTENNA		3.3W	3.0W	3.2W	3.0W	
COURSE SBO IN						
MIDDLE ANTENNA		29mW	26mW	30mW	26mW	
CLEARANCE IN						
UPPER ANTENNA						
COURSE % MODULATION		77.5%	78.8%	78.8%	78%	
90Hz % MODULATION		42.5%		42.5%		
150Hz % MODULATION		42.5%		42.5%		
CLEARANCE % MOD						
COURSE POWER SUPPLY 1						
Q5 DC OUT	0.75 TO 3.5 A	1.0		1.1		
Q4 DC OUT	0.75 TO 3.5 A	1.1		1.2		
DC OUT	26.5 TO 29.5 V	28		28		
PRE REG	30 TO 38 V	35		35		
COURSE POWER SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5 A	1.0		1.1		
Q10 DC OUT	0.75 TO 3.5 A	1.0		1.1		
DC OUT	26.5 TO 29.5	28		28		
PRE REG	30 TO 38 V	35		35		
COURSE TRANSMITTER						
XTAL DRIVE	0.5 MIN	2.5		3.7		
TRIPLER INPUT	0.2 TO 3.8	2.65		2.6		
EXCTR OUTPUT	0.5 TO 3.0	2.0		1.9		
EXCTR ALC	0.7 TO 3.0	2.05		2.25		
SBO DRIVER	0.2 TO 0.59	0.37		0.33		
CSB DRIVER	0.49 TO 1.50	0.8		0.8		
CSB PWR OUT	0.50 TO 3.90	2.4		2.6		
DC IN	22 TO 35	26.5		27		
DC IN	1.0 TO 3.0	1.92		2.0		
SBO PWR OUT	0.50 TO 4.0	1.65		1.9		
CLEARANCE TRANSMITTER						
TRIPLER INPUT	0.2 TO 3.8					
EXCTR OUTPUT	0.5 TO 3.0					
EXCTR ALC	0.7 TO 3.0					
RF AMP	LESS THAN 0.5					
POWER OUT	0.5 TO 3.0					

REMARKS

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
COURSE MONITOR 1						
TEST DDM	0.500 ± 0.020	.508		.509		
PATH (*Int mon*)	0.000 ± 0.050	.001/150	0	.001/150	0	
PATH (*Near field*)	0.000 ± 0.050	.003/90	0	.008/90	0	
WIDTH DDM	0.155-0.195	.166	.174	.172	.176	
RF LEVEL	100.0 ± 5.0	103.9	100.2	102.7	100.1	
% MOD	LAST FC ± 4.0	78.4	78.5	80.5	79.4	
COURSE MONITOR 2						
TEST DDM	0.500 ± 0.020	.509		.509		
PATH (*Int mon*)	0.000 ± 0.050	.003/150	0	.001/150		
PATH (*Near field*)	0.000 ± 0.050	.002/90	.001/150	.006/90	.001/150	
WIDTH DDM	0.155-0.195	.163	.175	.170	.176	
RF LEVEL	100.0 ± 5.0	103.9	100.2	102.7	100.1	
% MOD	LAST FC ± 4.0	77.6	77.8	79.7	78.8	
CLEARANCE MONITOR 1						
RF LEVEL	100.0 ± 5.0					
% MOD	90.0 ± 5.0					
FREQ SEP	8.00 ± 5.0					
CLEARANCE MONITOR 2						
RF LEVEL	100.0 ± 5.0					
% MOD	90.0 ± 5.0					
FREQ SEP	8.00 ± 5.0					
ALARM LIMITS						
COURSE MONITOR		MONITOR 1		MONITOR 2		
% MOD LOWER	NORMAL −004.0	76.9	74.5	75.8	73.5	
UPPER	NORMAL + 004.0	84.8	82.6	83.9	81.5	
RF LEVEL LOWER		66.2		65.9		
PATH (*Near*) UPPER	050.0 ± 0.002	.050		.050		
PATH (*Int*) UPPER	050.0 ± 0.002	.050		.050		
WIDTH DDM LOWER	0.155 ± 0.002	.145*	.155	.144*	.155	
UPPER	0.195 ± 0.002	.204*	.195	.205*	.195	
TEST DDM LOWER	0.426 ± 0.040	.412		.427		
UPPER	0.557 ± 0.040	.542		.558		
CLEARANCE MONITOR ALARM LIMITS						
% MOD LOWER	07.50 ± 5.0					
RF LEVEL LOWER	090.0 ± 5.0					

REMARKS

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
RADIO FREQUENCY						
COURSE	± .002"	332.5984		332.6032		LO=332.59335
CLEARANCE	+ .002"					HI=332.60665
ANTENNA VSWR						
UPPER ANTENNA	< 1.2:1	1.12:1				
CENTER ANTENNA	< 1.2:1	1.12:1				
LOWER ANTENNA	< 1.2:1	1.08:1				
GROUND CHECK						
0 DDM	LAST FC ± 0.010	11' 8"	11' 8"	11' 8"	11' 8"	
ABOVE PATH	LAST FC ± 0.010	15' 1"	14'11"	14' 9"	14'11"	
BELOW PATH	LAST FC ± 0.010	8' 5"	8' 7"	8' 8"	8' 6"	
PHASING						
GROUND CHECKPOINT	LAST FC ± 0.010		.010/90		.009/90	
FAR FIELD	NO SPEC ***	.028/90	.052/90	.110/90	.052/90	
APCU AMP AND PHASE						
		AMPLITUDE		PHASE		
C + SB DISTRIBUTION BALANCE						
SBO DISTRIBUTION BALANCE MID TO LOWER						
SBO DISTRIBUTION BALANCE MID TO UPPER						
CLEARANCE DISTRIBUTION BALANCE		INITIAL	ADJUST	INITIAL	ADJUST	
MOD Balance Far Field ***		.004/150	.002/90	.002/150	.003/90	
MONITOR OFFSETS						
PATH(INT) #1			.005/90		.004/90	
PATH(NF) #1			.010/150		.010/150	
WIDTH #1			.013/90		.013/90	
PATH(INT) #2			.004/90		.003/90	
PATH(NF) #2			.010/150		.013/150	
WIDTH #2			.011/90		.011/90	
IN QUADRATURE READINGS						
WIDTH #1			.017/90		.020/90	
WIDTH #2			.015/90		.018/90	

* - Change 3 to TO 31R4-2GRN31-2 changed the width monitor alarm points from 0.145 to 0.155 and from 0.205 to 0.195. The workcards, 31R4-2GRN31-6WC-1, have not been changed. TO tolerances were applied during the TRACALS Evaluation and the monitors tightened up to the TO specification. Local maintenance will submit an AFTO Form 22.

** - The "ADJUSTED" readings were recorded following the flight evaluation.

*** - Far field modulation balance and phasing were accomplished at the Localizer far field monitor.

A. C. POWER	DATE: 11 December 1980
LOCATION: Tinker AFB	EQUIPMENT & SERIAL NUMBER: AN/GRN-30 SN: 77007

CHECK	SPECIFICATIONS	PRIME POWER			STANDBY POWER		
1. VISUAL INSPECTION		SAT			SAT		
2. REGULATOR INPUT		VOLTAGE		CURRENT	VOLTAGE		CURRENT
		INITIAL	ADJUSTED		INITIAL	ADJUSTED	
PHASE A		124		4.5	122		5
PHASE B		124		6	122		7
PHASE C							
A + B		244			240		
NEUTRAL							
3. POWER FACTOR							

GENERATOR	MANUFACTURER: Katolight	TYPE: D20FGH4	SERIAL NUMBER: 76671-2S-27862
	CAPACITY: 20 kW	FREQUENCY: 60 Hz	LOAD:
AUTOMATIC CHANGEOVER	MANUFACTURER: Zenith	TYPE: ZTS10B-2EHTU	CHANGEOVER INTERVAL: 5 seconds

VOLTAGE REGULATOR RESPONSE

VOLTAGE REGULATOR	SPECIFICATION	AS FOUND	ADJUSTED TO: MANUALLY	ADJUSTED TO: AUTOMATIC	TIME TO ADJUST
PHASE A					
PHASE B					
PHASE C					

EQUIPMENT GROUNDING

REMARKS

The primary and backup power sources for the Localizer are adequate and reliable.

* U.S. GOVERNMENT PRINTING OFFICE 1978—686-009/617

A. C. POWER	DATE 11 December 1980
LOCATION: Tinker AFB	EQUIPMENT & SERIAL NUMBER: AN/GRN-31 SN: 77007

CHECK	SPECIFICATIONS	PRIME POWER			STANDBY POWER		
1. VISUAL INSPECTION		SAT			SAT		
2. REGULATOR INPUT		VOLTAGE		CURRENT	VOLTAGE		CURRENT
		INITIAL	ADJUSTED		INITIAL	ADJUSTED	
PHASE A		131		6.8	124		6.8
PHASE B		131		4.2	124		4.2
PHASE C							
A + B		260			245		
NEUTRAL							
3. POWER FACTOR							

GENERATOR	MANUFACTURER: Katolight	TYPE: D20FGH4	SERIAL NUMBER: 76671-1S-27862
	CAPACITY: 20 kW	FREQUENCY: 60 Hz	LOAD:
AUTOMATIC CHANGEOVER	MANUFACTURER: Zenith	TYPE: ZTS10B-2EHTU	CHANGEOVER INTERVAL: 6 seconds

VOLTAGE REGULATOR RESPONSE

VOLTAGE REGULATOR	SPECIFICATION	AS FOUND	ADJUSTED TO: MANUALLY	ADJUSTED TO: AUTOMATIC	TIME TO ADJUST
PHASE A					
PHASE B					
PHASE C					

EQUIPMENT GROUNDING

REMARKS

The primary power appeared to be slightly high. Local maintenance was advised to notify BCE. The backup power was adequate and reliable.

☆ U.S. GOVERNMENT PRINTING OFFICE 1978—665-009/617

SSILS LOC. PRE-POST AIRBORNE EVALUATION CHECKLIST

DATE 16 December 1980

CHECK	SPECIFICATION	TRANSMITTER NO 1		TRANSMITTER NO. 2		REMARKS
		PRE	POST	PRE	POST	
COURSE CARRIER POWER		15W	15W	15W	15.2W	
COURSE SB POWER		300mW	300mW	300mW	300mW	
CLEARANCE CARRIER POWER		4W	4W	4W	4W	
CLEARANCE SB POWER		130mW	130mW	140mW	140mW	
COURSE % MODULATION		40%	41.3%	40%	38.8%	
CLEARANCE % MODULATION		41.3%	48.8%*	42.5%	42.5%	
MONITORS COURSE I						
COURSE DDM	0.000 ± 0.011	.002/90	.001/90	.004/90	.004/90	**
WIDTH DDM	0.141 TO 0.175	.152	.156	.151	.153	
RF LEVEL	100.0 ± 10.0	99.5	99.8	99.6	101.2	
% MOD	LAST FC ± 0.004	40.5	40.6	39.6	39.6	
ID % MOD	005.0 ± 2.0	4.0	5.2	4.6	4.6	
COURSE II						
COURSE DDM	0.000 ± 0.011	.001/90	.001/90	.003/90	.003/90	**
WIDTH DDM	0.141 TO 0.175	.151	.156	.150	.153	
RF LEVEL	100.0 ± 10.0	99.5	99.7	99.6	101.2	
% MOD	LAST FC ± 0.004	41.2	41.4	40.3	40.3	
ID % MOD	005.0 ± 2.0	4.5	4.4	5.1	4.9	
CLEARANCE I						
COURSE DDM	0.000 ± 0.026	.004/150	.005/150	.002/150	.003/150	
WIDTH DDM	0.129 TO 0.181	.173	.174	.178	.179	**
RF LEVEL	100.0 ± 10.0	94.3	99.9	94.0	99.8	
% MOD	LAST FC ± 0.004	39.9	46.1	40.0	40.0	
ID % MOD	005.0 ± 2.0	3.9	3.9	4.0	4.2	
FREQ SEP	9.5 ± 1.0	9.5	9.4	9.2	9.1	
CLEARANCE II						
COURSE DDM	0.000 ± 0.026	.004/150	.004/150	.002/150	.003/150	
WIDTH DDM	0.129 TO 0.181	.177	.174	.181	.181	**
RF LEVEL	100.0 ± 10.0	94.2	99.7	94.0	99.6	
% MOD	LAST FC ± 0.004	41.1	47.4	41.2	41.2	
ID % MOD	005.0 ± 2.0	4.3	4.8	4.3	4.3	
FREQ SEP	9.5 ± 1.0	9.5	9.3	9.1	9.1	
FFM 1						
DDM	0.000 ± 0.005	.004/90	.003/90	.005/90	.005/90	
% MOD	40.0 ± 10.0	45	45	44	44	
FFM 2						
DDM	0.000 ± 0.005	.004/90	.004/90	.006/90	.006/90	
% MOD	40.0 ± 10.0	48	47	47	46	

REMARKS

* - Clearance percent of modulation was reduced during the 17 December flight inspection sortie.

** - Monitor readings were not optimized during this flight inspection sortie.

SSILS LOC. PRE-POST AIRBORNE EVALUATION CHECKLIST

DATE 17 December 1980

CHECK	SPECIFICATION	TRANSMITTER NO 1		TRANSMITTER NO. 2		REMARKS
		PRE	POST	PRE	POST	
COURSE CARRIER POWER		14.5W	15W	15W	15W	
COURSE SB POWER		300mW	310mW	300mW	310mW	
CLEARANCE CARRIER POWER		4W	4W	4W	4W	
CLEARANCE SB POWER		120mW	142mW	135mW	142mW	
COURSE % MODULATION		40%	40%	40%	40%	
CLEARANCE % MODULATION		47.5%	42.5%	42.5%	42.5%	
MONITORS COURSE I						
COURSE DDM	0.000 ± 0.011	.002/90	.001/150	.005/90	0	
WIDTH DDM	0.141 TO 0.175	.155	.156	.155	.155	
RF LEVEL	100.0 ± 10.0	101.4	100.0	101.1	101.0	
% MOD	LAST FC ± 0.004	40.7	40.5	39.6	40.4	
ID % MOD	005.0 ± 2.0	4.0	4.1	4.2	4.6	
COURSE II						
COURSE DDM	0.000 ± 0.011	.001/90	.001/150	.003/90	.001/90	
WIDTH DDM	0.141 TO 0.175	.155	.156	.154	.156	
RF LEVEL	100.0 ± 10.0	101.3	100.1	101.0	101.0	
% MOD	LAST FC ± 0.004	41.4	41.2	40.3	41.1	
ID % MOD	005.0 ± 2.0	4.4	4.5	5.2	5.1	
CLEARANCE I						
COURSE DDM	0.000 ± 0.026	.003/150	.002/150	.002/150	.001/90	
WIDTH DDM	0.129 TO 0.181	.168	.154	.175	.155	
RF LEVEL	100.0 ± 10.0	102.9	100.4	102.6	101.2	
% MOD	LAST FC ± 0.004	46.0	42.0	39.8	41.9	
ID % MOD	005.0 ± 2.0	3.7	4.0	3.5	4.0	
FREQ SEP	9.5 ± 1.0	9.5	9.3	9.3	9.2	
CLEARANCE II						
COURSE DDM	0.000 ± 0.026	.003/150	.002/150	.002/150	.002/90	
WIDTH DDM	0.129 TO 0.181	.168	.155	.178	.155	
RF LEVEL	100.0 ± 10.0	102.8	100.1	102.5	100.9	
% MOD	LAST FC ± 0.004	47.2	43.2	41.0	43.2	
ID % MOD	005.0 ± 2.0	4.3	4.5	3.3	4.4	
FREQ SEP	9.5 ± 1.0	9.5	9.3	9.2	9.1	
FFM 1						
DDM	0.000 ± 0.005	.004/90	0	.005/90	0	
% MOD	40.0 ± 10.0	45	45	44	45	
FFM 2						
DDM	0.000 ± 0.005	.004/90	0	.006/90	0	
% MOD	40.0 ± 10.0	48	47	46	47	

REMARKS

SSILS G/S PRE-POST AIRBORNE EVALUATION CHECKLIST						DATE 18 December 1980
CHECK	SPECIFICATION	TRANSMITTER 1		TRANSMITTER 2		REMARKS
		PRE	POST	PRE	POST	
UPPER ANTENNA POWER						
CENTER ANTENNA POWER		25mW	26mW	27mW	26mW	
LOWER ANTENNA POWER		3.0W	3.0W	3.2W	3.0W	
COURSE % MODULATION		80%	78.8%	80%	78%	
CLEARANCE % MODULATION						
MONITORS COURSE I						
PATH (*INT*)	0.000 ± 0.050	.006/90	0	.001/90	0	
PATH (*NF*)	0.000 ± 0.050	.002/90	0	.001/150	0	
WIDTH DDM	0.145 TO 0.205	.168	.174	.183	.176	
RF LEVEL	100.0 ± 10.0	95.1	100.2	98.3	100.1	
% MOD	LAST FC ± 4.0	78.5	78.5	81.2	79.4	
COURSE II						
PATH (*INT*)	0.000 ± 0.050	.006/90	0	0	.001/150	
PATH (*NF*)	0.000 ± 0.050	.001/90	.001/150	.002/150	.001/150	
WIDTH DDM	0.145 TO 0.205	.176	.175	.190	.176	
RF LEVEL	100.0 ± 10.0	95.4	100.2	98.4	100.1	
% MOD	LAST FC ± 4.0	77.8	77.8	80.5	78.8	
CLEARANCE I						
RF LEVEL	100.0 ± 5.0					
% MOD	90.0 ± 5.0					
FREQ SEP	8.00 ± 5.0					
CLEARANCE II						
RF LEVEL	100.0 ± 5.0					
% MOD	90.0 ± 5.0					
FREQ SEP	8.00 ± 5.0					

REMARKS

AFCC FORM JAN 80 939b

FLIGHT INSPECTION REPORT—INSTRUMENT LANDING SYSTEM

Reports Identification Symbol FS8071-19

1. STATION		2. IDENT.	3. DATE/DATES OF INSPECTION
Tinker AFB, OK	RWY 17	JTZ	12/16-18/80

4. TYPE OF INSPECTION

	SITE EVALUATION		PERIODIC	X	SPECIAL TRACALS		YES	**5. COMMON SYSTEM**
	COMMISSIONING		SURVEILLANCE		INCOMPLETE	X	NO	

6. OWNER					
		FAA		U.S. ARMY	PRIVATE (Indicate actual owner)
				U.S. NAVY	
		INTER-NATIONAL	X	U.S.A.F	OTHER (Indicate actual owner)
				U.S.C.G.	

7. FACILITY/COMPONENT INSPECTED					
X	LOCALIZER		COMPASS LOCATORS	X	75 mHz MARKERS
X	GLIDE SLOPE		DME	X	LIGHTING SYSTEM

8. LOCALIZER

COMMISSIONED WIDTH 3.30

FRONT COURSE TX 1 OT	TX 1 INIT.	TX 1 FINAL	TX 2 OT	TX 2 INIT.	TX 2 FINAL	CATEGORY I	BACK COURSE TX 1 OT	TX 1 INIT.	TX 1 FINAL	TX 2 OT	TX 2 INIT.	TX 2 FINAL
		3.25		3.30	3.35	COURSE WIDTH					✓	✓
		19.6			19.9	MODULATION						
		235/29				CLEARANCE 150					✓	
		230/29				CLEARANCE 90						
		0			0	COURSE STRUCTURE—Z1					✓	
		11/0.8			10/1.0	COURSE STRUCTURE—Z2					✓	
		13/0.3			9/0.5	COURSE STRUCTURE—Z3						
		C/L			2uaL	ALIGNMENT						
						VOICE						
		S			S	IDENTIFICATION			✓			
		18				USABLE DISTANCE						
						MONITOR						
		3.05			3.00	COURSE WIDTH (Narrow)						
		3.70			3.75	COURSE WIDTH (Wide)						
		205/29			195/28	CLEARANCE 150						
		200/29			200/28	CLEARANCE 90						
		10			10	ALIGNMENT 150						
		10			11	ALIGNMENT 90						

9. GLIDE SLOPE

COM'D ANGLE 2.50

TX 1 OT	TX 1 INIT	TX 1 FINAL	TX 2 OT	TX 2 INIT.	TX 2 FINAL	CATEGORY I
		79			79.5	MODULATION
		2.49			2.47	ANGLE
		0.71			0.73	WIDTH
					S	CLEARANCE BELOW PATH
		1.51			1.52	STRUCTURE BELOW PATH
		4/5.4			6/4.9	PATH STRUCTURE—Z1
		22/2.4			16/1.0	PATH STRUCTURE—Z2
		8/0.3			3/0.3	PATH STRUCTURE—Z3
		10				USABLE DISTANCE
						MONITOR
						ANGLE (Low)
						ANGLE (High)
		0.89			0.79	PATH WIDTH (Wide)
		S				CLEARANCE BELOW PATH

10. GENERAL

	SAT	UNSAT
75 mHz MARKERS	X	
COMPASS LOCATORS		
DME		
LIGHTING SYSTEMS	X	

11. FACILITY STATUS

	F/C	G/S	B/C
UNRESTRICTED		X	
RESTRICTED	X		
UNUSABLE			

NOTAM:

12. REMARKS

1. This was a special inspection/TRACALS Evaluation of number 1 transmitter, on an AN/GRN-29 ILS to RWY 17. Periodic requirements were fulfilled on both transmitters. TRACALS Evaluation was to investigate possible corrective actions for localizer structure problems from 1.5NM to threshold.
2. Localizer alignment and structure and glide slope actual angle and structure

REGION	FIELD OFFICE	FLIGHT INSPECTOR'S SIGNATURE
	1866 FCS	JAMES L. SMITH, Major, USAF

FAA Form 8240-7 (5-76) FORMERLY FAA FORM 3488

FLIGHT INSPECTION REPORT—INSTRUMENT LANDING SYSTEM
SUPPLEMENT SHEET

1. STATION	2. IDENT.	3. DATE/DATES OF INSPECTION
Tinker AFB, OK RWY 17	JTZ	12/16-18/80

4. LOlocalizer

	TX-1		TX-2	
4a. VERTICAL POLARIZATION	0 ua		0 ua	
4b. SYMMETRY	51 % 90 Hz	49 % 150 Hz	51 % 90 Hz	49 % 150 Hz

5. GLIDE PATH

		PATH ANGLE		PATH WIDTH		STRUCTURE BELOW PATH	
		TX-1	TX-2	TX-1	TX-2	TX-1	TX-2
5a. DEPHASE	ADVANCE 26/23°	2.52	2.54	0 .88	0 .85	1.20	1.28
	RETARD 15/18°	2.55	2.54	0 .89	0 .81	1.35	1.40
5b. PATH ANGLE LOWERED TO ALARM							
5c. PATH ANGLE RAISED TO ALARM							
5d. PATH WIDTH NARROWED TO ALARM		2.51		0 .61		1.48	
5e. PATH WIDTH WIDENED TO ALARM		2.52	2.53	0 .89	0 .79	1.34	1.38
5f. CLEARANCE TX MODULATION DECREASED TO ALARM							
5g. ATTENUATE MIDDLE ANT. TO ALARM							
5h. ATTENUATE UPPER ANT. TO ALARM							

	TX-1		TX-2	
5i. SYMMETRY →	39 % 90 Hz	61 % 150 Hz	47 % 90 Hz	53 % 150 Hz
5j. MODULATION BALANCE →	TX-1 0		TX-2	
5k. PHASING →	TX-1 2 ua 150		TX-2	
5l. FRONT COURSE AREA WHERE PHASING CONDUCTED →			On Course 0	Hz SIDE
5m. STRUCTURE BELOW PATH—CAPTURE EFFECT *(Special procedures)* →			TX-1	TX-2

6. REMARKS

measured with RTT.

3. Localizer alignment measured from INM from middle marker to middle marker.

4. Localizer clearance only width 7.00°.

5. CBP flown satisfactorily with TX advanced 26° to alarm because SBP was outside of service volume of the glide slope.

6. Actual angle at localizer extremeties: 90Hz side, 2.50°; 150Hz side, 2.43°.

7. TX 1 mean width 0.68° mean symmetry 49% 90Hz, above path angle 2.88°, below path angle 2.14°.

FLIGHT INSPECTION REPORT – CONTINUATION SHEET

1. STATION	2. LOCATION IDENT.	3. FACILITY TYPE	4. DATE/DATES OF INSPECTION
Tinker AFB, OK RWY 17	JTZ	ILS/AN/GRN 29	12/16-18/80

8. FAA FSNFO, Ms Mayes, notified at 2100Z, 12/18/80 of completion of periodic requirements.

9. Restriction placed on facility 5/19/80 remains in effect.

TITLE

LOCALIZER FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

17 December 1980

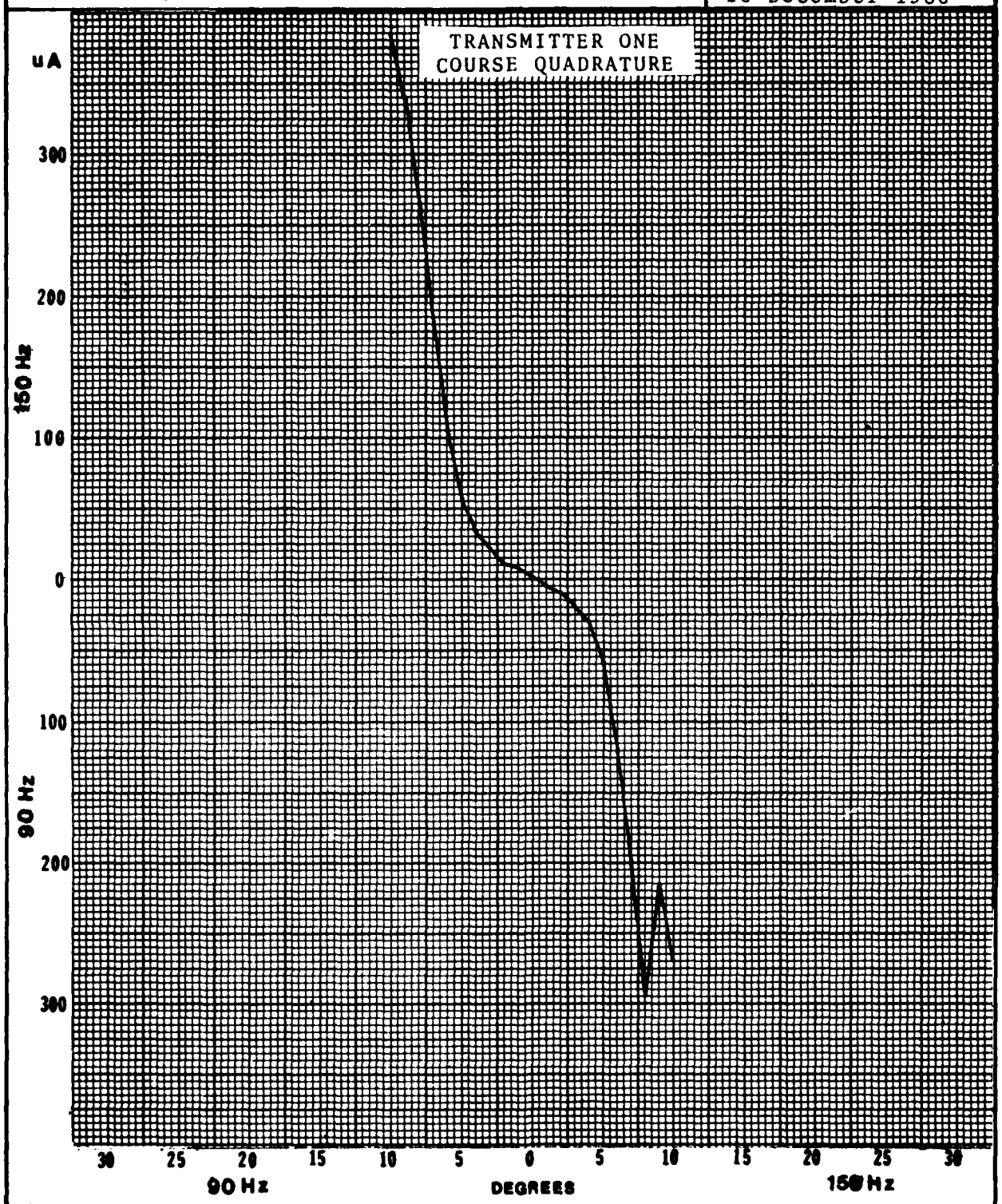
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

LOCALIZER FLIGHT INSPECTION DATA

LOCATION: Tinker AFB

DATE: 16 December 1980

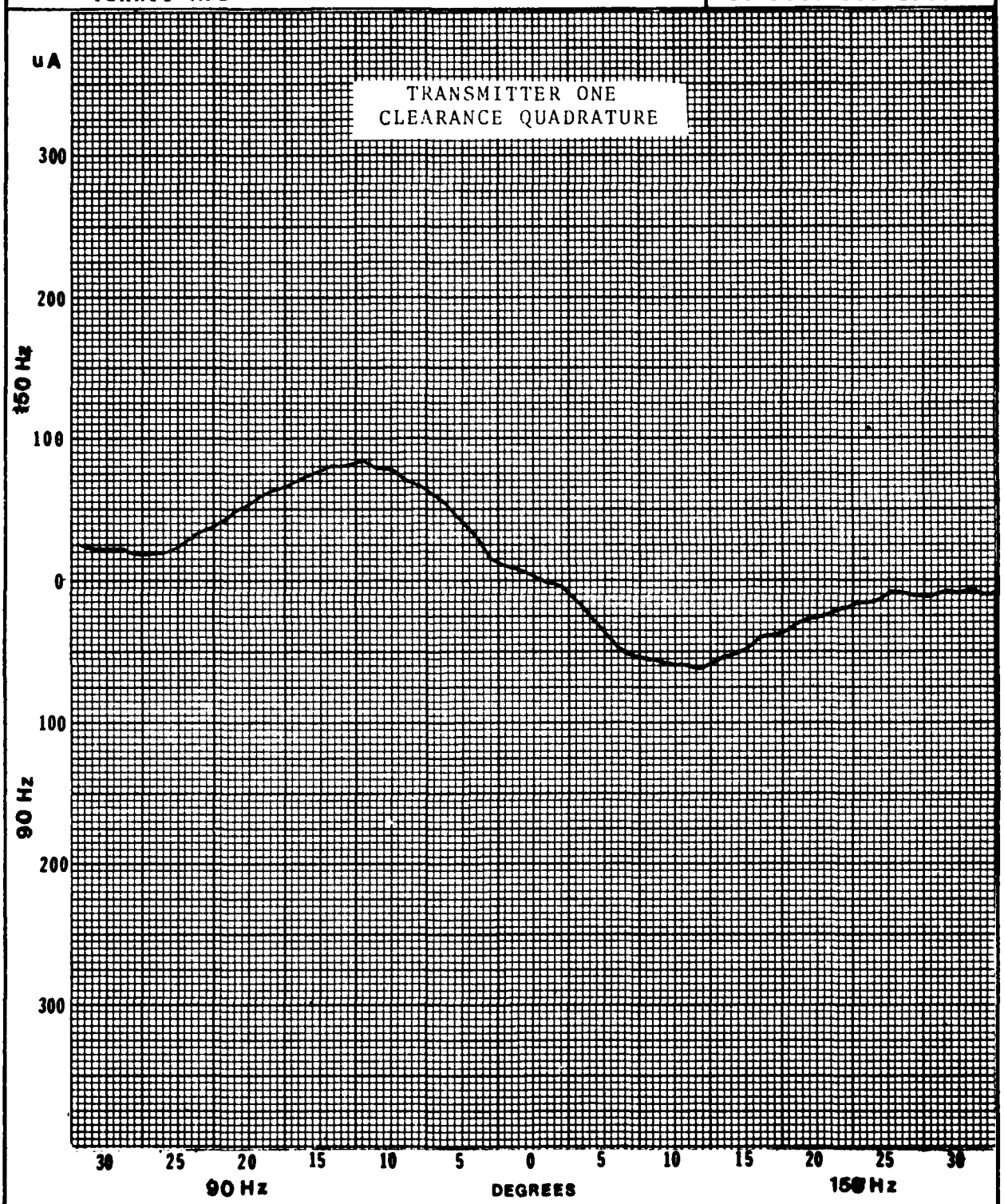


REMARKS

TITLE:

LOCALIZER FLIGHT INSPECTION DATA

LOCATION	DATE
Tinker AFB	16 December 1980



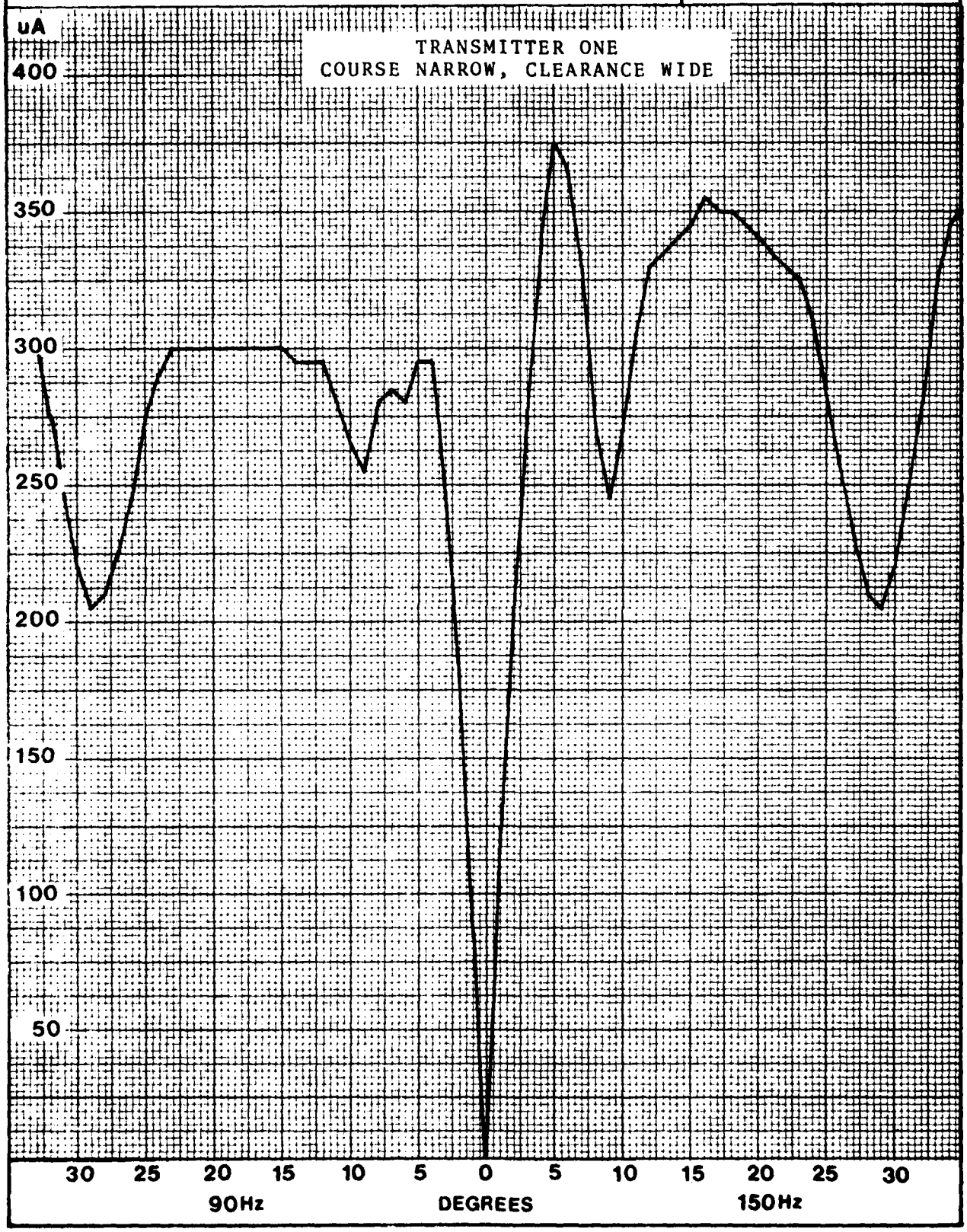
REMARKS

TITLE

LOCALIZER FLIGHT INSPECTION DATA

LOCATION: Tinker AFB

DATE: 17 December 1980



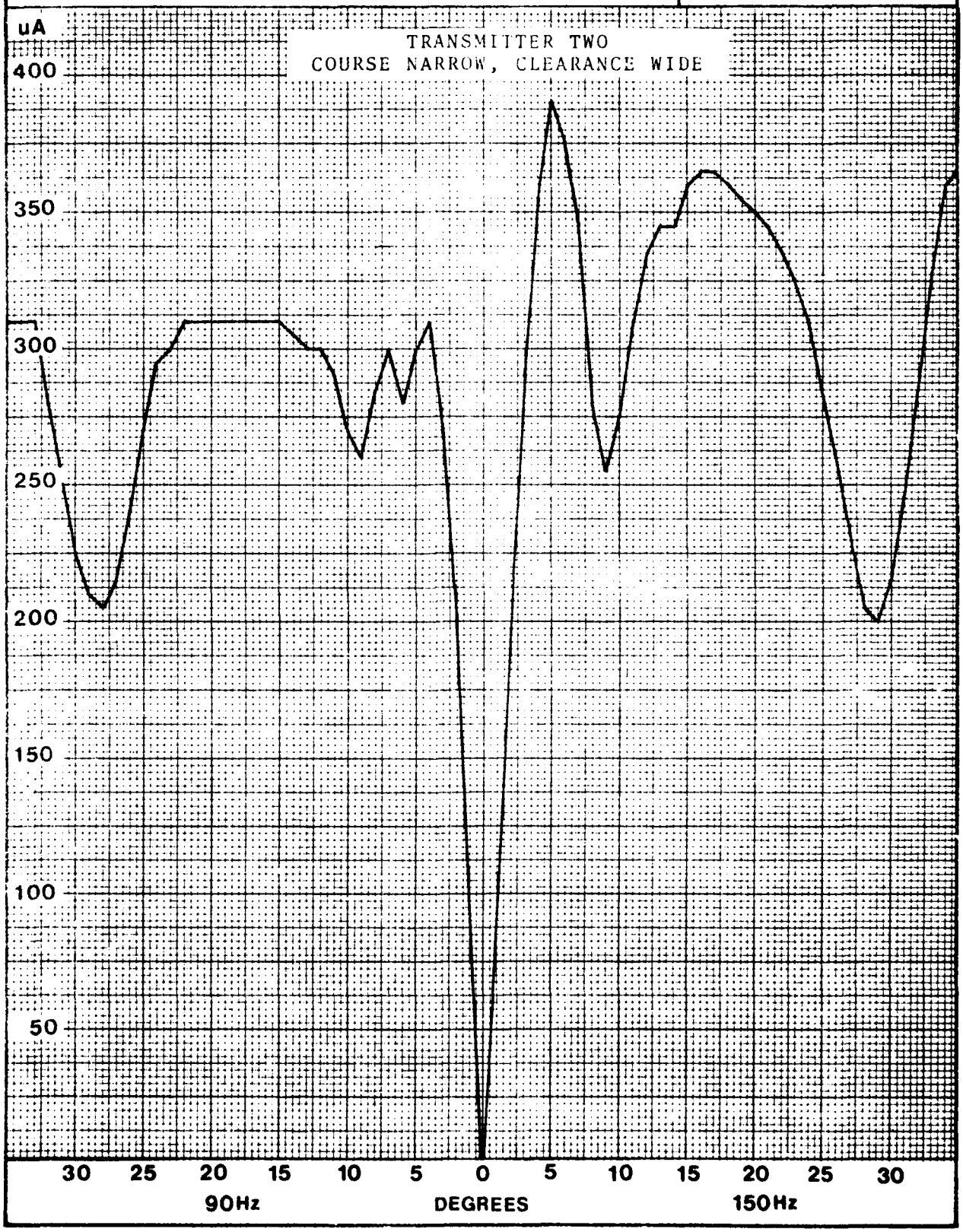
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

LOCALIZER FLIGHT INSPECTION DATA

LOCATION: Tinker AFB

DATE: 17 December 1980



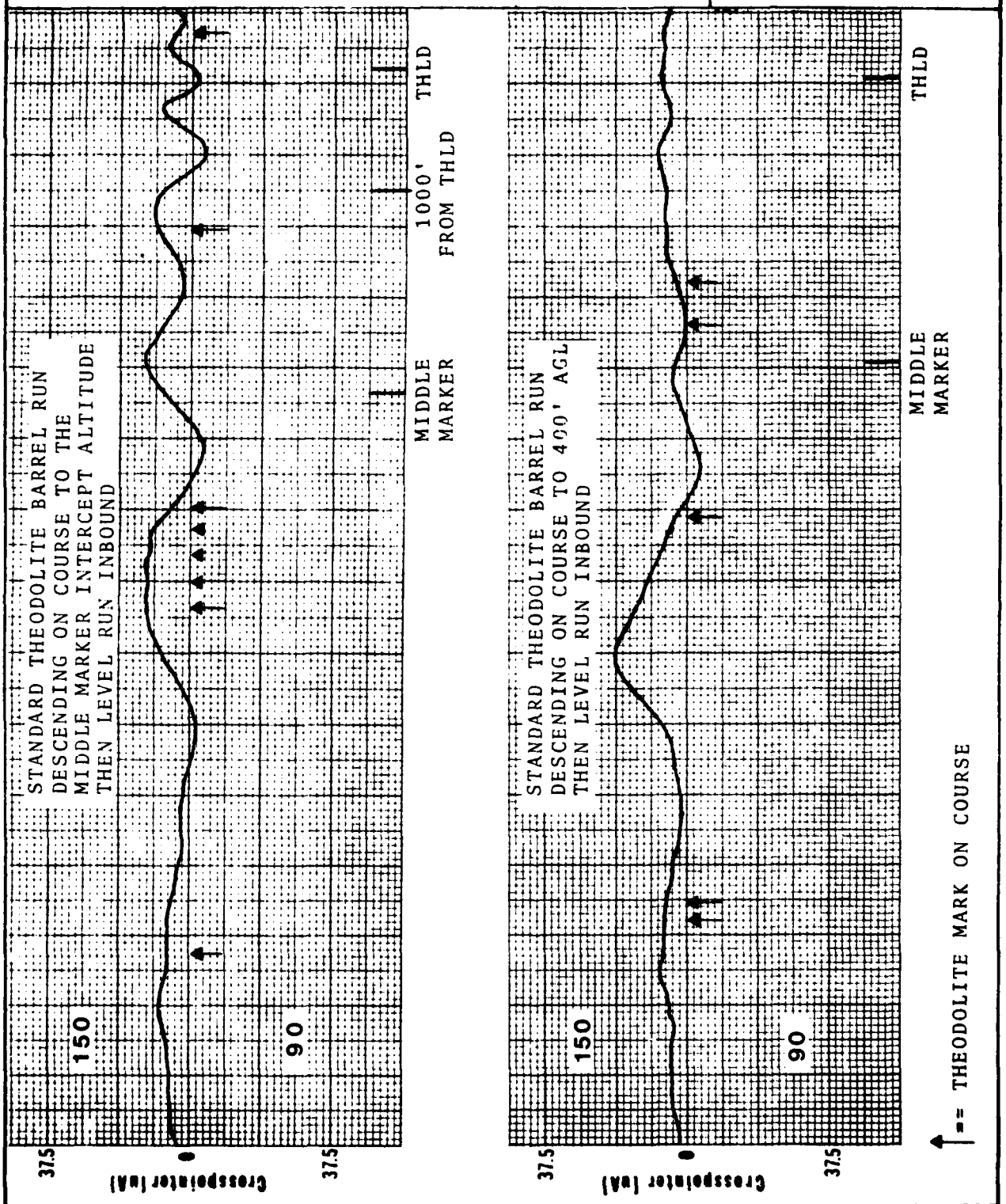
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

LOCALIZER FLIGHT INSPECTION DATA

LOCATION: Tinker AFB

DATE: 16 December 1980



REMARKS

AFCS FORM MAY 73 906 GENERAL INFORMATION

78-56791

TITLE

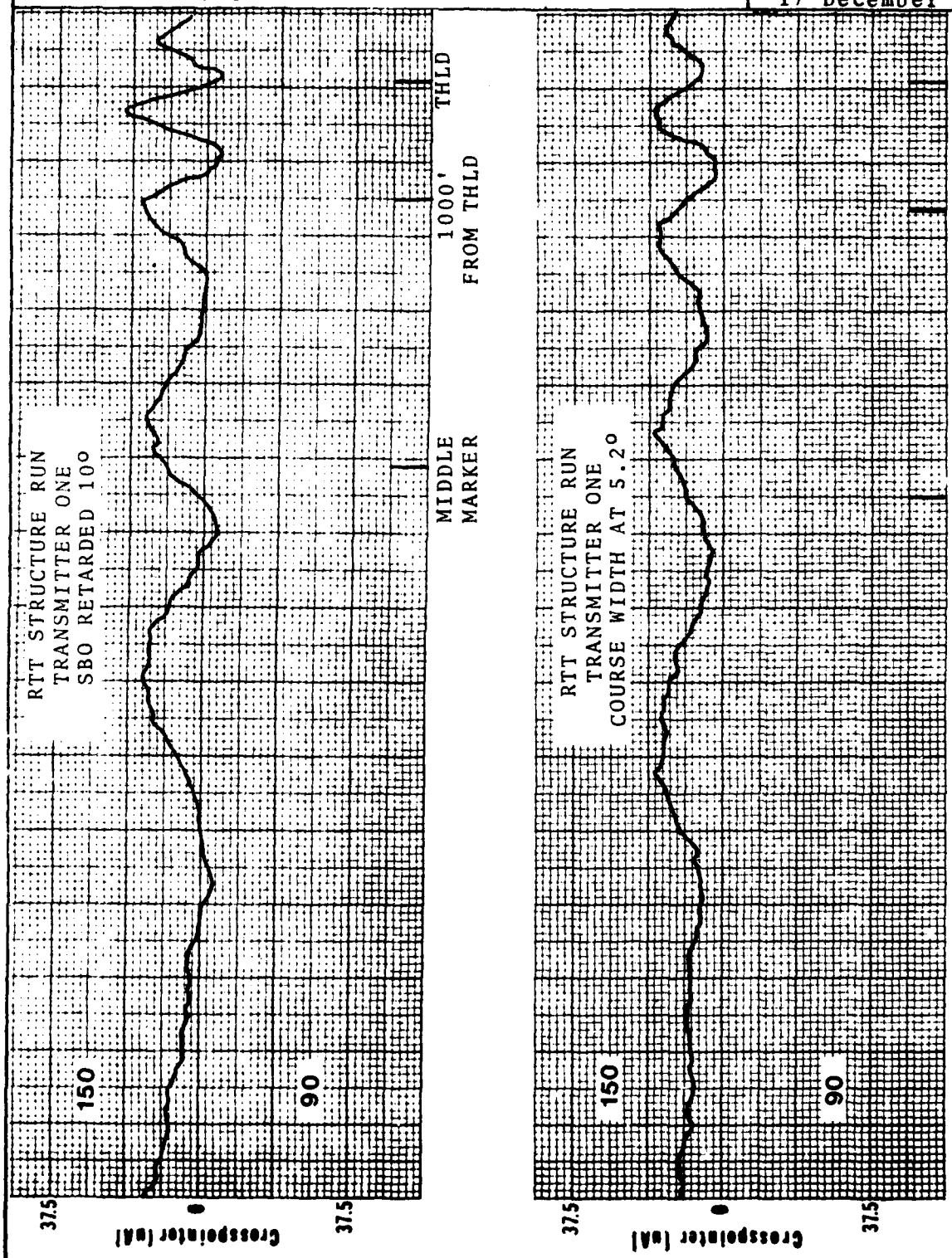
LOCALIZER FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

17 December 1980



REMARKS

AFCS FORM MAY 73 906 GENERAL INFORMATION

78-80791

TITLE

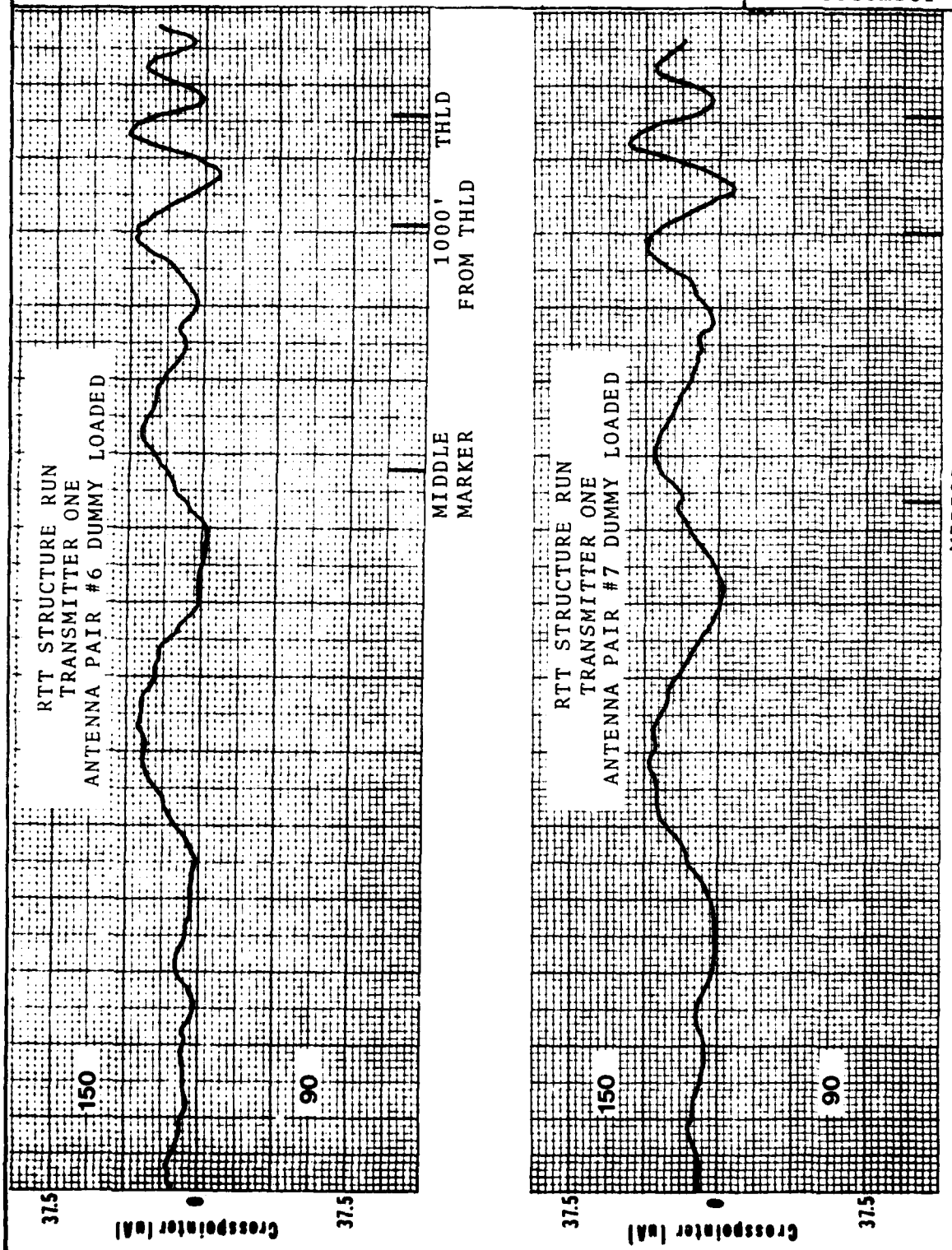
LOCALIZER FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

17 December 1980



REMARKS

TITLE

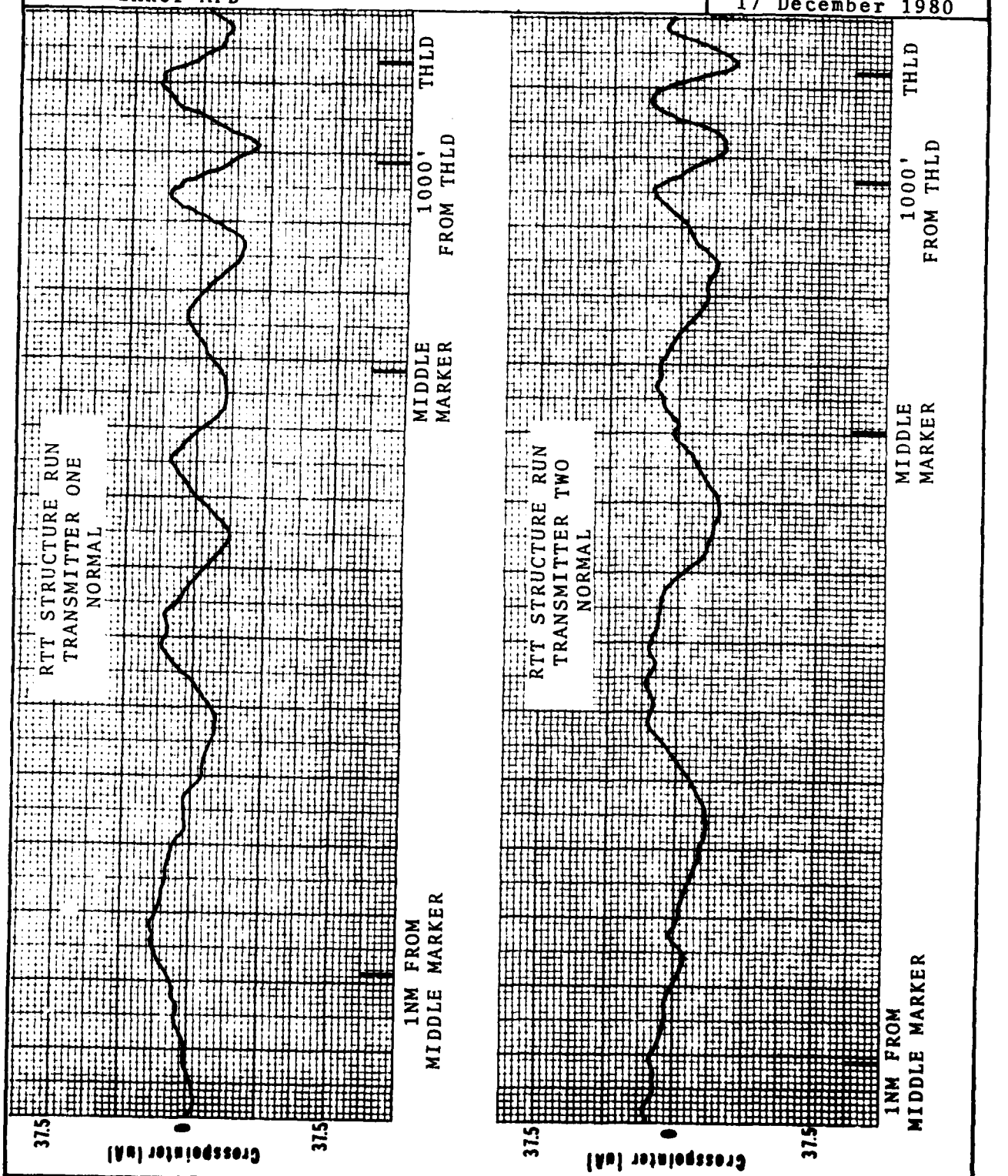
LOCALIZER FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

17 December 1980



REMARKS

AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

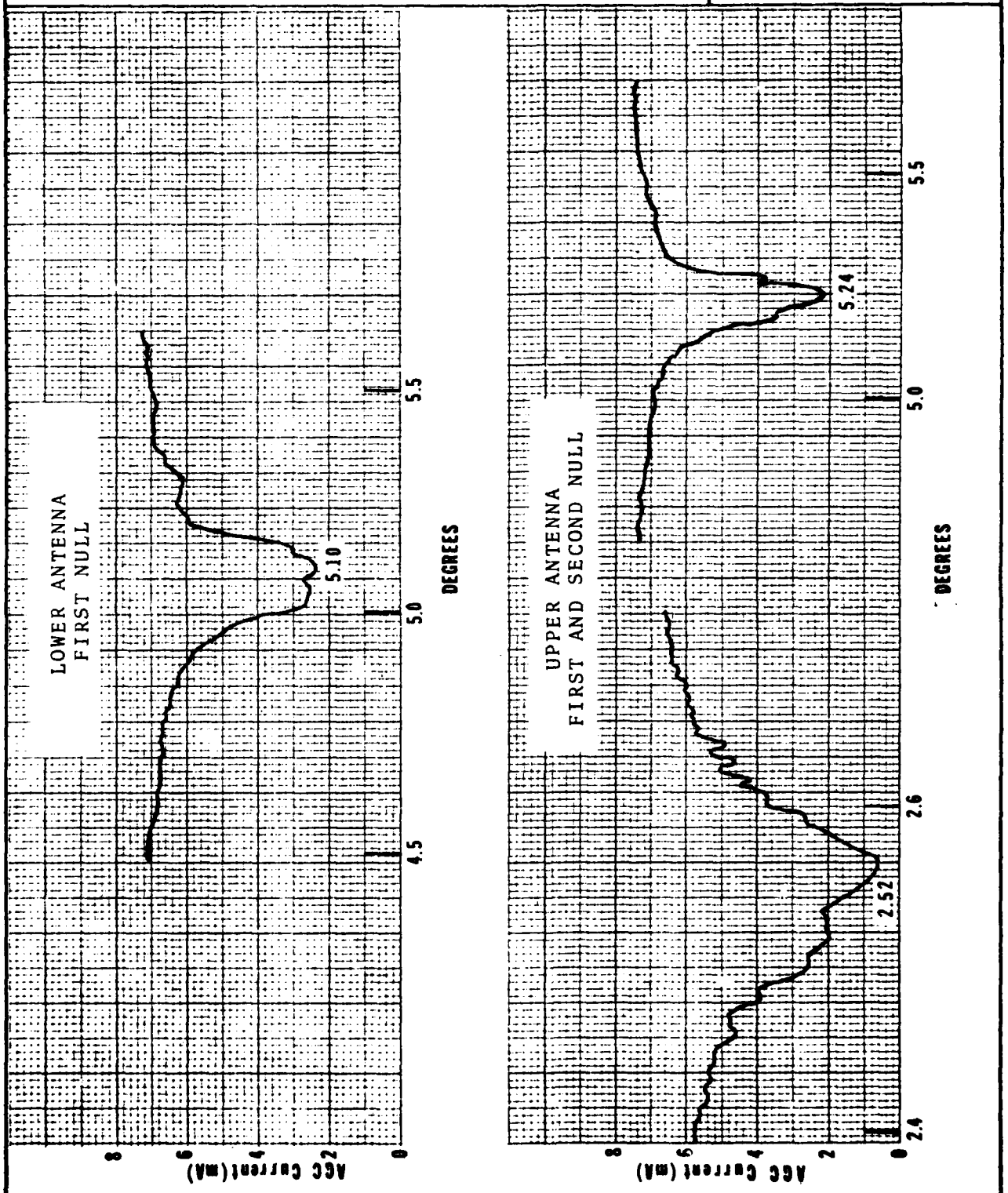
GLIDE SLOPE FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

18 December 1980



REMARKS

AFCS FORM MAY 906 GENERAL INFORMATION

TITLE

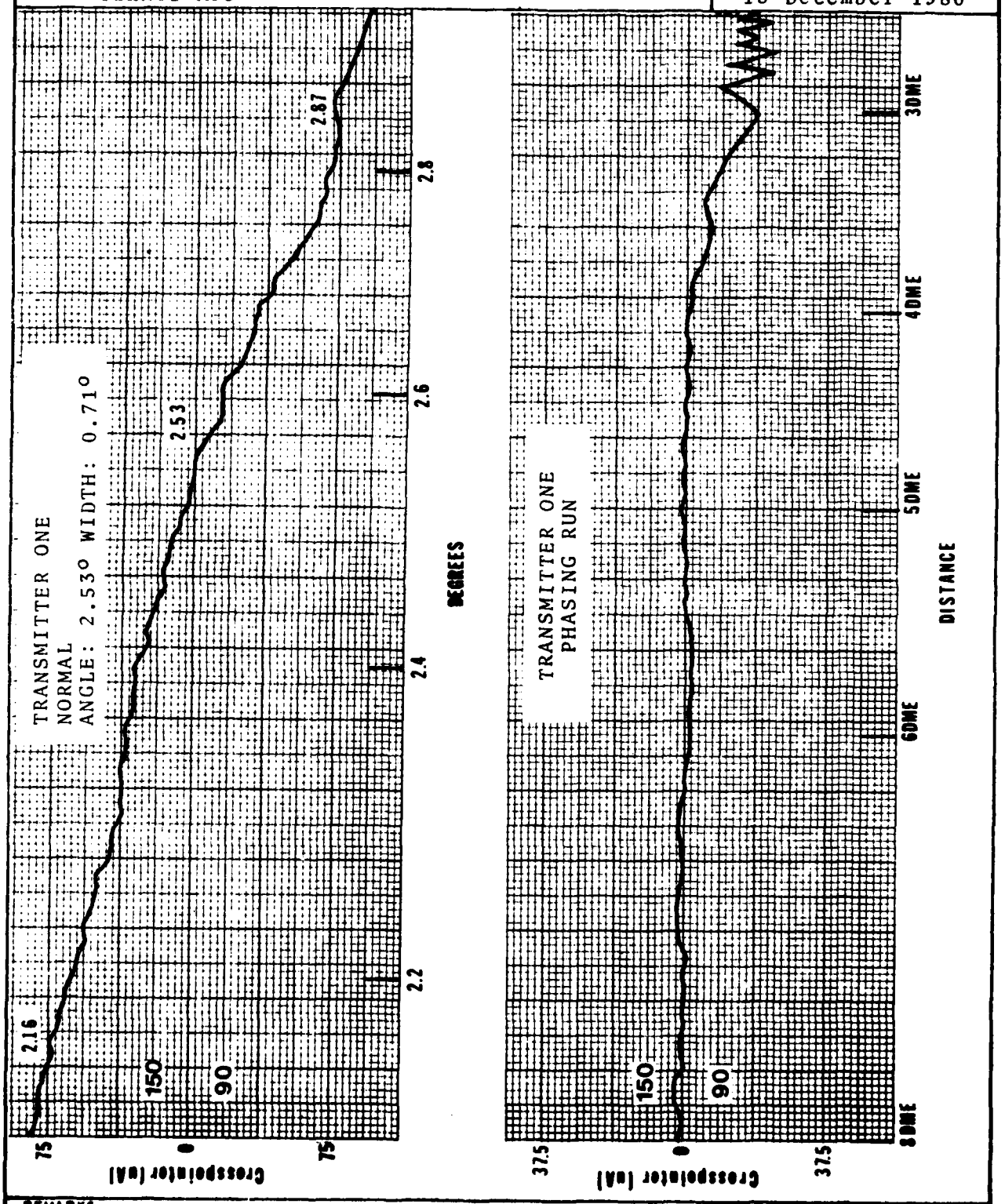
GLIDE SLOPE FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

18 December 1980



REMARKS

AFCS FORM MAY 79 906 GENERAL INFORMATION

TITLE

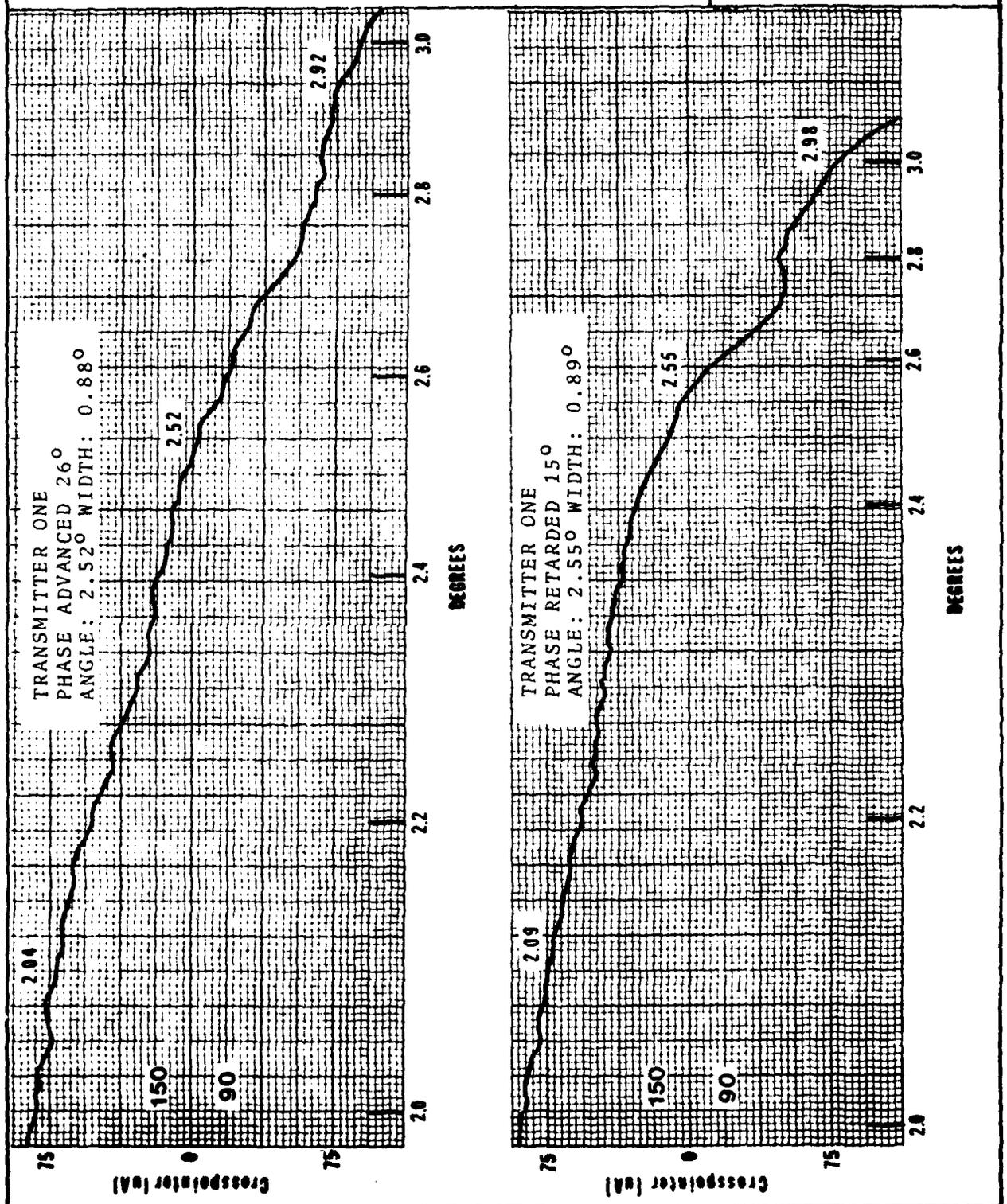
GLIDE SLOPE FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

18 December 1980



REMARKS

AFCS FORM MAY 75 906 GENERAL INFORMATION

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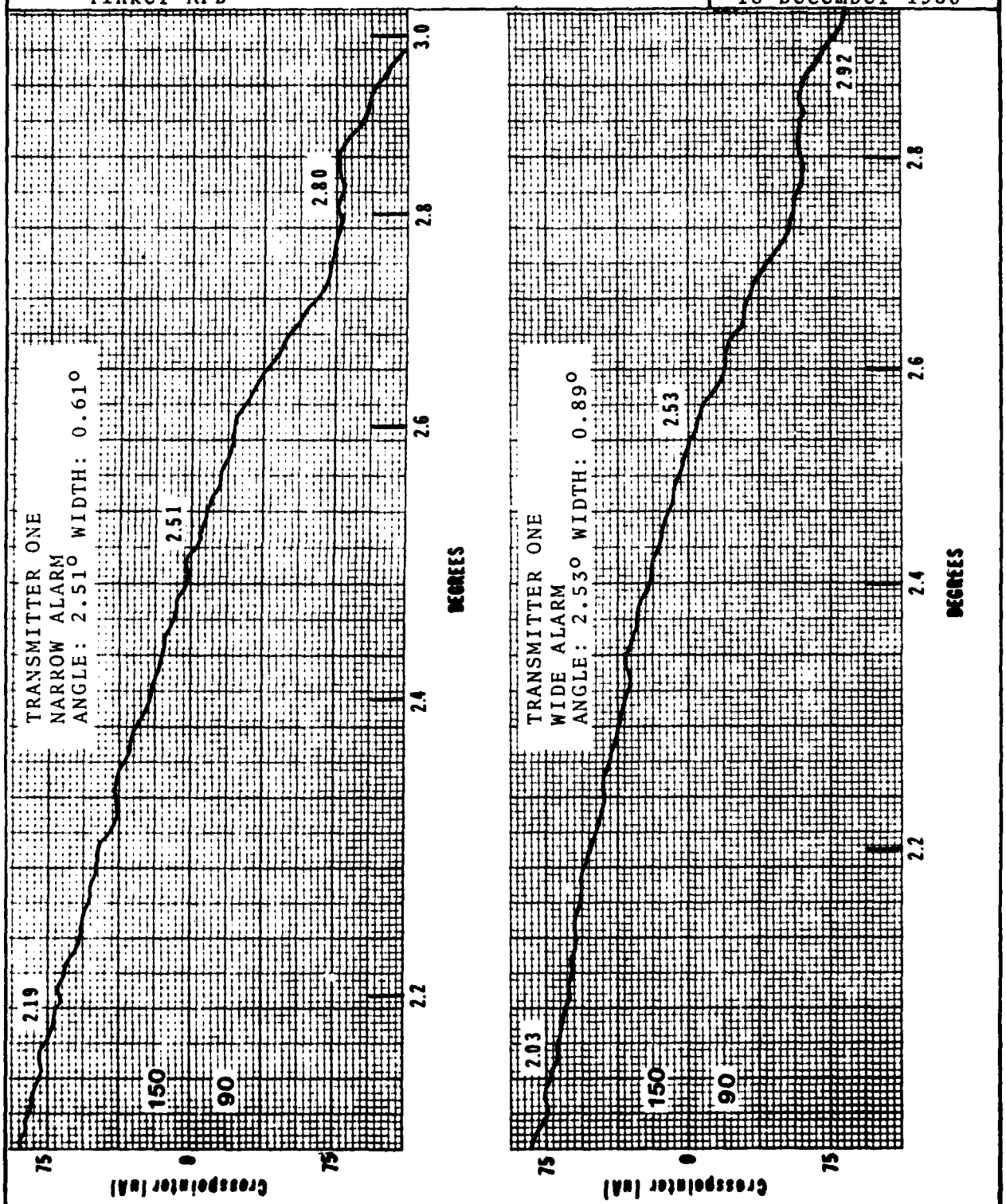
GLIDE SLOPE FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

18 December 1980



REMARKS

AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

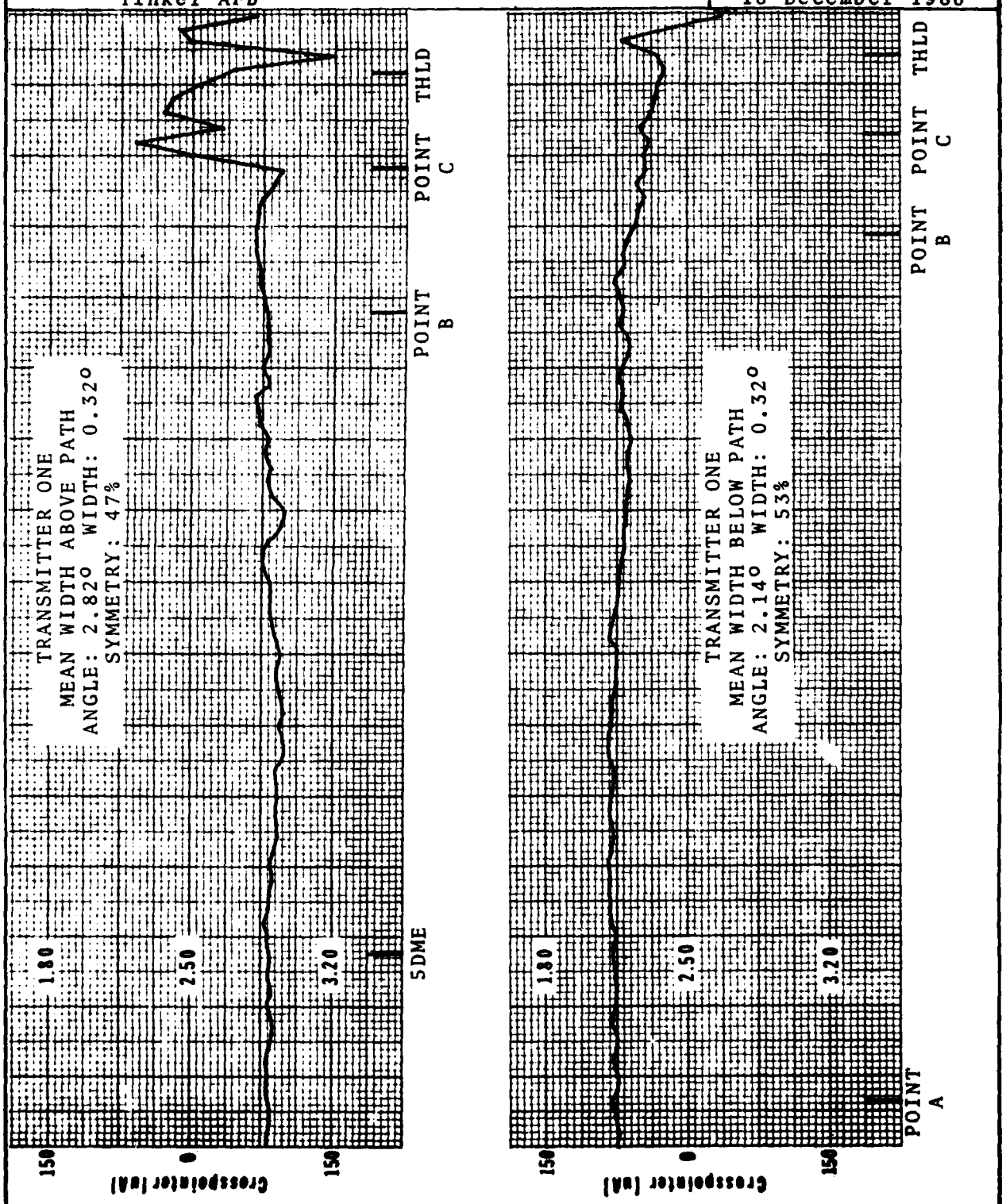
GLIDE SLOPE FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

18 December 1980



REMARKS

AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

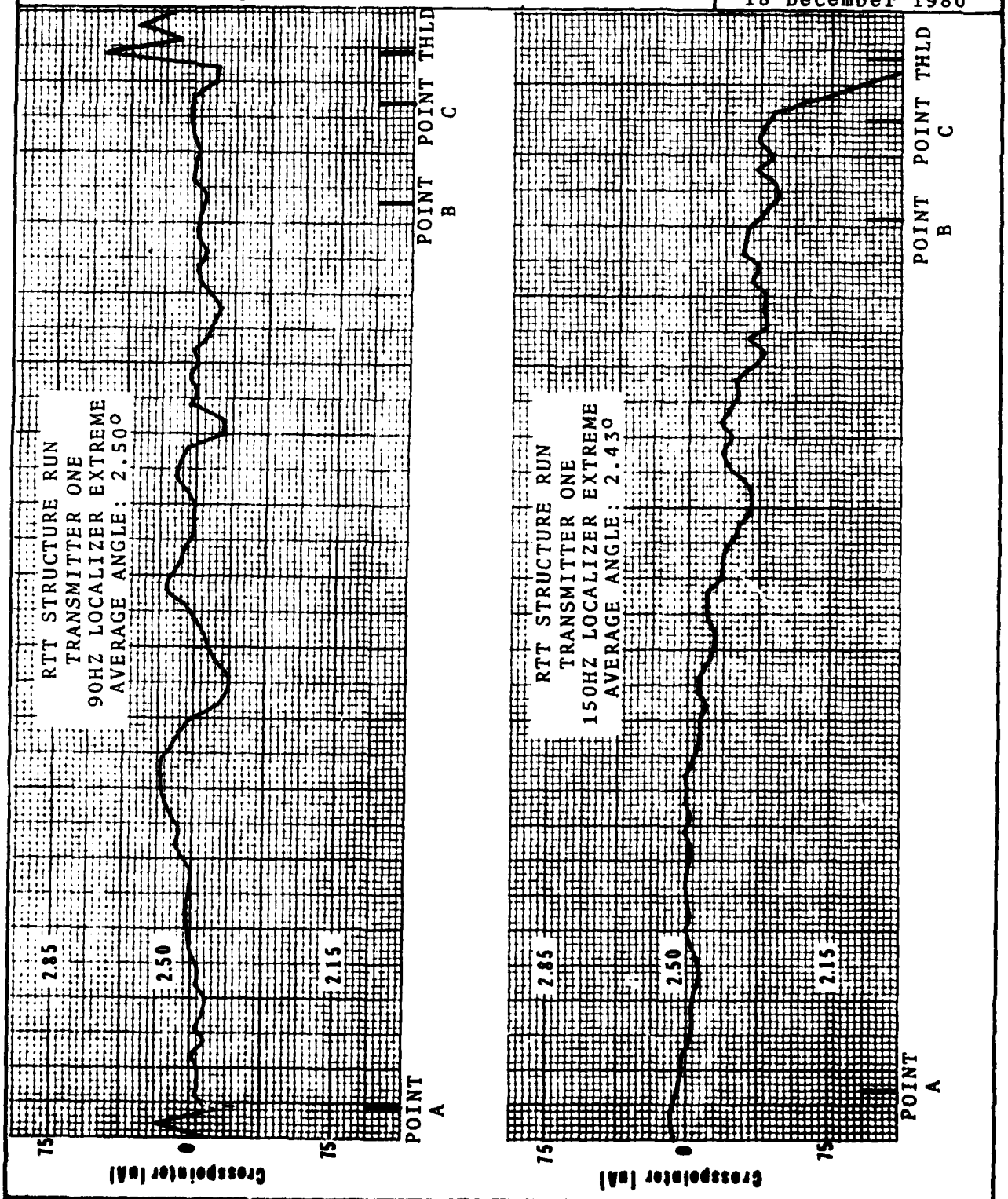
GLIDE SLOPE FLIGHT INSPECTION DATA

LOCATION

Tinker AFB

DATE

18 December 1980



REMARKS

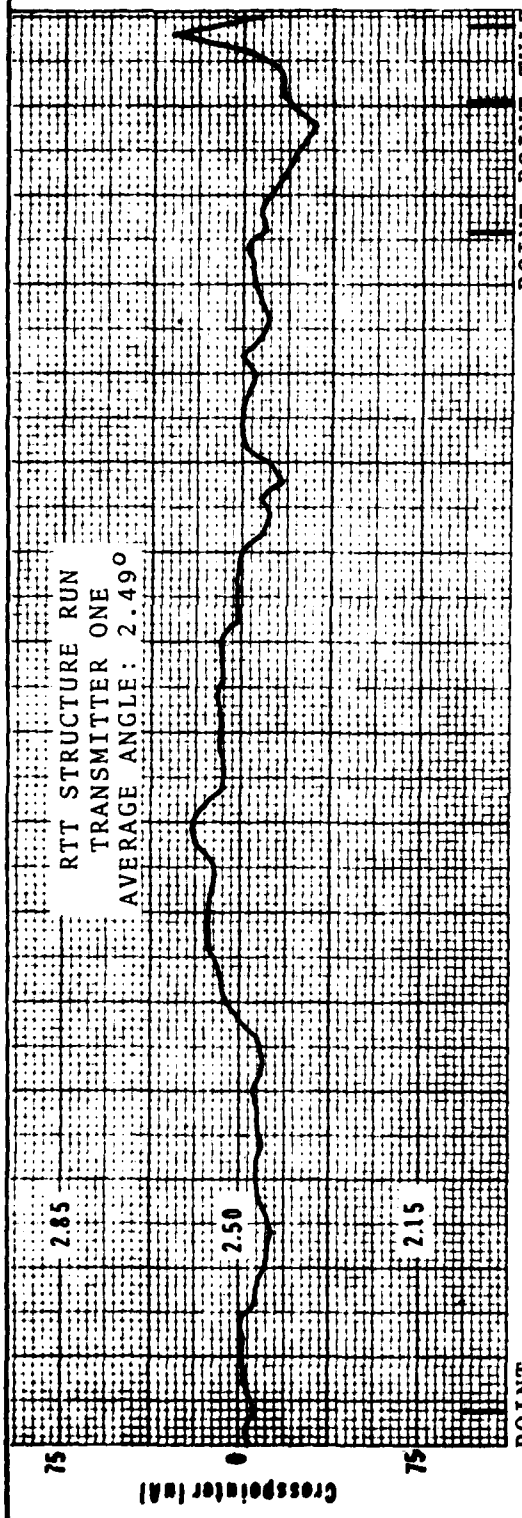
AFCS FORM MAY 79 906 GENERAL INFORMATION

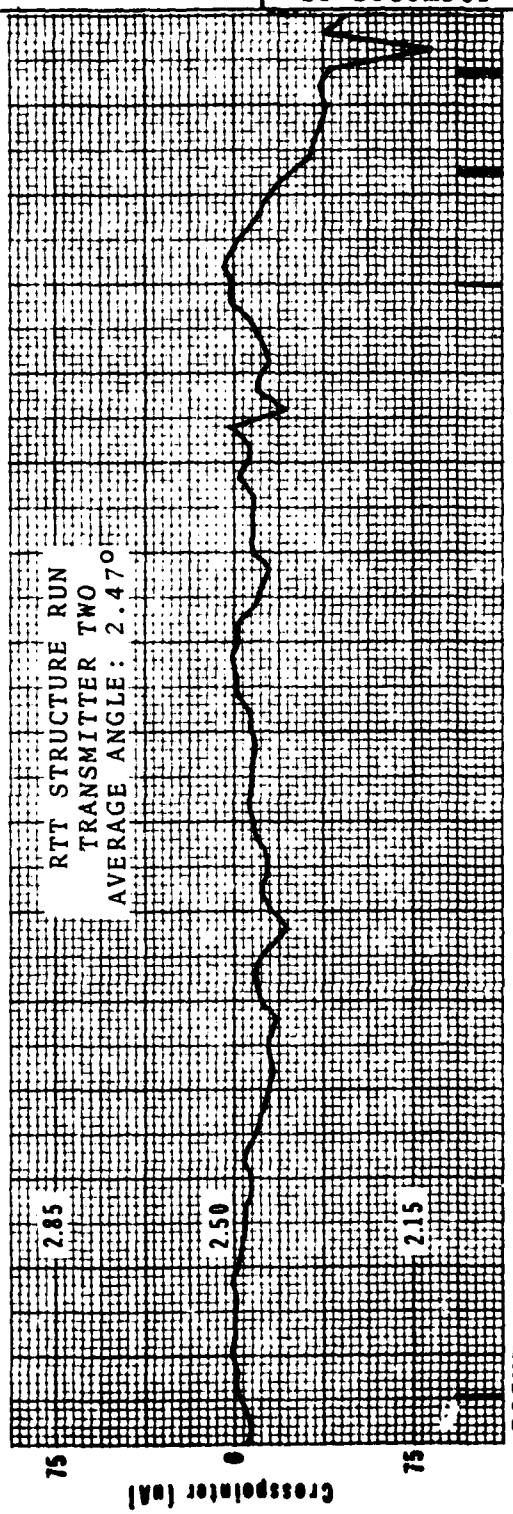
TITLE

GLIDE SLOPE FLIGHT INSPECTION DATA

LOCATION: Tinker AFB

DATE: 18 December 1980





REMARKS

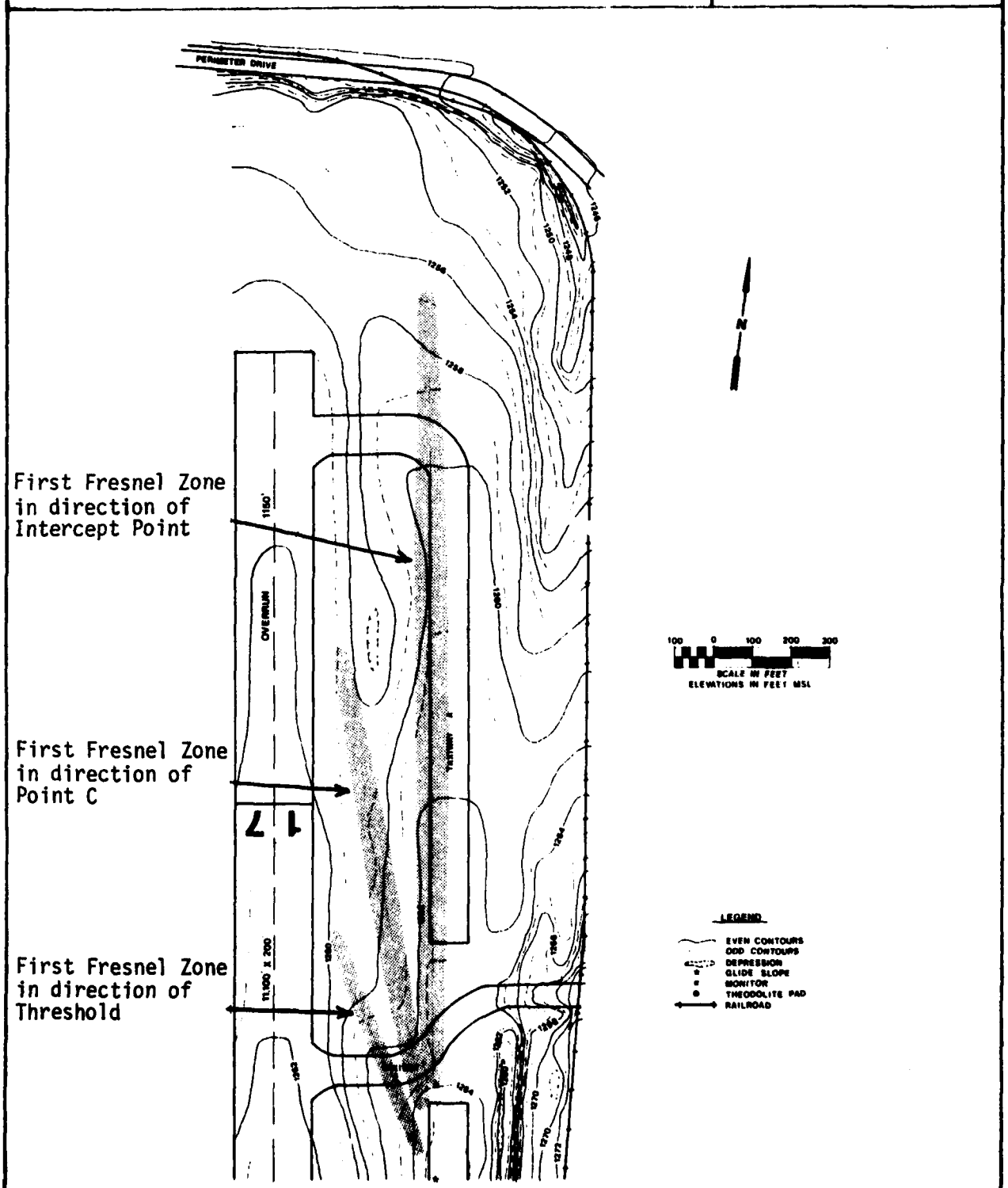
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

GLIDE SLOPE FRESNEL ZONE INFORMATION

LOCATION Tinker AFB

DATE 21 July 1978



REMARKS

AFCS FORM MAY 73 906

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AFCS FORM MAY 73 906 GENERAL INFORMATION

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21 July 1978

END

DATE

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