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E-SYSTEMS
Montek Division

Report No. 131500-601
14 January 1977

PERFORMANCE TEST REPORT FOR THE AN/TRN-41 TACAN NAVIGATIONAL SET

Prepared for:
Department of the Air Force
Headquarters Electronic Systems Division (AFSC)
Hanscom Air Force Base
Massachusetts 01731

Prepared by:
E-Systems, Inc., Montek Division
2268 South 3270 West
Salt Lake City, Utah 84119

Contract No. F19628-75-C-0200
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18. SUPPLEMENTARY NOTES

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

AN/TRN-41 TACAN Navigational Set

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

This report describes the complete performance test as defined in the Equipment Test Plan for Navigational Set, TACAN, AN/TRN-41.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

PERFORMANCE TEST REPORT
FOR THE
AN/TRN-41 TACAN NAVIGATIONAL SET

This report describes the complete performance test as defined in the Equipment Test Plan for Navigational Set, TACAN, AN/TRN-41, 131500-415.

1. Test Identification. The performance tests are those tests on all performance requirements of Specification No. 404L-701-5017A, Part I of two parts, Prime Item Development Specification for Navigational Set, TACAN, AN/TRN-41, that will not be tested as part of other qualification tests. These tests have been performed on one preproduction system and will not be repeated during acceptance, environmental or flight tests.

2. Functional Purpose. These tests form a part of the AN/TRN-41 qualification tests.

3. Test Objectives. To demonstrate that the AN/TRN-41 will meet the requirements of Specification No. 404L-701-5017A, Part I of two parts, dated 20 August 1976.

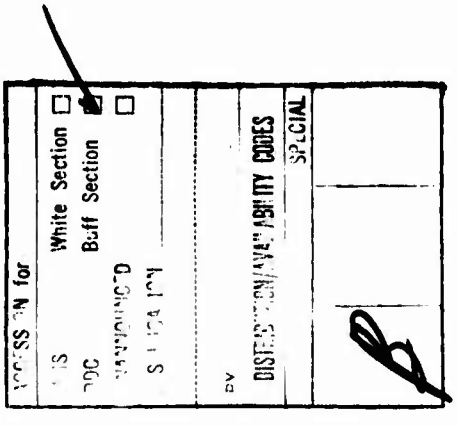
4. Description of Test Article. The AN/TRN-41 system was tested during the performance tests. Test configurations are shown in Appendix III of the Equipment Test Plan referenced above.

5. Summary of Test Results. Table 1 provides a summary of test results. The requirement tested is listed with reference paragraphs in 404L-701-5017A, Part I of two parts, the specification, the test procedure in the Equipment Test Plan, and a statement of results.

6. Description of Test Facility and Procedures. The test facilities and test procedures are described in Appendix III of the Equipment Test Plan.

7. Test Setup Diagrams. The test setup diagrams are provided in Appendix III of the Equipment Test Plan.

8. List of Test Equipment. The following is a list of test equipment used, with manufacturer and model number, and with serial number and calibration date, if applicable. The signal generator used was an HP 612A, but was not within calibration; however, the frequency and power from the signal generator was measured using calibrated equipment during the test, so calibration was not required.



Name	Mfr. & P/N	S/N	Calibration
Regulated Power Supply	HP 6274B	00947	1/16/77
Test Set, Transponder Set	AN/GRM-97	173	5/24/77
Oscilloscope	Tektronix 465	B261950	1/4/77
Signal Generator	HP 612A	3780	
Pulse Generator	Chronetics PG11A	1149	1/26/77
Load 10W 50 Ohms	Termoline 8160	936	N/A
20 dB Atten.	Narda 768-20	N/A	N/A
Directional Coupler	Narda 3042B-20	09089	N/A
Stop Watch	Galco	N/A	
Test Box	Montek P/N 131500-703	1	N/A
Pin Diode Modulator	Montek P/N 131500-701	2	N/A
Counter	Fluke 1953A	401-C	4/22/77
Isolator	E&M Laboratories L20T73	182	N/A
Directional Coupler, 10 dB	Microlab/FXR CB-A78	149	N/A
Attenuator, 10 dB	Narda 768-10	N/A	N/A
Circulator 4-port	Addington Labs 100201905	2005M	N/A
Digital Printer	CMC 400CT	12475	5/17/77
Spectrum Analyzer	Tektronix 7L13	335	5/26/77
Counter	CMC 727BN	91049	3/16/77

TABLE 1. SUMMARY OF TEST RESULTS

Requirement	404L-701-5017A Part I of Two Parts Paragraph No.	Specification	Equipment Test Plan, Appendix III Test No.	Results
Traffic Handling Capability (reply efficiency)	3.2.1.3	Provide identification, distance measurement, and azimuth to at least 50 aircraft with 70% reply rate.	6.7	The RT replied to 79% of interrogations when interrogated at rate of 3300 per second. (equal to 70% replies to 74 aircraft in track interrogating at 30 pairs/sec and 10 aircraft in search interrogating at 150 pairs/sec)
	3.7.1.2.1	Distance measuring to not less than 50 aircraft and azimuth and identity to unlimited aircraft.		
	3.7.1.2.12	Reply with no more than 30% countdown to 3300 interrogations per second.		
Standard TACAN signals and system turn on time	3.2.1.10	Shall generate, process and radiate standard TACAN signals per MIL-STD-291B within 60 seconds of turn-on.		System transmitted reply signals and reference bursts 14 seconds after turn-on. Reference acceptance tests.
RT Frequencies	3.7.1.1.2	Detect and decode TACAN interrogations at one frequency and reply at another frequency.		TACAN interrogation detected and decoded and replies transmitted. Reference acceptance tests.
	3.7.1.1.8	RT is tunable to 126X and 126Y channels.	6.9	RT is tunable to 126X and 126Y channels.
	3.7.1.2.5	Transmitter frequency maintained within 0.002 percent.	6.9	Frequency stability is maintained at better than 0.002 percent.
Isolation between receiver and transmitter	3.7.1.1.3	Provide blocking to prevent receive signals going to transmitter and transmit signals going to receiver.	6.2	No receiver output during transmission and no synchronous transmission during interrogation
RT Signal Priorities	3.7.1.1.4	Signal priority shall be: a. Main reference burst b. Auxiliary reference burst c. Station identification signal (ident) d. Distance measuring signal (reply pulses) e. Random or noise pulses (squitter)	6.3.4 6.3.6 6.3.8 6.3.8	Interrogation reply pulses have priority over squitter pulses. Ident has priority over squitter and reply pulses. Reference bursts have priority over ident. Every 9th aux burst is replaced by a north burst.
Transmitter pulse repetition rate	3.7.1.2.4	Distribution of pulse pairs shall comply to Figure 1 of MIL-STD-291B	6.11	Distribution meets requirements. See data sheet.
Transmitter modulation droop	3.7.1.2.9	Percentage modulation shall not exceed 0.08 percent.	6.5	135 Hz modulation 0.008% 15 Hz modulation 0.016%

TABLE 1. SUMMARY OF TEST RESULTS (CONTINUED)

Requirement	404L-701-5017A Part I of Two Parts Paragraph No.	Specification	Equipment Test Plan Appendix III Test No.	Results
Transmitter CW Output	3.7.1.2.10	CW output shall be in accordance with MIL-STD-291B. (5 microwatts or −23 dBm between pairs and −20 dB between pulses of a pair or group)	6.4.1 6.4.2	Between pulse pairs < −25 dBm Between pulses of a pair. Channel 64X <−20 dB 1Y <−20 dB
RT RF pulse spectrum	3.7.1.2.13	Spectrum shall meet MIL-STD-291B (<−30 dB at ± 0.8 MHz and <−47 dB at ± 2.0 MHz)	6.10	<41 dB at ± 0.8 MHz and <48 dB at ± 2.0 MHz)
Receiver frequency stability	3.7.1.3.1	Frequency shall be stabilized to within 100 KHz of channel frequency. (<3 dB sensitivity change)	6.8	Receiver sensitivity changes <3 dB for ± 100 KHz changes.
Receiver decoder interval	3.7.1.3.6	Sensitivity shall decrease no more than 3 dB to pulse pair spacing changes of ± 0.5 microsecond and shall decrease at least 40 dB to changes of 3 microseconds or greater.	6.6	0.5 microseconds change 1.5 dB max 3 microseconds change 90 dB min
Battery operation	3.7.3.1	Shall operate four hours on battery at 0°C	6.12	After 5 1/2 hours run time the battery voltage dropped to 23 volts.

9. Recorded Test Data. Attachment 1 is a copy of the completed data sheet for the performance test. Attachment 2 is a photograph of the detected RF from the receiver-transmitter (RT) and the worksheets and calculation sheets used in determining transmitter modulation (droop). Attachment 3 contains photographs and worksheets used in making the RF spectrum measurements and calculations. Attachment 4 contains squitter spacing measurements and worksheets used in determining the squitter distribution. Attachment 5 is the temperature chamber control chart for the battery operation test.

10. Ambient Conditions. The performance tests, with the exception of the battery operation test, were performed at ambient room temperature conditions. The battery test was performed with the AN/TRN-41 system and the battery installed in a temperature chamber set at 0°C.

11. Test Results Analyses. The test results show that the system meets the performance requirements tested.

12. Certification. The last page of the data sheet shown in Attachment 1 has been signed by a Montek Quality Assurance representative and a DCAS representative, certifying that the test results are authentic, accurate, current and in accordance with related test plans.

ATTACHMENT 1
PERFORMANCE TEST DATA SHEET

OFFICAL DATA COPY

PERFORMANCE TESTS DATA SHEET FOR AN/TRN-41 TACAN NAVIGATIONAL SET

Date 8 DEC 76 Serial No. 001

Paragraph	Description	Data	Requirements
6.1	System Turn-On Delay	145 sec.	
6.1.3	Transmission of TACAN pulses take place within 60 sec. after turn-on.	✓	Check if OK
6.1.4	Period between antenna triggers (66.667 ± .133 msec)	✓	Check if OK
6.2	Receiver and Transmitter Isolation		
6.2.4	No receiver output during transmission	✓	Check if OK
6.2.8	No steady state coincidence transmitter output pulses during interrogation	✓	Check if OK
6.3	RT Signal Priorities		
6.3.4	Interrogation Reply pulses have priority over squitter pulses	✓	Check if OK
6.3.6	Ident has priority over squitter and interrogation reply pulses	✓	Check if OK
6.3.8	Reference Bursts have priority over Ident	✓	Check if OK
6.3.8	Every 9th Aux. Ref. Burst is replaced by a North Ref. Burst	✓	Check if OK
6.4	Transmitter CW Output		
6.4.1.3	CW level between pulse pairs	-25 dBm	(< -23 dBm)
6.4.2	CW level between pulses of a pair		
6.4.2.6	Channel 64X	✓	(< -20 dB)
6.4.2.7	Channel 1Y	✓	(< -20 dB)

6.5 Transmitter Modulation(Droop)

6.5.1.5 Average Peak Amplitude of the pulses: 2 volts

$V_{av} = 2V$

6.5.1.9 and 6.5.1.10

Sample Recording Sheet

N_x	Y_x	N_x	Y_x	N_x	Y_x
1	.0028	31	.0032	61	.0036
2	.0036	32	.0042	62	.0038
3	.0040	33	.0042	63	.0040
4	.0048	34	.0042	64	.0040
5	.0048	35	.0042	65	.0040
6	.0052	36	.0040	66	.0040
7	.0044	37	.0040	67	.0040
8	.0044	38	.0040	68	.0040
9	.0044	39	.0038	69	.0040
10	.0044	40	.0042	70	.0042
11	.0036	41	.0034	71	.0036
12	.0050	42	.0040	72	.0042
13	.0050	43	.0038	73	.0042
14	.0050	44	.0038	74	.0042
15	.0048	45	.0040	75	.0042
16	.0046	46	.0040	76	.0040
17	.0044	47	.0040	77	.0040
18	.0042	48	.0040	78	.0040
19	.0042	49	.0040	79	.0048
20	.0042	50	.0040	80	.0052
21	.0032	51	.0036	81	.0036
22	.0048	52	.0042	82	.0042
23	.0046	53	.0044	83	.0044
24	.0046	54	.0040	84	.0044
25	.0046	55	.0040	85	.0042
26	.0042	56	.0040	86	.0042
27	.0042	57	.0048	87	.0042
28	.0044	58	.0040	88	.0042
29	.0044	59	.0040	89	.0044
30	.0042	60	.0040	90	.0044

Average Peak Amplitude of the Pulses:
$V_{av} = 2\ V$

6.5.1.11	135 Hz Modulation	.008 %	(< 0.08%)
	15 Hz Modulation	.016 %	(< 0.08%)
6.6	Receiver Decoder Interval		
6.6.1.14	Interrogation level for 12 μsec pulse spacing	-90 dBm	
6.6.1.17	Interrogation level for 12.5 μsec pulse spacing	-89 dBm	
6.6.1.18	Interrogation level difference	1 dB	(< 3 dB)
6.6.1.20	Interrogation level for 11.5 μsec pulse spacing	-88.5 dBm	
	Interrogation level difference	1.5 dB	(< 3dB)
6.6.1.22	Interrogation level for 15 μsec Pulse spacing	>40 dBm	
	Interrogation level difference	>90 dB	(> 40 dB) ✓
6.6.1.23	Interrogation level for 9 μsec pulse spacing	>0 dBm	
	Interrogation level difference	>90 dB	(> 40 dB) ✓
6.6.1.25	Interrogation level for 36 μsec pulse spacing	-90 dBm	
	Interrogation level for 36.5 μsec pulse spacing	-90 dBm	
	Interrogation level for difference	0 dB	(< 3 dB)
6.6.1.26	Interrogation level for 35.5 μsec pulse spacing	-89.5 dBm	
	Interrogation level difference	.5 dB	(< 3 dB)
6.6.1.27	Interrogation level for 39 μsec pulse spacing	>0 dBm	
	Interrogation level difference	>90 dB	(> 40 dB)
6.6.1.28	Interrogation level for 33 μsec pulse spacing	>0 dBm	
	Interrogation level difference	>90 dB	(> 40 dB)
6.7	Traffic Handling Capacity		
6.7.1.1	Reply count with 3300 interrogations per second, channel 64X	2629	(> 2310)
6.7.1.2	Reply count with 3300 interrogations per second, channel 64Y	2626	(> 2310)

6.8 Receiver Frequency Stability

6.8.4 Interrogation Frequency — Receiver Sensitivity

1X	1025 MHz	90 [illegible] dBm	
	-100 KHz	89 ~~88.5~~ dBm	(Change < 3 dB)
	+100 KHz	89 ~~88.0~~ dBm	(Change < 3 dB)
64Y	1088 MHz	89 dBm	
	-100 KHz	88.5 dBm	(Change<3 dB)
	+100 KHz	88.0 dBm	(Change< 3 dB)
126X	1150 MHz	90 dBm	
	-100 KHz	89 dBm	(Change <3 dB)
	+100 KHz	89 dBm	(Change <3 dB)

6.9 Transmitter Frequency Accuracy

6.9.2	Data	Requirements
Channel 1X	961.996 MHz	(962 MHz ± 19.24 KHz)
Channel 31X	991.996 MHz	(992 MHz ± 19.84 KHz)
Channel 63X	1023.996 MHz	(1024 MHz ±20.48 KHz)
Channel 64X	1150.994 MHz	(1151 MHz ±23.02 KHz)
Channel 94X	1180.993 MHz	(1181 MHz ± 23.62KHz)
Channel 126X	1212.993 MHz	(1213 MHz ±24.26 KHz)
Channel 94Y	1054.996 MHz	(1055 MHz ±21.10 KHz)
Channel 1Y	1087.996 MHz	(1088 MHz ±21.76 KHz)
Channel 31Y	1117.996 MHz	(1118 MHz ±22.36 KHz)

6.10 RF Pulse Spectrum

6.10.5 and 6.10.6 Channel 1X (962 MHz)

DBL1	~~2~~	DBR1	3
DBL2	~~8~~	DBR2	9
DBL3	18	DBR3	17
DBL6	~~36~~	DBR6	38
DBL7	~~35~~ 50	DBR7	41

DBL8	45	DBR8	45
DBL9	43	DBR9	50
DBL10	53	DBR10	47
DBL11	44	DBR11	53
DBL12	54	DBR12	47
DBL13	51	DBR13	49
DBL21	53	DBR21	48
DBL22	58	DBR22	55
DBL23	55	DBR23	52
DBL24	55	DBR24	52
DBL25	58	DBR25	55
DBL26	53	DBR26	51
DBL27	58	DBR27	55

6.10.5 and 6.10.6 Channel 63X (1024 MHz) Data

DBL1	1	DBR1	2
DBL2	8	DBR2	9
DBL3	17	DBR3	15
DBL6	34	DBR6	41
DBL7	48	DBR7	39
DBL8	47	DBR8	46
DBL9	44	DBR9	45
DBL10	51	DBR10	~~47~~ 50
DBL11	46	DBR11	48
DBL12	50	DBR12	49
DBL13	52	DBR13	49
DBL21	53	DBR21	50
DBL22	51	DBR22	55
DBL23	54	DBR23	52
DBL24	55	DBR24	52
DBL25	58	DBR25	55
DBL26	55	DBR26	51
DBL27	58	DBR27	55

6.10.5 and 6.10.6

Channel 64X (1151 MHz) Data

DBL1	1	DBR1	2
DBL2	8	DBR2	8
DBL3	17	DBR3	15
DBL6	35	DBR6	40
DBL7	46	DBR7	40
DBL8	46	DBR8	44
DBL9	44	DBR9	46
DBL10	49	DBR10	50
DBL11	46	DBR11	49
DBL12	50	DBR12	50
DBL13	49	DBR13	48
DBL21	52	DBR21	55
DBL22	53	DBR22	57
DBL23	55	DBR23	55
DBL24	54	DBR24	61
DBL25	60	DBR25	55
DBL26	55	DBR26	57
DBL27	58	DBR27	58

6.10.5 and 6.10.6

Channel 126X (1213 MHz) Data

DBL1	1	DBR1	2
DBL2	7	DBR2	8
DBL3	15	DBR3	13
DBL6	33	DBR6	44
DBL7	42	DBR7	40
DBL8	50	DBR8	46
DBL9	43	DBR9	43
DBL10	49	DBR10	50
DBL11	46	DBR11	46
DBL12	50	DBR12	50

DBL13	47	DBR13	48
DBL21	52	DBR21	51
DBL22	54	DBR22	53
DBL23	53	DBR23	54
DBL24	53	DBR24	52
DBL25	56	DBR25	58
DBL26	53	DBR26	52
DBL27	57	DBR27	58

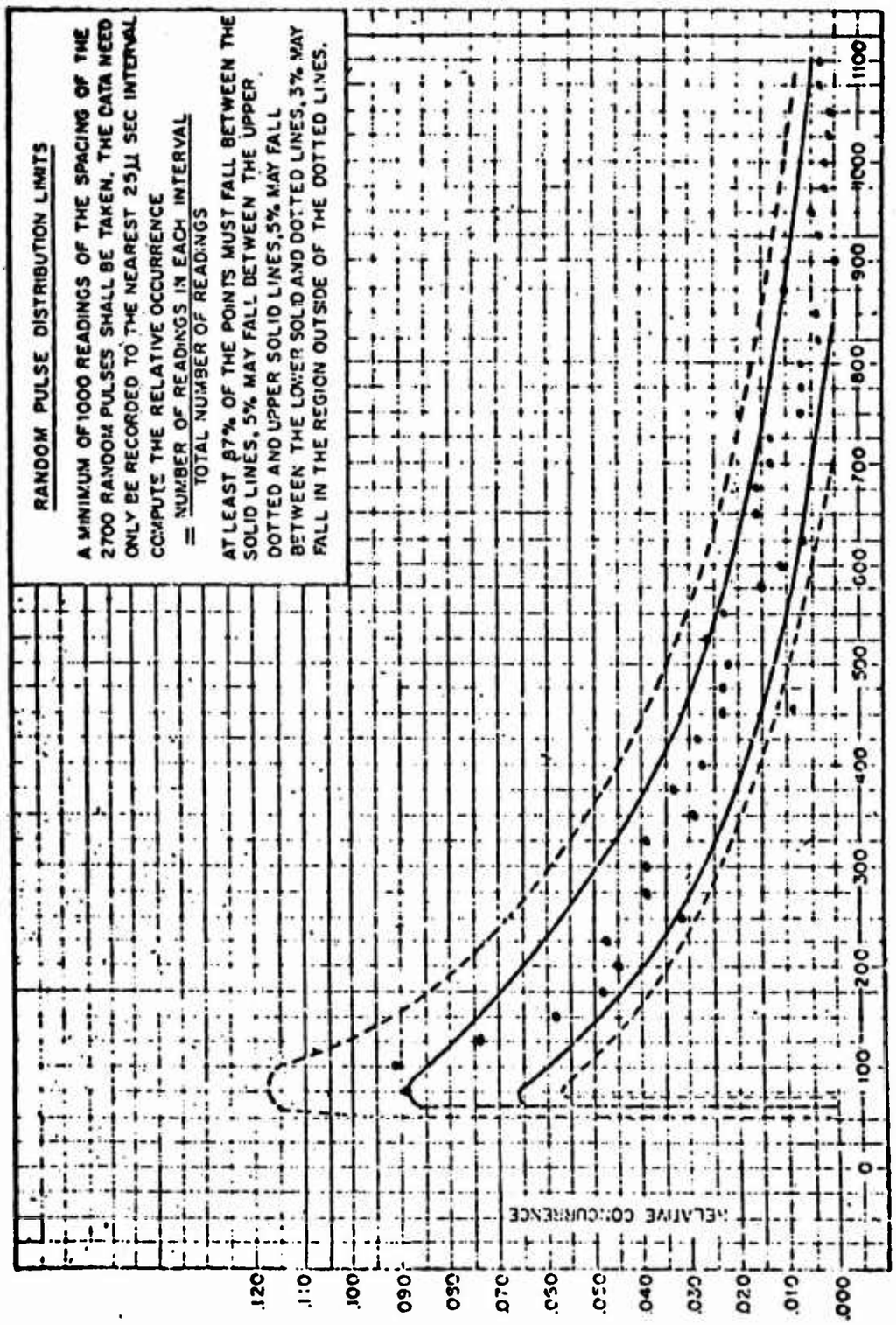
			Data	Requirements
6.10.7	Channel 1X			
		L0.8	41.8 dB	(>30 dB)
		R0.8	41.7 dB	(>30 dB)
		L2	51.3 dB	(>47 dB)
		R2	48.2 dB	(>47 dB)
	Channel 63X			
		L0.8	42.7 dB	(>30 dB)
		R0.8	41.2 dB	(>30 dB)
		L2	52.0 dB	(>47 dB)
		R2	49.7 dB	(>47 dB)
	Channel 64X			
		L0.8	42.0 dB	(>30 dB)
		R0.8	41.6 dB	(>30 dB)
		L2	51.8 dB	(>47 dB)
		R2	53.1 dB	(>47 dB)
	Channel 126X			
		L0.8	41.4 dB	(>30 dB)
		R0.8	41.3 dB	(>30 dB)
		L2	50.4 dB	(>47 dB)
		R2	50.0 dB	(>47 dB)

6.11 RT Squitter Distribution

6.11.3.7

Spacing in μs		Number at each int.	Relative Occurence	Spacing in μs	Number at that spac.	Relative Occurence	
60 - 84.9	75	89	.089	600	11	.011	585.0 - 609.9
85.0 - 109.9	100	91	.091	625	7	.007	610.0 - 634.9
110.0 - 134.9	125	74	.074	650	16	.016	635.0 - 659.9
135.0 - 154.9	150	58	.058	675	16	.016	660.0 - 685.9
160.0 - 184.9	175	48	.048	700	13	.013	685.0 - 709.9
185.0 - 209.9	200	45	.045	725	13	.013	710.0 - 734.9
210.0 - 234.9	225	47	.047	750	7	.007	735.0 - 759.9
235.0 - 259.9	250	32	.032	775	7	.007	760.0 - 784.9
260.0 - 284.9	275	44	.044	800	7	.007	785.0 - 809.9
285.0 - 309.9	300	44	.044	825	3	.003	810.0 - 834.9
310.0 - 334.9	325	44	.044	850	4	.004	835.0 - 859.9
335.0 - 359.9	350	29	.029	875	10	.010	860.0 - 884.9
360.0 - 384.9	375	33	.033	900	0	.000	885.0 - 909.9
385.0 - 409.9	400	27	.027	925	3	.003	910.0 - 934.9
410.0 - 434.9	425	28	.028	950	5	.005	935.0 - 959.9
435.0 - 459.9	450	23	.023	975	2	.002	960.0 - 984.9
460.0 - 484.9	475	23	.023	1000	2	.002	985.0 - 1009.9
485.0 - 509.9	500	22	.022	1025	1	.001	1010.0 - 1034.9
510.0 - 534.9	525	27	.027	1050	1	.001	1035.0 - 1059.9
535.0 - 559.9	550	23	.023	1075	3	.003	1060.0 - 1084.9
560.0 - 584.9	575	15	.015	1100	3	.003	1085.0 - 1109.9

6.11.3.9


RANDOM PULSE DISTRIBUTION LIMITS
A MINIMUM OF 1000 READINGS OF THE SPACING OF THE 2700 RANDOM PULSES SHALL BE TAKEN. THE DATA NEED ONLY BE RECORDED TO THE NEAREST 25μ SEC INTERVAL
COMPUTE THE RELATIVE OCCURRENCE
= NUMBER OF READINGS IN EACH INTERVAL / TOTAL NUMBER OF READINGS
AT LEAST 87% OF THE POINTS MUST FALL BETWEEN THE SOLID LINES, 5% MAY FALL BETWEEN THE UPPER DOTTED AND UPPER SOLID LINES, 5% MAY FALL BETWEEN THE LOWER SOLID AND DOTTED LINES, 3% MAY FALL IN THE REGION OUTSIDE OF THE DOTTED LINES.
RELATIVE OCCURRENCE
.120
.110
.100
.090
.080
.070
.060
.050
.040
.030
.020
.010
.000
0
100
200
300
400
500
600
700
800
900
1000
1100

		Check if OK
6.12	Battery Operation	
6.12.2	Chamber and system at 0°C for two hours	✓
6.12.4	System operates properly TURN ON 1:20 PM CURRENT = 4.2A VOLTAGE = 25V	✓
6.12.7	Check meter every half hour (between 18V and 24V)	✓
	.5 hour	✓
	1.0 hours	✓
	1.5 hours	✓
	2.0 hours	✓
	2.5 hours	✓
	3.0 hours	✓
	3.5 hours	✓
	4.0 hours	✓
6.12.9	System operates properly	✓

The system was left running until 6:55 PM (5½ hours of run time) at which time the system was turned off because the battery voltage had dropped to 23 volts.

Accepted
Montek QA Representative

12.13.76
Date

Accepted
DCAS Representative

12-13-76
Date

ATTACHMENT 2

TRANSMITTER MODULATION (DROOP) PHOTOGRAPH, WORK SHEETS AND CALCULATION SHEETS

6.5 Transmitter Modulation(Droop) OFFICAL WORK SHEETS FOR DROOP TEST 12/8/76

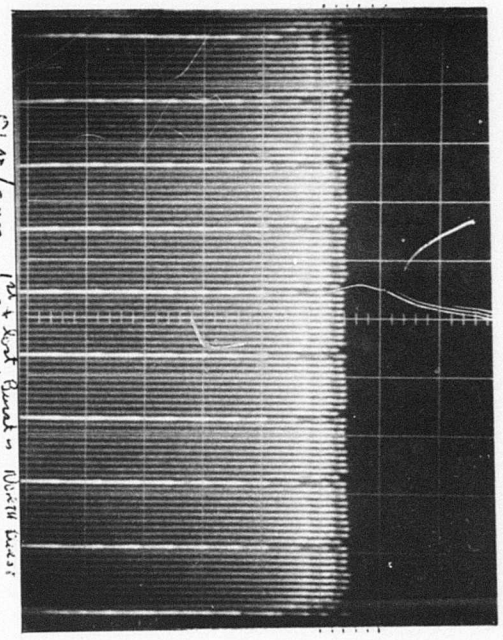
6.5.1.5 Average Peak Amplitude of the pulses: 2V

~~$V_{av} = 2$ V~~

6.5.1.9 and
6.5.1.10

Sample Recording Sheet

N_x	Y_x	N_x	Y_x	N_x	Y_x
1	.0028	31	.0032	61	.0036
2	.0036	32	.0042	62	.0038
3	.0040	33	.0042	63	.0040
4	.0048	34	.0042	64	.0040
5	.0048	35	.0042	65	.0040
6	.0052	36	.0040	66	.0040
7	.0044	37	.0040	67	.0040
8	.0044	38	.0040	68	.0040
9	.0044	39	.0038	69	.0040
10	.0044	40	.0042	70	.0042
11	.0036	41	.0034	71	.0036
12	.0050	42	.0040	72	.0042
13	.0050	43	.0038	73	.0042
14	.0050	44	.0038	74	.0042
15	.0048	45	.0040	75	.0042
16	.0046	46	.0040	76	.0040
17	.0044	47	.0040	77	.0040
18	.0042	48	.0040	78	.0040
19	.0042	49	.0040	79	.0048
20	.0042	50	.0040	80	.0052
21	.0032	51	.0036	81	.0036
22	.0048	52	.0042	82	.0042
23	.0046	53	.0044	83	.0044
24	.0046	54	.0040	84	.0044
25	.0046	55	.0040	85	.0042
26	.0042	56	.0040	86	.0042
27	.0042	57	.0040	87	.0042
28	.0044	58	.0040	88	.0042
29	.0044	59	.0040	89	.0044
30	.0042	60	.0040	90	.0044



Average Peak Amplitude of the Pulses:

Calculation Sheet No. 1

N_x	Y_x	N_x	Y_x	N_x	Y_x	N_x	Y_x	N_x	Y_x	N_x	Y_x
1	.0028	4	.0048	2	.0036	3	.0040	10	.0044	5	.0048
9	.0044	6	.0052	8	.0044	7	.0044	20	.0042	15	.0048
11	.0036	14	.0050	12	.0050	13	.0050	30	.0042	25	.0046
19	.0042	16	.0046	18	.0042	17	.0044	40	.0042	35	.0042
21	.0032	24	.0046	22	.0048	23	.0046	50	.0040	45	.0040
29	.0044	26	.0042	28	.0044	27	.0042	60	.0040	55	.0040
31	.0032	34	.0042	32	.0042	33	.0042	70	.0042	65	.0040
39	.0038	36	.0040	38	.0040	37	.0040	80	.0052	75	.0042
41	.0034	44	.0038	42	.0040	43	.0038	90	.0044	85	.0042
49	.0040	46	.0040	48	.0040	47	.0040				
51	.0036	54	.0040	52	.0042	53	.0044				
59	.0040	56	.0040	58	.0040	57	.0040				
61	.0036	64	.0040	62	.0038	63	.0040				
69	.0040	66	.0040	68	.0040	67	.0040				
71	.0036	74	.0042	72	.0042	73	.0042				
79	.0042	76	.0040	78	.0040	77	.0040				
81	.0036	84	.0044	82	.0042	83	.0044				
89	.0044	86	.0042	88	.0042	87	.0042				
	ADD:		ADD:		ADD:		ADD:		ADD:		ADD:
Y_{x1} = .0686		Y_{x2} = .0772		Y_{x3} = .0754		Y_{x4} = .0758		Y_{x5} = .0388		Y_{x6} = .0388	
$Y_{x1} - Y_{x2}$ = -.0086				$Y_{x3} - Y_{x4}$ = -.0004				$Y_{x5} - Y_{x6}$ = 0			
$(Y_{x1} - Y_{x2}) \times 0.0179$ = R = -.0001539				$(Y_{x3} - Y_{x4}) \times 0.0069$ = S = -.0000276				$(Y_{x5} - Y_{x6}) \times 0.0222$ = T = 0			

Calculation Sheet No. 2

N_x	Y_x	N_x	Y_x	N_x	Y_x	N_x	Y_x
1	.0078	6	.0052	2	.0036	7	.0044
4	.0049	9	.0044	3	.0040	8	.0044
11	.0036	16	.0046	12	.0050	17	.0044
14	.0050	19	.0042	13	.0050	18	.0042
21	.0032	26	.0042	22	.0048	27	.0042
24	.0046	29	.0044	23	.0046	28	.0044
31	.0032	36	.0044	32	.0042	37	.0040
34	.0042	39	.0038	33	.0042	38	.0040
41	.0034	46	.0040	42	.0040	47	.0040
44	.0038	49	.0040	43	.0038	48	.0040
51	.0036	56	.0040	52	.0042	57	.0040
54	.0040	59	.0040	53	.0044	58	.0040
61	.0036	66	.0040	62	.0038	67	.0040
64	.0040	69	.0040	63	.0040	68	.0040
71	.0036	76	.0040	72	.0042	77	.0040
74	.0042	79	.0048	73	.0042	78	.0040
81	.0036	86	.0042	82	.0042	87	.0042
84	.0044	89	.0044	83	.0044	88	.0042
	ADD:		ADD:		ADD:		ADD:

$Y_{x7} = .0696$	$Y_{x8} = .0762$	$Y_{x9} = .0768$	$Y_{x10} = .0744$
$Y_{x7} - Y_{x8} = -.0066$		$Y_{x9} - Y_{x10} = +.0024$	
$Y_{x7} - Y_{x8} \times 0.0131 =$ $= U = -.00009646$		$Y_{x9} - Y_{x10} \times 0.0211$ $= V = .00005064$	

Calculation Sheet No. 3

$A_9 = U + V = -.00003582$

$B_9 = R + S + T = -.00015670$

$C_9 = \sqrt{A_9^2 + B_9^2} =$ 16.05×10^{-5}

135 Hz Modulation (less than 0.08%).

$M_{135} = 100 \frac{C_9}{V_{av}} =$ 0.008 %

Calculation Sheet No. 4

Nx	Yx	Nx	Yx	Nx	Yx	Nx	Yx
1	.0028	2	.0036	3	.0040	4	.0048
44	.0038	43	.0038	42	.0040	41	.0034
	ADD:		ADD:		ADD:		ADD:
E_1 =	.0066	E_2 =	.0074	E_3 =	.0080	E_4 =	.0082
5	.0047	6	.0052	7	.0044	8	.0044
40	.0042	39	.0038	38	.0040	37	.0040
	ADD:		ADD:		ADD:		ADD:
E_5 =	.0090	E_6 =	.0090	E_7 =	.0084	E_8 =	.0094
9	.0044	10	.0044	11	.0036	12	.0050
36	.0040	35	.0042	34	.0042	33	.0042
	ADD:		ADD:		ADD:		ADD:
E_9	.0094	E_{10} =	.0096	E_{11} =	.0078	E_{12} =	.0092
13	.0050	14	.0050	15	.0048	16	.0046
32	.0042	31	.0032	30	.0042	29	.0044
	ADD:		ADD:		ADD:		ADD:
E_{13} =	.0092	E_{14} =	0092	E_{15} =	0040	E_{16} =	.0090
17	.0044	18	.0042	19	.0042	20	.0042
28	.0044	27	.0042	26	.0042	25	.0046
	ADD:		ADD:		ADD:		ADD:
E_{17} =	.0088	E_{18} =	.0084	E_{19} =	.0084	E_{20} =	.0088
21	.0032	22	.0048				
24	.0046	23	.0046				
	ADD:		ADD:				
E_{21} =	.0078	E_{22} =	.0094				

Calculation Sheet No. 5

Nx	Yx	Nx	Yx	Nx	Yx	Nx	Yx
46	.0040	47	.0040	48	.0040	49	.0040
89	.0044	88	.0042	87	.0042	86	.0042
	ADD:		ADD:		ADD:		ADD:
F_1 =	.0084	F_2 =	.0082	F_3 =	.0082	F_4 =	.0082
50	.0040	51	.0036	52	.0042	53	.0044
85	.0042	84	.0044	83	.0044	82	.0042
	ADD:		ADD:		ADD:		ADD:
F_5 =	.0082	F_6 =	.0080	F_7 =	.0086	F_8 =	.0086
54	.0040	55	.0040	56	.0040	57	.0040
81	.0036	80	.0052	79	.0046	78	.0040
	ADD:		ADD:		ADD:		ADD:
F_9 =	.0076	F_{10} =	.0092	F_{11} =	.0086	F_{12} =	.0080
58	.0040	59	.0040	60	.0040	61	.0036
77	.0040	76	.0040	75	.0042	74	.0042
	ADD:		ADD:		ADD:		ADD:
F_{13} =	.0080	F_{14} =	.0080	F_{15} =	.0082	F_{16} =	.0078
62	.0038	63	.0040	64	.0040	65	.0040
73	.0042	72	.0042	71	.0036	70	.0042
	ADD:		ADD:		ADD:		ADD:
F_{17} =	.0080	F_{18} =	.0082	F_{19} =	.0076	F_{20} =	.0082
66	.0040	67	.0040				
69	.0040	68	.0040				
	ADD:		ADD:				
F_{21} =	.0080	F_{22} =	.0080				

Calculation Sheet No. 6

Nx	Yx	Nx	Yx	Nx	Yx	Nx	Yx
1	.0028	2	.0036	3	.0040	4	.0048
89	.0044	88	.0042	87	.0042	86	.0042
	ADD:		ADD:		ADD:		ADD:
G_1 =	.0072	G_2 =	.0078	G_3 =	.0082	G_4 =	.0090
5	.0048	6	.0052	7	.0044	8	.0044
85	.0042	84	.0044	83	.0044	82	.0042
	ADD:		ADD:		ADD:		ADD:
G_5 =	.0090	G_6 =	.0096	G_7 =	.0088	G_8 =	.0086
9	.0044	10	.0044	11	.0036	12	.0050
81	.0036	80	.0052	79	.0048	78	.0040
	ADD:		ADD:		ADD:		ADD:
G_9 =	.0080	G_{10} =	.0096	G_{11} =	.0084	G_{12} =	.0090
13	.0050	14	.0050	15	.0048	16	.0046
77	.0040	76	.0040	75	.0042	74	.0042
	ADD:		ADD:		ADD:		ADD:
G_{13} =	.0090	G_{14} =	.0090	G_{15} =	.0090	G_{16} =	.0088
17	.0044	18	.0042	19	.0042	20	.0042
73	.0042	72	.0042	71	.0036	70	.0042
	ADD:		ADD:		ADD:		ADD:
G_{17} =	.0088	G_{18} =	.0084	G_{19} =	.0078	G_{20} =	.0084
21	.0032	22	.0048				
69	.0040	68	.0040				
	ADD:		ADD:				
G_{21} =	.0072	G_{22} =	.0088				

Calculation Sheet No. 7

Nx	Yx	Nx	Yx	Nx	Yx	Nx	Yx
44	.0038	43	.0038	42	.0040	41	.0034
46	.0040	47	.0040	48	.0040	49	.0040
	ADD:		ADD:		ADD:		ADD:
H_1 = .0078		H_2 = .0078		H_3 = .0080		H_4 = .0074	
40	.0042	39	.0038	38	.0040	37	.0040
50	.0040	51	.0036	52	.0042	53	.0044
	ADD:		ADD:		ADD:		ADD:
H_5 = .0082		H_6 = .0084		H_7 = .0082		H_8 = .0084	
36	.0040	35	.0042	34	.0042	33	.0042
54	.0040	55	.0040	56	.0040	57	.0040
	ADD:		ADD:		ADD:		ADD:
H_9 = .0080		H_{10} = .0082		H_{11} = .0082		H_{12} = .0082	
32	.0042	31	.0032	30	.0042	29	.0044
58	.0040	59	.0040	60	.0040	61	.0036
	ADD:		ADD:		ADD:		ADD:
H_{13} = .0082		H_{14} = .0072		H_{15} = .0082		H_{16} = .0080	
28	.0044	27	.0042	26	.0042	25	.0046
62	.0038	63	.0040	64	.0040	65	.0040
	ADD:		ADD:		ADD:		ADD:
H_{17} = .0082		H_{18} = .0082		H_{19} = .0082		H_{20} = .0086	
24	.0046	23	.0046				
66	.0040	67	.0040				
	ADD:		ADD:				
H_{21} = .0086		H_{22} = .0086					

Calculation Sheet No. 8

$K_1 = E_1 - F_1 = -.0018$	$L_1 = G_1 - H_1 = -.0006$
$K_2 = E_2 - F_2 = -.0006$	$L_2 = G_2 - H_2 = 0$
$K_3 = E_3 - F_3 = -.0002$	$L_3 = G_3 - H_3 = .0002$
$K_4 = E_4 - F_4 = 0$	$L_4 = G_4 - H_4 = .0016$
$K_5 = E_5 - F_5 = .0008$	$L_5 = G_5 - H_5 = .0008$
$K_6 = E_6 - F_6 = .0010$	$L_6 = G_6 - H_6 = .0012$
$K_7 = E_7 - F_7 = -.0002$	$L_7 = G_7 - H_7 = .0006$
$K_8 = E_8 - F_8 = -.0002$	$L_8 = G_8 - H_8 = .0002$
$K_9 = E_9 - F_9 = .0008$	$L_9 = G_9 - H_9 = 0$
$K_{10} = E_{10} - F_{10} = -.0006$	$L_{10} = G_{10} - H_{10} = .0014$
$K_{11} = E_{11} - F_{11} = -.0010$	$L_{11} = G_{11} - H_{11} = +.0002$
$K_{12} = E_{12} - F_{12} = .0012$	$L_{12} = G_{12} - H_{12} = .0008$
$K_{13} = E_{13} - F_{13} = .0012$	$L_{13} = G_{13} - H_{13} = .0008$
$K_{14} = E_{14} - F_{14} = .0002$	$L_{14} = G_{14} - H_{14} = .0018$
$K_{15} = E_{15} - F_{15} = +.0008$	$L_{15} = G_{15} - H_{15} = .0008$
$K_{16} = E_{16} - F_{16} = .0012$	$L_{16} = G_{16} - H_{16} = .0008$
$K_{17} = E_{17} - F_{17} = .0008$	$L_{17} = G_{17} - H_{17} = .0006$
$K_{18} = E_{18} - F_{18} = .0002$	$L_{18} = G_{18} - H_{18} = +.0002$
$K_{19} = E_{19} - F_{19} = .0008$	$L_{19} = G_{19} - H_{19} = -.0004$
$K_{20} = E_{20} - F_{20} = .0006$	$L_{20} = G_{20} - H_{20} = -.0002$
$K_{21} = E_{21} - F_{21} = -.0002$	$L_{21} = G_{21} - H_{21} = -.0008$
$K_{22} = E_{22} - F_{22} = .0014$	$L_{22} = G_{22} - H_{22} = +.0002$

Calculation Sheet No. 9

$a_1 = 0.0698 \times K_1 = -.0001\,2564$ ($K_1 = -.0018$)	$a_2 = 0.139 \times K_2 = -.0000\,834$ ($K_2 = -.0006$)
$a_3 = 0.208 \times K_3 = -.0000\,416$ ($K_3 = -.0002$)	$a_4 = 0.276 \times K_4 = 0$ ($K_4 = 0$)
$a_5 = 0.342 \times K_5 = .0002\,736$ ($K_5 = .0008$)	$a_6 = 0.407 \times K_6 = .000\,407$ ($K_6 = .0010$)
$a_7 = 0.469 \times K_7 = -.0000\,992$ ($K_7 = -.0002$)	$a_8 = 0.530 \times K_8 = -.000\,106$ ($K_8 = -.0002$)
$a_9 = 0.588 \times K_9 = .1004\,704$ ($K_9 = .0008$)	$a_{10} = 0.643\ K_{10} = -.0003\,858$ ($K_{10} = -.0006$)
$a_{11} = 0.695 \times K_{11} = -.000\,695$ ($K_{11} = -.0010$)	$a_{12} = 0.743 \times K_{12} = .0008\,916$ ($K_{12} = .0012$)
$a_{13} = 0.788 \times K_{13} = .0009\,456$ ($K_{13} = .0012$)	$a_{14} = 0.829 \times K_{14} = .0001\,658$ ($K_{14} = .0002$)
$a_{15} = 0.866 \times K_{15} = .0006\,928$ ($K_{15} = .0008$)	$a_{16} = 0.899 \times K_{16} = .0010\,788$ ($K_{16} = .0012$)
$a_{17} = 0.927 \times K_{17} = .0007\,416$ ($K_{17} = .0008$)	$a_{18} = 0.951 \times K_{18} = .0001\,902$ ($K_{18} = .0002$)
$a_{19} = 0.970 \times K_{19} = .000\,776$ ($K_{19} = .0008$)	$a_{20} = 0.985 \times K_{20} = .000\,591$ ($K_{20} = .0006$)
$a_{21} = 0.995 \times K_{21} = -.000\,199$ ($K_{21} = -.0002$)	$a_{22} = 0.999 \times K_{22} = .0013\,986$ ($K_{22} = .0014$)

Calculation Sheet No. 10

$b_1 = 0.998 \overset{-.0006}{\times} L_1 = -.0005988$	$b_2 = 0.990 \overset{0}{\times} L_2 = 0$
$b_3 = 0.978 \overset{.0002}{\times} L_3 = .001956$	$b_4 = 0.961 \overset{.0016}{\times} L_4 = .0015376$
$b_5 = 0.940 \overset{.0008}{\times} L_5 = .000752$	$b_6 = 0.914 \overset{.0012}{\times} L_6 = .0010968$
$b_7 = 0.883 \overset{.0006}{\times} L_7 = .0005298$	$b_8 = 0.848 \overset{.0002}{\times} L_8 = .0001696$
$b_9 = 0.809 \overset{0}{\times} L_9 = 0$	$b_{10} = 0.766 \overset{.0014}{\times} L_{10} = .0010724$
$b_{11} = 0.719 \overset{.0002}{\times} L_{11} = .0001438$	$b_{12} = 0.669 \overset{.0008}{\times} L_{12} = .0005352$
$b_{13} = 0.616 \overset{.0008}{\times} L_{13} = .0004928$	$b_{14} = 0.559 \overset{.0018}{\times} L_{14} = .0010062$
$b_{15} = 0.500 \overset{.0008}{\times} L_{15} = .0004$	$b_{16} = 0.438 \overset{.0008}{\times} L_{16} = .000350 4$
$b_{17} = 0.375 \overset{.0006}{\times} L_{17} = .000225$	$b_{18} = 0.309 \overset{.0002}{\times} L_{18} = .0000618$
$b_{19} = 0.242 \overset{-.0004}{\times} L_{19} = -.0000968$	$b_{20} = 0.174 \overset{-.0002}{\times} L_{20} = -.0000348$
$b_{21} = 0.105 \overset{-.0008}{L_{21}} = -.0000944$	$b_{22} = 0.0349 \overset{.0002}{\times} L_{22} = .00000698$
$b_{23} = Y_{90} \overset{.0044-.0040}{-} Y_{45} = .0004$	

Calculation Sheet No. 11

.22476

a_1	-.00012524	b_1	-.00059880
a_2	-.0000834	b_2	.0
a_3	-.0000416	b_3	.00195600
a_4	.0	b_4	.00153760
a_5	.0002736	b_5	.00075200
a_6	.0004070	b_6	.00109680
a_7	-.0000992	b_7	.00052980
a_8	-.0001060	b_8	.00016960
a_9	.0004704	b_9	.0
a_{10}	-.0003858	b_{10}	.00107240
a_{11}	-.0006950	b_{11}	.00014380
a_{12}	.0008916	b_{12}	.00053520
a_{13}	.0009456	b_{13}	.00049280
a_{14}	.0001658	b_{14}	.00100620
2.0854 a_{15}	.0006928	b_{15}	.00040000
a_{16}	.0010788	b_{16}	.00350400
a_{17}	.0007416	b_{17}	.00022500
a_{18}	.0007902	b_{18}	.00006180
a_{19}	.0007760	b_{19}	-.00009680
a_{20}	.0005910	b_{20}	-.00003480
a_{21}	-.0001990	b_{21}	-.00008400
4.5772 a_{22}	.0013986	b_{22}	.00008898
	ADD:	b_{23}	.0004 ADD:
P =	0068736	Q =	.01107558

Complete the following calculations:

$A_1 = \frac{P}{45} = \frac{}{45} = .0001530$5 $\quad B_1 = \frac{Q}{45} = \frac{}{45} = .0002906$

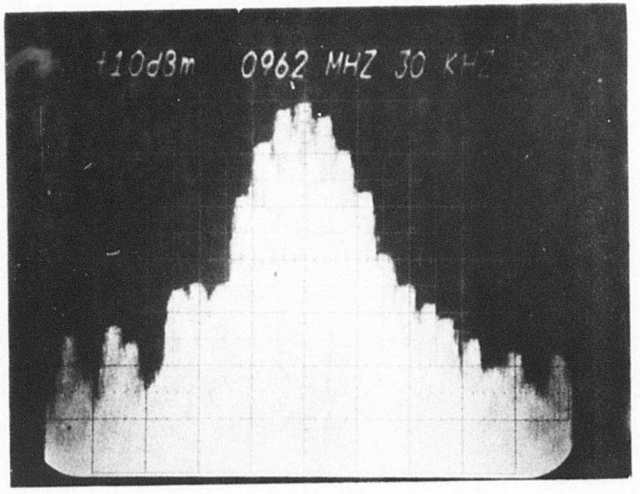
$C_1 = \sqrt{A_1^2 + B_1^2} = \sqrt{2.3 \times 10^{-8} + 8.4 \times 10^{-8}} = .0003271$

15 Hz Modulation (less than 0.08%):

$M_{15} = 100. \frac{C_1}{V_{av}} = .0164$ %

ATTACHMENT 3

RF SPECTRUM PHOTOGRAPHS AND WORK SHEETS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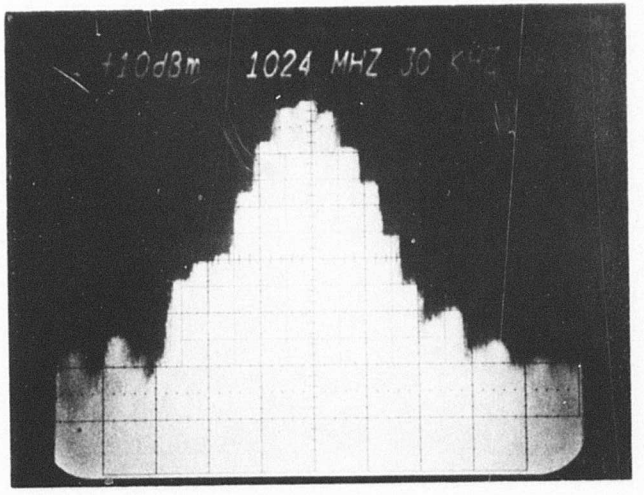
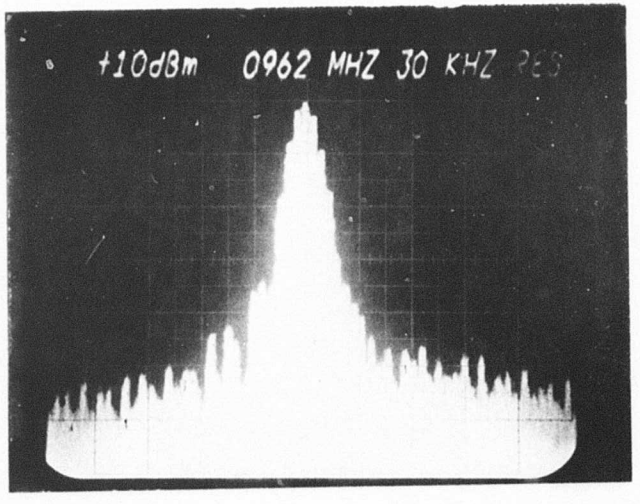

+10dBm 1024 MHZ 30 KHZ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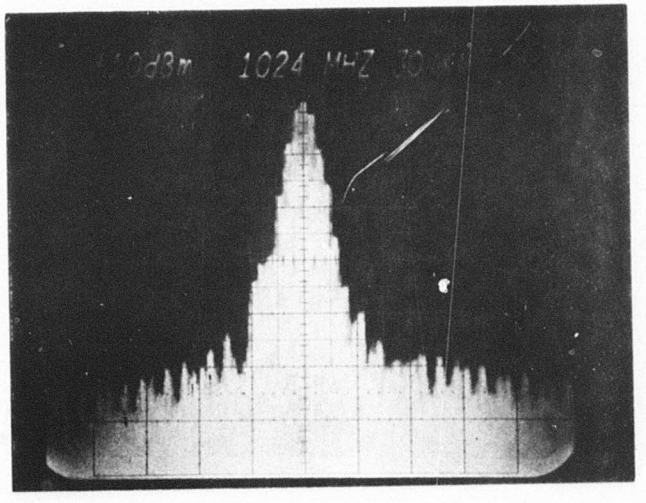
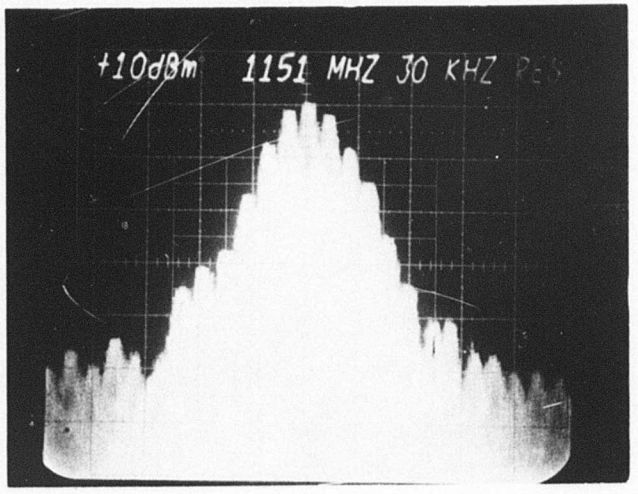
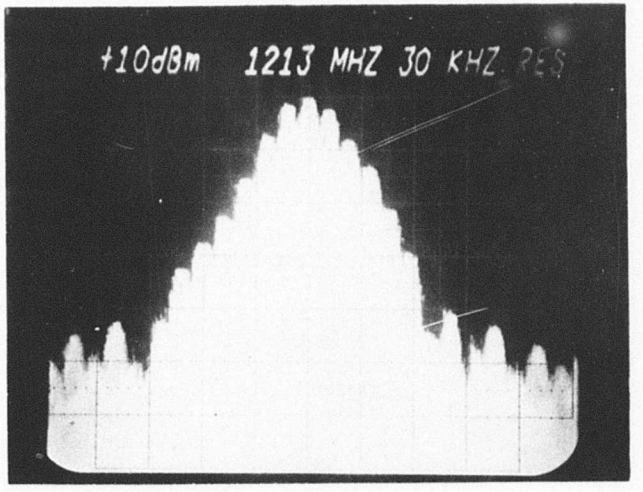
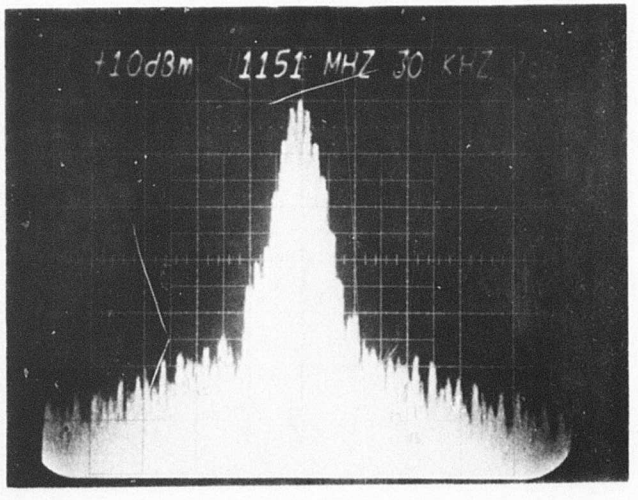
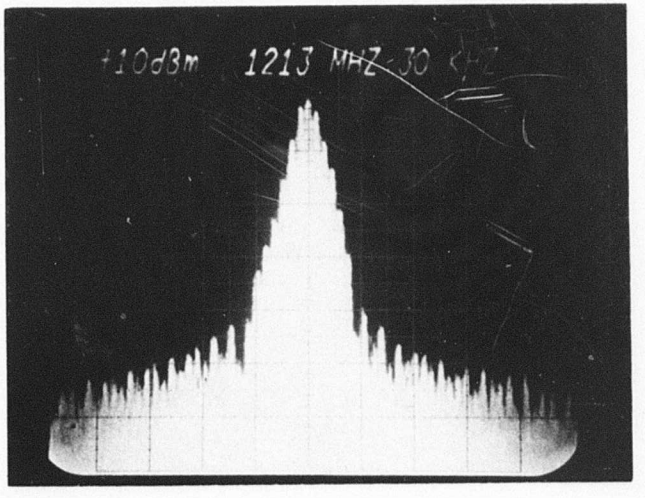

1024 MHZ


+10dBm 1151 MHZ 30 KHZ


+10dBm 1213 MHZ 30 KHZ


+10dBm 1151 MHZ 30 KHZ


+10dBm 1213 MHZ 30 KHZ

Spectrum Calculations - Channel 1X

12/13/76
AN/TRN-41
Official Work Sheets
for Spectrum Test -

YL1 = 631.0 YC = 1000

YL2 = 158.5

YL3 = 15.85

YL6 = .2512

YL7 = .01

YL8 = .03162

YL9 = .05012

YL10 = .005012

YL11 = .03981

YL12 = .003981

YL13 = .007943

YL21 = .005012

YL22 = .001585

YL23 = .003162

YL24 = .003162

YL25 = .001585

YL26 = .005012

YL27 = .001585

YR1 = 501.2

YR2 = 125.9

YR3 = 19.95

YR6 = .1585

YR7 = .07943

YR8 = .03162

YR9 = .0100

YR10 = .01995

YR11 = .005012

YR12 = .001995

YR13 = .01259

YR21 = .01585

YR22 = .003162

YR23 = .00631

YR24 = .00631

YR25 = .00316

YR26 = .007943

YR27 = .003162

PC = .5YL3 + YL2 + YL1 + YC + YR1 + YR2 + .5YR3 = 2434.5

PR.8 = .08YR6 +.82YR7 + YR8 + YR9 + YR10 + YR11 + .92 YR12 + .18YR13 = .165015

PR.2 = .5YR21 + YR22 + YR23 + YR24 + YR25 +YR26 + .5YR27 = .036391

PL.8 = .08YL6 + .82YL7 + YL8 + YL9 + YL10 + YL11 + .92 YL12 + .18YL13 = .15995

PL2 = .5YL21 + YL22 + YL23 + YL24 + YL25 + YL26 + .5 YL27 = .017805

$L.8 = 10 \log_{10} \frac{PC}{PL.8} = 41.8$

$L2 = 10 \log_{10} \frac{PC}{PL2} = 51.3$

$R.8 = 10 \log_{10} \frac{PC}{PR.8} = 41.7$

$R2 = 10 \log_{10} \frac{PC}{PR2} = 48.2$

12/13/76

Spectrum Calculations - Channel 63X

AN/TRN-41
Official Work Sheets
for Spectrum Test -

YL1 = 794.3 YC = 1000

YL2 = 158.5

YL3 = 19.5

YL6 = .3981

YL7 = .01585

YL8 = .01995

YL9 = .03981

YL10 = .007943

YL11 = .02512

YL12 = .010

YL13 = .00631

YL21 = .005012

YL22 = .001995

YL23 = .003981

YL24 = .003162

YL25 = .001585

YL26 = .003162

YL27 = .001585

YR1 = 631.0

YR2 = 125.9

YR3 = 31.62

YR6 = .07943

YR7 = .1259

YR8 = .02512

YR9 = .03162

YR10 = .01

YR11 = .01585

YR12 = .01259

YR13 = .01259

YR21 = .00100

YR22 = .003162

YR23 = .00631

YR24 = .00631

YR25 = .003162

YR26 = .007943

YR27 = .003162

PC = .5YL3 + YL2 + YL1 + YC + YR1 + YR2 + .5YR3 = 2735.5

PR.8 = .08YR6 +.82YR7 + YR8 + YR9 + YR10 + YR11 + .92 YR12 + .18YR13 = .206031

PR.2 = .5YR21 + YR22 + YR23 + YR24 + YR25 +YR26 + .5YR27 = .028968

PL.8 = .08YL6 + .82YL7 + YL8 + YL9 + YL10 + YL11 + .92 YL12 + .18YL13 = .148004

PL2 = .5YL21 + YL22 + YL23 + YL24 + YL25 + YL26 + .5 YL27 = .017184

$L.8 = 10 \log_{10} \frac{PC}{PL.8} = 42.7$

$L2 = 10 \log_{10} \frac{PC}{PL2} = 52.0$

$R.8 = 10 \log_{10} \frac{PC}{PR.8} = 41.2$

$R2 = 10 \log_{10} \frac{PC}{PR2} = 49.7$

12/13/76

Spectrum Calculations - Channel 63X

AN/TRN-41
Official Work Sheets
for Spectrum Test -

YL1 =	794.3	YC = 1000	
YL2 =	158.5		YR1 = 631.0
YL3 =	19.5		YR2 = 125.9
YL6 =	.3981		YR3 = 31.62
YL7 =	.01585		YR6 = .07943
YL8 =	.01995		YR7 = .1259
YL9 =	.03981		YR8 = .02512
YL10 =	.007943		YR9 = .03162
YL11 =	.02512		YR10 = .01
YL12 =	.010		YR11 = .01585
YL13 =	.00631		YR12 = .01259
YL21 =	.005012		YR13 = .01259
YL22 =	.001995		YR21 = .00100
YL23 =	.003981		YR22 = .003162
YL24 =	.003162		YR23 = .00631
YL25 =	.001585		YR24 = .00631
YL26 =	.003162		YR25 = .003162
YL27 =	.001585		YR26 = .007943
			YR27 = .003162

PC = .5YL3 + YL2 + YL1 + YC + YR1 + YR2 + .5YR3 = 2735.5

PR.8 = .08YR6 +.82YR7 + YR8 + YR9 + YR10 + YR11 + .92 YR12 + .18YR13 = .206031

PR.2 = .5YR21 + YR22 + YR23 + YR24 + YR25 +YR26 + .5YR27 = .028968

PL.8 = .08YL6 + .82YL7 + YL8 + YL9 + YL10 + YL11 + .92 YL12 + .18YL13 = .148004

PL2 = .5YL21 + YL22 + YL23 + YL24 + YL25 + YL26 + .5 YL27 = .017184

$L.8 = 10 \log_{10} \frac{PC}{PL.8} = 42.7$

$L2 = 10 \log_{10} \frac{PC}{PL2} = 52.0$

$R.8 = 10 \log_{10} \frac{PC}{PR.8} = 41.2$

$R2 = 10 \log_{10} \frac{PC}{PR2} = 49.7$

Spectrum Calculations - Channel 64X

12/13/76
AN/TRN-41
Official Work Sheets
for Spectrum Test -

YL1 = 794.3 YC = 1000 YR1 = 631.0

YL2 = 158.5 YR2 = 158.5

YL3 = 19.95 YR3 = 31.62

YL6 = .5012 YR6 = .1

YL7 = .02512 YR7 = .1

YL8 = .02512 YR8 = .03981

YL9 = .03981 YR9 = .02512

YL10 = .01259 YR10 = .01

YL11 = .02512 YR11 = .01259

YL12 = .01 YR12 = .01

YL13 = .01259 YR13 = .01585

YL21 = .00631 YR21 = .003162

YL22 = .003162 YR22 = .001995

YL23 = .003162 YR23 = .003162

YL24 = .003981 YR24 = .0007943

YL25 = .001 YR25 = .003162

YL26 = .003162 YR26 = .001995

YL27 = .001585 YR27 = .001585

PC = .5YL3 + YL2 + YL1 + YC + YR1 + YR2 + .5YR3 = 2768.09

PR.8 = .08YR6 + .82YR7 + YR8 + YR9 + YR10 + YR11 + .92 YR12 + .18YR13 = .18957

PR.2 = .5YR21 + YR22 + YR23 + YR24 + YR25 + YR26 + .5YR27 = .013482

PL.8 = .08YL6 + .82YL7 + YL8 + YL9 + YL10 + YL11 + .92 YL12 + .18YL13 = .1748

PL2 = .5YL21 + YL22 + YL23 + YL24 + YL25 + YL26 + .5 YL27 = .01841

$L.8 = 10 \log_{10} \frac{PC}{PL.8} = 42.0$

$L2 = 10 \log_{10} \frac{PC}{PL2} = 51.8$

$R.8 = 10 \log_{10} \frac{PC}{PR.8} = 41.6$

$R2 = 10 \log_{10} \frac{PC}{PR2} = 53.1$

12/13/76

Spectrum Calculations - Channel 126X

AN/TRN-41
Official Work Sheets
for Spectrum Test -

YL1 = 794.3 YC = 1000

YL2 = 199.5

YL3 = 31.62

YL6 = .5012

YL7 = .0631

YL8 = .0100

YL9 = .05012

YL10 = .01259

YL11 = .02512

YL12 = .01

YL13 = .01995

YL21 = .00631

YL22 = .003981

YL23 = .005012

YL24 = .005012

YL25 = .002512

YL26 = .005012

YL27 = .001995

YR1 = 631.0

YR2 = 158.5

YR3 = 50.12

YR6 = .03981

YR7 = .1

YR8 = .02512

YR9 = .05012

YR10 = .01

YR11 = .02512

YR12 = .01

YR13 = .01585

YR21 = .007943

YR22 = .005012

YR23 = .003981

YR24 = .00631

YR25 = .001585

YR26 = .00631

YR27 = .001585

PC = .5YL3 + YL2 + YL1 + YC + YR1 + YR2 + .5YR3 = 2824.17

PR.8 = .08YR6 +.82YR7 + YR8 + YR9 + YR10 + YR11 + .92 YR12 + .18YR13 = .207598

PR.2 = .5YR21 + YR22 + YR23 + YR24 + YR25 +YR26 + .5YR27 = .027962

PL.8 = .08YL6 + .82YL7 + YL8 + YL9 + YL10 + YL11 + .92 YL12 + .18YL13 = .202459

PL2 = .5YL21 + YL22 + YL23 + YL24 + YL25 + YL26 + .5 YL27 = .025682

$L.8 = 10 \log_{10} \frac{PC}{PL.8} = 41.4$

$L2 = 10 \log_{10} \frac{PC}{PL2} = 50.4$

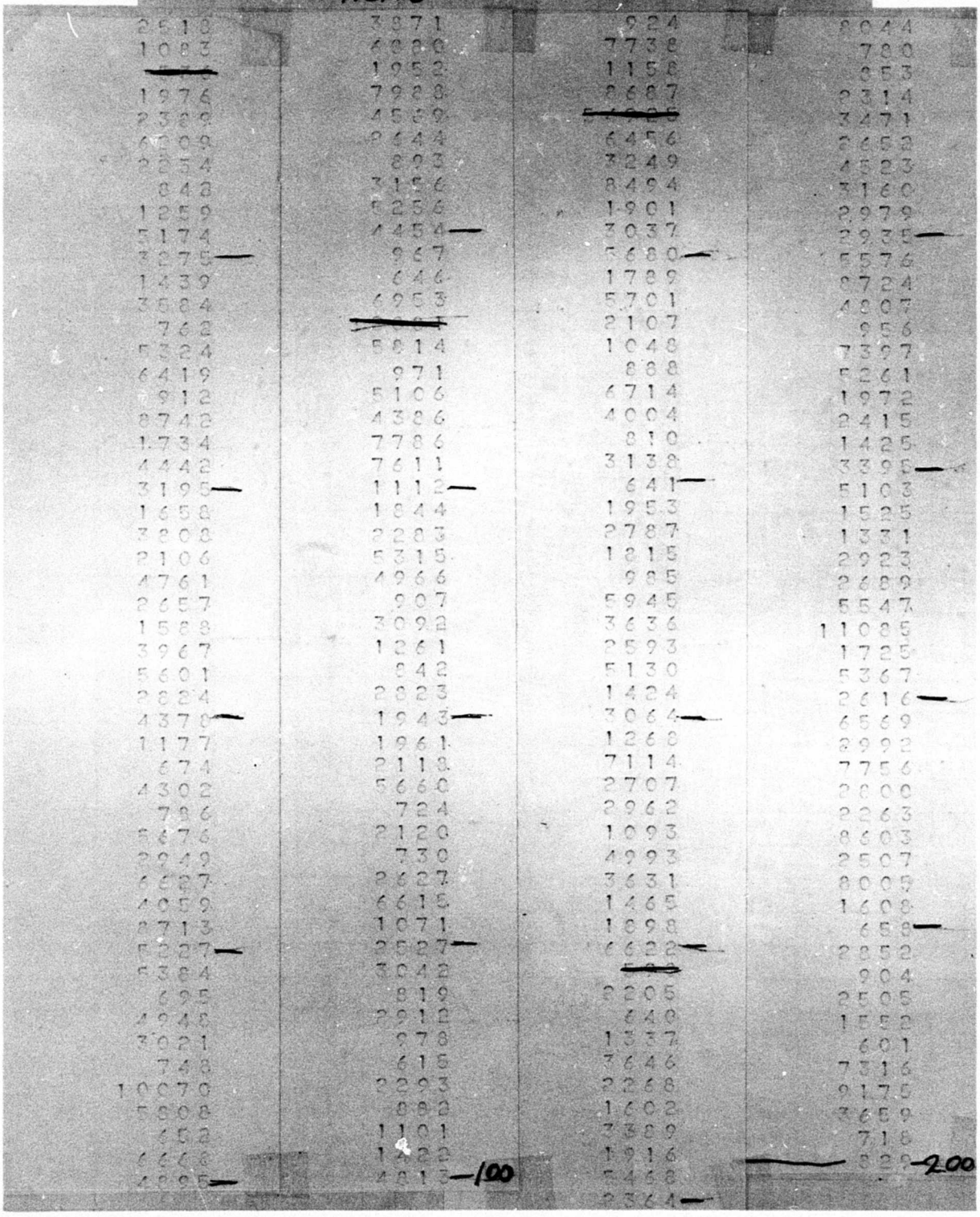
$R.8 = 10 \log_{10} \frac{PC}{PR.8} = 41.3$

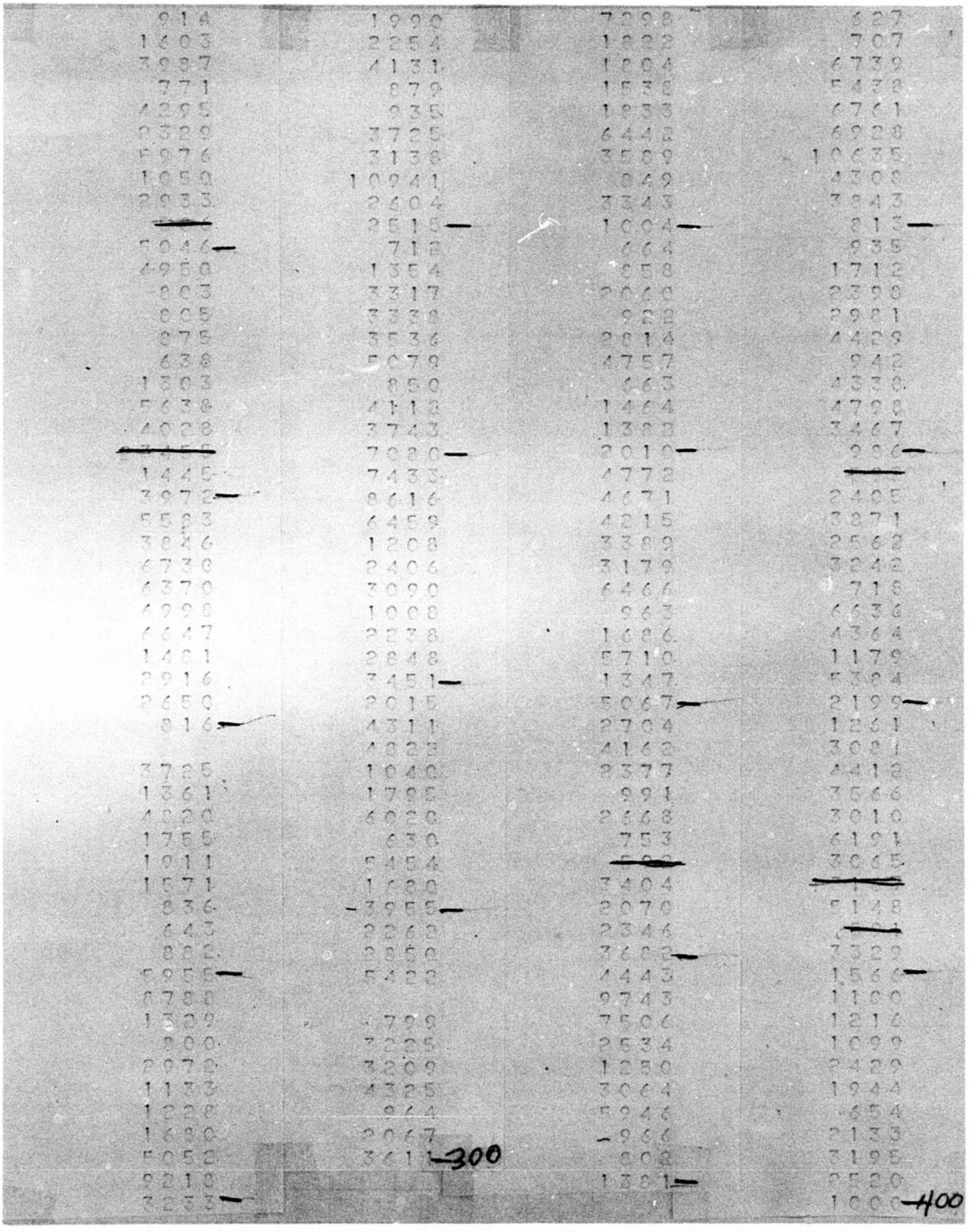
$R2 = 10 \log_{10} \frac{PC}{PR2} = 50.0$

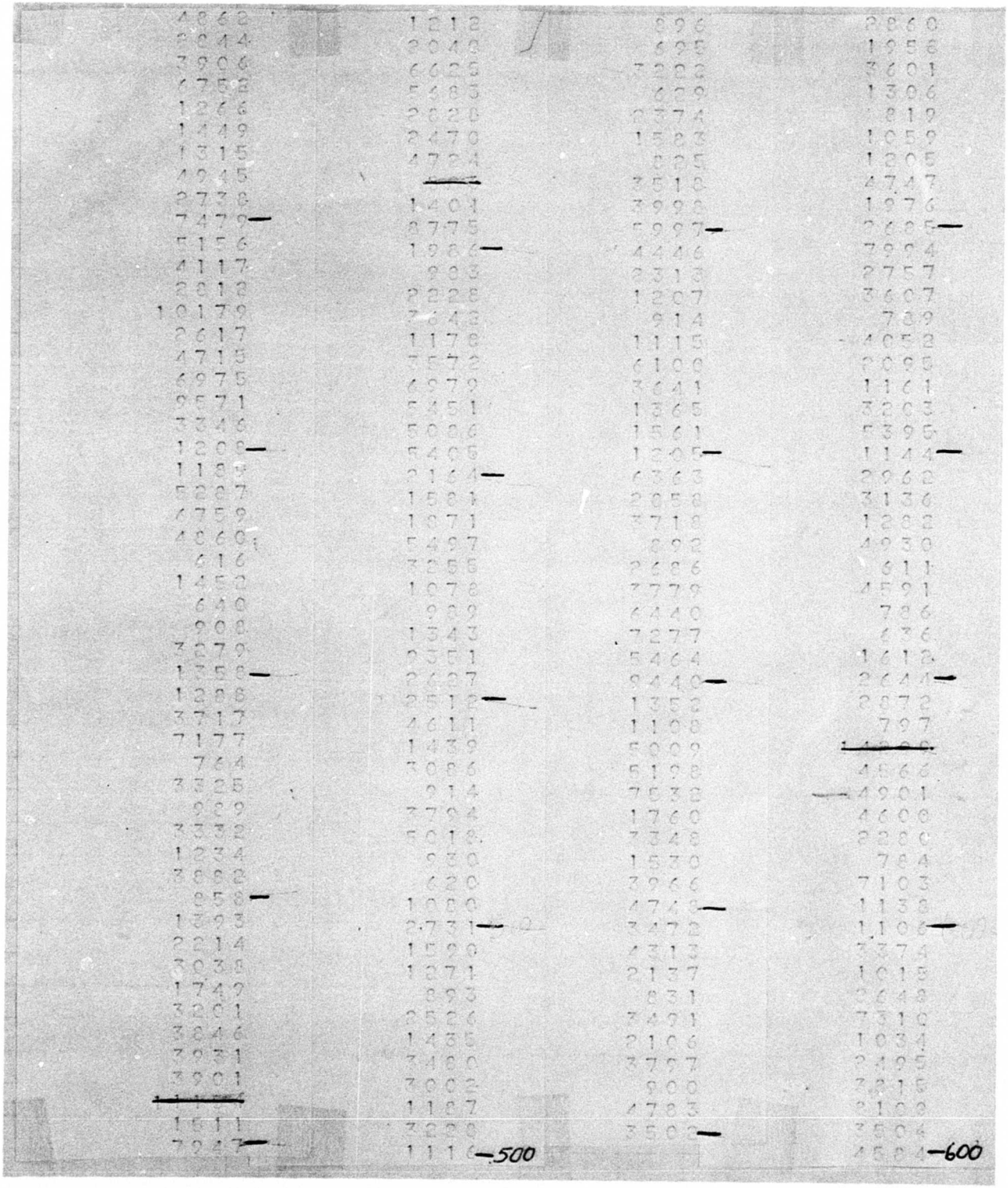
ATTACHMENT 4

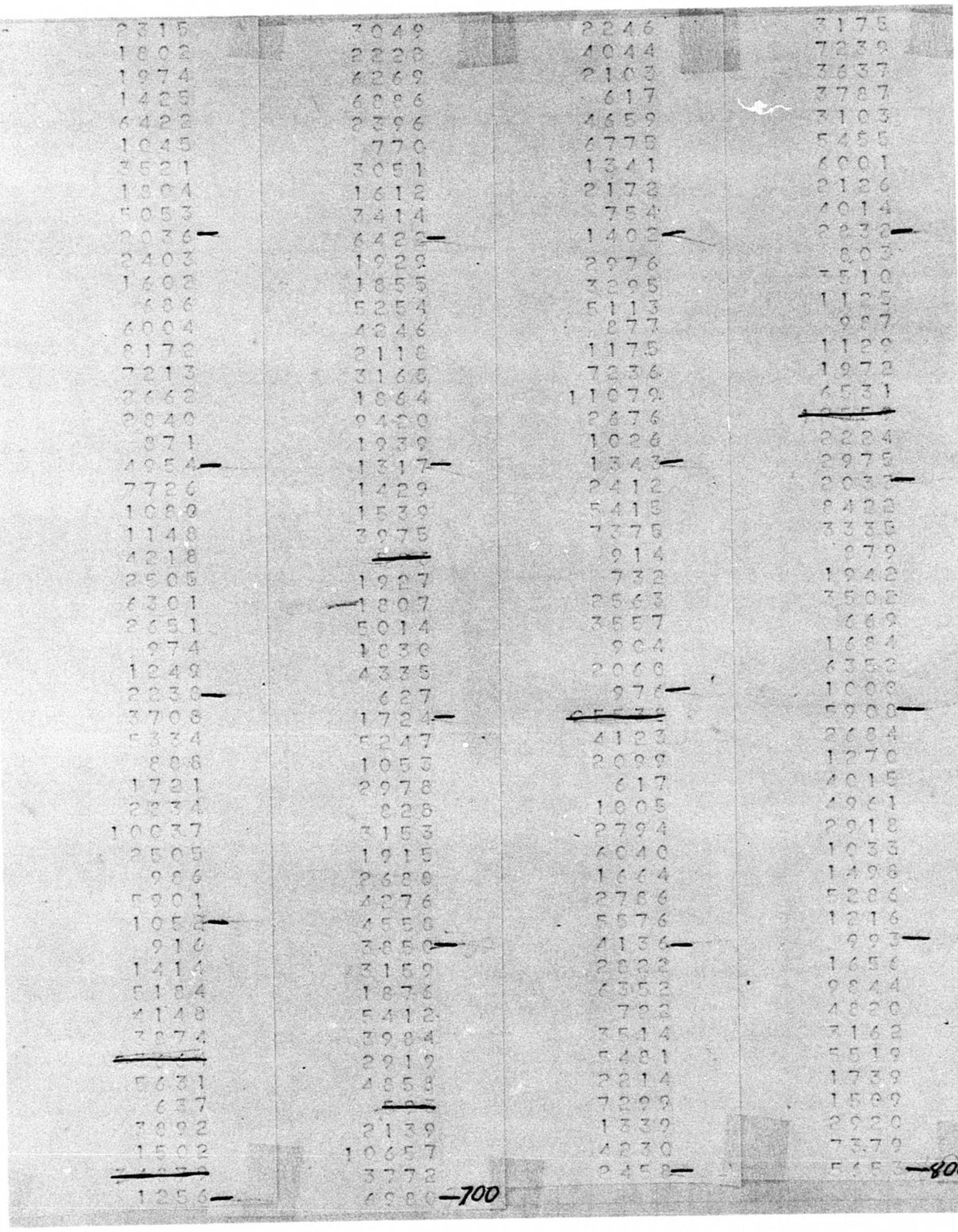
SQUITTER DISTRIBUTION SPACING MEASUREMENTS AND WORK SHEET

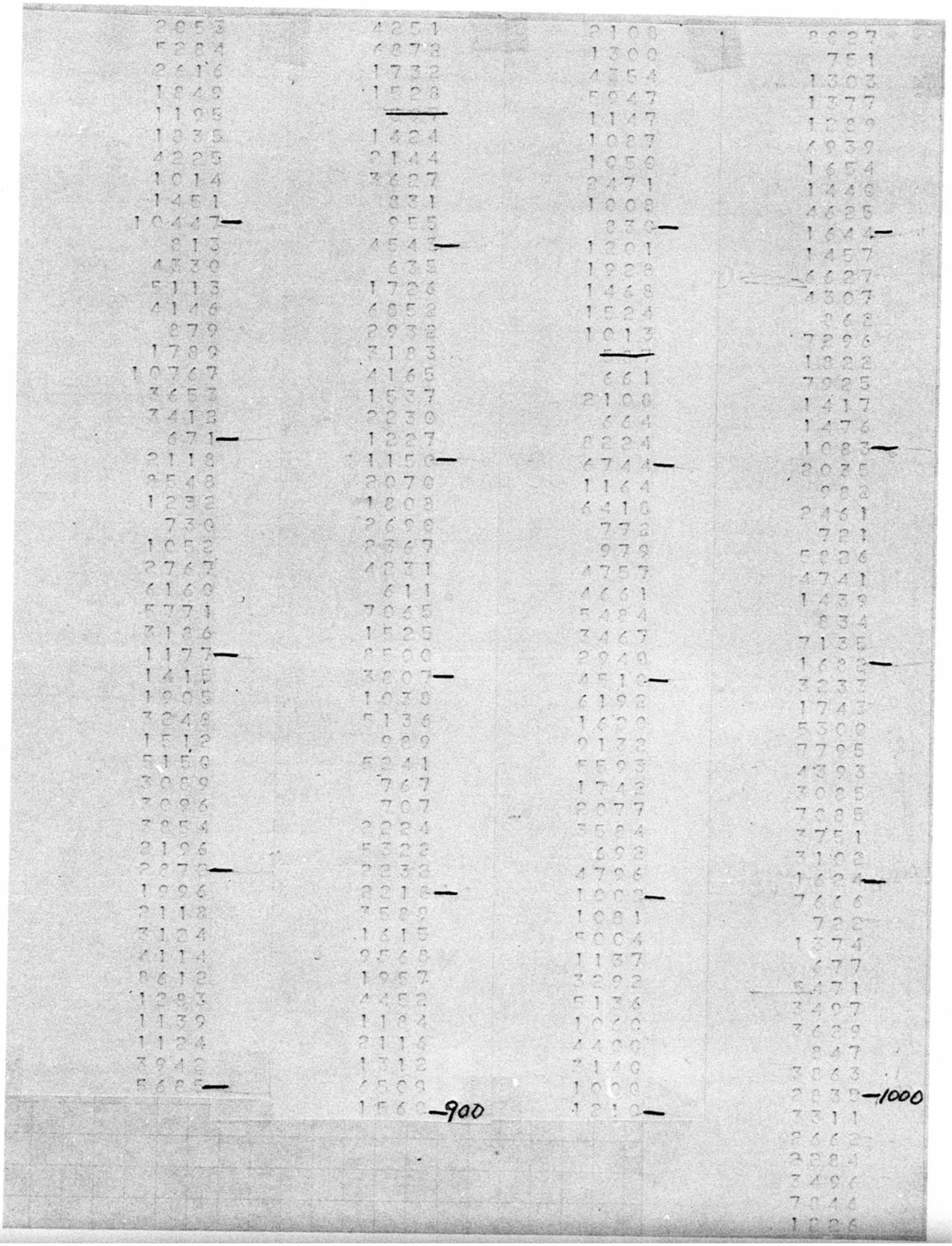
SQUITTER DISTRIBUTION TEST, AN/TRN-41
12/13/76











		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90		
60.0 –	84.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	89
85.0 –	109.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	35	91
110.0 –	134.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		74
135.0 –	159.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		58
160.0 –	184.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	34	78
185.0 –	209.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		45
210.0 –	234.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		47
235.0 –	259.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		32
260.0 –	284.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	37	43
285.0 –	309.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		44
310.0 –	334.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		44
335.0 –	359.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		29
360.0 –	384.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		38
385.0 –	409.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	32	28
410.0 –	434.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		28
435.0 –	459.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		23
460.0 –	484.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		23
485.0 –	509.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		22
510.0 –	534.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		27
635,0 –	559.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		28
560.0 –	584.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		15
585.0 –	609.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		11
610.0 –	634.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		7
635.0 –	659.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	35	16
660.0 –	685.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		16
685.0 –	709.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		13
710.0 –	734.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		13
735.0 –	759.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		7
760.0 –	784.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		8
785.0 –	809.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		7
810.0 –	834.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		3
835.0 –	859.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		4
860.0 –	884.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		10
885.0 –	909.9																				0
910.0 –	934.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		3
935.0 –	959.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		5
960.0 –	984.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		2
985.0 –	1009.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		2
1010.0 –	1034.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		1
1035.0 –	1059.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		1
1060.0 –	1084.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		3
1085.0 –	1109.9	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		3

OFFICAL WORK SHEETS -

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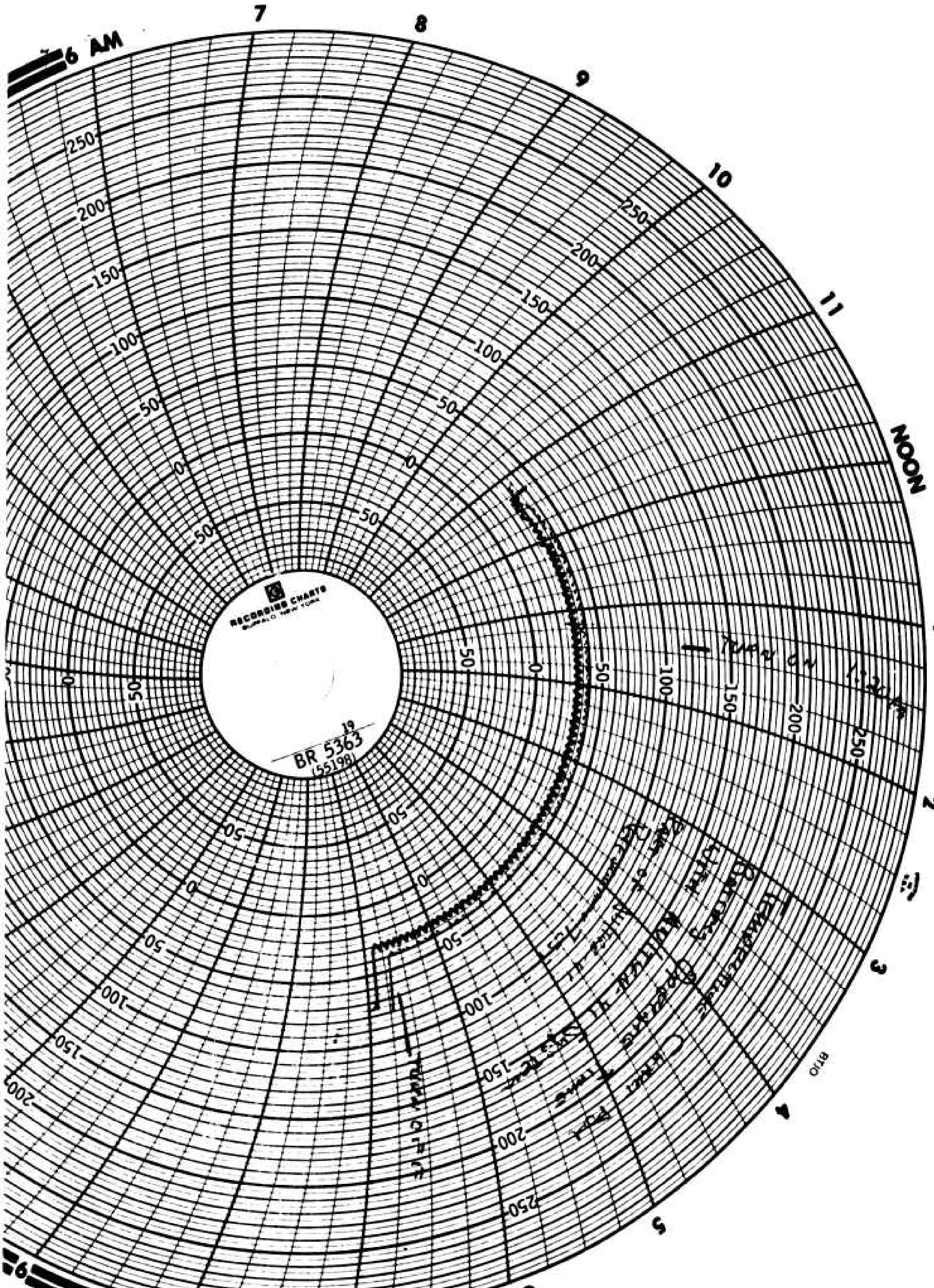
ATTACHMENT 5

BATTERY OPERATION TEMPERATURE CHAMBER CHART

 6 AM
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