Transformer 2

POWER TRANSFORMER DEPARTMENT

GENERAL ELECTRIC

PITTSFIELD, MASS.

[redacted]

Date of Test May 1975

REPORT OF TEST ON TRANSFORMERS

Purchaser [redacted]

RATING **120000/160000/200000(Output)KVA

[redacted]

	H – Winding	X – Winding	Y – Winding
Volts	223000GRY/128750	69000GRY/39840	13800
Kva	**	**	29000//48300

Taps as per attached Nameplate 268276

CHARACTERISTICS

Losses, efficiencies and regulations are based on wattmeter measurements and, unless otherwise stated, on normal rating.
For three phase transformers the resistances given are the sum of the three phases.

[redacted]	Resistance at 85C			NO LOAD LOSS WATTS AT 100% VOLTAGE	% EXCIT. CURRENT AT 100% VOLTAGE	223 GRY Kv To 69 GRY Kv At 120000 Kva		223 GRY Kv To 13.8 Kv At 29000 Kva		69 GRY Kv To 13.8 Kv At 29000 Kva	
	H	X	Y			LOAD LOSS WATTS @ 85 C	% IMP. 75 C	LOAD LOSS WATTS @ 85 C	% IMP. 75 C	LOAD LOSS WATTS @ 85 C	% IMP. 75 C
	1.270	.1544	.1736	96850	0.553	230500	5.99	133060	10.26	147290	13.70
AVERAGE											
GUARANTEE	———	———	———	98000	.6	———	6.20	———	–	———	–
Total Loss Watts at 85C				AVERAGE		327350		229910		244140	
				GUARANTEE		335000					

	EFFICIENCIES AT 85C 100% P-F					REGULATION AT 85C				
	Load	Full Load	¾ Load	½ Load	¼ Load		100% P-F	90% P-F	80% P-F	70% P-F
AVERAGE		99.73	99.75	99.74	99.63	AVERAGE	0.371	2.93	3.85	
GUARANTEE		99.72	99.74	99.74	99.63	GUARANTEE	0.4	–	4.0	

TEMPERATURE RISE (Serial No. *)

Average ultimate temperature rise in deg C corrected to instant of shutdown

	H – Winding		X – Winding		Y – Winding			
Winding Connection	223000 V.		61275 V.		13800 V.		Method of cooling:	OA
MVA Amp.	120	311	120	1116	29	1213	Top oil rise:	56.4 C
Rise: Test Guar.	58.7C	65 C	59.3C	65C	62.2C	65 C	Ambient:	25.0 C
Winding Temp. Ind.		deg C		deg C		deg C		
Winding Connection	223000 V.		61275 V.		13800 V.		Method of cooling:	FOA
MVA Amp.	200	518	200	1674	200	2030	Top oil rise:	32.7 C
Rise: Test Guar.	59.0C	65 C	61.5 C	65 C	57.1 C	65 C	Ambient:	25.0 C
Winding Temp. Ind.		deg C		deg C		deg C		

DIELECTRIC TESTS

APPLIED POTENTIAL TEST	VOLTAGE OF WINDING TESTED	TEST VOLTAGE APPLIED	DURATION IN SECONDS
Voltage applied to each winding in turn with all other windings connected to core and ground. Line terminal to ground	H	50000	60 seconds for all tests
	X	50000	
	Y	34000	

Induced voltage test 328V/5V [redacted] for 7200 cycles

Remarks

*Temperature values are based on design data obtained from thermally similar transformers.

(Continued on Page -2-)

[redacted]

[redacted]

Additional Test Data

Additional Resistances at 85°C

Connection	Test
75900Y	.1843
62100Y Ser.	.1855
Exc. U. Wdg.	.9654

Insulation Power Factor Tests

H-X - Grd.	Y - Grd.	Temp. °C
0.23	0.23	43.2

Voltage Ratios

Connection	Calculated	Phase 1	Phase 2	Phase 3
223000-75965	2.9356	2.9352	2.9373	2.9385
223000-75550	2.9517	2.9524	2.9545	2.9562
223000-75125	2.9684	2.9671	2.9692	2.9708
223000-74705	2.9851	2.9849	2.9870	2.9888
223000-74280	3.0021	3.0010	3.0032	3.0050
223000-73850	3.0196	3.0194	3.0216	3.0234
223000-73420	3.0373	3.0361	3.0382	3.0401
223000-72985	3.0554	3.0551	3.0573	3.0591
223000-72550	3.0737	3.0725	3.0746	3.0765
223000-72110	3.0925	3.0920	3.0942	3.0961
223000-71670	3.1115	3.1101	3.1123	3.1142
223000-71225	3.1309	3.1305	3.1326	3.1346
223000-70780	3.1506	3.1502	3.1526	3.1547
223000-70330	3.1708	3.1703	3.1725	3.1744
223000-69880	3.1912	3.1898	3.1920	3.1940
223000-69425	3.2121	3.2117	3.2140	3.2159
223000-69000	3.2319	3.2329	3.2352	3.2371
223000-68510	3.2550	3.2545	3.2568	3.2587
223000-68050	3.2770	3.2757	3.2779	3.2799
223000-61275	3.6393	3.6378	3.6415	3.6430
223000-13800	16.1594	16.1748	16.1796	16.1960
69000-13800	5.0000	5.0117	5.0086	5.0117

Polarity and phase relation checked out OK.

To check the calibration of the winding temperature indicators the following information may be used.

CT	Current To Apply For 30 Minutes	Terminals	Rise Over 25°C Oil	Resistance (Ohms)
A	32.4	X1 - Xo G	38.8	None
B	32.0	X2 - Xo G	39.1	.070
C	30.3	X3 - Xo G	38.1	.170

These values will be approximately 3°C higher in 0°C top oil and 3°C lower in 50°C top oil. The resistors should be in place for all tests.

[redacted]

[redacted]

DOBLE INSULATION TESTS

AUTO TRANSFORMERS

[redacted]

[redacted]

DATE 8-27-76

AIR TEMP. 50 °F TOP OIL TEMP.

WEATHER [illegible] % HUMIDITY 7[illegible]%

MFR. G-E [redacted] TYPE 30 FORM CLASS OA/FA/FOA

KVA 200,000

HIGH SIDE KV 223 Y ☒ Δ ☐

LOW SIDE KV 69 Y ☒ Δ ☐

TERT. SIDE KV 13.8 Y ☐ Δ ☒

BUSHINGS

MFR.	TYPE	FORM	CLASS	KV	AMP.	YEAR
GE	U			69(230)	1200	1976
GE	U		HT 69	69(W)	1200	1976
GE	U		HT 23	0 (H)	1200	1976

COPIES TO: DATE LAST TEST 1N [illegible] LAST SHEET NO.

OVERALL TESTS

TEST	TEST CONNECTIONS: WINDING ENERGIZED	WINDING GROUNDED	WINDING GUARDED	TEST KV	EQUIVALENT 10 KV READINGS: MILLIAMPERES: METER READING	MULTIPLIER	MILLIAMPERES	WATTS: METER READING	MULTIPLIER	WATTS	% POWER FACTOR: MEASURED	COR. 20°C	KEY TO INSULATION RATING	INSULATION RATING
1	HIGH LOW	TERT.		10	93	2	.186	6	1	6	— —	— —		— —
2	HIGH LOW		TERT.	10	87	2	.174	5.5	1	5.5	.3.1		C_H	
3	TERT.	HIGH LOW		10	79	1	.79	1.5	.2	1.5	— —	— —		— —
4	TERT.		HIGH LOW	10	66	1	.66	7	.2	1.4	.2.2		C_T	
CALCULATED RESULTS					— —	— —	.12	— —	— —	.5	.4[illegible]		C_{HT} (TEST 1 MINUS TEST 2)	
					— —	— —	.2	— —	— —	.1	— —	— —	(TEST 3 MINUS TEST 4)*	— —

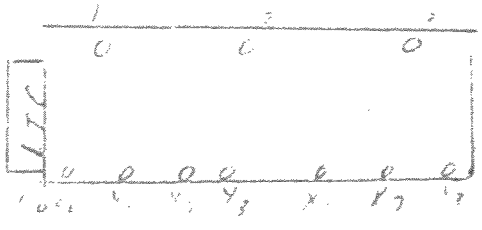
*CURRENT AND WATTS SHOULD COMPARE WITH THOSE FOR C_{HT}

BUSHING TESTS

LINE NO.	BUSH. NO.	PHASE	TEST KV	EQUIVALENT 10KV READINGS: MICROAMPERES: METER READING	MULTIPLIER	MICRO-AMPERES	WATTS: METER READING	MULTIPLIER	WATTS	% POWER FACTOR: MEASURED	COR. 20°C	COLLAR TESTS (WATTS/CURRENT): TOP		INSULATION RATING
HIGH 1	H_1	[redacted]	10	67	20	1340	6	.01	.11	44.7				
HIGH 2	H_2		10	67	20	1340	3	.01	.03	.223				
HIGH 3	H_3		10	67	20	1340	3	.01	.03	.223				
LOW 4	X_1		7	64	20	1280	5	.01	.05	.39				
LOW 5	X_2		7	66	20	1320	5	.01	.05	.39				
LOW 6	X_3		7	63	20	1260	4	.01	.04	.317				
LOW	H_0X_0 N		10	63	20	1260	6	.01	.06	.476				
TERT. 8	Y_1		10	95	20	1900	7	.01	.07	.368				
TERT. 9	Y_2		10	22	1	2.2	3	.01	.01	.273				
TERT. 10	Y_3		10	20	.1	2.0	2.5	.01	.05	2[illegible]				
	11 N			EXCITE [illegible]			[illegible]			[illegible]		[illegible]		
	12		10	21	1	21						H_1	[illegible]	
	13		10	26	1	26						X_3	H_0	H_2
	14 OIL SAMPLE		10	35	1	35						OIL TEMP	15°C	H_3

N = NEUTRAL

DIAGRAM



[redacted]

[redacted]

INSULATION TESTS

MISCELLANEOUS EQUIPMENT

[redacted]

[redacted]

DATE 5-27-76

AIR TEMP. [illegible] OIL TEMP.

WEATHER [illegible] % HUM. [illegible]

DATE LAST TEST [illegible]

LAST TEST SHEET NO.

LINE NO.	[redacted]	TEST KV	EQUIVALENT 10 KV READINGS						% POWER FACTOR				INSULATION RATING
			MICROAMPERES			WATTS							
			METER READING	MULTIPLIER	MICROAMPERES	METER READING	MULTIPLIER	WATTS	MEASURED	COR 20°C			
1		5 KV	[illegible]			[illegible]			[illegible]				
2			15 KV	[illegible]		[illegible]		1870	[illegible]				
3		10	22	10	220	1	.00	.00					
4		10	20	10	200	.0	.00	.00					
5			20	10	200	.2	.01	.002					
6													
7		10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
8			[illegible]	[illegible]	[illegible]	149							
9		10	11	10	110	2.9	.00	.029					
10			11	10	110	4.2	.00	.042					
11		10	11	10	110	5.3	.01	.053					
12													
13		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
14		[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]				
15		10	15	10	150	75	.01	.75					
16		10	17.5	10	175	76	.01	.76					
17		10	17	10	170	75	.01	.75					
18													
19		[illegible]	[illegible]	15	ON	T-	1003						
20		10	13	10	130	25	.01	.04					
21		10	13	10	130	15	.001	.036					
22		10	13	10	130	15	.001	.03					
23		10	12	10	120	5	.001	.010					
24		10	12	10	20	5	.001	.016					
25		10	12	10	120	5	.001	.02					
26		10	12	10	120	4	.001	.016					
27		[illegible]	12	10	120	5	.001	.006					
28		10	13	10	130	10	.001	.03					
29		10	10.5	10	24	6	.001	.007					

REMARKS

[redacted]

[redacted]

DOBLE TEST

[redacted]

230KV - 69KV 200 MVA TRANSFORMER

[redacted]

[redacted]

AUTO TRANSFORMERS

[redacted]

DATE 2-11-76
AIR TEMP. 22°F TOP OIL TEMP. 20°C
WEATHER Cloudy % HUMIDITY 51%

MFR. G-E [redacted] TYPE OF FORM CLASS OA/FA/FOA

	KVA	200,000
	HIGH SIDE KV	233 Y ☒ Δ ☐
	LOW SIDE KV	69 Y ☒ Δ ☐
	TERT. SIDE KV	13.8 Y ☐ Δ ☒

BUSHINGS

	MFR	TYPE	FORM	CLASS	KV	AMP.	YEAR
H	G.E	U		[redacted]	230	800	1975
X	G.E	U		A161	69	2000	1975
Y	G.E	U		A173	15	3000	1975

COPIES TO: DATE LAST TEST INITIAL LAST SHEET NO. INITIAL

OVERALL TESTS

TEST	TEST CONNECTIONS: WINDING ENERGIZED	WINDING GROUNDED	WINDING GUARDED	TEST KV	EQUIVALENT 10 KV READINGS: MILLIAMPERES METER READING	MULTIPLIER	MILLIAMPERES	WATTS METER READING	MULTIPLIER	WATTS	% POWER FACTOR MEASURED	% POWER FACTOR COR. 20°C	KEY TO INSULATION RATING	INSULATION RATING
1	HIGH LOW	TERT.		10	76	2	192	6	1	6	—	—		—
2	HIGH LOW		TERT.	10	90	2	180	5.5	1	5.5	.30	.27	C_H	WG
3	TERT.	HIGH LOW		10	80	1	80	10	.2	2.0	—	—		—
4	TERT.		HIGH LOW	10	65	1	68	9	.2	1.8	.26	.23	C_T	WG
CALCULATED RESULTS					—	—	12	—	—	.5	.41	.369	C_{HT} (TEST 1 MINUS TEST 2)	WG
					—	—	12	—	—	.2	—	—	(TEST 3 MINUS TEST 4)*	—

*CURRENT AND WATTS SHOULD COMPARE WITH THOSE FOR C_{HT}

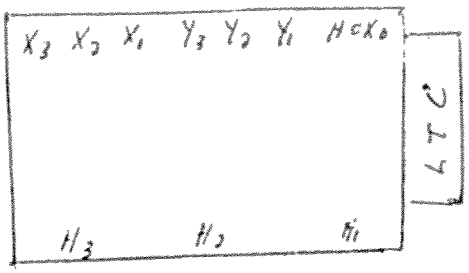
BUSHING TESTS

[redacted]

	LINE NO.	BUSH. NO.	PHASE	TEST KV	EQUIVALENT 10 KV READINGS: MICROAMPERES METER READING	MULTIPLIER	MICRO-AMPERES	WATTS METER READING	MULTIPLIER	WATTS	% POWER FACTOR MEASURED	% POWER FACTOR COR. 20°C	COLLAR TESTS (WATTS/CURRENT) TOP		INSULATION RATING
HIGH	1	H_1		10	66	20	1320	3.5	.01	.035	.26		0		G
	2	H_2		10	65	20	1300	4	.01	.04	.30		0		G
	3	H_3		10	67	20	1340	4	.01	.04	.29		0		G
LOW	4	X_1		10	SEE MISC. SHEET								0		—
	5	X_2		10	62	20	1240	5	.01	.05	.40		0		G
	6	X_3		10	SEE MISC. SHEET								0		
		H+X		10	84	20	1680	9	.01	.09	.53		0		G
TERT.	8	Y_1		10	21	.1	2.1	3	.02	.06	.20		0		G
	9	Y_2		10	20	.1	2.0	3	.02	.06	.30		0		G
	10	Y_3		10	20	.1	2.0	3	.02	.06	.30		0		G
	11	N		CAPACITANCE TEST OF X WINDING TO:									GUARD	GND	
	12			8	67	1	67					X_1	X_2	X_3	
	13			8	58	1	58					X_2	X_3	X_1	
	14	OIL SAMPLE		8	83	2	166					X_3	OIL TEMP °C X_1	°C X_2	

N = NEUTRAL

DIAGRAM



[redacted]

INSULATION TESTS

MISCELLANEOUS EQUIPMENT

[redacted]

DATE 2-11-76

AIR TEMP. 71°F OIL TEMP. 24°C

WEATHER Cloudy % HUM. 51%

DATE LAST TEST

LAST TEST SHEET NO.

LINE NO.	[redacted]	TEST KV	EQUIVALENT 10 KV READINGS MICROAMPERES METER READING	MULTIPLIER	MICROAMPERES	EQUIVALENT 10 KV READINGS WATTS METER READING	MULTIPLIER	WATTS	% POWER FACTOR MEASURED	[redacted]	INSULA-
X1		2	60	20	1200	9	.02	.18	1.5		
2		8	60	20	1200	3.5	.01	.035	.30		
3											
4											
X2		2	61	20	1220	8	.02	.16	1.31		
6		8	62	20	1240	4	.01	.04	.325		
7											
8											
X3		2	61	20	1220	8	.02	.16	1.31		
10		8	60	20	1200	3.5	.01	.035	.30		
11											
12											
13											
14		EXCITATION			TEST			ON H	WINDI		
15									ENERGIZ		
16		10	24	1	24			H1	R		
17		10	24	1	24			H2			
18		10	37	1	34			H3			
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											

REMARKS

[redacted]

TY

BELMONT, MASS.
FORM MH-AT175

AUTO TRANSFORMERS

[redacted]

DATE 1-23-70
AIR TEMP. 62 TOP OIL TEMP. 20°C
WEATHER Clear % HUMIDITY 68
FORM CLASS OA/FA/FOA

KVA 120-160-200
HIGH SIDE KV 223 Y ☐ △ ☐
LOW SIDE KV 69 Y ☐ △ ☐
TERT. SIDE KV 13.8 Y ☐ △ ☐

BUSHINGS

MFR	TYPE	FORM	CLASS	KV	AMP.	YEAR
GE	U			146	800	1974
GE	U		AT-69	44	2000	1975
GE	U		AT-23	16	3000	1974

[redacted]

COPIES TO:
DATE LAST TEST LAST SHEET NO.

XO - GE. Type U Class 7 -23. CAT # 7B322BB G4 mms 400/1200 10KV 1974
FT TAP 2 Liter

OVERALL TESTS

TEST	TEST CONNECTIONS: WINDING ENERGIZED	WINDING GROUNDED	WINDING GUARDED	TEST KV	EQUIVALENT 10 KV READINGS: MILLIAMPERES METER READING	MULTIPLIER	MILLIAMPERES	WATTS METER READING	WATTS MULTIPLIER	WATTS	% POWER FACTOR: MEASURED	COR. 20°C	KEY TO INSULATION RATING: G= GOOD D= DETERIORATED I= INVESTIGATE B= BAD (REMOVE OR RECONDITION	INSULATION RATING
1	HIGH LOW	TERT.		10	94.5	2	189.	5.25	1	5.25	—	—		—
2	HIGH LOW		TERT.	10	88.5	2	177.	5.	1	5.	.27	.29	C_H	WG
3	TERT.	HIGH LOW		10	41.	1	81	10.25	.2	2.05	—	—		—
4	TERT.		HIGH LOW	10	68.75	1	68.75	9.25	.2	1.85	.27	.27	C_T	WG
CALCULATED RESULTS					—	—	12.	—	—	.25	.21	.21	C_{HT} (TEST 1 MINUS TEST 2)	WG
					—	—	17.25	—	—	.2	—	—	(TEST 3 MINUS TEST 4)*	—

*CURRENT AND WATTS SHOULD COMPARE WITH THOSE FOR C_{HT}

BUSHING TESTS

LINE NO.	BUSH. NO.	PHASE	TEST KV	EQUIVALENT 10KV READINGS: MICROAMPERES METER READING	MULTIPLIER	MICROAMPERES	WATTS METER READING	WATTS MULTIPLIER	WATTS	% POWER FACTOR: MEASURED	COR. 20°C	COLLAR TESTS (WATTS/CURRENT): TOP		INSULATION RATING
HIGH	1 H1	A	10	69	20	1380	2.5	.01	.025	.18	.18	.03	150	G
	2 H2	B	10	67	20	1340	2.5	.01	.025	.16	.18	.03	150	G
	3 H3	C	10	67	20	1340	2.5	.01	.025	.18	.18	.03	150	G
LOW	4 X1	A	10	60.5	20	1210	2.5	.01	.025	.21	.21	.02	130	G
	5 X2	B	10	60.5	20	1210	2.5	.01	.025	.21	.21	.01	130	G
	6 X3	C	10	60.5	20	1210	2.5	.01	.025	.21	.21	.02	130	G
	7 N													
TERT.	8 T1	A	10	23	.1	2.3	4	.02	.08	.35	.35	.01	130	G
	9 T2	B	10	21.5	.1	2.15	3.5	.02	.07	.33	.33	.01	130	G
	10 T3	C	10	21.5	.1	2.15	3.5	.02	.07	.33	.33	.01	130	G
	11 XO		10	81.5	20	1630	4.5	.01	.045	.27	.27	.01	110	G
	12													
	13		10	79	10	790	5	.005	.01	.12				X G
	14 OIL SAMPLE	MAIN	10	79	10	790	4	.002	.003	.1		H. TEMP	°C	X G

N = NEUTRAL

DIAGRAM

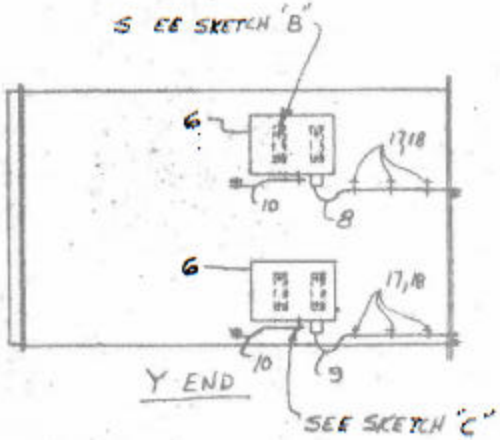
exciting Current Test

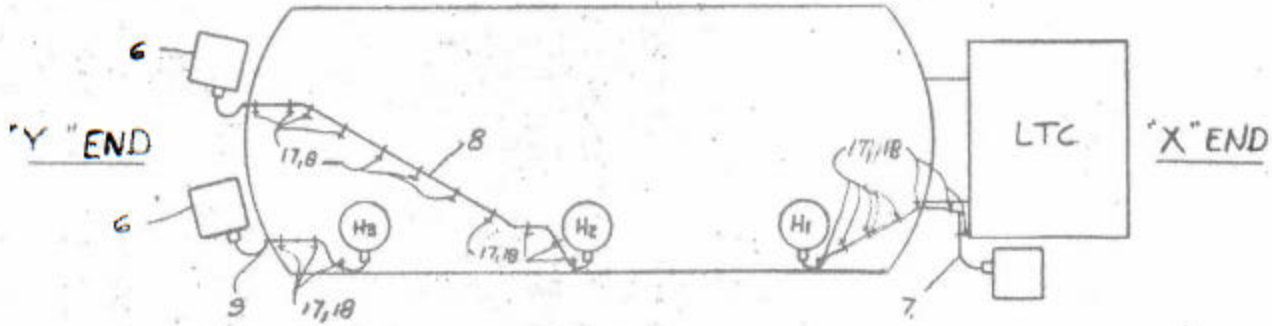
H1 - 10KV 27 X 2 = 54 milliamps
H2 - 10KV 98 X 2 = 3
H3 - 10KV 26 X 2 = 52

	C1	%PF	REMARKS	C1-C1
H1	379	.32		365
2	56 9	.52		355
3	[illegible]	.30		355
X1	[illegible]	[illegible]		3
2	530	.26		320
3	330	.26		320
T1	565	.24		609
2	665	.22		569
3	607	.31		569
XO	442	.32		431

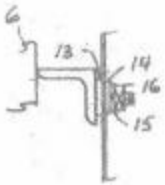
[redacted]

[redacted]

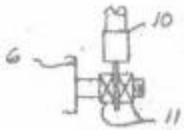




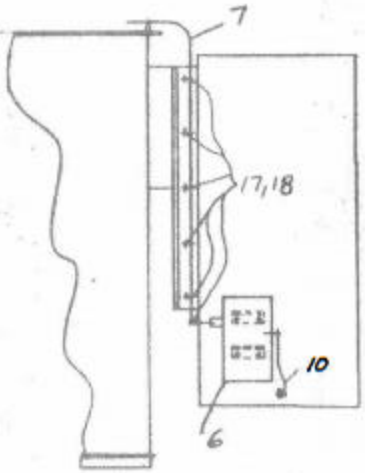
5 NOTE FOR REF PTS SEE [redacted]



SKETCH "B" (12) PLACES



SKETCH "C" (8) PLACES



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