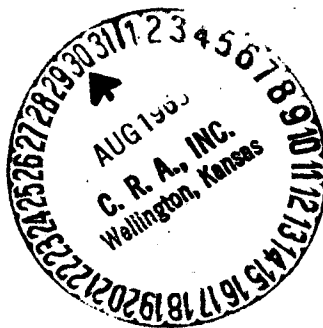


SEP 1 1966



CRA, INC.

WOODWARD NO. 13, 15, 16, 18, 19, & 27-I

DIPMETER REPORT

BRONSON FIELD

Computer inventoried



SCHLUMBERGER WELL SERVICES

A DIVISION OF SCHLUMBERGER TECHNOLOGY CORPORATION

8000 GULF FREEWAY P. O. BOX 2178 HOUSTON, TEXAS 77001

August 25, 1966

PLEASE REPLY TO
SUITE 1120 WICHITA PLAZA BLDG.
WICHITA, KANSAS 67202

CRA, Inc.
Box 445
Wellington, Kansas

Gentlemen:

This report is intended to summarize our interpretation of the Continuous Dipmeter Surveys ran on your Woodward Wells Nos. 13, 15, 16, 18, 19, and 27-I, Bourbon County, Kansas. Included in this report is the graphic presentation of dip calculations, the tabular presentation of dip calculations and a series of dip frequency polar diagrams the interpretation of which is discussed below.

Originally we had called the Bartlesville Sand in wells No. 2, 4, 8, and 9 a bar sand because the geometry derived from the dipmeters on them described a curved upper surface. It now appears the Bartlesville Sand in all of the Woodward wells has both a curved upper and lower surface. The dipmeter data on Wells 13, 15, 16, 18, 19, and 27-I all describe the sand as a channel cut and fill system with a curved upper surface. The strike information derived is valid whether the sand system is a bar type or channel cut and fill system. The direction toward thickening sand will vary 180 degrees if the wrong assumption is made. Subsequent drilling has proved that this is a channel cut and fill system.

The following strike and direction of sand thickening were derived assuming the system is a channel cut and fill:

Woodward No. 13 strikes N20W-S20E and thickens S70W.

Woodward No. 15 strikes N10W-S10E and thickens S80W.

Woodward No. 16 strikes N20E-S20W and thickens N70W.

Woodward No. 18 strikes N20E-S20W and thickens N70W.

Woodward No. 19 strikes N20E-S20W and thickens S70E.

Woodward No. 27-I strikes N20E-S20W and thickens S70E.

Further development should be along a strike direction of N20E.

August 25, 1966

The interpretation of dipmeter logs and the geological conclusions which are discussed in this report represent our best judgment. Nevertheless, since all interpretations and the conclusions reached are based on inferences from electrical and other measurements, as well as geological data which necessarily includes the consideration of some unproven factors, we must advise you that we cannot and do not guarantee their accuracy or correctness and shall not be liable or responsible, except in the case of willful negligence on our part, for any loss, costs, damages or expenses that may be incurred or sustained from such interpretations or the geological conclusions set out in this report.

Thank you for calling Schlumberger on these wells. If we can be of further assistance, please feel free to call on us at any time.

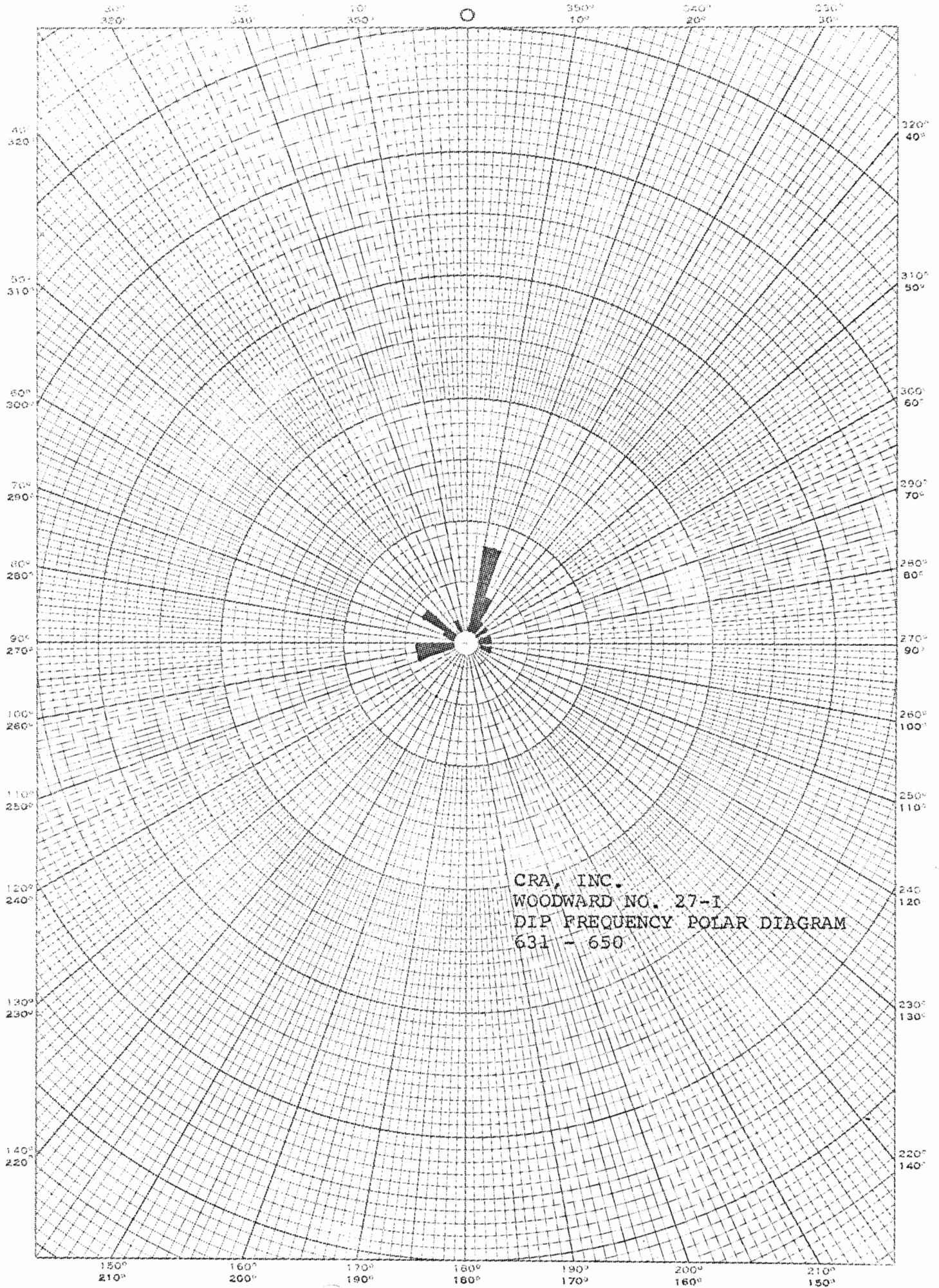


Sam Fain

SF:ep

EUGENE DIETZGER CO.
MADE IN U. S. A.

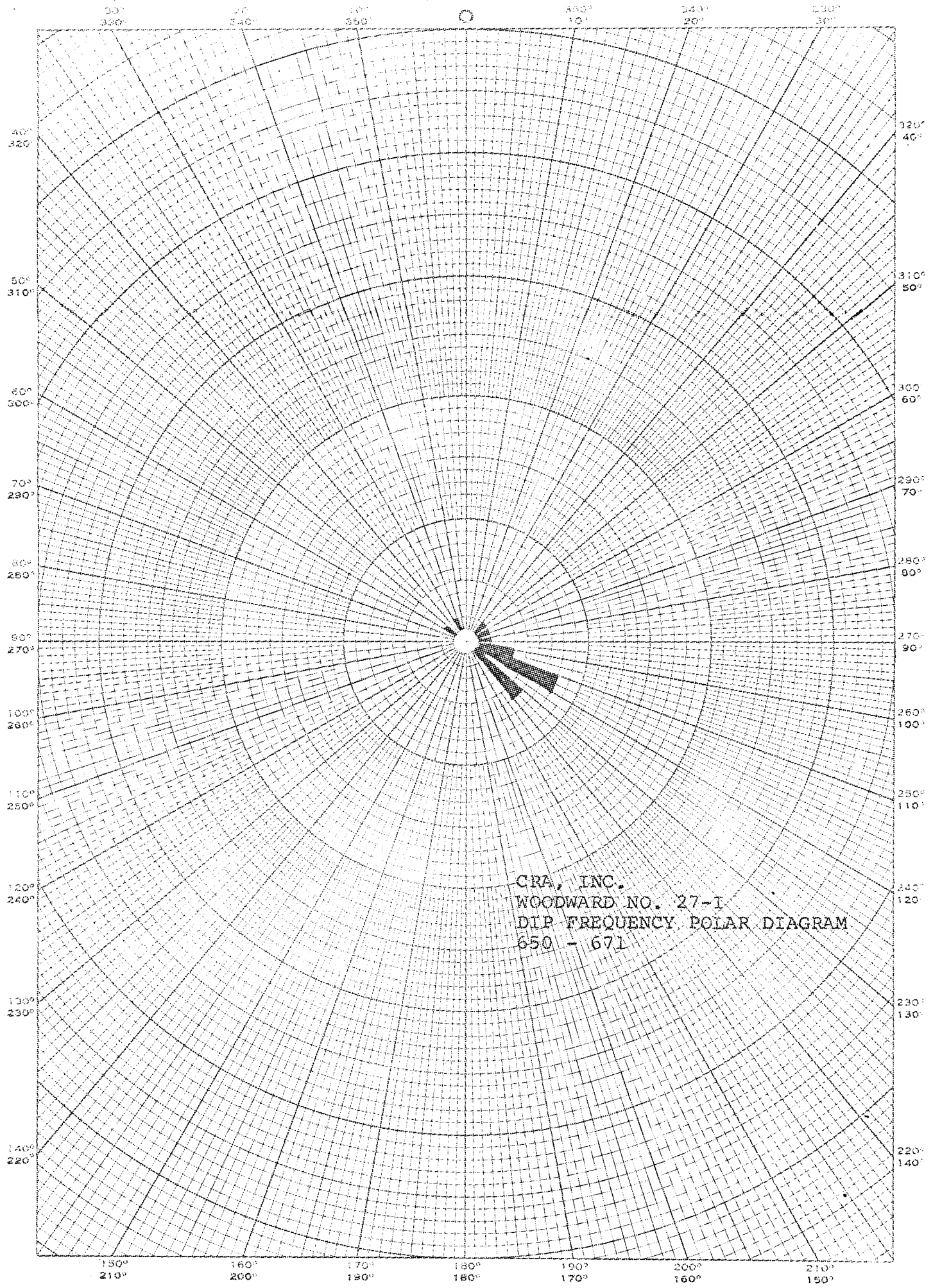
NO. 3015-B ELECTRIC GRAPH PAPER
POLAR COORDINATE



CRA, INC.
WOODWARD NO. 27-1
DIP FREQUENCY POLAR DIAGRAM
631 - 650

FIGURE PREPARED BY
MADE IN U. S. A.

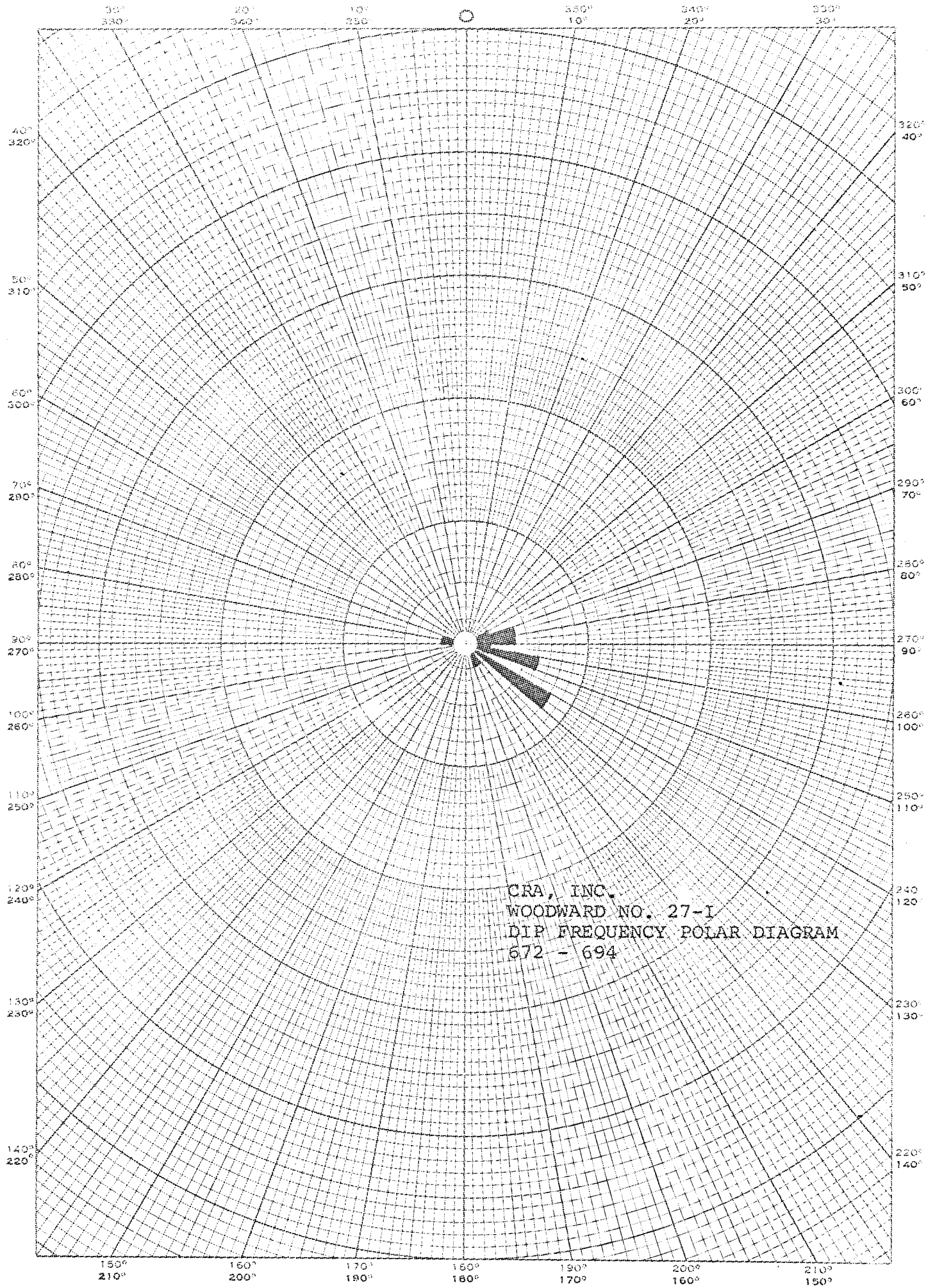
NO. 740-D DIP-FREQUENCY GRAPH PAPER
POLAR COORDINATE



CRA, INC.
WOODWARD NO. 27-1
DIP FREQUENCY POLAR DIAGRAM
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SCHLUMBERGER WELL SURVEYING CORPORATION
CONTINUOUS DIPIETER CALCULATIONS

C. P. A., INCORPORATED
WOODWARD NO. 27-1
BRONSON FIELD
SEC. 12-25S-21E
ROUEN COUNTY, KANSAS

DEPTH	DIP	DIP AZM	DIP PRG	DEV	DEV AZM
447	2.0	177	S 2 E	0.5	104
449	2.0	177	S 3 E	0.5	104
451	1.0	177	S 3 E	0.5	104
453	1.0	172	S 8 E	0.5	99
455	1.0	172	S 8 E	0.5	99
457	1.0	172	S 8 E	0.5	99
458	2.5	142	S 38 E	0.5	99
459	1.8	161	S 19 E	0.5	99
461	2.2	121	S 59 E	0.5	104
462	1.8	160	S 20 E	0.5	104
465	1.8	195	S 15 W	0.5	104
467	2.6	192	S 2 W	0.5	99
469	2.6	172	S 7 E	0.5	99
471	2.0	140	S 31 E	0.5	104
473	7.9	161	S 19 E	0.5	104
475	3.4	116	S 64 E	0.5	99
477	4.7	126	S 44 E	0.5	99
479	3.4	115	S 65 E	0.5	104
481	4.2	154	S 26 E	0.5	99
483	6.7	178	S 2 E	0.5	99
485	4.8	191	S 11 W	0.5	104
487	2.7	178	S 2 E	0.5	104
489	1.8	162	S 18 E	0.6	104
491	2.8	188	S 8 W	0.6	99
493	2.7	175	S 5 E	0.6	99
495	5.7	191	S 11 W	0.6	104
497	6.0	192	S 12 W	0.5	104
499	2.7	181	S 1 W	0.5	104
501	3.7	188	S 8 W	0.6	109
503	5.6	172	S 7 E	0.6	109
505	0.5			0.6	104
507	0.8	181	S 1 W	0.6	104
509	0.6	68	N 68 E	0.6	109
511	1.6	82	N 82 E	0.6	104
513	1.2	119	S 61 E	0.6	104
515	2.4	120	S 50 E	0.6	104
517	1.8	167	S 22 E	0.6	99
519	2.4	120	S 50 E	0.6	104
521	2.2	115	S 65 E	0.6	109
523	4.2	122	S 58 E	0.6	109
525	3.6	165	S 15 E	0.6	109

527	5.5	168	S	12	F	0.6	109
529	6.4	174	S	6	F	0.6	109
530	8.0	191	S	11	W	0.6	104
531	5.5	174	S	6	F	0.6	109
532	2.2	122	S	57	F	0.6	100
533	1.7	140	S	31	F	0.6	100
535	2.4	124	S	56	F	0.6	104
537	2.4	124	S	56	F	0.6	104
539	2.8	146	S	34	F	0.6	104
541	1.7	140	S	31	F	0.6	109
543	1.7	140	S	31	F	0.6	100
545	1.7	142	S	37	F	0.6	100
547	1.7	138	S	42	F	0.6	104
549	4.2	221	S	41	W	0.6	99
551	2.2	92	S	87	F	0.6	99
552	2.2	108	S	75	F	0.6	104
555	1.6	121	S	40	F	0.6	104
557	2.2	90	S	81	F	0.6	104
559	1.6	122	S	57	F	0.6	100
561	2.2	97	S	82	F	0.7	109
563	3.4	66	N	66	F	0.7	109
565	3.4	156	S	24	F	0.6	100
567	3.4	155	S	25	F	0.6	114
569	1.6	123	S	57	F	0.6	109
571	13.1	137	S	43	F	0.6	94
572	4.4	148	S	32	F	0.6	99
574	2.6	170	S	10	F	0.6	109
575	3.4	151	S	29	F	0.6	104
576	4.2	141	S	30	F	0.6	109
577	2.6	150	S	30	F	0.6	109
578	5.6	64	N	64	F	0.6	109
581	7.7	3	N	3	F	0.6	94
582	1.6	95	N	85	F	0.6	99
585	0.5					0.6	99
587	0.5					0.6	99
589	0.5					0.6	104
591	0.6	63	N	63	F	0.6	104
593	0.6	63	N	63	F	0.6	104
595	0.6	63	N	63	F	0.6	104
597	1.7	72	N	72	F	0.6	99
598	1.7	72	N	72	F	0.6	99
599	2.0	76	N	76	F	0.6	99
601	2.0	76	N	76	F	0.6	99
602	5.4	293	N	67	W	0.6	94
603	7.6	294	N	76	W	0.6	99
609	9.0	260	S	80	W	0.6	99
610	8.8	285	N	75	W	0.6	99
611	11.0	226	N	34	W	0.6	99
612	15.0	244	N	16	W	0.6	99
613	8.7	273	N	87	W	0.6	99
614	8.2	222	S	42	W	0.6	99
615	6.2	202	N	57	W	0.6	99
616	6.6	212	N	48	W	0.6	99
617	6.6	212	N	48	W	0.6	99
618	7.2	226	N	24	W	0.6	99
619	5.6	210	N	50	W	0.6	99
620	4.7	260	S	80	W	0.6	99

621	12.8	207	S	27	W	0.6	99
622	9.0	276	N	84	W	0.6	99
623	6.7	205	N	65	W	0.6	109
624	7.3	207	N	53	W	0.6	109
625	8.0	219	N	41	W	0.6	109
626	7.2	212	N	48	W	0.6	109
627	6.6	204	N	66	W	0.6	109
628	7.1	212	N	49	W	0.6	109
629	7.1	289	N	71	W	0.6	109
630	6.3	294	N	66	W	0.6	109
631	14.1	203	N	57	W	0.6	99
632	6.0	240	N	20	W	0.6	99
633	5.5	269	S	80	W	0.6	99
634	8.6	299	N	61	W	0.6	109
635	5.0	202	N	58	W	0.6	104
636	2.7	252	S	72	W	0.6	104
637	2.7	256	S	76	W	0.6	104
638	2.6	25	N	25	E	0.6	99
640	12.0	12	N	12	E	0.6	104
641	12.8	14	N	14	E	0.6	104
642	12.1	27	N	27	E	0.6	104
643	9.6	17	N	17	E	0.6	104
644	4.0	9	N	9	E	0.6	104
645	1.8	52	N	52	E	0.6	104
646	5.6	40	N	40	E	0.6	104
647	4.2	85	N	85	E	0.6	104
648	5.4	76	N	76	E	0.6	99
649	2.4	100	S	80	E	0.6	99
650	2.2	87	N	87	E	0.6	99
651	6.1	209	S	29	W	0.6	104
652	3.5	111	S	60	E	0.6	104
653	2.2	115	S	65	E	0.6	109
654	2.2	104	S	76	E	0.6	104
655	5.7	45	N	45	E	0.6	104
656	2.2	226	N	24	W	0.6	109
657	10.2	207	N	53	W	0.6	99
658	6.9	118	S	62	E	0.6	99
659	4.0	128	S	52	E	0.6	99
660	2.6	138	S	42	E	0.6	99
662	4.0	110	S	70	E	0.6	99
663	5.7	114	S	66	E	0.6	99
669	2.5	69	N	60	E	0.6	99
670	4.5	125	S	45	E	0.6	99
671	2.5	125	S	45	E	0.6	99
672	2.9	76	N	76	E	0.6	99
673	2.0	74	N	74	E	0.6	104
674	2.8	22	N	22	E	0.6	99
675	2.0	271	N	80	W	0.6	99
676	5.0	80	N	80	E	0.6	104
677	4.8	110	S	70	E	0.6	94
678	5.5	106	S	74	E	0.6	99
679	9.4	110	S	61	E	0.6	99
680	11.9	140	S	40	E	0.6	99
681	12.1	110	S	61	E	0.6	94
682	14.7	121	S	50	E	0.6	99
683	4.6	60	N	60	E	0.6	99
684	2.5	88	N	88	E	0.5	99

685	1.7	105	S	75	F	0.5	00
686	1.7	105	S	75	F	0.5	00
690	0.8	150	S	30	F	0.5	00
691	5.5	120	S	60	F	0.5	00
692	1.7	00	S	81	F	0.5	00
694	0.5					0.5	00
695	1.4	276	N	86	W	0.5	00
696	2.0	252	N	7	W	0.0	154
697	3.0	0	N	0	E	0.0	150
698	7.8	1	N	1	E	0.0	150
699	6.0	252	N	2	W	0.0	150
700	2.0	14	N	14	F	0.0	164
702	3.0	134	S	46	F	0.0	164
703	11.0	118	S	62	F	0.0	150
704	10.0	114	S	66	F	0.0	150
705	7.7	120	S	51	F	0.0	150
706	4.0	122	S	52	F	0.0	150
707	4.0	112	S	62	F	0.0	164
708	4.0	127	S	52	F	0.0	164
709	2.2	100	S	71	F	0.0	160
711	2.0	250	S	70	W	0.0	160
713	5.1	278	N	82	W	0.0	160
715	3.0	248	S	62	W	0.0	160
717	4.6	220	S	40	W	0.0	160
719	7.0	242	S	62	W	0.0	160
721	3.2	254	S	74	W	0.0	164
722	5.1	262	S	22	W	0.0	150
725	6.0	222	S	52	W	0.0	150