THE PENNSYLVANIA STATE UNIVERSITY
EARTH & MINERAL SCIENCES EXPERIMENT STATION
DEPARTMENT OF GEOLOGY & GEOPHYSICS
GEOPHYSICAL LABORATORY
Project B-130

Seismograph Report XL

1 July 1968 - 31 May 1971

Code - SCP

S. S. Alexander, Director
FAYETTEVILLE, ARKANSAS
G. M. Lundquist, Graduate Assistant
R. S. Pekarik, Undergraduate
R. L. Rothman, Graduate Assistant
D. E. Siskind, Graduate Assistant

Locality: The station is located in the basement of Deike Building. The instruments are mounted on concrete pillar separated from the foundations and set on bedrock (limestone). The geographic coordinates are:

ϕ = 40° 47.65'N = 77° 51.95'W H = +352 m

The geocentric coordinates are:

ϕ = 40° 36'N = 77° 52'W H = +1m

Please address all communications to:

Geophysical Laboratory
207 Mineral Sciences Building
University Park, Pennsylvania, U.S.A., 16802

The State College Observatory is equipped with world-wide standard VELA-Uniform instruments. These were in continuous operation throughout the period covered by this report except for interruptions to change records and to make repairs and adjustments. The instruments were last calibrated on November 16, 1966. The constants were:

Component	Seismometer Period (sec)	Galvanometer Period (sec)	Damping ratio	Sensitivity
SPN	1.0	0.79	17	50,000
SPE	1.0	0.78	17	50,000
SPZ	1.0	0.75	17	50,000
LPN	15.0	100.	critical	1,500
LPE	15.0	100.	critical	1,500
LPZ	15.0	100.	critical	1,500

Events marked "LOCAL" are short-duration, high-frequency events with P-S times of 20 seconds or less. Most of these are quarry blasts in Pennsylvania and adjoining states. Only the larger of the many such events recorded daily are reported, and many of the reported events not so labeled are of this nature.

The time is controlled by a crystal clock which is checked daily against radio station WWV. Time corrections have been applied to all readings reported on this bulletin.

The recorded seismograms are filed with the Environmental Science Services Administration, Environmental Data Service, National Geophysical Data Center, Federal Building,

Asheville, North Carolina 28801, U.S.A. Copies of individual seismograms may be obtained from them in a variety of forms. The original records are returned after approximately six months and kept on permanent file in our Geophysical Laboratory.

The list which follows shows the earliest observed motion of each earthquake recorded and lists the components on which the earthquake is observable. Where readable, the direction of first motion is indicated by the following symbols:

N and S = North and South

E and W = East and West

U and D = Up and Down

i means readable to 0.1 sec on at least 1 trace

e means not readable to 0.1 sec.

RF means record failure. No seismogram exists for this earthquake on this component.

* means earthquake recorded by this component, direction of first motion not read (no implication that it is unreadable)

- means seismogram exists but body waves not strongly or not clearly recorded. Surface waves may be clearly recorded.

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	EW	Z	LONG PER NS	EW	Z	REMARKS
01 JUL 68	04 14 07.1	I	*	*	U	-	-	-	
01 JUL 68	10 58 34.6	I	*	*	U	*	*	U	
02 JUL 68	03 50 55.8	I	N	*	U	S	W	D	
02 JUL 68	18 59 12	E	-	-	*	-	-	-	
03 JUL 68	01 27 03.6	I	*	*	*	*	*	*	
04 JUL 68	16 27 28	E	*	*	*	-	-	-	LOCAL
04 JUL 68	21 59 29	E	*	*	U	*	*	D	
05 JUL 68	00 52 00.5	I	N	E	U	*	*	*	
05 JUL 68	07 26 17.1	I	-	-	D	-	-	-	
05 JUL 68	11 41 26.3	I	N	*	D	S	E	U	
06 JUL 68	19 45	E	*	*	*	-	-	-	
07 JUL 68	01 18 51	E	-	-	D	-	-	-	
07 JUL 68	23 12 45.2	I	*	*	U	*	*	*	
07 JUL 68	23 56 33.5	I	N	*	U	*	*	*	
08 JUL 68	16 54 18	E	-	-	D	-	-	-	
08 JUL 68	17 52 57.5	I	-	-	U	-	-	-	
12 JUL 68	00 57 43.0	I	S	*	D	*	*	D	
12 JUL 68	04 09 35.2	I	*	*	D	*	*	*	
12 JUL 68	09 31 41.0	I	*	*	D	*	*	*	
12 JUL 68	16 14	E	*	*	*	-	-	-	
13 JUL 68	06 57 23.4	I	*	*	D	-	-	-	
13 JUL 68	16 29 05	E	*	*	*	-	-	-	
14 JUL 68	04 01 09	E	*	*	*	-	-	*	
14 JUL 68	11 09 33	E	-	-	U	-	-	-	
14 JUL 68	21 35 45	E	*	*	*	*	RF	*	
16 JUL 68	13 27 06	E	-	-	U	-	RF	-	
17 JUL 68	05 42 43	E	*	*	*	*	RF	*	
17 JUL 68	06 28 29.0	I	N	*	U	*	RF	*	
19 JUL 68	05 15 35.6	I	*	*	U	*	*	*	
21 JUL 68	00 29 42	E	*	*	D	-	-	*	
21 JUL 68	01 53 42	E	*	*	*	-	-	-	
21 JUL 68	06 28 42	E	*	*	U	-	-	-	
21 JUL 68	17 48 00	E	*	*	*	*	*	*	
22 JUL 68	00 26 50	E	*	*	*	*	*	*	
23 JUL 68	18 34 36	E	*	*	*	*	*	*	
23 JUL 68	23 15 44	E	*	*	*	*	*	*	
24 JUL 68	04 13 17	E	*	*	*	*	*	*	
24 JUL 68	08 27 25.0	I	*	*	U	*	*	*	
24 JUL 68	09 41 13.5	I	*	*	U	-	-	-	
25 JUL 68	07 41 47.9	I	*	*	U	*	*	*	
25 JUL 68	11 03 09.0	I	*	*	U	*	*	U	
26 JUL 68	06 40 03	E	*	*	*	*	*	*	
26 JUL 68	14 08 39	E	S	*	D	-	-	-	
26 JUL 68	17 20 09.5	I	*	*	U	-	-	-	
27 JUL 68	02 57 50	E	*	*	*	-	-	*	
28 JUL 68	18 44 33.7	I	*	-	D	*	*	*	
28 JUL 68	21 23 44	E	*	*	*	*	*	D	
29 JUL 68	10 00	E	*	*	*	*	*	*	
30 JUL 68	00 11 18	E	-	-	*	-	-	-	
30 JUL 68	00 11 29	E	*	*	U	*	*	U	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
30 JUL 68	02 32 44	E	–	–	*	–	–	–	
30 JUL 68	20 47 15.3	I	*	*	U	N	*	U	
01 AUG 68	20 34 40	E	*	*	*	S	E	U	
02 AUG 68	14 12 46.2	I	N	E	U	N	RF	U	
03 AUG 68	05 09 00	E	*	*	*	*	*	D	
03 AUG 68	06 43 54.5	I	*	*	D	*	*	*	
04 AUG 68	12 00 19	E	*	*	U	–	–	U	
05 AUG 68	16 30 53.5	I	*	*	U	–	–	D	
05 AUG 68	16 47 03	E	*	*	*	–	–	–	
06 AUG 68	03 29 50	E	*	*	D	*	RF	*	
07 AUG 68	08 12 59.9	I	S	*	U	*	*	*	
09 AUG 68	03 19 20.5	I	*	*	U	*	*	D	
10 AUG 68	02 23 18	E	–	–	–	–	E	U	
10 AUG 68	02 25 56	P	*	*	*	*	*	D	
10 AUG 68	02 28 40	P	*	*	*	*	*	*	
10 AUG 68	04 24 50	E	*	*	*	–	–	–	
10 AUG 68	06 10 42	E	*	*	*	–	–	–	
10 AUG 68	08 29 45	E	*	*	*	–	–	–	
11 AUG 68	02 51 19.0	IP	S	E	D	–	RF	D	
11 AUG 68	12 47 49.0	IP	S	E	U	–	RF	*	
11 AUG 68	20 19 40	E	*	*	*	*	*	*	
12 AUG 68	20 44 48	E	*	*	D	–	–	–	
13 AUG 68	03 12 03	E	*	*	*	–	–	–	
13 AUG 68	06 35 20	E	–	–	*	–	–	–	
13 AUG 68	22 39 44.8	I	*	*	D	–	–	–	
14 AUG 68	08 44 58.9	I	*	*	U	*	*	U	
14 AUG 68	22 29 50	E	–	–	–	–	–	D	
14 AUG 68	22 33 32	E	*	*	*	*	*	*	
15 AUG 68	02 41 42.5	E	*	*	U	–	–	–	
15 AUG 68	05 02 06	E	*	*	*	–	–	–	LOCAL
15 AUG 68	07 09 32	E	–	–	*	–	–	–	
16 AUG 68	18 29 57.8	I	N	*	U	RF	*	U	
16 AUG 68	21 30 54	E	*	*	U	–	–	*	
17 AUG 68	03 10 50	E	*	*	*	–	–	–	
17 AUG 68	04 19 37	E	*	*	*	RF	*	*	
18 AUG 68	06 03 13	E	–	–	*	–	–	–	
18 AUG 68	18 28	E	–	–	–	*	–	*	
18 AUG 68	18 38 20	E	*	*	*	*	E	*	
20 AUG 68	00 39 51	E	S	*	U	–	–	–	
21 AUG 68	18 16 40	E	–	–	–	–	*	*	
22 AUG 68	14 11 12.0	I	*	*	U	*	*	*	
23 AUG 68	22 46 32.7	IP	S	E	D	*	RF	D	
23 AUG 68	23 24 33.1	I	*	*	U	–	–	–	
28 AUG 68	21 01 10.3	I	*	*	D	*	*	*	
29 AUG 68	22 51 10.3	I	S	E	U	*	*	*	
31 AUG 68	11 01 08	E	*	*	*	*	*	*	
01 SEPT 68	04 59 22	E	*	*	*	–	–	*	
01 SEPT 68	07 40 55	E	*	*	*	*	*	*	
01 SEPT 68	19 16 29	E	*	*	*	–	–	–	
03 SEPT 68	08 31 44.0	I	*	*	U	*	*	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
03 SEPT	6815 42 15.3	I	N	W	U	*	*	*	
05 SEPT	6802 55 38.0	I	*	*	U	-	*	*	
06 SEPT	6814 06 07.0	IP	N	*	D	*	*	*	
06 SEPT	6814 15 47	E	*	*	*	*	*	U	
06 SEPT	6814 18 00	E	*	*	*	*	*	*	
07 SEPT	6817 50 18	E	*	*	U	-	-	-	
08 SEPT	6802 30 57	E	-	-	*	-	-	-	
08 SEPT	6815 31 28.5	I	*	*	D	*	*	*	
09 SEPT	6800 43 54.5	I	*	*	D	*	*	*	
09 SEPT	6805 03 17	E	*	*	*	*	*	*	
09 SEPT	6818 37 19	E	*	*	U	-	-	-	
10 SEPT	6823 20 17	E	*	*	*	*	*	*	
11 SEPT	6818 39 03.0	I	N	*	U	RF	*	D	
12 SEPT	6823 01 31.5	I	*	*	D	*	-	*	
13 SEPT	6807 36 44.0	I	*	*	U	*	*	*	
14 SEPT	6801 45 10	E	*	*	*	-	-	*	
14 SEPT	6814 02 04	E	-	-	*	-	-	*	
15 SEPT	6805 07 50	E	-	*	*	-	-	*	
15 SEPT	6811 03 15	E	*	*	U	-	*	*	
16 SEPT	6814 14 32.4	I	*	*	U	*	*	*	
17 SEPT	6811 19 20	E	*	*	*	RF	-	*	
20 SEPT	6800 06 30.0	IP	N	E	U	N	E	U	
21 SEPT	6813 19 54.2	IP	S	E	U	S	E	U	
22 SEPT	6821 44 40	E	*	*	*	*	*	*	
22 SEPT	6822 03 21.9	I	S	*	U	*	*	*	
23 SEPT	6805 18	E	*	*	*	*	*	*	
25 SEPT	6810 44 19.9	I	*	*	U	N	E	U	
26 SEPT	6808 26 31.0	I	*	*	D	-	-	-	
26 SEPT	6818 17	E	*	*	*	*	*	*	
27 SEPT	6804 17 59.5	I	*	*	U	*	*	*	
27 SEPT	6818 01 17	E	*	*	U	-	-	-	
27 SEPT	6819 05 09.1	I	*	*	*	-	-	-	
27 SEPT	6819 25 48	E	*	*	*	*	RF	*	
27 SEPT	6822 41 48	E	*	*	*	-	-	-	
28 SEPT	6814 07 51.1	I	*	*	U	*	RF	*	
29 SEPT	6803 55 48.7	I	*	*	U	-	-	-	
29 SEPT	6819 23 48	E	*	*	*	-	-	-	
29 SEPT	6820 04 21	E	-	-	U	-	-	-	
03 OCT 68	10 25 05.7	I	-	*	D	-	-	-	
03 OCT 68	11 19 01	E	*	*	*	-	-	-	
04 OCT 68	07 11 13	E	-	-	*	*	RF	*	
07 OCT 68	15 30 18.8	I	*	*	U	-	-	-	
07 OCT 68	15 30 36.7	I	*	*	*	-	-	-	
07 OCT 68	19 33 31	I	*	*	*	N	W	D	
08 OCT 68	15 03 53.6	I	*	*	D	*	*	*	
10 OCT 68	15 24 35	E	*	*	*	*	*	*	
11 OCT 68	02 43 05	E	*	*	*	*	-	*	
12 OCT 68	02 26 28	E	-	-	*	-	-	-	
12 OCT 68	08 02 15	E	*	*	*	-	-	-	
14 OCT 68	03 18 56.0	I	*	*	D	*	*	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	EW	Z	LONG PER NS	EW	Z	REMARKS
15 OCT 68	02 29 50	E	*	*	*	–	–	–	
16 OCT 68	02 00 33	E	*	*	*	*	*	*	
22 OCT 68	06 48 00	E	*	–	*	–	–	–	
23 OCT 68	02 13 49	E	*	*	*	*	*	*	
23 OCT 68	13 45 40.0	I	*	*	U	–	–	–	
23 OCT 68	21 23 49.2	I	*	*	D	*	*	D	
24 OCT 68	01 01 19	E	–	–	U	–	–	–	
24 OCT 68	01 39 44.7	I	*	*	D	–	–	–	
24 OCT 68	16 10 19	E	*	*	*	*	*	*	
24 OCT 68	17 45 50	E	*	*	*	*	*	*	
24 OCT 68	22 47 49.0	I	*	*	U	–	–	–	
25 OCT 68	11 49 12.0	I	*	*	D	*	*	*	
28 OCT 68	23 51 09	E	–	–	*	*	–	*	
29 OCT 68	22 24 43.5	I	*	*	U	*	*	*	
31 OCT 68	09 25 27.0	I	*	*	U	*	*	*	
01 NOV 68	00 13 03	E	*	–	D	–	–	–	
01 NOV 68	04 02 21	E	*	*	*	*	*	*	
01 NOV 68	10 31 15	E	*	*	*	–	–	–	
01 NOV 68	23 35 58	E	*	*	*	–	–	–	
04 NOV 68	09 25 13.2	I	N	*	D	*	*	*	
07 NOV 68	00 56 10	E	*	*	*	–	–	–	
07 NOV 68	10 12 27.1	I	S	W	U	*	–	*	
09 NOV 68	17 03 43.3	IP	S	W	D	*	W	*	
09 NOV 68	20 49 55	E	*	*	*	–	–	–	
09 NOV 68	23 31 07.5	I	*	*	U	–	–	–	
13 NOV 68	18 54 50	E	–	–	*	–	–	*	
15 NOV 68	00 15 44.4	I	*	*	U	*	*	*	
16 NOV 68	03 39 45	E	–	–	*	*	*	*	
17 NOV 68	00 22 13.7	I	*	N	D	*	*	D	
17 NOV 68	07 52 30	E	*	–	*	–	–	*	
17 NOV 68	10 47 58	E	–	–	*	–	–	–	
17 NOV 68	13 36 56	E	*	*	*	–	–	–	
19 NOV 68	00 15 34.3	I	S	*	D	–	–	–	
20 NOV 68	22 30 53	E	–	–	*	–	–	–	
21 NOV 68	07 25 44.8	I	*	*	D	–	–	–	
24 NOV 68	21 33 02.1	I	S	*	U	*	*	*	
25 NOV 68	13 56	E	–	–	*	–	–	*	
28 NOV 68	14 42 08	E	*	*	*	*	*	*	
01 DEC 68	13 24 01.8	I	*	*	D	*	*	*	
03 DEC 68	19 46 23.7	I	*	*	U	–	–	–	
05 DEC 68	08 04 07.5	I	RF	*	U	–	–	–	
05 DEC 68	09 51 37	E	RF	*	U	–	–	–	
07 DEC 68	15 51 55	E	*	*	*	–	–	–	
07 DEC 68	15 57 39	E	*	*	U	–	–	–	
07 DEC 68	19 35 29	E	*	*	*	–	–	–	
07 DEC 68	20 47 55.6	E	–	–	D	–	–	–	
10 DEC 68	09 13 28.5	E	–	–	*	–	–	–	
10 DEC 68	09 13 31.8	I	*	*	*	–	–	–	
14 DEC 68	10 10 07	E	*	*	*	*	*	*	
15 DEC 68	02 25 16.0	I	N	W	D	–	–	–	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
15 DEC 68	02 39 29	E	*	*	*	-	-	-	
16 DEC 68	03 14 05	E	*	*	*	-	-	-	
17 DEC 68	12 10 52	E	S	E	U	N	*	D	
19 DEC 68	15 27 27.8	I	S	*	U	-	-	-	
19 DEC 68	16 30 11.0	I	N	E	U	*	*	*	
22 DEC 68	16 53 31.3	I	*	*	D	*	*	*	
29 DEC 68	17 42 26.8	I	N	*	U	*	*	*	
30 DEC 68	07 11 51.8	I	*	W	U	*	*	*	
01 JAN 69	23 36 40	E	*	*	*	-	-	-	
03 JAN 69	03 29 32	E	*	*	*	-	-	-	
03 JAN 69	05 24 03	E	*	*	*	-	-	-	
03 JAN 69	11 25 05	E	*	*	*	-	-	*	
03 JAN 69	13 38 48	E	*	*	*	*	*	*	
05 JAN 69	13 41	E	-	-	-	*	-	*	
05 JAN 69	13 45 27.8	I	N	*	D	*	*	*	
06 JAN 69	09 30 33.1	I	*	*	U	*	*	*	
06 JAN 69	15 57 45	E	*	*	*	-	-	-	
06 JAN 69	20 28 37	E	*	*	*	-	-	-	
14 JAN 69	23 24 07.0	I	*	*	U	RF	*	*	
18 JAN 69	03 20 30	E	*	*	*	-	-	*	
18 JAN 69	04 09 10.5	E	*	*	*	-	-	-	
19 JAN 69	07 14 20.2	I	S	E	U	S	E	U	
19 JAN 69	18 59 50	E	*	*	*	*	*	*	
19 JAN 69	19 09 27.6	I	S	E	U	*	*	*	
20 JAN 69	14 31 23.7	I	S	E	U	*	*	*	
20 JAN 69	19 28	E	*	*	*	-	-	-	
21 JAN 69	08 12 50	E	-	*	*	RF	*	*	
22 JAN 69	00 53 43.7	I	*	*	U	*	*	*	
24 JAN 69	02 50 32.0	I	*	*	U	*	*	*	
25 JAN 69	05 38 24	E	-	*	*	-	-	*	
25 JAN 69	13 32 22.2	I	*	*	U	-	-	-	
26 JAN 69	15 16 48.7	I	*	*	U	*	*	*	
28 JAN 69	13 52 06	E	*	*	*	-	-	-	
30 JAN 69	10 45 36	E	-	-	-	-	-	*	
31 JAN 69	01 03 15	E	-	*	*	-	-	*	
31 JAN 69	04 21 49	E	*	-	*	-	-	-	
02 FEB 69	10 03 01	E	*	*	*	-	-	*	
03 FEB 69	19 24 03	E	-	-	*	-	-	*	
03 FEB 69	21 57 45	E	-	-	-	-	-	*	
03 FEB 69	22 00 46.9	I	*	*	U	*	*	U	
04 FEB 69	04 19 07.0	I	S	*	U	*	*	*	
10 FEB 69	23 15 31.5	I	*	*	U	*	*	*	
11 FEB 69	22 34 38	E	*	*	*	*	*	*	
12 FEB 69	15 51 07.2	I	-	-	U	-	-	-	
13 FEB 69	03 02 02	E	*	*	*	-	-	-	
13 FEB 69	01 46 01	E	*	*	*	-	-	-	
14 FEB 69	13 16 50	E	S	*	D	-	-	*	
15 FEB 69	11 22 02	E	*	*	*	*	*	*	
16 FEB 69	19 02	E	*	*	*	*	*	*	
20 FEB 69	10 14 41	E	-	-	*	-	-	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	EW	Z	LONG PER NS	EW	Z	REMARKS
22 FEB 69	23 17 03.5	I	*	*	U	–	–	–	
23 FEB 69	00 56 15.3	E	*	*	U	*	*	D	
24 FEB 69	00 28 01	E	*	*	*	*	*	*	
24 FEB 69	22 50 43	E	*	*	D	–	–	–	
25 FEB 69	07 29 34.0	I	S	*	D	–	–	*	
27 FEB 69	05 23	E	*	*	D	–	–	–	
28 FEB 69	02 59 27	I	S	W	U	S	W	U	
28 FEB 69	04 34 40	E	*	*	D	–	–	–	
03 MAR 69	01 09 49	E	*	*	*	*	*	*	
03 MAR 69	15 01 13.5	I	*	*	U	–	–	–	
04 MAR 69	02 07 26	E	*	*	*	–	–	–	
05 MAR 69	19 47	E	–	–	*	–	–	*	
06 MAR 69	17 16 25	E	–	*	*	–	–	–	
06 MAR 69	17 38 34.3	I	N	E	U	–	–	–	LOCAL
08 MAR 69	10 32 57.8	I	S	*	U	–	–	–	
10 MAR 69	07 12 51.0	I	*	*	U	*	*	*	
10 MAR 69	08 21 10.9	I	N	*	U	*	*	*	
13 MAR 69	18 58	E	–	–	*	–	–	–	
13 MAR 69	20 58 50.8	I	S	E	D	–	–	–	
13 MAR 69	22 28 20	E	*	*	*	–	–	–	
14 MAR 69	06 53 03.1	I	N	E	U	N	E	U	
15 MAR 69	12 04	E	*	*	*	*	*	*	
15 MAR 69	13 46 10	E	*	*	*	*	*	*	
16 MAR 69	16 07 28.5	I	*	*	D	*	*	*	
18 MAR 69	04 35 03.2	I	*	*	D	–	–	–	
18 MAR 69	16 29 10.5	I	*	*	D	*	*	*	
18 MAR 69	20 07 20	E	–	–	–	*	*	*	
18 MAR 69	20 40	E	–	–	–	*	*	*	
20 MAR 69	07 23 17	E	–	*	–	–	W	–	
20 MAR 69	16 37 56.0	I	*	*	D	*	*	*	
21 MAR 69	03 13	E	*	*	*	*	*	*	
21 MAR 69	12 40	E	*	*	*	*	*	*	
21 MAR 69	16 45	E	*	*	*	*	*	*	
21 MAR 69	18 14	E	*	*	*	*	*	*	
22 MAR 69	07 31	E	*	*	*	*	*	*	
23 MAR 69	11 54	E	–	–	*	–	–	–	
23 MAR 69	15 54	E	*	*	*	RF	RF	RF	
23 MAR 69	21 20 32.4	I	N	E	D	RF	RF	RF	
24 MAR 69	09 18	E	*	*	*	RF	RF	RF	
25 MAR 69	13 33 19	E	*	*	D	RF	RF	D	
26 MAR 69	13 00 34	E	*	*	*	*	*	*	
28 MAR 69	02 00 20.9	E	*	*	D	E	*	D	
28 MAR 69	15 25 30	E	–	–	*	–	–	–	
29 MAR 69	09 32	E	–	–	*	–	–	*	
31 MAR 69	19 38 12.5	I	*	*	U	RF	RF	*	
01 APR 69	16 58	E	*	*	*	–	–	–	
01 APR 69	21 25 53	E	*	*	*	*	*	*	
03 APR 69	23 23 33	E	*	*	*	–	–	–	
04 APR 69	08 56 23.9	I	N	*	D	–	–	*	
04 APR 69	16 22 35.2	I	*	*	U	*	*	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
04 APR 69	23 06	E	*	*	*	*	*	*	
05 APR 69	07 13 25	E	*	*	*	*	*	*	
05 APR 69	23 33 35.6	E	*	*	D	*	–	D	
06 APR 69	04 01 08	I	*	W	D	–	–	–	
13 APR 69	17 43 40	E	–	–	*	–	–	–	
13 APR 69	23 52 11	E	*	*	*	*	*	*	
15 APR 69	22 33 41.3	I	N	E	D	–	–	–	
16 APR 69	01 41 42	E	*	*	*	*	*	*	
16 APR 69	23 07 37	E	*	*	*	–	–	–	
16 APR 69	23 34 01	E	*	*	*	–	–	–	
17 APR 69	06 12 44	E	–	–	*	–	–	–	
19 APR 69	09 04 51.2	I	*	*	U	*	*	*	
21 APR 69	02 25 02.3	I	N	*	U	*	*	*	
22 APR 69	06 43 38	E	*	*	*	*	*	*	
22 APR 69	08 24 26.4	I	*	*	U	*	*	*	
26 APR 69	06 10 08.5	I	*	*	U	N	*	U	
28 APR 69	23 27 09.4	I	S	E	U	*	RF	D	
03 MAY 69	08 35 16	E	*	*	U	–	–	–	
04 MAY 69	05 43 31.0	I	*	*	U	*	*	*	
05 MAY 69	14 03 58	E	*	*	U	–	–	–	
05 MAY 69	22 55 17.5	E	*	*	D	–	–	–	
07 MAY 69	13 51 11.0	I	N	E	U	*	*	*	
13 MAY 69	14 22 00.3	I	S	*	D	*	E	*	
13 MAY 69	14 48 42.2	I	N	E	D	*	*	*	
13 MAY 69	17 44 36.5	I	*	*	U	*	*	*	
14 MAY 69	10 17 10.5	I	*	E	D	*	*	*	
14 MAY 69	13 55 08.2	I	N	*	U	*	*	*	
14 MAY 69	19 43 40.0	I	S	E	U	S	E	U	
15 MAY 69	20 49 21.5	I	*	*	U	*	W	U	
15 MAY 69	22 27 05.5	E	*	*	*	–	–	–	
18 MAY 69	08 52 23	E	*	*	U	–	–	*	
22 MAY 69	15 00 13.0	I	N	*	U	–	–	–	
22 MAY 69	22 50 02	E	–	–	*	–	–	–	
23 MAY 69	13 14 02.0	I	N	W	D	*	*	D	
26 MAY 69	06 00	E	*	*	*	*	*	*	
28 MAY 69	13 37 50	E	*	*	*	*	*	*	
31 MAY 69	11 14 56.5	I	N	*	U	–	–	–	
01 JUNE69	18 58 20	E	*	–	*	*	*	*	
02 JUNE69	09 56 09	E	*	*	*	*	*	*	
03 JUNE69	04 04 37	E	*	*	*	*	*	*	
07 JUNE69	22 57 20	E	RF	*	*	–	*	*	
08 JUNE69	06 20 05	E	RF	–	*	–	–	–	
08 JUNE69	15 01 06	E	*	*	U	*	*	*	
09 JUNE69	07 10 21	E	RF	–	*	*	*	*	
11 JUNE69	01 06 15.9	I	N	*	D	*	*	*	
11 JUNE69	01 13 05.9	I	*	*	D	*	*	*	
11 JUNE69	21 24 13	E	*	*	U	–	–	–	
12 JUNE69	07 54 04	E	*	*	*	*	*	*	
12 JUNE69	15 25 23.3	I	*	*	U	*	*	*	
13 JUNE69	09 00 26.3	I	S	E	U	S	E	U	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	EW	Z	LONG PER NS	EW	Z	REMARKS
14 JUNE69	03 41 41	E	*	*	U	*	*	*	
14 JUNE69	13 59 19	E	*	*	D	-	-	-	
15 JUNE69	17 16 03	E	*	*	*	*	*	*	
17 JUNE69	19 44 32.9	I	*	*	U	*	*	*	
18 JUNE69	00 17 34	E	*	*	*	*	*	*	
18 JUNE69	01 46 58	E	*	*	*	*	*	*	
18 JUNE69	23 54 10	E	*	*	*	*	*	*	
19 JUNE69	19 08 19	E	*	*	U	-	-	-	
20 JUNE69	02 47 23.8	I	N	W	D	N	W	D	
21 JUNE69	15 30 43.1	I	*	*	D	-	-	-	
21 JUNE69	22 38 50	E	*	*	*	*	*	*	
22 JUNE69	02 45 41.3	I	*	*	D	*	*	*	
22 JUNE69	10 56 05.5	I	S	E	U	S	E	U	
22 JUNE69	14 35 44	E	*	*	*	*	*	*	
23 JUNE69	07 14 51.6	I	S	W	D	*	*	*	
24 JUNE69	00 41 10.0	I	N	*	U	*	*	*	
27 JUNE69	02 28 36	E	*	*	*	*	*	*	
28 JUNE69	04 40 43.3	I	*	*	U	*	*	U	
29 JUNE69	11 03 30	E	-	-	-	*	*	*	
29 JUNE69	11 07 31	E	*	*	*	*	*	*	
29 JUNE69	17 28 35	E	*	*	*	*	*	*	
01 JUL 69	18 56 10	E	-	*	U	*	*	*	
03 JUL 69	17 04 57	E	*	*	*	*	*	*	
04 JUL 69	06 40 44	E	*	*	U	*	*	*	
04 JUL 69	11 22 24	E	*	*	*	*	*	*	
04 JUL 69	23 14 00	E	*	*	*	*	*	*	
05 JUL 69	02 03 07	E	-	-	*	*	*	*	
05 JUL 69	05 03 55	E	*	*	*	*	*	*	
08 JUL 69	08 20 40	E	*	-	D	*	*	*	
09 JUL 69	02 06 41	E	*	*	*	*	*	*	
11 JUL 69	06 03 34	E	*	*	*	*	*	*	
11 JUL 69	07 57 24	E	*	*	*	*	*	*	
13 JUL 69	21 52 42	E	*	*	*	-	-	-	
16 JUL 69	08 28 10	E	*	*	*	*	*	*	
18 JUL 69	05 38 30	E	*	*	*	*	*	*	
18 JUL 69	23 27 19	E	*	*	*	*	*	*	
19 JUL 69	05 04 43	E	*	*	U	*	*	U	
23 JUL 69	05 32 34.8	I	*	*	U	-	-	-	
24 JUL 69	03 08 41	E	*	*	*	*	*	*	
25 JUL 69	06 16 46	E	*	*	*	*	*	*	
25 JUL 69	13 04 24	E	*	*	*	*	*	*	
26 JUL 69	07 27 05	E	*	*	*	*	*	*	
26 JUL 69	18 44 29	E	*	*	*	*	*	*	
27 JUL 69	21 29 53.0	I	*	*	D	*	*	*	
27 JUL 69	23 55	E	*	*	*	-	-	-	
28 JUL 69	06 38 43	E	*	*	*	*	*	*	
29 JUL 69	00 45 53	E	*	*	*	*	*	*	
31 JUL 69	11 33 04	E	*	*	*	*	*	*	
01 AUG 69	23 56 11	E	*	*	*	*	*	U	
02 AUG 69	00 46 46	E	*	*	*	*	*	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	EW	Z	LONG PER NS	EW	Z	REMARKS
02 AUG 69	05 03 20.5	I	*	*	U	*	*	*	
03 AUG 69	00 41 20	E	*	*	*	*	*	*	
04 AUG 69	10 34 11	E	*	*	*	*	*	*	
04 AUG 69	17 37 40	E	*	*	*	*	*	*	
05 AUG 69	02 32 18	E	*	*	*	*	*	*	
05 AUG 69	16 46	E	-	-	-	*	-	*	
05 AUG 69	16 51 14	E	*	*	*	*	*	*	
06 AUG 69	15 58 36	E	*	*	*	*	*	*	
07 AUG 69	19 00 06	E	*	*	*	*	*	*	
08 AUG 69	06 44 12	E	*	*	D	*	*	*	
08 AUG 69	11 26 35	E	*	*	*	*	*	*	
08 AUG 69	21 02 56	E	*	*	*	*	*	*	
11 AUG 69	20 21 46	E	*	*	*	*	*	*	
11 AUG 69	20 51 05	E	*	*	*	*	*	*	
11 AUG 69	21 39 17.5	I	*	*	U	*	*	U	
11 AUG 69	21 40 15	E	*	*	*	*	*	*	
11 AUG 69	23 15 35	E	*	*	*	*	*	*	
12 AUG 69	00 12 05	E	*	*	*	*	*	*	
12 AUG 69	03 40 21	E	*	*	*	*	*	*	
12 AUG 69	05 16 07	E	*	*	U	*	*	*	
13 AUG 69	03 41 55.5	I	*	*	D	*	*	*	
13 AUG 69	08 44 11.0	I	*	*	*	*	*	*	
13 AUG 69	23 09 43	E	*	*	*	*	*	*	
14 AUG 69	14 31 45.4	I	*	*	D	*	*	*	
15 AUG 69	04 44 43.0	I	*	*	U	*	*	*	
15 AUG 69	08 59	E	*	*	*	*	*	*	
16 AUG 69	15 28 12	E	*	*	U	*	*	*	
17 AUG 69	12 06 39	E	*	*	U	*	*	*	
17 AUG 69	20 19 16	E	*	*	*	*	*	U	
18 AUG 69	03 28 05	E	*	*	*	*	*	*	
18 AUG 69	07 57 10	E	*	*	*	*	*	*	
19 AUG 69	01 58 43	E	*	*	*	*	*	*	
19 AUG 69	09 02 34	E	*	*	*	*	*	*	
20 AUG 69	08 02 10.0	I	*	*	U	*	*	*	
30 AUG 69	01 34 13.2	I	*	*	D	*	*	*	
30 AUG 69	07 24 20	E	*	*	*	*	*	*	
30 AUG 69	08 07 12.3	I	*	*	U	*	*	*	
30 AUG 69	08 40 47	E	*	*	*	*	*	*	
31 AUG 69	23 53 43	E	*	*	*	*	*	*	
01 SEPT 69	08 34 31	E	*	*	*	*	*	*	
01 SEPT 69	10 02 35	E	*	*	*	*	*	*	
02 SEPT 69	03 57 58	E	*	*	*	*	*	*	
02 SEPT 69	16 45 35.5	I	N	E	U	*	*	*	
04 SEPT 69	03 21 08	E	*	*	*	*	*	*	
04 SEPT 69	18 29 21	E	*	*	*	*	*	*	
04 SEPT 69	21 25 18	E	*	*	*	*	*	*	
06 SEPT 69	07 56 11	E	*	*	*	*	*	*	
06 SEPT 69	15 39 36	E	*	*	*	*	*	*	
07 SEPT 69	09 42 29	E	*	*	*	*	*	*	
09 SEPT 69	05 33	E	*	*	*	*	*	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
10 SEPT 6921	20 06	E	*	*	*	*	*	*	
11 SEPT 6918	33 58	E	*	*	*	*	*	*	
12 SEPT 6909	07 47	I	*	*	U	*	*	*	
12 SEPT 6915	10 50	E	*	*	*	*	*	*	
13 SEPT 6911	03 21	E	*	*	*	*	*	*	
13 SEPT 6912	04 54.0	I	*	*	U	*	*	*	
15 SEPT 6914	56 37	E	*	*	*	*	*	*	
16 SEPT 6914	31 30	E	*	*	*	–	–	–	
16 SEPT 6914	36 10.5	I	S	E	U	*	*	*	
19 SEPT 6901	48 35	E	*	*	*	*	*	*	
20 SEPT 6905	15 37	E	*	*	*	S	E	U	
20 SEPT 6915	34 47.5	I	*	*	D	*	*	*	
21 SEPT 6902	11 20.4	I	*	*	D	–	–	*	
22 SEPT 6902	08	E	–	–	–	*	*	*	
22 SEPT 6913	57 16	E	*	*	*	*	*	*	
23 SEPT 6901	33 37	E	*	*	*	*	*	*	
23 SEPT 6923	44 00	E	*	*	*	*	*	*	
24 SEPT 6918	10 35	E	*	*	*	S	E	D	
26 SEPT 6907	12 04	E	*	*	*	*	*	*	
27 SEPT 6904	14 56.7	I	*	*	U	–	–	–	
27 SEPT 6909	18	E	*	*	*	*	*	*	
27 SEPT 6910	49 02	E	*	*	*	*	*	*	
28 SEPT 6923	06 00	E	*	*	*	*	*	*	
29 SEPT 6918	11	E	*	*	*	*	*	*	
01 OCT 69	05 14 58	E	*	*	*	*	*	*	
01 OCT 69	06 07 21	I	N	*	U	*	*	*	
01 OCT 69	08 37 29	E	*	*	*	*	*	*	
01 OCT 69	17 18 03	E	*	*	*	*	*	*	
02 OCT 69	22 16 49	E	S	E	U	*	*	*	
08 OCT 69	14 36 10.8	I	*	*	U	*	*	*	
09 OCT 69	08 09 42	E	*	*	*	*	*	*	
09 OCT 69	24 08 33	E	*	*	*	*	*	*	
13 OCT 69	01 13 48	E	*	*	D	*	*	*	
13 OCT 69	07 14 21	E	*	*	U	*	*	*	
14 OCT 69	07 10 26.6	I	S	W	U	*	*	*	
15 OCT 69	04 01 17	E	*	*	*	*	*	*	
17 OCT 69	01 43 30	E	RF	–	*	–	–	*	
17 OCT 69	01 44 03	E	RF	*	*	*	*	*	
18 OCT 69	08 55 01.5	I	S	*	U	*	*	*	
20 OCT 69	13 17 40	E	*	*	*	*	*	*	
20 OCT 69	15 26 17	I	N	E	U	*	*	*	
21 OCT 69	21 04 28	I	S	E	U	*	*	*	
22 OCT 69	10 31 53	I	*	*	U	*	*	*	
22 OCT 69	12 55 52	E	*	*	*	*	*	*	
22 OCT 69	22 58 24.3	I	*	W	D	*	*	*	
24 OCT 69	08 46 51	E	*	*	*	*	*	*	
26 OCT 69	15 47 37	E	RF	*	U	*	*	*	
26 OCT 69	21 58 24	I	RF	*	U	*	*	*	
27 OCT 69	08 21 43	I	RF	*	U	*	*	U	
29 OCT 69	22 08	E	*	*	*	*	*	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
29 OCT 69	22 31 48.8	I	N	*	D	–	–	–	
31 OCT 69	11 58 45	I	*	*	U	*	*	*	
01 NOV 69	11 14 39	E	*	*	*	*	*	*	
05 NOV 69	18 01 00.8	I	*	E	U	*	E	U	
06 NOV 69	20 30 58	I	*	*	D	*	*	*	
07 NOV 69	18 47 50	E	*	*	*	*	*	*	
12 NOV 69	19 18 58	E	*	*	*	*	*	*	
13 NOV 69	08 02 30.5	I	S	*	D	*	*	*	
20 NOV 69	01 01 14.0	I	S	E	D	*	*	*	
20 NOV 69	23 55 02	E	*	*	*	*	*	*	
21 NOV 69	02 25 01	E	*	*	*	*	*	*	
22 NOV 69	23 20 42	I	S	W	U	S	W	U	
24 NOV 69	21 19 07.0	I	N	*	U	*	*	*	
24 NOV 69	23 00 41.5	I	*	*	D	*	*	*	
26 NOV 69	21 37 37.4	I	S	*	RF	–	–	–	
1 DEC 69	19 58	E	*	*	*	–	–	–	
1 DEC 69	20 30	E	*	*	*	–	–	–	
1 DEC 69	22 19 46.0	E	*	*	*	*	*	*	
04 DEC 69	09 03 22.0	E	*	*	*	–	–	*	
06 DEC 69	07 15 38.6	I	*	W	U	–	–	–	
10 DEC 69	20 12 52.0	E	*	*	*	*	*	*	
13 DEC 69	03 30 03.0	I	N	*	U	*	*	*	
13 DEC 69	21 44 44.6	I	*	*	U	*	*	*	
14 DEC 69	03 01 15.0	E	*	*	*	*	*	*	
16 DEC 69	15 29 40.0	E	*	*	*	*	*	*	
18 DEC 69	13 44 09.3	I	S	E	U	*	*	U	
19 DEC 69	13 39 15.8	I	*	*	D	*	*	*	
22 DEC 69	11 29 17.0	E	*	*	*	*	*	*	
25 DEC 69	21 38 34.0	E	*	*	*	S	E	D	
26 DEC 69	00 27 41.7	I	*	*	D	*	*	*	
26 DEC 69	09 02	E	–	–	–	*	*	*	
26 DEC 69	10 46	E	–	–	–	*	*	*	
26 DEC 69	20 09	E	*	*	*	*	*	*	
27 DEC 69	09 30 55.0	E	*	*	*	*	*	*	
29 DEC 69	00 57 50.2	I	*	E	U	*	*	*	
31 DEC 69	19 01 27.0	E	*	*	*	*	*	*	
31 DEC 69	23 57 31.1	I	N	*	D	*	*	*	
1 JAN 70	18 39 12.0	E	*	*	*	–	*	*	
1 JAN 70	22 04 27.0	I	N	*	D	–	*	*	
4 JAN 70	17 19 30.0	E	*	*	*	*	*	*	
6 JAN 70	05 54 56.0	E	*	*	*	*	*	*	
6 JAN 70	13 07 08.7	I	N	*	U	*	*	*	
7 JAN 70	08 02 14.0	I	N	E	D	*	*	*	
9 JAN 70	23 35 54.0	I	*	*	D	*	*	*	
10 JAN 70	04 29 55.0	E	*	–	*	*	*	*	
10 JAN 70	12 22 45.0	E	–	–	–	*	*	*	
10 JAN 70	12 26 07.0	E	*	*	*	*	*	*	
14 JAN 70	02 42 13.0	E	*	*	*	*	*	*	
16 JAN 70	08 14 14.0	I	N	E	U	*	*	*	
20 JAN 70	07 34 40.0	E	*	*	*	*	*	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	EW	Z	LONG PER NS	EW	Z	REMARKS
20 JAN 70	08 33 57.6	I	N	*	U	*	*	*	
20 JAN 70	17 45 56.0	I	N	E	U	*	*	*	
21 JAN 70	17 59 21.2	I	N	E	U	*	*	*	
22 JAN 70	04 06 25.0	E	*	*	*	*	*	*	
27 JAN 70	09 36 26.0	I	S	E	U	*	*	*	
04 FEB 70	05 15 09.0	I	N	E	D	*	E	D	
05 FEB 70	12 58 50.0	E	*	*	*	*	*	*	
05 FEB 70	22 24 58.0	E	*	*	*	*	*	*	
06 FEB 70	00 23 06.0	I	*	*	D	*	*	*	
13 FEB 70	16 01 54.0	I	N	W	D	N	W	D	
13 FEB 70	17 35 47.5	I	N	*	U	*	*	*	
14 FEB 70	11 26 17.0	I	N	*	U	*	*	*	
24 FEB 70	08 13 47.0	E	*	*	*	*	*	*	
27 FEB 70	07 18 47.0	I	S	*	D	*	*	*	
27 FEB 70	11 07 06.0	I	N	E	D	*	E	D	
28 FEB 70	11 02 38.4	I	N	E	U	*	*	D	
4 MAR 70	03 49 17.0	E	*	*	*	*	*	*	
09 MAR 70	16 19	E	–	–	–	*	*	*	
10 MAR 70	05 11 00.4	I	*	*	U	S	E	U	
11 MAR 70	22 47 24.0	I	N	W	D	*	*	D	
14 MAR 70	07 40 01.0	E	*	*	*	*	*	*	
15 MAR 70	13	I	*	*	*	*	*	*	
17 MAR 70	22 08 34.0	I	N	E	U	*	*	*	
18 MAR 70	23 24 08.1	I	N	*	U	*	*	*	
19 MAR 70	23 44 35.4	I	*	E	D	*	*	*	
20 MAR 70	11 26 39.8	I	*	*	D	*	*	*	
24 MAR 70	10 55 09.1	I	N	W	D	*	*	D	
25 MAR 70	22 11 32.9	I	–	–	D	*	*	*	
26 MAR 70	16 51 08.6	I	N	W	D	*	*	*	
26 MAR 70	19 06 11.4	I	S	E	U	*	E	U	
28 MAR 70	18 45 05.8	I	–	–	U	*	*	*	
28 MAR 70	18 56 09.9	I	–	–	D	*	*	*	
29 MAR 70	21 14 13.7	I	–	W	D	N	E	D	
30 MAR 70	17 05 44.4	I	*	*	D	*	*	*	
7 APR 70	05 52 58.4	I	*	*	D	*	*	*	
8 APR 70	15 01 57.3	I	N	E	D	*	*	D	
11 APR 70	04 13 50.0	E	*	*	*	*	*	*	
12 APR 70	04 18 37.6	E	*	*	U	*	*	*	
16 APR 70	05 41 23.3	I	N	W	D	*	*	*	
18 APR 70	09 59 15.7	I	–	E	D	*	*	*	
19 APR 70	01 23 50.8	I	–	*	D	*	*	*	
20 APR 70	10 57 32.5	I	–	E	U	*	*	*	
20 APR 70	22 02 39.2	I	–	W	U	*	*	*	
22 APR 70	22 54 52.5	I	S	W	U	–	–	–	
26 APR 70	14 46 34.0	I	S	E	U	*	*	*	
27 APR 70	19 48 05.6	I	S	*	U	–	–	–	
27 APR 70	22 07 56.8	I	N	E	U	–	–	–	
29 APR 70	11 28 34.4	I	*	W	U	N	W	U	
29 APR 70	14 07 19.5	I	*	*	D	N	E	U	
30 APR 70	08 39 01.0	E	–	*	*	N	E	U	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
14 MAY 70	09 32 48.0	I	-	W	U	*	*	*	
14 MAY 70	18 24 49.3	I	-	E	U	*	*	*	
15 MAY 70	21 15 53.2	I	*	W	D	*	*	*	
15 MAY 70	21 56 38.9	I	*	W	D	*	*	*	
16 MAY 70	21 42 20.7	E	S	W	D	-	-	-	
19 MAY 70	10 29 18.2	I	N	W	D	*	*	*	
19 MAY 70	18 39 47.8	I	S	W	D	-	-	-	
19 MAY 70	20 03 36.0	I	S	*	D	-	-	-	
21 MAY 70	15 56 21.2	I	S	W	D	*	*	*	
21 MAY 70	21 01 32.0	I	N	E	D	-	-	-	
27 MAY 70	12 18 25.1	I	*	-	D	S	W	D	
27 MAY 70	18 00 05.8	E	S	-	U	-	-	-	
31 MAY 70	20 32 17.1	I	-	-	D	S	W	D	
31 MAY 70	21 57 01.4	I	-	-	U	*	*	*	
01 JUN 70	01 45 00.0	I	-	-	D	*	*	*	
01 JUN 70	02 54 45.8	I	-	-	D	*	*	*	
01 JUN 70	04 53 42.4	I	-	-	U	-	-	-	
01 JUN 70	17 51 10.7	I	-	-	D	*	*	*	
01 JUN 70	20 32 32.9	I	-	-	D	*	*	*	
02 JUN 70	01 46 14.6	I	-	-	U	*	*	*	
02 JUN 70	03 08 00.0	I	-	-	D	*	*	*	
04 JUN 70	04 18 19.0	I	-	*	U	*	*	U	
05 JUN 70	05 06 27.5	I	*	*	D	S	*	U	
09 JUN 70	20 25 12.1	I	S	W	U	-	-	-	
10 JUN 70	16 30 17.9	I	*	*	U	*	*	*	
11 JUN 70	06 13 28.0	I	S	W	D	S	*	D	
11 JUN 70	17 06 18.5	I	*	-	D	N	E	D	
12 JUN 70	05 03 15	E	*	-	D	*	*	*	
14 JUN 70	00 13 20.9	I	S	-	U	*	*	*	
15 JUN 70	11 28 15	E	*	-	U	*	*	U	
16 JUN 70	05 17 31.9	I	N	W	U	*	W	U	
17 JUN 70	04 53 55.8	I	N	W	U	N	W	U	
19 JUN 70	11 06 39.4	I	S	E	-	S	E	D	
19 JUN 70	14 32 32.8	I	S	E	D	*	W	-	
21 JUN 70	16 31 21.8	I	N	W	D	-	-	-	
22 JUN 70	14 48 35.1	I	S	*	U	*	*	*	
24 JUN 70	07 37 42	E	*	*	U	*	*	*	
24 JUN 70	13 16 21	I	*	E	*	S	E	U	
25 JUN 70	05 32 44.1	I	S	*	U	*	*	*	
25 JUN 70	16 10 17.3	I	N	E	D	-	-	-	
28 JUN 70	01 49 38.1	I	*	*	D	S	*	-	
02 JUL 70	00 53 57.1	I	*	*	D	S	*	D	
08 JUL 70	04 54 29.8	I	S	E	D	S	E	D	
18 JUL 70	01 59 17.8	I	*	E	U	S	E	U	
25 JUL 70	22 55 05.2	I	*	*	U	S	E	U	
29 JUL 70	10 31	E	*	*	*	*	*	-	
30 JUL 70	01 05 21	I	*	*	*	*	*	-	
31 JUL 70	17 15 06.5	I	S	E	D	S	E	D	
05 SEP 70	08 03 26.9	I	S	E	D	S	E	D	
06 AUG 70	20 32 41.7	I	N	W	D	-	-	-	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
12 AUG 70	09 30 20.0	I	N	W	U	N	*	*	
12 AUG 70	10 30 29.4	I	N	W	U	*	*	*	
13 AUG 70	04 42 04.3	I	S	E	U	S	E	U	
14 AUG 70	03 47 52.5	I	*	*	D	*	*	*	
18 AUG 70	18 00 23.0	I	S	E	U	S	E	U	
20 AUG 70	16 35 28	I	*	-	*	-	-	-	
30 AUG 70	17 57 02.0	I	S	*	*	S	W	D	
26 SEP 70	12 09 19.7	I	N	*	U	N	*	U	
27 SEP 70	03 45 25.5	I	S	*	D	S	*	D	
29 SEP 70	04 48 40.1	I	N	E	U	N	E	U	
06 OCT 70	20 48 42.2	I	S	E	U	*	*	*	
07 OCT 70	14 14 13	E	*	E	D	-	-	-	
14 OCT 70	06 10 18.0	I	S	W	U	S	W	U	
26 OCT 70	21 02 13.3	I	*	E	U	S	-	U	
03 NOV 70	02 38 39.2	I	N	W	-	-	-	-	
08 NOV 70	22 54 52	E	-	-	-	-	-	-	
08 NOV 70	23 16 15	E	-	-	-	-	-	-	
15 NOV 70	09 24 13.4	I	S	*	U	-	-	-	
17 NOV 70	02 16 29.3	I	*	*	D	-	-	-	
18 NOV 70	12 29 58.4	I	-	W	U	-	-	-	
26 NOV 70	03 18 48.0	I	*	W	D	*	E	U	
28 NOV 70	11 19 01.8	I	N	W	U	N	*	U	
28 NOV 70	14 55 50.7	I	N	W	U	-	-	-	
28 NOV 70	20 41 45.0	I	S	*	D	-	*	*	
29 NOV 70	06 13 20.8	I	S	*	D	*	*	D	
29 NOV 70	20 06 41	E	-	-	-	-	-	-	
01 DEC 70	21 20 06.1	I	N	W	U	*	*	U	
02 DEC 70	02 45 25.5	I	N	E	W	*	*	*	
02 DEC 70	09 13 40	E	*	*	U	*	*	*	
02 DEC 70	11 09 02.6	I	S	W	D	*	*	*	
03 DEC 70	05 06 31.9	I	*	*	D	S	*	D	
04 DEC 70	17 19 19.9	I	N	*	U	*	*	U	
10 DEC 70	19 41 23.6	I	N	E	D	*	*	*	
10 DEC 70	04 42 50.0	I	N	*	U	N	*	U	
12 DEC 70	07 13 39.0	I	*	W	U	-	-	-	
16 DEC 70	01 07 39.4	E	*	-	*	*	*	*	
16 DEC 70	01 10 11.2	E	*	-	*	*	*	*	
16 DEC 70	08 50 46.9	I	*	-	U	*	*	*	
19 DEC 70	00 08 27.4	E	*	*	*	-	-	-	
19 DEC 70	10 57 36.8	E	*	*	*	-	-	-	
20 DEC 70	06 09 57.6	I	*	*	D	-	-	-	
21 DEC 70	15 00 16.9	I	*	E	U	-	-	-	
22 DEC 70	01 56 40.8	E	*	*	*	-	-	-	
23 DEC 70	07 13 39.3	I	S	W	U	*	*	*	
24 DEC 70	08 06 19	E	*	*	*	*	*	*	
25 DEC 70	02 49 56.5	I	*	*	D	-	-	-	
27 DEC 70	12 00 15.4	I	*	*	D	-	-	-	
29 DEC 70	20 22 14.3	I	*	*	D	*	*	*	
30 DEC 70	02 44 54.7	E	*	*	*	*	*	*	
30 DEC 70	08 10 08.6	I	*	*	U	*	*	*	

DATE	GMT OF FIRST MOTION	TYPE OF ONSET	OBSERVABLE ON SHORT PER NS	SHORT PER EW	SHORT PER Z	LONG PER NS	LONG PER EW	LONG PER Z	REMARKS
31 DEC 70	05 41 18.0	I	-	*	U	-	-	-	
07 JAN 71	03 00 08.4	I	*	E	U	-	-	-	
08 JAN 71	20 53 32.1	I	S	*	U	-	-	-	
10 JAN 71	07 33 07	I	*	*	*	*	*	U	
19 JAN 71	03 23 09.0	I	S	E	*	*	*	*	
20 JAN 71	04 51 26.0	I	N	-	U	*	*	U	
25 JAN 71	16 18 50.5	I	*	*	U	S	E	U	
29 JAN 71	22 09 10.7	I	*	*	D	N	W	D	
01 FEB 71	05 29 24.4	I	*	*	D	*	*	*	
04 FEB 71	15 52 50	E	*	*	*	*	*	U	
05 FEB 71	07 40 41	E	*	-	*	*	*	U	
07 FEB 71	02 40 00.0	I	*	E	U	*	*	U	
07 FEB 71	02 52 38.5	I	N	W	U	*	*	*	
07 FEB 71	03 03 44.3	I	N	W	U	*	*	*	
08 FEB 71	21 18 28	I	-	-	-	*	*	D	
09 FEB 71	14 07 12.4	I	S	E	U	S	E	U	
18 FEB 71	19 30 09.6	E	S	*	D	-	-	-	
21 FEB 71	10 45 41.4	I	S	E	D	S	*	D	
03 MAR 71	00 59 10.7	I	*	*	U	-	-	-	
3 MAR 71	14 58 15	E	*	*	*	*	*	*	
5 MAR 71	17 19 14.3	I	N	E	U	-	-	-	
13 MAR 71	23 58 43.5	I	*	E	U	*	*	U	
19 MAR 71	06 18 15.4	I	S	W	D	-	-	-	
23 MAR 71	09 34 50.9	I	S	W	U	S	W	U	
23 MAR 71	21 22 11.4	I	S	W	U	*	*	*	
30 MAR 71	11 41 16.8	I	*	*	D	*	*	D	
01 APR 71	05 06 30.4	I	*	*	D	-	-	-	
05 APR 71	09 14 34.0	I	N	W	D	*	*	D	
08 APR 71	08 05 23.9	I	N	W	D	*	*	U	
20 APR 71	14 38 04.0	I	S	*	D	*	*	*	
02 MAY 71	06 19 01.4	I	S	E	U	S	E	U	
04 MAY 71	02 24 05.0	I	S	W	U	S	W	U	
08 MAY 71	01 01 55.2	I	N	E	D	-	*	U	
09 MAY 71	08 37 28.4	I	*	*	U	*	*	U	
12 MAY 71	06 37 10.2	E	*	*	D	*	*	D	
17 MAY 71	11 11 44.5	I	N	E	U	N	E	U	
18 MAY 71	06 23 35.1	I	S	*	D	S	*	D	
18 MAY 71	22 55 52.4	I	S	*	U	*	*	*	
20 MAY 71	02 45 50.5	I	S	E	U	-	-	-	
20 MAY 71	18 29 54.1	I	S	*	D	-	-	-	
21 MAY 71	19 07 00.0	I	S	E	D	*	*	D	
22 MAY 71	16 56 25.6	E	*	*	D	*	*	*	
23 MAY 71	06 25 36.5	I	*	*	*	-	-	-	
23 MAY 71	09 31 09.2	I	*	E	*	-	-	-	
25 MAY 71	05 55 18.5	I	N	E	D	N	E	D	
25 MAY 71	20 35 05.0	I	S	W	U	-	-	-	
26 MAY 71	00 19 30.4	I	S	E	U	-	-	-	
28 MAY 71	14 17 53.5	I	N	E	U	-	E	U	

We acknowledge with thanks receipt of the following bulletins and other publications between 30 June 1968 and 31 May 1971:

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The Geophysical Laboratory
Department of Geology and Geophysics
201-218 Mineral Sciences Building
University Park, Pa., U.S.A. 16802
S. S. Alexander, Director
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