LANDSAT FOLLOW-ON INVESTIGATION #22518
TYPE II PROGRESS REPORT #4 - 1 MARCH 1976

THE USE OF LANDSAT DCS AND IMAGERY
IN RESERVOIR MANAGEMENT AND OPERATION

PRINCIPAL INVESTIGATOR
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CORPS OF ENGINEERS
WALTHAM, MASS. 02154

1. ACCOMPLISHMENTS

A. DATA COLLECTION

ON THE EVENING OF 8-9 DECEMBER 1975 NED'S AUTOMATIC DCS TRACKING SYSTEM WAS SET RUNNING UNATTENDED OVERNIGHT FOR THE FIRST TIME. IT SUCCESSFULLY TRACKED FOUR PASSES THAT NIGHT, AND IT HAS WORKED WELL EVER SINCE. A MANUAL CONTAINING OPERATING THEORY AND PROCEDURES IS BEING PREPARED AND WILL BE COMPLETED FOR OUR NEXT PROGRESS REPORT.

WE ARE CONTINUING TO DEVELOP DATA HANDLING PROGRAMS TO TAILOR THE COMPUTER OUTPUT TO NEEDS OF USERS AT NEI. A TEKTRONIX 4014-1 CRT TERMINAL WITH A HARD COPIER HAS BEEN ADDED TO THE COMPUTER FACILITY. USE OF THIS NEW EQUIPMENT HAS SPEEDED UP OUR OUTPUT CAPABILITY, AND A COPY OF THE LATEST PRINCIPAL OUTPUT (FIGURE 2) SHOWS THE WIDE RANGE OF CAPABILITIES ALREADY WORKED INTO THE DATA HANDLING PROGRAMS. LOCATIONS OF NED'S DCP'S AS OF 30 MARCH 1976 ARE SHOWN IN FIGURE 1. TALLIES OF MESSAGES ARE BEING KEPT FOR LONG-TERM EVALUATION OF DCP'S AND OVERALL SYSTEM PERFORMANCE. A SAMPLE OF THE TALLYING IS SHOWN IN FIGURE 3.

NED HAS OBTAINED A NEW FIELD DCP TEST METER WHICH WAS BUILT FOR THE U.S.G.S. BY THE GFA ENGINEERING, INC., 11800 SW 87TH AVE., MIAMI, FLORIDA 33176. IT HAS TWO DESIRABLE FEATURES BUILT INTO IT: AN AUDIBLE 'BEEP' WHEN THE DCP TRANSMITS AND A SIGNAL STRENGTH METER THAT HOLDS THE MAXIMUM SIGNAL ATTAINED UNTIL IT IS CLEARED MANUALLY.

AS MENTIONED IN AN EARLIER QUARTERLY PROGRESS REPORT WE HAVE INTERFACED TWO SNOW PILLOWS TO DCP'S AND PLACED THEM IN NORTHERN MAINE. THE INTERFACES FOR THESE DEVICES WERE DESIGNED AND BUILT BY THE COLD REGIONS RESEARCH AND ENGINEERING LABORATORY (CRREL), HANOVER, N.H. A SCHEMATIC DIAGRAM OF THE INTERFACE IS SHOWN IN FIGURE 4.

DURING THIS REPORTING PERIOD FOUR DCP'S WERE RETURNED TO NASA AT WALLOPS ISLAND FOR REPAIRS WHICH COULD NOT BE EFFECTED AT NED. OTHER THAN NORMAL BATTERY REPLACEMENT, GENERAL PERFORMANCE WAS GOOD, AND ONLY THE FOLLOWING CHANGES IN THE COLLECTION NETWORK WERE WORTHY OF MENTIONING:

ON 19 JANUARY THE FORT KENT DCP (7273) BECAME INOPERATIVE BECAUSE OF ICE IN THE STILLING WELL OF THE U.S.G.S. GAGE.

ON 19-20 JANUARY WE CHANGED THE POWER SOURCE AT NINE-MILE BRIDGE IN MAINE FROM GEL-CELS TO DRY CELLS BECAUSE OF EXCEEDINGLY LOW TEMPERATURE (DOWN TO -45 DEGREES F). IN GENERAL AFTER RECHARGING, GEL-CELS HAVE NOT PERFORMED WELL, SO WE ARE INSTALLING DRY CELLS INSTEAD AS THE GEL-CELS ARE USED UP.

OUR FITCHBURG, MASS., DCP (7106) IS REPORTING NONVALID WATER QUALITY DATA, BECAUSE THE MONITOR IS NOT BEING MAINTAINED.

OUR DCP AT QUINCY, MASS., WAS REMOVED BECAUSE OF REPEATED VANDALISM TO THE ANTENNA.

B. IMAGERY

PLANNING IS CONTINUING IN OUR MAJOR FOLLOW-ON STUDY, THE USE OF LANDSAT IMAGERY IN WATERSHED MANAGEMENT. COORDINATION AND DISCUSSIONS ARE TAKING PLACE AMONG THE FOLLOWING PEOPLE:

NED

SAUL COOPER, PRINCIPAL INVESTIGATOR
TIMOTHY BUCKELEW, HYDROLOGIST

CRREL

DR. HARLAN MCKIM, SCIENTIST
MS. CAROLYN MERRY, RESEARCH ASST.

UNIVERSITY OF CONNECTICUT

DR. PAUL BOCK, CIVIL ENGINEER

IN CONNECTION WITH THIS FOLLOW-ON STUDY A LANDSAT COMPUTER COMPATIBLE TAPE (1635-14541; 15 APRIL 1974) WAS RECEIVED ON 17 FEBRUARY 1976 FROM NASA. THIS CCT HAS BEEN PLACED ONTO THE GISS (GODDARD INSTITUTE FOR SPACE STUDIES) COMPUTER SYSTEM FOR PROCESSING BEFORE THE SUBSEQUENT DETAILED IMAGERY ANALYSIS OF THE DICKEY-LINCOLN AREA, MAINE. ANOTHER CCT (1491-14572) WAS ALSO ORDERED. HOWEVER, IT WAS MISTAKENLY SENT BY NASA TO ANOTHER AGENCY

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AND IS BEING RECALLED FOR TRANSMITTAL TO CRREL. TWO OTHER CCT'S (1203-15002,1365-14593) HAVE ALSO BEEN ORDERED AND WE ARE STILL AWAITING RECEIPT OF THESE TAPES. THE FOUR CCT'S REPRESENT SEASONAL CONDITIONS IN THE DICKEY-LINCOLN AREA, MAINE, AND WILL ENABLE THE IDENTIFICATION AND QUANTIFICATION OF HYDROLOGIC PARAMETERS.

2. MAJOR PROBLEMS

A. DCS

NO MAJOR PROBLEMS HAVE BEEN ENCOUNTERED DURING THIS REPORTING PERIOD IN THE LANDSAT DCS.

B. IMAGERY

THERE HAS BEEN A TIME DELAY IN THE DELIVERY OF LANDSAT COMPUTER COMPATIBLE TAPES FROM NASA WHICH RESULTED IN A DELAY IN IMAGERY ANALYSIS.

4. SIGNIFICANT RESULTS

SOON AFTER NED BEGAN RECEIVING REAL TIME DATA DIRECTLY AT THEIR LOCAL USER TERMINAL, THE INFLUENCE OF THIS INCREASED CAPABILITY WAS CLEARLY SEEN. ON THURSDAY 1 APRIL 1976, AN INTENSE STORM WITH TEMPERATURES IN THE MID-FIFTIES MOVED THROUGH NEW ENGLAND. CORPS OF ENGINEERS RESERVOIRS WERE OPERATED PRIMARILY IN THE CONNECTICUT AND MERRIMACK RIVER BASINS, AND ESTIMATED DAMAGES PREVENTED WERE $35 MILLION. THE MAJOR METHOD OF COMMUNICATION AND DATA COLLECTION IN THE AFFECTED AREAS WAS OUR LONG-ESTABLISHED GROUND-BASED RADIO NETWORK. BUT SIGNIFICANTLY, THE LANDSAT GROUND RECEIVE STATION PROVIDED CAPABILITY IN A NEW WAY: TO GATHER RELIABLE REALTIME DATA FROM NORTHERN MAINE TO MONITOR POTENTIAL FLOOD DANGERS THERE. NO DAMAGES OCCURRED IN NORTHERN MAINE AS A RESULT OF THIS STORM, BUT IT IS NOTEWORTHY THAT BECAUSE STREAMFLOW DATA WERE AVAILABLE FROM A POINT FIFTY MILES UPSTREAM OF FORT KENT, MAINE, NED PERSONNEL HAD A 24-HOUR ADVANCE WARNING OF FLOOD CRESTS WHICH COULD THREATEN FORT KENT, A COMMUNITY WHICH HAS BEEN HIT HARD BY SPRING FLOODING IN THE LAST FEW YEARS. CORPS PERSONNEL IN THE EMERGENCY OPERATIONS CENTER WERE THE BEST INFORMED PEOPLE IN NEW ENGLAND CONCERNING FLOOD DANGERS IN MAINE.

5. MEETINGS

A BRIEFING ON THE USES OF LANDSAT WAS GIVEN ON 29 JANUARY 1976 TO LTG WILLIAM C. GRIBBLE, JR. CHIEF ENGINEER OF THE ARMY CORPS OF ENGINEERS, DURING HIS SPECIAL TOUR TO NED TO VIEW THE NEW GROUND RECEIVE STATION IN THE WATER CONTROL BRANCH. RESPONDING TO THE INVITATION OF COLONEL JOHN MASON TO COME TO WALTHAM TO VIEW THE NEW DATA COLLECTION METHOD, THE CHIEF RECEIVED AN EXPLANATION OF THE VALUE OF THE DOWNLINK IN LOCATING IMMINENT FLOOD DANGERS AND ALERTING APPROPRIATE PERSONNEL.

GENERAL GRIBBLE'S BRIEFING FOLLOWED BY ONE DAY A VISITATION BY COLONEL ROBERT S. MCGARRY, DIVISION ENGINEER OF THE BALTIMORE DISTRICT, WHO ALSO CAME TO NED TO FIND OUT ABOUT DATA-COLLECION, ESPECIALLY THE NEW DOWNLINK. SEVERAL OTHER INDIVIDUALS AND GROUPS, INCLUDING STUDENTS AND CONSULTANTS HAVE VIEWED THE SYSTEM, AND THERE IS ALREADY EVIDENCE THAT SOME OF THE FEATURES BUILT INTO NED'S GROUND RECEIVE STATION ARE BEING INCORPORATED INTO OTHER SYSTEM DESIGNS.

JAMES L. MCMILLEN OF THE PANAMA CANAL COMPANY VISITED NED ON 16 NOVEMBER 1975 TO LEARN ABOUT OUR TELECOMMUNICATIONS HARDWARE AND SOFTWARE.

ON 18-20 NOVEMBER 1975 TIMOTHY BUCKELEW OF THE WATER CONTROL BRANCH TRAVELED TO LABARGE ELECTRONICS, INC., IN TULSA, OKLAHOMA, TO ATTEND A WORKSHOP ON PROGRAMMING AND OPERATING THEIR NEWLY DESIGNED CONVERTIBLE DATA COLLECTION PLATFORMS. WHILE THERE, MR. BUCKELEW DESCRIBED NED'S DOWNLINK TO SOME 80 OTHER ATTENDEES FROM SEVERAL FEDERAL AGENCIES.

ON 10 FEBRUARY 1976 DR. HARLAN L. MCKIM AND MS. CAROLYN J. MERRY (CRREL) ATTENDED A DEMONSTRATION OF THE LANDSAT DCS DATA BANK AT THE USGS REGIONAL OFFICE LOCATED IN BOSTON, MASS. MR. RICHARD PAULSON (USGS) AND MR. CHARLES MERK (USGS) DESCRIBED THEIR COMPUTER SYSTEM IN RESTON, VA, AND THE ANALYSIS AND DISPLAY OF THE LANDSAT DCP DATA. CRREL AND NED ARE CURRENTLY INVESTIGATING THE FEASIBILITY OF OBTAINING THE LANDSAT DCP DATA THROUGH THE COPE 1200 TERMINAL LOCATED AT CRREL. CLOSE COORDINATION WITH NED DURING THIS REPORTING PERIOD WAS MAINTAINED THROUGH PHONE CONVERSATIONS AND MEETINGS.

6. RECOMMENDATIONS

NO RECOMMENDATIONS AT THIS TIME.

7. FUTURE PLANS

A. DCS

AT THIS POINT WE ENVISION USING THE LANDSAT

DCS AS WE HAVE IN THE PAST -- AS A SUPPLEMENTAL SYSTEM TO WHATEVER OPERATIONAL DATA COLLECTION SYSTEM WE ADOPT. LANDSAT DCS CANNOT IN ITS PRESENT CONFIGURATION SERVE AS OUR PRIMARY MEDIUM BECAUSE OF THE DAILY INTERMITTENT AVAILABILITY. BUT IN TERMS OF CONVENIENCE, RELIABILITY, AND ECONOMICS IT IS DESIRABLE.

WE WILL CONTINUE TO EXPERIMENT WITH DCP'S, SENSORS, AND INTERFACES THAT WILL ENHANCE OUR WATER RESOURCE MANAGEMENT FUNCTIONS.

B. IMAGERY

THE TIME-TABLE FOR THE IMAGERY PORTION OF THE FOLLOW-ON INVESTIGATION IS AS FOLLOWS.

DICKEY-LINCOLN, MAINE -- ANALYSIS OF HYDROLOGICAL PARAMETERS

QUANTIFICATION OF SNOW AND ICE COVER. SPECIFICATION OF HYDROLOGIC PARAMETERS TO BE EXAMINED	MARCH 76-JUNE 76
CORRELATION OF GROUND TRUTH DATA TO SNOW RADIANCE FOR PREDICTION OF SNOW WATER VOLUME IN ST. JOHN RIVER BASIN	APRIL 76-JAN 77
WETLANDS DISTRIBUTION AND AREAL EXTENT OF WATER	JULY 76-OCT 76

8. ACCOUNTING

A TABULATION OF THE DOLLAR VALUE OF THE IMAGERY DATA ORDERED AND RECEIVED THROUGH 29 FEBRUARY 1976 FOR THIS INVESTIGATION FOLLOWS:

TYPE OF IMAGERY	VALUE OF DATA ALLOWED	VALUE OF DATA ORDERED	VALUE OF DATA RECEIVED
LANDSAT PRINTS AND TRANSPARENCIES (STANDING ORDER)	A TOTAL OF $9900	DOES NOT APPLY	$8036
LANDSAT PRINTS AND TRANSPARENCIES (RETROSPECTIVE ORDERS)		0	0
LANDSAT COMPUTER COMPATIBLE TAPES	$3800	0	0
AIRCRAFT IMAGERY	$360	0	0

Saul Cooper

SAUL COOPER
PRINCIPAL INVESTIGATOR

LANDSAT-2 - DCP INFORMATION SHEET
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION 15 APRIL 1976

DCP NO.	STATION NAME	PARAMETER(S)*	LAT	LONG
7147	ST. JOHN RIVER AT NINEMILE BRIDGE, ME.	RS WES	46 42 00	69 42 59
7101	ST. JOHN RIVER AT DICKEY, ME.	RS WQ	47 06 44	69 05 25
7355	MICHAUD FARM AT ALLAGASH FALLS, ME.	WES	46 57 05	69 11 43
7273	ST. JOHN RIVER AT FORT KENT, ME.	RS	47 15 27	68 35 35
7071	PENOBSCOT RIVER AT WEST ENFIELD, ME.	RS	45 14 12	68 38 56
7272	CARABASSETT RIVER NEAR NORTH ANSON, ME.	RS	44 52 09	69 57 20
7356	SACO RIVER AT CORNISH, ME.	RS	43 48 35	70 46 53
7271	STINSON MOUNTAIN, N.H.	P	43 50 06	71 46 49
7127	SOUTH MOUNTAIN, N.H.	P	42 58 59	71 35 21
7201	PEMIGEWASSET RIVER AT PLYMOUTH, N.H.	RS	43 45 33	71 41 10
7233	MERRIMACK RIVER NEAR GOFFS FALLS, N.H.	RS	42 56 54	71 27 52
7214,7331	COLD REGIONS LAB, HANOVER,N.H.	T	VARIABLE	
7246	WACHUSETT MOUNTAIN, MA.	P	42 29 24	71 53 15
6063	IPSWICH RIVER NEAR IPSWICH, MA. (1)	RS	42 39 35	70 53 39
7106	NORTH NASHUA RIVER AT FITCHBURG, MA.	RS	42 34 34	71 47 19
7142	CHICOPEE RIVER AT CHICOPEE FALLS, MA.	WQ	42 09 37	72 34 52
7021	WESTFIELD RIVER AT WEST SPRINGFIELD,MA.	WQ	42 05 59	72 38 28
7207	FRENCH RIVER AT WEBSTER, MA.	WQ	42 03 03	71 53 08
----	NED HEADQUARTERS, WALTHAM, MA.	T	42 23 46	71 12 56
7012	BRANCH RIVER AT FORESTDALE, R.I.	RS	41 59 47	71 33 47
7345	PAWTUXET RIVER AT CRANSTON, R.I.	RS	41 45 03	71 26 44
7254	CONNECTICUT RIVER AT HARTFORD, CT.	RS	41 46 10	72 40 04
7242	CONNECTICUT RIVER NEAR MIDDLETOWN, CT.	RS	41 33 40	72 36 45
7206	PORTER BROOK NEAR MANCHESTER,CT.(2)	RS	41 45 55	72 30 12
7124,6216		(3) RL AT GST GT WP		
7042,7325		(3,4)		
7010,7304,7171,7220,7207,7335		SPARES		

* P - PRECIPITATION
WES - WATER EQUIVALENT OF SNOWPACK
RS - RIVER STAGE
RL - RESERVOIR LEVEL
WQ - WATER QUALITY (TEMPERATURE, CONDUCTIVITY, PH AND DISSOLVED OXYGEN)
AT - AIR TEMPERATURE(S)
GST - GROUND SURFACE TEMPERATURE
GT - GROUND TEMPERATURE(S)
WP - WIND PASSAGE
PV - PARAMETERS VARIABLE
T - TEST SET

(1) DCP BELONGS TO U.S. GEOLOGICAL SURVEY, BOSTON, MA.
(2) DCP ON LOAN TO U.S. GEOLOGICAL SURVEY, HARTFORD, CT.-
-ON DEMONSTRATION AT THE MANCHESTER NATURE CENTER
(3) DCP ON LOAN TO U.S. ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB, HANOVER, N.H.
(4) NOT YET INSTALLED

FIGURE 1.

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P3
PLATFORM        LOCATION
 I.D. #

7147 NINEMILE BRIDGE, ME.          NO REPORT
7101 DICKEY, ME.                   NO REPORT
7355 ALLAGASH FALLS, ME.           4/22/76
     10:10 EST    WES= 3.62IN
     10:12 EST    WES= 3.68IN
     10:14 EST    WES= 3.62IN
7273 FORT KENT, ME.                4/22/76
     10: 9 EST                STG=21.51FT   95450.CFS  16.8 CSM
     10:12 EST                STG=21.51FT   95450.CFS  16.8 CSM
     10:15 EST                STG=21.51FT   95450.CFS  16.8 CSM
7071 WEST ENFIELD, ME.             4/22/76
     10: 8 EST                STG=12.19FT   46830.CFS   7.0 CSM
     10:11 EST                STG=12.19FT   46830.CFS   7.0 CSM
     10:14 EST                STG=12.19FT   46830.CFS   7.0 CSM
     10:18 EST                STG=12.19FT   46830.CFS   7.0 CSM
7272 NORTH ANSON, ME.              4/22/76
     10:11 EST                STG= 5.90FT    1934.CFS   5.5 CSM
     10:14 EST                STG= 5.90FT    1934.CFS   5.5 CSM
7356 CORNISH, ME.                  4/22/76
     10:11 EST                STG= 6.75FT    6475.CFS   5.0 CSM
     10:18 EST                STG= 6.75FT    6475.CFS   5.0 CSM


7271 STINSON MT., N.H.             4/22/76
     10:11 EST   PRC=  0.05IN
     10:15 EST   PRC=  0.05IN
7127 SOUTH MT., N.H.               4/22/76
     10:12 EST   PRC=  0.62IN
     10:15 EST   PRC=  0.62IN
7201 PLYMOUTH, N.H.                NO REPORT
7233 GOFFS FALLS, N.H.             4/22/76
     10:10 EST                STG= 6.08FT    8544.CFS   2.8 CSM
     10:14 EST                STG= 6.08FT    8544.CFS   2.8 CSM
     10:17 EST                STG= 6.08FT    8544.CFS   2.8 CSM
7331 CRREL, HANOVER, N.H.          NO REPORT
7214 CRREL, HANOVER, N.H.          NO REPORT


7246 WACHUSETT MT., MA.            NO REPORT
6063 IPSWICH, MA.                  4/22/76
     10: 8 EST                STG= 3.60FT     174.CFS   1.4 CSM
     10:11 EST                STG= 3.60FT     174.CFS   1.4 CSM
     10:14 EST                STG= 3.60FT     174.CFS   1.4 CSM
     10:17 EST                STG= 3.60FT     174.CFS   1.4 CSM
7106 FITCHBURG, MA.                4/22/76
     10:11 EST                STG= 2.64FT   10340.CFS  #162 CSM
     10:15 EST                STG= 2.64FT   10340.CFS  #162 CSM
     10:18 EST                STG= 2.64FT   10340.CFS  #162 CSM
7142 CHICOPEE, MA.                 4/22/76
     10: 9 EST   CD= 217.5   DO=11.300  WT= 10.84  PH= 8.960
     10:16 EST   CD= 217.5   DO=11.300  WT= 10.84  PH= 8.980
7021 WESTFIELD, MA.                4/22/76
     10:10 EST        INVALID
     10:13 EST        INVALID
     10:16 EST        INVALID
     10:19 EST        INVALID
7910 NED,WALTHAM, MA.              NO REPORT
7912 FORESTDALE, R.I.              NO REPORT
7345 CRANSTON, R.I.                4/22/76
     10:10 EST                STG= 4.13FT     259.CFS   1.3 CSM
     10:14 EST                STG= 4.13FT     259.CFS   1.3 CSM
     10:17 EST                STG= 4.13FT     259.CFS   1.3 CSM
7254 HARTFORD, CT.                 4/22/76
     10: 9 EST                STG= 8.31FT   24550.CFS   2.3 CSM
     10:12 EST                STG= 8.31FT   24550.CFS   2.3 CSM
     10:15 EST                STG= 8.31FT   24550.CFS   2.3 CSM
     10:18 EST                STG= 8.31FT   24550.CFS   2.3 CSM
7842 MIDDLETOWN, CT.               4/22/76
     10: 9 EST                STG= 4.00FT       0.CFS   0.0 CSM
     10:12 EST                STG= 4.00FT       0.CFS   0.0 CSM
     10:15 EST                STG= 4.00FT       0.CFS   0.0 CSM
     10:18 EST                STG= 3.97FT       0.CFS   0.0 CSM
7806 MANCHESTER, CT.               4/22/76
     10:10 EST                STG= 1.92FT       0.CFS   0.0 CSM
     10:13 EST                STG= 1.92FT       0.CFS   0.0 CSM
     10:16 EST                STG= 1.92FT       0.CFS   0.0 CSM


6564 ST.FRANCIS R., N.B.           4/22/76
     10: 9 EST                STG= 8.96FT       0.CFS   0.0 CSM
     10:12 EST                STG= 8.96FT       0.CFS   0.0 CSM
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FIGURE 2. PRINCIPAL COMPUTER OUTPUT FROM LANDSAT DATA HANDLING PROGRAM

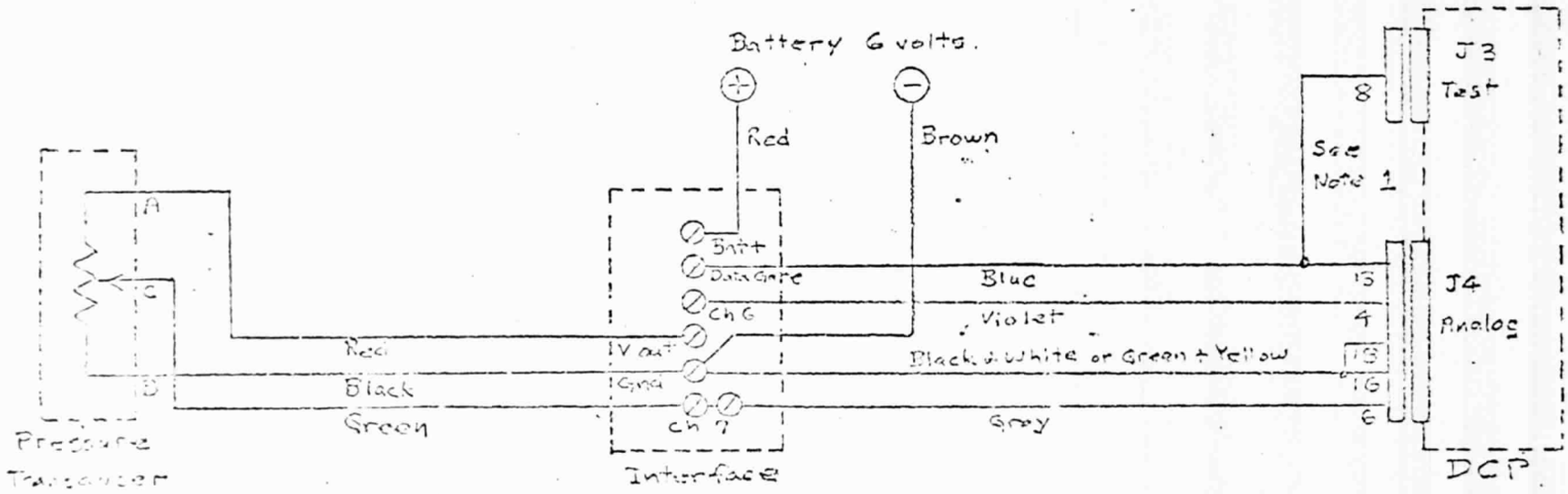
DCP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
7147	23	116	220	103	0	0	0	0	0	0	0	0	462
7101	0	0	0	0	0	0	0	0	0	0	0	0	0
7355	6	41	208	120	0	0	0	0	0	0	0	0	375
7220	40	145	302	132	0	0	0	0	0	0	0	0	619
7071	30	68	92	182	0	0	0	0	0	0	0	0	372
7272	0	0	80	41	0	0	0	0	0	0	0	0	121
7356	23	11	127	129	0	0	0	0	0	0	0	0	290
7170	24	101	0	0	0	0	0	0	0	0	0	0	185
7187	28	126	273	194	0	0	0	0	0	0	0	0	821
7201	25	89	168	132	0	0	0	0	0	0	0	0	414
7233	8	0	0	120	0	0	0	0	0	0	0	0	128
7331	0	0	0	88	0	0	0	0	0	0	0	0	88
7246	29	0	0	0	0	0	0	0	0	0	0	0	29
7106	27	111	273	173	0	0	0	0	0	0	0	0	584
7242	0	0	14	207	0	0	0	0	0	0	0	0	221
7142	40	106	229	165	0	0	0	0	0	0	0	0	540
7021	0	0	0	87	0	0	0	0	0	0	0	0	87
7207	27	96	10	0	0	0	0	0	0	0	0	0	133
7304	0	0	0	0	0	0	0	0	0	0	0	0	0
7345	16	10	6	163	0	0	0	0	0	0	0	0	195
7254	0	0	12	184	0	0	0	0	0	0	0	0	196
7335	0	0	0	0	0	0	0	0	0	0	0	0	0
7206	17	80	185	129	0	0	0	0	0	0	0	0	411
7042	0	0	0	0	0	0	0	0	0	0	0	0	0
7325	0	0	0	0	0	0	0	0	0	0	0	0	0
7010	0	0	0	0	0	0	0	0	0	0	0	0	0
7012	0	0	0	0	0	0	0	0	0	0	0	0	0
7171	0	0	0	0	0	0	0	0	0	0	0	0	0
7271	0	0	80	156	0	0	0	0	0	0	0	0	236
7273	0	0	0	78	0	0	0	0	0	0	0	0	78
TOTALS	363	1100	2279	2583	0	0	0	0	0	0	0	0	

GTOT= 6325

NOT OURS= 720
STOP

R
GTOD
4/23/76 15:13:22
R

FIGURE 3. SAMPLE TALLY OF TOTAL NUMBER OF LANDSAT MESSAGES RECEIVED



C. D. G. Type 4000
5 K Ω

Note 1: On some DCP's, data gate is not wired to pin 13, J4; in which case connect data gate lead to pin 8, J3.

INTERCONNECTION DIAGRAM - Snow pillow transducer to interface to DCP

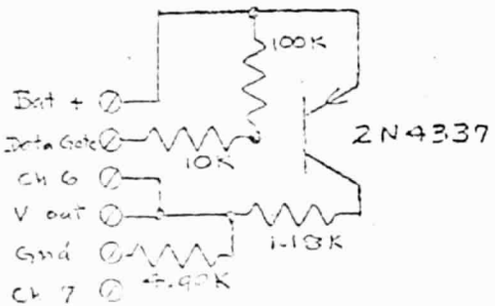


FIGURE 4. SCHEMATIC DIAGRAM OF SNOW PILLOW INTERFACE.

B.P. Sep 26, 1985