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S I D A

Satellite Imagery Descriptors Analysis

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Sida rhombifolia

broom jute

Preface

Under contract No 73/332 between DRME (Direction des Recherches et Moyens d'Essais, Ministère des Armées, Paris) and ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer, Paris), the senior author is responsible for the implementation of a geographical information system in plain language leading to nonparametric statistical analysis.

A package of file handling programs have been running satisfactorily since 1969 with only minor modifications - such as an increased number of variables or a diversified output. Programs were written in Fortran V by André Giey of the REGIE INFORMATIQUE company.

As a complement to this implemented package, repertoires have been developed by Ana Garcia Gomez in a number of domains: ISCC-NBS Colors, Soluble salts, Spatial and temporal referencing, Soil types, Human environment, Vegetation, Soil horizons, Geomorphological and hydrological environment. Some repertoires are bilingual, Spanish - French and one is trilingual, English - Spanish - French.

All former statistical programs were abandoned a few years ago to avoid normality assumptions. Some nonparametric programs were developed since.

ORSTOM has a terminal ORDO TMF 342 card reader and line printer, linked by a 4500 bauds line to a 192 K UNIVAC 1108 computer of STAD in Paris. This same computer supports 30 other terminals. Users have access to 106 K for the moment, but a fourth 64 K bank is to be installed soon.

The purpose of this work is to extend the geographical soil information system to the vocabulary of ERTS descriptors.

The authors wish to express their indebtedness to Dr. Verger, EPHE, for furnishing his own ERTS-1 image descriptor forms. Authors would acknowledge, with thanks, receipt of a large number of such forms, from different countries, to evaluate application of other statistical tests.

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Chapter 1

The Earth Resources Vocabulary

In accordance with paragraph 3g of the "Provisions for Participation in the NASA Earth Resources Technology Satellite", all principal investigators furnish completed image descriptor forms to Goddard Space Flight Center within four weeks after each receipt of Return Beam Vidicon (RBV) and Multispectral Scanner (MSS) images.

A list of the descriptors appears on pages 4-15 and 4-16 of ERTS Users Handbook, under table 4-2 "Earth Resources Vocabulary". A few examples of descriptors are: bay-head beach, coastal dune, railroad. The list is alphabetical and comprises more than 380 descriptors.

Extending our GEOGRAPHICAL information system to the Earth Resources Vocabulary has initiated recently. Provision was made for 9 types of products (bands): RBV1, RBV2, RBV3, MSS4, MSS5, MSS6, MSS7, MSS COLOR COMPOSITE, RBV COLOR COMPOSITE.

ERTS Data Users Handbook, (1971). Document No 71SD4249, G.E.C. Space Division, Philadelphia.

Table 4-2. Earth Resources Vocabulary

A
Acclinal Valley
Active Glacier
Active Volcano
Actiniform Clouds
Adobe Flat
Advancing Glacier
Advancing Shoreline
Aerial Imagery Used
Agriculture
Airfield
Alfalfa
Algal Bloom
Alkali Flat (use Salt Flat)
Alluvial Cone
Alluvial Fan
Alluvial Flat
Alluvial Plain
Alluvial Terrace
Altocumulus
Altostratus
Anaclinal Stream
Anaclinal Valley
Annular Drainage Pattern
Anticlinal Mountain
Anticlinal Valley
Anticline
Anticlinorium
Anvils
Aquifer
Arroyo
Ash Cone (use Cinder Cone)
Atoll
Atoll Reef
Avalanche
Avalanche Scar
Axial Stream

B
Back Bay
Backshore
Badland
Bajada
Barbed Tributary
Barchan
Barley
Barrens
Barrier Bar
Barrier Beach
Barrier Flat
Barrier Island
Barrier Lagoon
Barrier Lake
Barrier Reef
Basin
Basin and Range
Batholith
Bay
Bay-Head Bar
Bay-Head Beach
Bay-Head Delta
Bay Ice
Baymouth Bar
Bayou
Bed
Bedrock
Belt
Belted Plain

B (cont'd)
Billow
Billow Cloud
Bioluminescence
Bird-Foot Delta
Blight (use Diseased)
Bog (use Marsh)
Braided Stream
Breakwater (use Jetty)
Bridge
Broken Clouds
Bruse
Butte

C
Caldera
Cana
Canyon (use Valley)
Cape
Cartography
Catchment Area
Cay
Chaotic Cloud Pattern
Chaparral
Circue Zone
Cirque
Cirrocumulus
Cirrostratus
Cirrus
Cirrus Shield
Citrus
City
Clearing
Closed Basin
Closed Fault
Closed Fold
Cloud Streets
Coast
Coastal Current
Coastal Dune
Coastal Marsh
Coastal Plain
Coast Line
Col (use Gap)
Cold Front
Cone
Conifer
Consequent Lake
Consequent Stream
Consequent Valley
Contact
Continental Shelf
Copse
Coral Head
Coral Reef
Corn
Cotton
Cotton
Crater
Cropland
Cross-Bedding
Cross-Fault
Cuesta
Cumulonimbus
Cumulus
Current
Cusp
Cyclone

D
Dam
Deciduous
Delta
Deltaic Coastal Plain
Dendritic Drainage
Depression
Desert
Desertline
Dike
Diseased Vegetation
Divide
Dome
Dormant Vegetation
Drought Conditions
Drumlin
Dune

E
Earthquake Damage
Echelon Fault
Eddy
EEO (Excellent Example of) Keyword
End Moraine
Entrenched Stream
Erosion
Esker
Estuary

F
Fall Line
Fallow Field
Fan
Fault
Finger Lake
Fiord
Fire
Firebreak
Fire Damage
Flood
Flood Damage
Floodplain
Fog
Fold
Forest
Forest Fire
Forest Fire Damage
Frost Damage
Frontal Wave
Frozen Lake
Frozen Soil

G
Gap
Geofracture
Geography
Geology
Geosyncline
Glacier
Gorge (use Valley)
Graben
Grass
Grassland
Gravel Deposit
Grazing Land (use Pasture)
Ground Truth Used
Gulf

H
Harbor
Hardwood Forest
Hay
Haze
Highway
Hogback
Horst
Hourglass Valley
Hurricane
Hurricane Damage
Hydrology

I
Ice
Iceberg
Ice Floe
Ice Jam
Ice Pack
Ice Shelf
IRI (Image Referenced in) Journal
Industrial Area
Inlet
Inlier
Insect Damage
Inshore Zone
Insequent Stream
Interlacing Drainage
Intermontane Floor
Intrusion
Irrigation
Island
Island Arc
Isthmus

J
Jet Stream Indicated
Jetty

K
Kame
Karst
Kelp
Kettle
Key (use Cay)
Klippe

L
Lagoon
Lake
Lake Bed
Landslide
Laterite
Lattice Drainage Pattern
Lava
Lee Wave
Lineament
Littoral Current
Littoral Drift
Littoral Transport
Locust Swarm
Locust Damage
Longshore Bar
Longshore Current
Lumbering Area

Table 4-2. Earth Resources Vocabulary

M
Maar
Marsh
Massif
Mature Stream
Mature Vegetation
Meadowland
Meander
Mesa (use Butte)
Meteor Crater
Meteorology
Metropolitan Area
Microwave Data Used
Millet
Mine
Monoclinal Valley
Morainal Delta
Morainal Lake
Moraine
Mountain
Mud
Mud Flat
Muskeg

N
Nappe
Nunatak

O
Oasis
Oats
Occluded Front
Oceanography
Oil Field
Oil Slick
Open Pit Mine
Orchard
Orographic Cloud
Outlet
Outlier
Outwash Plain

P
Parallel Drainage
Park
Pass (use Gap)
Pasture

P (cont'd)
Pediment
Pediplain
Peneplain
Peninsula
Permafrost
Piedmont
Piedmont Plain
Peidmont Scarp
Pier (use Jetty)
Pinnacle
Plain
Plankton Bloom
Plateau
Playa
Playa Lake
Plowed Field
Pond (use Lake)
Potatoes
Prairie
Pressure Ridge
Protozoans

Q
Quarry

R
Radial Drainage Pattern
Railroad
Rain Forest
Raised Reef
Rangeland
Rapids
Ravine (use Valley)
Rectangular Drainage
Red Tide
Reef
Reservoir (use Lake)
Residential Area
Retrogressive Shoreline
Rice
Ridge
Rift
Rift Valley
River
Road (use Highway)
Runoff
Rural Area
Rust

S
Saline Dome
Saline Soil
Salt
Salt Flat
Salt Marsh
Sand Dune (use Dune)
Savannah
Scar
Scattered Clouds
Scrub
Sea
Sea Grass
Sea Wall
Secondary Front
Sediment
Shallow Water
Shield
Shipyard
Shoal
Silt
Sink
Slash
Slick
Smog
Smoke
Snow
Snow Pack
Soil
Soybean
Split
Spring
Squall Line
Stationary Front
Step Fault
Steppe
Stoss-and-Lee Topography
Strait
Strath
Stream
Suburban Area
Sugar Beet
Sugar Cane
Swamp (use Marsh)
Synclinal Valley
Syncline
Synclinorium

T
Terrace
Tidal Flat
Tidal Wave
Tidal Wave Damage
Thrust Fault
Timberline
Tobacco
Tombolo
Tornado
Tornado Damage
Towering Cumuli
Transverse Fault
Transverse Valley
Trellised Drainage
Trench
Tributary
Tsunami
Tsunami Damage
Tundra
Typhoon
Typhoon Damage

U
Upwelling
Urban Area

V
Valley
Vegetation
Vineyard
Volcano

W
Wadi (use Arroyo)
Warm Front
Wave
Wharf (use Jetty)

X Y Z

Chapter 2

The Repertoire Concept

A repertoire is the essential module of our system. Three parts are included in a repertoire, under separate control cards, even if preparation is progressing simultaneously under the three headings.

Part *L List of alphabetical codes for the variables;

Part *N Names of the variables;

Part *E Equivalencies data in plain language = variable code = data code.

Part *L List of alphabetical codes for the variables.

Internal code structure:

3 letters (mandatory)

First letter for the variable type

- A for binary variable
- B for nominal variable
- C for ordinal variable
- F for interval variable

Second letter for the order of appearance in the repertoire

ordering starts with letter A for each type of variable

AA	BA	CA	FA
AB	BB	CB	FB
⋮	⋮	⋮	⋮
AZ	BZ	CZ	FZ

Third letter for the identification of the alphabet when the number of variables

of a given type exceeds 26

AAA	BAA	CAA	FAA
ABA	BBA	CBA	FBA
⋮	⋮	⋮	⋮
AZA	BZA		FZA
AAB			FAB
ABB			FBB
⋮			⋮
AZB			
AAC			
ABC			
⋮			

Important: The total number of variables must not exceed 500 . Codes are punched sequentially, without separator, from column 1 to 80 .

Part *N Names of the variables.

There is one card for each name. The name is left-justified in col. 1-67 . Only five special signs are valid * , / - $

These signs have the same punching codes on all machines. No separators are used. Of course, all names must differ. These names, or the corresponding codes of part *L, will be used for selection purposes.

Part *E Equivalencies data in plain language = variable code = data code.

Data in plain language may contain five special signs only * , / - $ to avoid compatibility problems. Data length can range from 1 to 150 characters or spaces. Care is needed to avoid identical data. However, data may be identical to variables.

Example: DUNE punched col. 1-4 in part ≠N is punched .DUNE=AIF=1. in col. 1-12 of part ≠E .

Variable code is the same as under control card ≠L

This code may be deleted - and no blank space is left between the two equality signs - after the first data, when variable is nominal, ordinal, or interval.

Example: .0DEG W=FIA=0.

.1DEG W==1.

.2DEG W==2.

Data code is always positive and in the I4 format. For binary variables, data is unique and equals 1 . No input of zero data.

Example: .DUNE=AIF=1.

For nominal, ordinal, and interval variables, zero data is requested when meaningfull.

Equivalencies are punched, preceded and followed by a period (full-stop sign). Only one equivalency is specified on each card, although this is not mandatory. The first equivalency of the repertoire is not preceded by a period; the last one of the repertoire is preceded by a period and followed by two periods.

A double period is now and then used between subsets of equivalencies to have the descriptions subdivided into paragraphs. Thirty paragraphs are accepted.

When two terms, or more, of a binary variable are followed in the repertoire by the same numerical code, all are accepted for input. The one which is used will appear on the output listing when the description is inserted on tape. The first one of these "synonyms" is always used to print the descriptions.

The repertoire deck containing no more than 60 000 UNIVAC words from card ≠L to the card containing the last equivalency, is loaded on tape (2400' 800 bpi 7 tracks) with 7 system and program control cards.

SYSTEM AND PROGRAM CONTROL CARDS

INSERT THE REPERTOIRE

```
         1         2         3         4         5         6
123456789012345678901234567890123456789012345678901234567890123456789012
"RUN,G ORSIDA,TP0160,ORSTOM                                  026 OR 029
"ASG,TF SORTIE.,,8C,155E
"XQT RGX.RGX
*140174
*P
  R E P E R T O I R E   D E C K
*FIN
"FIN
```

This example means repertoire No 140174 is loaded for the first time (*P) on tape No 155 (E) with the repertoire program in absolute version RGX on Fastrand.

OR means ORSTOM and TP remote batch processing.

Faulty loading or loading of an erroneous repertoire aborts on following code numbers:

Error 2 Number of variables exceeds 500 .

Error 4 Numerical code is not in the I4 format.

Error 5 No data for a given variable.

Error 6 An equal sign is missing.

Error 7 Non-announced alphabetical code in an equivalence sentence.

Error 8 Discrepancy between the number of codes and the number of variables.

Error 9 Control card *N is missing.

Error 10 Unknown control card.

When this happens, corrections are introduced and the whole file is rerun. Loading is satisfactory when listing ends on *FIN

LOAD 155 E

Updating the repertoire is easy, as control cards are few. Once again, two tapes are used in flip-flop mode. The repertoire card has the same reference number and is followed by a modification card.

SYSTEM AND PROGRAM CONTROL CARDS

MODIFY THE REPERTOIRE

```
        1         2         3         4         5         6
123456789012345678901234567890123456789012345678901234567890123456789012
"RUN,G ORSIDA,TP0160,ORSTOM                              026 OR 029
"ASG,T ENTREE.,8C,155L                                    OR 175L
"ASG,T SORTIE.,8C,175E                                    AND 155E
"XQT RGX.RGX
*140174
*M
 M O D I F I E D   R E P E R T O I R E   D E C K
*FIN
"FIN
```

Should modification abort on an error code, another run after corrections is needed.

As expected, the system offers translation capabilities. An equivalent repertoire, in a foreign language, is inserted under its own reference number with control card *I

SYSTEM AND PROGRAM CONTROL CARDS

INSERT A TRANSLATED REPERTOIRE

```
        1         2         3         4         5         6
123456789012345678901234567890123456789012345678901234567890123456789012
"RUN,G ORSIDA,TP0160,ORSTOM                              026 OR 029
"ASG,T ENTREE.,8C,155L                                    OR 175L
"ASG,T SORTIE.,8C,175E                                    AND 155E
"XQT RGX.RGX
*150175
*I
 T R A N S L A T E D   R E P E R T O I R E   D E C K
*FIN
"FIN
```

The number of equivalent repertoires has no limit.

To complete this chapter, let us mention another function which can be used to delete an obsolete repertoire.

DELETE A REPERTOIRE

```
         1         2         3         4         5         6
123456789012345678901234567890123456789012345678901234567890123456789012
"RUN,G ORSIDA,TP0160,ORSTOM                                    026 OR 029
"ASG,T ENTREE.,8C,155L                                          OR 175L
"ASG,T SORTIE.,8C,175E                                          AND 155E
"XQT RGX.RGX
*150175
*A
*FIN
"FIN
```

Chapter 3

An Earth Resources Repertoire

```
*L
AAAABAACAADAAEAAFAAGAAHAAIAAJAAKAALAAMAANAAOAAPAAQAARAASAATAAUAAVAAWAAXAAYAAZAAA
BABBACBADBAEBAFBAGBAHBAIBAJBAKBALBAMBANBAOBAPBAQBARBASBATBAUBAVBAWBAXBAYBAZBAACA
BCACCADCAECAFCAGCAHCAICAJCAKCALCAMCANCAOCAPCAQCARCASCATCAUCAVCAWCAXCAYCAZCAADABD
ACDADDAEDAFDAGDAHDAIDAJDAKDALDAMDANDAODAPDAQDARDASDATDAUDAVDAWDAXDAYDAZDAAEABEAC
EADEAEEAFEAGEAHEAIEAJEAKEALEAMEANEAOEAPEAQEAREASEATEAUEAVEAWEAXEAYEAZEAAFABFACFA
DFAEFAFFAGFAHFAIFAJFAKFALFAMFAOFAPFAQFARFASFATFAUFAVFAWFAXFAYFAZFAAGABGACGADGAFG
AFGAGGAHGAIGAJGAKGALGAMGANGAOGAPGAQGARGASGATGAUGAVGAWGAXGAYGAZGAAHABHACHADHAEHAF
HAGHAHHAIHAJHAKHALHAMHANHAOHAPHAQHARHASHATHAUHAVHAWHAXHAYHAZHAAIABIACIADIAEIAFIA
GIAHIAIIAJIAKIALIAMIANIAOIAPIAQIARIASIATIAUIAVIAWIAXIAYIAZIAAJABJACJADJAEJAFJAGJ
AHJAIJAJJAKJALJAMJANJAOJAPJAQJARJASJATJAUJAVJAWJAXJAYJAZJAAKABKACKADKAEKAFKAGKAH
KAIKAJKAKKALKAMKANKAOKAPKAQKARKASKATKAUKAVKAWKAXKAYKAZKAALABLACLADLAELAFLAGLAHLA
ILAJLAKLALLAMLANLAOLAPLAQLARLASLATLAULAVLAWLAXLAYLAZLAAMABMACMADMAEMAFMAGMAHMAIM
AJMAKMALMAMMANMAOMAPMAQMARMASMATMAUMAVMAWMAXMAYMAZMAANABNACNADNAENAFNAGNAHNAINAJ
NAKNALNAMNANNAONAPNAQNARNASNATNAUNAVNAWNAXNAYNAZNAAOABOACOADOAEOAFOAGOAHOAIOAJOA
KOALOAMOANOAOOAPOAQOAROASOATOAUOAVOAWOFAAFBAFCAFDAFEAFFAFGAFHAFIAFJAFKAFLA
*N
ACCLINAL VALLEY
ACTIVE GLACIER
ACTIVE VOLCANO
ACTINIFORM CLOUDS
ADOBE FLAT
ADVANCING GLACIER
ADVANCING SHORELINE
AERIAL IMAGERY USED
AGRICULTURE
AIRFIELD
ALFALFA
ALGAL BLOOM
ALLUVIAL CONE
ALLUVIAL FAN
ALLUVIAL FLAT
ALLUVIAL PLAIN
ALLUVIAL TERRACE
ALTOCUMULUS
ALTOSTRATUS
ANACLINAL STREAM
ANACLINAL VALLEY
ANNULAR DRAINAGE PATTERN
ANTICLINAL MOUNTAIN
ANTICLINAL VALLEY
ANTICLINE
ANTICLINORIUM
ANVILS
```

AQUIFER
ARROYO
ATOLL
ATOLL REEF
AVALANCHE
AVALANCHE SCAR
AXIAL STREAM
BACK BAY
BACKSHORE
BADLAND
BAJADA
BARBED TRIBUTARY
BARCHAN
BARLEY
BARRENS
BARRIER BAR
BARRIER BEACH
BARRIER FLAT
BARRIER ISLAND
BARRIER LAGOON
BARRIER LAKE
BARRIER REEF
BASIN
BASIN AND RANGE
BATHOLITH
BAY
BAY-HEAD BAR
BAY-HEAD BEACH
BAY-HEAD DELTA
BAY ICE
BAYMOUTH BAR
BAYOU
BED
BEDROCK
BELT
BELTED PLAIN
BILLOW
BILLOW CLOUD
BIOLUMINESCENCE
BIRD-FOOT DELTA
BRAIDED STREAM
BRIDGE
BROKEN CLOUDS
BRUSH
BUTTE
CALDERA
CANAL
CAPE
CARTOGRAPHY
CATCHMENT AREA
CAY
CHAOTIC CLOUD PATTERN
CHAPERRAL
CINDER CONE
CIRQUE
CIRROCUMULUS
CIRROSTRATUS
CIRRUS
CIRRUS SHIELD
CITRUS
CITY
CLEARING
CLOSED BASIN
CLOSED FAULT
CLOSED FOLD
CLOUD STREETS
COAST
COASTAL CURRENT
COASTAL DUNE
COASTAL MARSH
COASTAL PLAIN
COAST LINE
COLD FRONT
CONE
CONIFER
CONSEQUENT LAKE
CONSEQUENT STREAM
CONSEQUENT VALLEY
CONTACT
CONTINENTAL SHELF
COPSES
CORAL READ
CORAL REEF
CORN
COTTON
COULEE
CRATER
CROPLAND
CROSS-BEDDING
CROSS-FAULT
CUESTA
CUMULONIMBUS
CUMULUS
CURRENT
CUSP
CYCLONE
DAM
DECIDUOUS
DELTA
DELTAIC COASTAL PLAIN
DENDRITIC DRAINAGE
DEPRESSION
DESERT
DESERTLINE
DIKE
DISEASED VEGETATION
DIVIDE
DOME
DORMANT VEGETATION
DROUGHT CONDITIONS
DRUMLIN
DUNE
EARTHQUAKE DAMAGE
ECHELON FAULT

EDDY
SYNCLINE
END MORAINE
ENTRENCHED STREAM
EROSION
ESKER
ESTUARY
FALL LINE
FALLOW FIELD
FAN
FAULT
FINGER LAKE
FIORD
FIRE
FIREBREAK
FIRE DAMAGE
FLOOD
FLOOD DAMAGE
FLOODPLAIN
FOG
FOLD
FOREST
FOREST FIRE
FOREST FIRE DAMAGE
FROST DAMAGE
FRONTAL WAVE
FROZEN LAKE
FROZEN SOIL
GAP
GEOFRACTURE
GEOGRAPHY
GEOLOGY
GEOSYNCLINE
GLACIER
GRABEN
GRASS
GRASSLAND
GRAVEL DEPOSIT
GROUND TRUTH USED
GULF
HARBOR
HARDWOOD FOREST
HAY
HAZE
ROAD
HOGBACK
HORST
HOURGLASS VALLEY
HURRICANE
HURRICANE DAMAGE
HYDROLOGY
ICE
ICEBERG
ICE FLOE
ICE JAM
ICE PACK
ICE SHELF

IMAGE REFERENCED IN JOURNAL
INDUSTRIAL AREA
INLET
INLIER
INSECT DAMAGE
INSHORE ZONE
INSEQUENT STREAM
INTERLACING DRAINAGE
INTERMONTANE FLOOR
INTRUSION
IRRIGATION
ISLAND
ISLAND ARC
ISTHMUS
JET STREAM INDICATED
JETTY
KAME
KARST
KELP
KETTLE
KLIPPE
LAGOON
LAKE
LAKE BED
LANDSLIDE
LATERITE
LATTICE DRAINAGE PATTERN
LAVA
LEE WAVE
LINEAMENT
LITTORAL CURRENT
LITTORAL DRIFT
LITTORAL TRANSPORT
LOCUST SWARM
LOCUST DAMAGE
LONGSHORE BAR
LONGSHORE CURRENT
LUMBERING AREA
MAAR
MARSH
MASSIF
MATURE STREAM
MATURE VEGETATION
MEADOWLAND
MEANDER
METEOR CRATER
METEOROLOGY
METROPOLITAN AREA
MICROWAVE DATA USED
MILLET
MINE
MONOCLINAL VALLEY
MORAINAL DELTA
MORAINAL LAKE
MORAINE
MOUNTAIN
MUD

MUD FLAT
MUSKEG
NAPPE
NUNATAK
OASIS
OATS
OCCLUDED FRONT
OCEANOGRAPHY
OIL FIELD
OIL SLICK
OPEN PIT MINE
ORCHARD
OROGRAPHIC CLOUD
OUTLET
OUTLIER
OUTWASH PLAIN
PARALLEL DRAINAGE
PARK
PASTURE
PEDIMENT
PEDIPLAIN
PENEPLAIN
PENINSULA
PERMAFROST
PIEDMONT
PIEDMONT PLAIN
PIEDMONT SCARP
PINNACLE
PLAIN
PLANKTON BLOOM
PLATEAU
PLAYA
PLAYA LAKE
PLOWED FIELD
POTATOES
PRAIRIE
PRESSURE RIDGE
PROTOZOANS
QUARRY
RADIAL DRAINAGE PATTERN
RAILROAD
RAIN FOREST
RAISED REEF
RANGELAND
RAPIDS
RECTANGULAR DRAINAGE
RED TIDE
REEF
RESIDENTIAL AREA
RETROGRESSIVE SHORELINE
RICE
RIDGE
RIFT
RIFT VALLEY
RIVER
RUNOFF
RURAL AREA
RUST
SALINE DOME
SALINE SOIL
SALT
SALT FLAT
SALT MARSH
SAVANNAH
SCAR
SCATTERED CLOUDS
SCRUB
SEA
SEA GRASS
SEA WALL
SECONDARY FRONT
SEDIMENT
SHALLOW WATER
SHIELD
SHIPYARD
SHOAL
SILT
SINK
SLASH
SLICK
SMOG
SMOKE
SNOW
SNOW PACK
SOIL
SOYBEAN
SPLIT
SPRING
SQUALL LINE
STATIONARY FRONT
STEP FAULT
STEPPE
STOSS-AND-LEE TOPOGRAPHY
STRAIT
STRATH
STREAM
SUBURBAN AREA
SUGAR BEET
SUGAR CANE
SYNCLINAL VALLEY
SYNCLINORIUM
TERRACE
TIDAL FLAT
TIDAL WAVE
TIDAL WAVE DAMAGE
THRUST FAULT
TIMBERLINE
TOBACCO
TOMBOLO
TORNADO
TORNADO DAMAGE
TOWERING CUMULI
TRANSVERSE FAULT
TRANSVERSE VALLEY

TRELLISED DRAINAGE
TRENCH
TRIBUTARY
TSUNAMI
TSUNAMI DAMAGE
TUNDRA
TYPHOON
TYPHOON DAMAGE
UPWELLING
URBAN AREA
VALLEY
VEGETATION
VINEYARD
VOLCANO
WARM FRONT
WAVE
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DAY
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YEAR
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CASE
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.CASE 85==85.
.CASE 86==86.
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.CASE 94==94.
.CASE 95==95.
.CASE 96==96.
.CASE 97==97.
.CASE 98==98.
.CASE 99==99.
.CASE 100==100..
*FIN

@FIN
```

Example of "synonyms":

```
.CINDER CONE=ACD=1.

.ASH CONE==1.
```

corresponding to Ash Cone (use Cinder Cone)

from the Earth Resources Vocabulary.

NASA identification numbers of the imagery are introduced periodically in the repertoire, before or after loading the corresponding descriptions. Prior updating of the repertoire with more case numbers is requested from time to time. The above list, for example, is updated:

```
.CASE 85==85.
.CASE 86==86.
 etc
.CASE 100==100.
.CASE 101==101.
 etc
.CASE 500==500..
*FIN
```

Chapter 4

The Repertoire Program

by

A. Giey, Régie Informatique, Paris, 1969

11	seconds CPU compilation time
68	K
5	Fastrand tracks
stored	on tape No 5755, file No 16

	ELEMENTNAME	VERSION	TYPE	instructions
A	LGX	REPERT	FOR SYMB	130
B	INIT		FOR SYMB	67
C	LSVIO		FOR SYMB	294
D	KREAD	REPERT	FOR SYMB	20
E	KREADB		FOR SYMB	12
F	KREADF		FOR SYMB	9
G	MTRANS		ASM SYMB	41
H	PRINT		FOR SYMB	190

```
      COMMON                    KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER DICTIO,OUTBUF
      DIMENSION NSUJET(100)                                          4  2
      INTEGER   CARACT
      EQUIVALENCE (DICTIO(6),NBVARI)
      EQUIVALENCE(KASTER,KARACT(41)),(KPOINT,KARACT(62)),(KBL,KARACT(6))
     1,(KEGAL,KARACT(37)),(KVIRG,KARACT(47)),(KR,KARACT(24)),
     2(KD,KARACT(10)),(KL,KARACT(18)),(KN,KARACT(20)),(KE,KARACT(11))
     3,(KARACT(12),KF),(KARACT(25),KS)
      NERROR=1
      CALL INIT(IDATE)
      CARACT=KREADB(1)
      INSERT=0
      IANNUL=0
      IF(CARACT-39)1,5,1
1     IF(CARACT-17)3,2,3
2     IANNUL=1
      GOTO5
3     INSERT=1
      IF(CARACT-25)4,5,4
4     IANNUL=1
      IF(CARACT-36)901,5,901
5     IF(INSERT)7,6,7
6     IF(IANNUL)380,7,380
7     DICTIO(2)=IDATE
      IF(KREADB(1)-KL)901,10,901
10    CARACT=KREADF(1)
      INDEXD=7
20    CARACT=CARACT*(2**6)+KREAD(1)
      DICTIO(INDEXD)=CARACT*(2**6)+KREAD(1)
      INDEXD=INDEXD+2
      NBVARI=NBVARI+1
      CARACT=KREAD(1)
      IF(CARACT-KBL)30,40,30
30    IF(CARACT-KASTER)20,40,20
40    IF(KREADB(1)-KN)902,50,902
50    DICTIO(3)=INDEXD
      IF(500-NBVARI)909,55,55
55    DO100I=1,NBVARI
      J=1
      L=0
      CARACT=KREADF(0)
60    DO80K=1,6
      CARACT=KREAD(1)
      IF(CARACT-KBL)70,65,70
65    IF(KREAD(0)-KBL)70,90,70
70    DICTIO(INDEXD+J)=DICTIO(INDEXD+J)*(2**6)+CARACT
      L=L+1
      IF(80-L)90,90,80
80    CONTINUE
      J=J+1
      GOTO60
90    DICTIO(INDEXD)=L
100   INDEXD=INDEXD+(L-1)/6+2
      DICTIO(4)=INDEXD
      IF(KREADB(1)-KE)903,150,903
150   CARACT=KREADF(0)
      J=7
      M=0
      NV=0
      I=1
210   IN=0
```

```
220   K=2
      N=0
230   DO250L=1,6
      CARACT=KREAD(1)
      IF(CARACT-KEGAL)240,260,240
240   DICTIO(INDEXD+K)=DICTIO(INDEXD+K)*(2**6)+CARACT
250   N=N+1
      K=K+1
      GOTO230
260   CARACT=KREAD(1)
      IF(CARACT-KEGAL)270,290,270
270   CARACT=CARACT*(2**6)+KREAD(1)
      CARACT=CARACT*(2**6)+KREAD(1)
      IF(CARACT-DICTIO(J))904,280,904
280   IF(KREAD(1)-KEGAL)905,285,905
285   DICTIO(J+1)=INDEXD
      J=J+2
      IN=IN+1
      NV=NV+1
290   IF(N)906,906,300
300   DICTIO(INDEXD+1)=N
      DO310L=1,5
      CARACT=KREAD(1)
      IF(CARACT-KPOINT)305,320,305
305   IF(9-CARACT)907,310,310
310   DICTIO(INDEXD)=DICTIO(INDEXD)*(2**6)+CARACT
      GOTO907
320   INDEXD=INDEXD+(N-1)/6+3
      CARACT=KREAD(0)
      IF(CARACT-KPOINT)330,350,330
330   IF(CARACT-KBL)220,340,220
340   CARACT=KREAD(1)
      IF(CARACT-KPOINT)330,220,330
350   M=M+1
      NSUJET(I)=IN
      I=I+1
      IF(NBVARI-NV)907,360,355
355   CARACT=KREAD(1)
      CARACT=KREAD(0)
356   IF(CARACT-KPOINT)357,210,357
357   IF(CARACT-KBL)210,358,210
358   CARACT=KREAD(1)
      GOTO356
360   DICTIO(INDEXD)=M
      DICTIO(5)=INDEXD
      DO370L=1,M
370   DICTIO(INDEXD+L)=NSUJET(L)
      DICTIO(1)=INDEXD+M
C     ECRITURE DU REPERTOIRE
380   CALL IOD(0,IANNUL,INSERT,IDATE,0,4,J)
      IF(J)908,390,908
390   IF(KREADR(1)-KF)908,400,908
901   NERROR=NERROR+1
902   NERROR=NERROR+1
903   NERROR=NERROR+1
904   NERROR=NERROR+1
905   NERROR=NERROR+1
906   NERROR=NERROR+1
907   NERROR=NERROR+1
908   NERROR=NERROR+1
909   NERROR=NERROR+1
900   PRINT930,NERROR.
930   FORMAT(//8H ERROR  ,1I2)
      STOP
400   CALL IOD(0,0,0,0,0,2,0)
      STOP
      END
```

```
      SUBROUTINE INIT(N)
      COMMON                KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER OUTBUF,DICTIO
      NPAGE=1
      IERR=48
      KAFLD=6H
      KAFLD=KAFLD.AND.63
      KAFLD=KAFLD-5
      IF(KAFLD)90,100,90
90    KAFLD=1
100   DO9I=1,7000
9     DICTIO(I)=0
      KARACT(49)=0
      DO1I=50,58
1     KARACT(I)=I-49
      DO2I=7,15
2     KARACT(I)=I+10
      DO3I=16,24
3     KARACT(I)=I+17
      DO4I=25,32
4     KARACT(I)=I+25
      KARACT(6)=48
      KARACT(33)=28
      KARACT(34)=32
      KARACT(35)=16
      KARACT(37)=11
      KARACT(40)=43
      KARACT(41)=44
      KARACT(42)=60
      KARACT(47)=59
      KARACT(61)=49
      KARACT(62)=27
      DO5I=1,10
5     ICARAC(I)=I+47
      ICARAC(12)=36
      ICARAC(17)=34
      DO6I=18,26
6     ICARAC(I)=I-12
      ICARAC(28)=61
      ICARAC(29)=32
      ICARAC(33)=33
      DO7I=34,42
7     ICARAC(I)=I-19
      ICARAC(44)=39
      ICARAC(45)=40
      ICARAC(49)=5
      ICARAC(50)=60
      DO8I=51,58
8     ICARAC(I)=I-27
      ICARAC(60)=46
      ICARAC(61)=41
10    READ11,(KCARTE(J),J=1,80)
11    FORMAT(80R1)
      PRINT12,(KCARTE(J),J=1,80)
12    FORMAT(1H 80R1)
      IF(KAFLD)16,14,16
14    DO15J=1,80
      I=KCARTE(J).AND.63
15    KCARTE(J)=KARACT(I+1)
16    IF(KCARTE(1)-44)10,17,10
17    N=0
      DO20I=1,6
20    N=N*(2**6)+KCARTE(I+1)
      INDEXC=81
      RETURN
      END
```

```
      SUBROUTINE IOD(BUFFER,ANNUL,INSERT,NOPRF,NOHRZ,TYPE,ERR)
      INTEGER BUFFER,ANNUL,TYPE,ERR,PCOURS,HCOURS
      DIMENSION BUFFER(1000)
      COMMON /KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER OUTBUF,DICTIO
      DIMENSION INTER(682)
C     TYPE 1 = POUR INSERTION,ANNULATION ET MODIFICATION DE DONNEES
C          2 = CLOTURE LA BANDE SORTIE
C          3 = LECTURE D'UN DICTIONNAIRE
C          4 = ECRITURE D'UN DICTIONNAIRE
C          5 = LECTURE ET ECRITURE D'UN DICTIONNAIRE
C          6 = LECTURE D'UN BLOC
C          7 = INITIALISATION
      GOTO(1000,500,100,300,100,10,600),TYPE
10    ERR=0
      ASSIGN 20 TO MRET
      GOTO2000
20    ASSIGN 30 TO MRET
      GOTO2300
30    RETURN
100   ERR=0
      ASSIGN 110 TO KRET
      GOTO800
110   K=0
      IF(INDIC)130,3000,130
130   ASSIGN 140 TO MRET
      GOTO2300
140   INDIN=2
      NLONG=NLONG-2
      DO150I=1,NLONG
150   DICTIO(K+I)=INBUF(INDIN+I)
      K=K+NLONG
      IF(TYPE-3)155,160,155
155   ASSIGN160 TO MRET
      GOTO2600
160   ASSIGN 170 TO MRET
      GOTO2000
170   IF(INTER(4))230,180,230
180   IF(INTER(3))230,190,230
190   IF(DICTIO(1)-K)3000,3000,130
230   IF(DICTIO(1)-K)240,240,3000
240   IF(INTER(4))280,250,280
250   IF(TYPE-3)260,270,260
260   ASSIGN 270 TO MRET
      GOTO2600
270   ASSIGN 240 TO MRET
      GOTO2000
280   ASSIGN 290 TO MRET
      GOTO2300
290   INDACT=INBUF(2)
      PCOURS=INBUF(2)
      HCOURS=0
      INDOUT=KAFLD
      RETURN
300   ERR=0
      IF(ANNUL+INSERT)400,400,310
310   ASSIGN 320 TO KRET
      GOTO800
320   IF(ANNUL)370,370,325
325   IF(INDIC)330,3000,330
330   ASSIGN 340 TO MRET
```

```
      GOTO2000
340   IF(INTER(4))360,350,360
350   IF(INTER(3))360,330,360
360   INDIC=0
      ASSIGN 370 TO KRET
      GOTO810
370   ASSIGN 380 TO MRET
      GOTO2300
380   IF(INSERT)390,280,390
390   IF(INDIC)3000,400,3000
400   OUTBUF(1+KAFLD)=DICTIO(1)
      K=0
410   INDOUT=2+KAFLD
      OUTBUF(2+KAFLD)=0
      DO420I=1,500
420   OUTBUF(INDOUT+I)=DICTIO(K+I)
      INDOUT=INDOUT+500
      K=K+500
      ASSIGN 440 TO MRET
      GOTO 2500
440   IF(DICTIO(1)-K)460,460,450
450   OUTBUF(1+KAFLD)=0
      GOTO410
460   IF(INSERT+ANNUL)290,470,290
470   INBUF(1)=2
      INBUF(2)=2**34
      INBUF(3)=0
      INDACT=2**34
      INDIN=1
480   RETURN
500   NUMHRZ=0
      INDREC=2**34
      ASSIGN 510 TO IRET
      GOTO1500
510   IF(INDOUT-KAFLD)520,530,520
520   ASSIGN 530 TO MRET
      GOTO2500
530   OUTBUF(1+KAFLD)=2
      OUTBUF(2+KAFLD)=2**34
      INDOUT=2+KAFLD
      ASSIGN 540 TO MRET
      GOTO2500
540   RETURN
C     INITIALISATION
600   RETURN
800   INDIC=0
805   ASSIGN 810 TO MRET
      GOTO2000
810   IF(INTER(4))880,830,880
830   IF(INTER(3))840,850,840
840   I=INTER(6)
      IF(KAFLD)845,842,845
842   I=FLD(24,12,INTER(6))*2**24+FLD(0,24,INTER(7))
845   IF(NOPRF-I)850,870,850
850   IF(TYPE-3)860,805,860
860   ASSIGN 805 TO MRET
      GOTO2600
870   INDIC=1
880   GOTOKRET
1000  INDIC=0
      NUMPRF=NOPRF
      NUMHRZ=NOHRZ
      IMASK=2**30-1
      I=BUFFER(2).AND.IMASK
      J=BUFFER(2)/2**30
      IF(INSERT+I-1)1020,3000,1010
```

```
1010  IF(INSERT)3000,3000,1015
1015  IF(NOHRZ)3000,1040,3000
1020  IF(NOPRF)3000,3000,1030
1030  INDIC=NOHRZ
      NUMANN=0
      GOTO 1080
1040  INDIC=NOPRF
      IF(J*NOPRF)3000,3000,1060
1060  IF(NOPRF)1072,1070,1072
1070  NUMPRF=I
      NUMANN=I
1072  NUMHRZ=BUFFER(2)
1080  IMASK2=2**30
      INDREC=NUMPRF.OR.IMASK2
      ASSIGN 1090 TO IRET
      GOTO1500
1090  IF(INSERT*ANNUL)1095,1300,1095
1095  IF(ANNUL)1100,1220,1100
1100  IF(INDREC-INDACT)1110,1120,3000
1110  IF(INDREC-NUMANN)3000,1220,3000
1120  IF(NUMPRF-NUMANN)1150,1130,1150
1130  NUMANN=INDACT
1150  IF(INDIC)1170,1170,1160
1160  IF(NUMHRZ-INBUF(INDIN+1))3000,1165,3000
1165  INDIN=INDIN+INBUF(INDIN)
      HCOURS=HCOURS-1
      IF(INSERT)1240,1280,1240
1170  ASSIGN 1200 TO MRET
      GOTO2000
1200  IF(INTER(4)-2**7)1170,1170,1210
1210  INDACT=INTER(4)
      ASSIGN 1220 TO MRET
      GOTO2300
1220  IF(INSERT)1230,1280,1230
1230  IF(BUFFER(2)-INBUF(INDIN+1))1240,3000,1240
1240  M1=BUFFER(1)
      IF(BUFFER(2)-2**7)1245,1243,1243
1243  PCOURS=BUFFER(2)
      HCOURS=0
      IF(INDOUT-KAFLD)1250,1260,1250
1245  IF(INDREC-PCOURS)3000,1246,3000
1246  IF(BUFFER(2)-HCOURS)3000,3000,1247
1247  HCOURS=BUFFER(2)
      IF(510-INDOUT-M1)1250,1260,1260
1250  ASSIGN 1260 TO MRET
      GOTO2500
1260  DO1270I=1,M1
1270  OUTBUF(INDOUT+I)=BUFFER(I)
      INDOUT=INDOUT+M1
1280  RETURN
1300  IF(INDREC-INDACT)3000,1310,3000
1310  IF(NOHRZ)1400,1315,1400
1315  CALL PRINTE(0,0,3)
1320  IF(INBUF(INDIN))1330,1340,1330
1330  CALL PRINTE(INBUF(INDIN),0,6)
      INDIN=INDIN+INBUF(INDIN)
      GOTO1320
1340  ASSIGN 1350 TO MRET
      GOTO2600
1350  ASSIGN 1360 TO MRET
      GOTO2000
1360  ASSIGN 1370 TO MRET
      GOTO2300
1370  IF(INBUF(2)-2**7)1320,1380,1380
1380  INDACT=INBUF(2)
      GOTO1280
```

```
1400  IF(NOHRZ-INBUF(INDIN+1))3000,1410,3000
1410  CALL PRINTF(0,0,3)
      CALL PRINTF(INBUF(INDIN),0,6)
      GOTO1280
1500  IF(INDREC-INDACT)1760,1640,1505
1505  M1=INBUF(INDIN)
      IF(M1)1550,1550,1510
1510  IF(INBUF(INDIN+1)-2**7)1520,3000,1515
1515  IF(INDOUT-KAFLD)1560,1520,1560
1520  IF(510-INDOUT-M1)1560,1530,1530
1530  DO1540I=1,M1
1540  OUTBUF(INDOUT+I)=INBUF(INDIN+I-1)
      INDOUT=INDOUT+M1
      INDIN=INDIN+M1
      GOTO1505
1550  IF(INDOUT-KAFLD)1580,1580,1560
1560  ASSIGN 1505 TO MRET
      GOTO 2500
1580  ASSIGN 1590 TO MRET
      GOTO 2000
1590  IF(INTER(4)-2**7)1620,1620,1610
1610  IF(INDREC-INTER(4))1630,1630,1620
1620  ASSIGN 1580 TO MRET
      GOTO2600
1630  INDACT=INTER(4)
      ASSIGN 1632 TO MRET
      GOTO2300
1632  IF(INDREC-INDACT)1760,1635,1760
1635  HCOURS=0
1640  PCOURS=INDACT
      IF(NUMHRZ)1660,1760,1660
1660  IF(INBUF(INDIN))1690,1670,1690
1670  ASSIGN 1680 TO MRET
      GOTO2000
1680  ASSIGN 1690 TO MRET
      GOTO2300
1690  IF(INBUF(INDIN+1)-NUMHRZ)1710,1745,1700
1700  IF(INBUF(INDIN+1)-PCOURS)1760,1705,1750
1705  HCOURS=0
      GOTO1715
1710  HCOURS=INBUF(INDIN+1)
1715  M1=INBUF(INDIN)
      IF(510-INDOUT-M1)1720,1730,1730
1720  ASSIGN 1730 TO MRET
      GOTO2500
1730  DO1740I=1,M1
1740  OUTBUF(INDOUT+I)=INBUF(INDIN+I-1)
      INDOUT=INDOUT+M1
      INDIN=INDIN+M1
      GOTO1660
1745  HCOURS=NUMHRZ
      GOTO1760
1750  INDACT=INBUF(INDIN+1)
1760  GOTOIRET
2000  CALL NTRANS(2,682,INTER(1+KAFLD))
      GOTOMRET
2300  IF(KAFLD)2320,2305,2320
2305  INDIN=FLD(12,24,INTER(1))*(2**12)+FLD(0,12,INTER(2))
      J=1
      DO2310I=1,INDIN,3
      INBUF(I)=FLD(24,12,INTER(J+1))*(2**24)+FLD(0,24,INTER(J+2))
      INBUF(I+1)=INTER(J+3)
      INBUF(I+2)=FLD(12,24,INTER(J+4))*(2**12)+FLD(0,12,INTER(J+5))
2310  J=J+4
      GOTO2350
2320  INDIN=INTER(2)
```

```
      DO2330I=1,INDIN
2330  INBUF(I)=INTER(I+2)
2350  INBUF(INDIN+1)=0
      NLONG=INDIN
      INDIN=1
      GOTOMRET
2500  IF(KAFLD)2505,2508,2505
2505  OUTBUF(1)=INDOUT-1
      CALL NTRANS(1,INDOUT,OUTBUF(1))
      INDOUT=1
      GOTOMRET
2508  INTER(1)=FLD(0,24,INDOUT)
      INTER(2)=FLD(24,12,INDOUT)*2**24
      J=2
      DO2510I=1,INDOUT,3
      INTER(J)=INTER(J)+FLD(0,12,OUTBUF(I))
      INTER(J+1)=FLD(12,24,OUTBUF(I))*2**12
      INTER(J+2)=OUTBUF(I+1)
      INTER(J+3)=FLD(0,24,OUTBUF(I+2))
      INTER(J+4)=FLD(24,12,OUTBUF(I+2))*2**24
2510  J=J+4
      INDOUT=0
      GOTO2620
2600  IF(KAFLD)2610,2620,2610
2610  I=INTER(2)+1
      CALL NTRANS(1,I,INTER(2))
      GOTOMRET
2620  I=FLD(12,24,INTER(1))*2**12+FLD(0,12,INTER(2))
      I=((I+2)*4)/3
      CALL NTRANS(1,I,INTER(1))
      GOTOMRET
3000  ERR=1
      RETURN
      END

      FUNCTION KREAD(N)
      COMMON              KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER DICTIO,OUTBUF
      IF(81-INDEXC)1,1,8
1     READ2,(KCARTE(J),J=1,80)
2     FORMAT(80R1)
      PRINT3,(KCARTE(J),J=1,80)
3     FORMAT(1H 80R1).
      DO4J=1,80
4     KCARTE(J)=KCARTE(J).AND.63
      IF(KAFLD)7,5,7
5     DO6J=1,80
      M=KCARTE(J)
6     KCARTE(J)=KARACT(M+1)
7     INDEXC=INDEXC-80
8     KREAD=KCARTE(INDEXC)
      INDEXC=INDEXC+N
      RETURN
      END

      FUNCTION KREADB(N)
      COMMON              KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER DICTIO,OUTBUF
      EQUIVALENCE(KASTER,KARACT(41)),(KPOINT,KARACT(62)),(KBL,KARACT(6))
      IF(INDEXC-2)2,2,3
2     IF(KCARTE(1)-KASTER)3,4,3
3     J=KREAD(82-INDEXC)
      IF(KCARTE(1)-KBL)2,3,2
4     KREADB=KREAD(N)
      RETURN
      END
```

```
      FUNCTION KREADF(N)
      COMMON                  KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER DICTIO,OUTBUF
      IF(INDEXC-81)1,2,1
1     J=KREAD(81-INDEXC)                                          4 10
2     KREADF=KREAD(N)
      RETURN
      END
@ASM,IS .G,,G
    AXR$
$(0).
PKTIN     'ENTREE'
     '      '
     +    0
      +     040,0,0
     +   0
      RES    3
       +       020
PKTOUT       'SORTIE'
      '       '
     +     0
     +     040,0,0
       +       0
       RES     3
       +     010
$(1).
NTRANS*.
          LXI       A1,*1,X11
     LXM     A1,2,X11
          L          A2,*0,X11
      L,U       A0,PKTIN
     TNE,U       A2,2
      J       INIT.
     L,U      A0,PKTOUT
          TE,U       A2,1
       ER         ERR$
INIT       TNZ      8,A0
      J         SUITE
     ER     IOW$
     L      A2,8,A0
     S,S2      A2,3,A0
       SZ        8,A0
SUITE         S        A1,4,A0
      ER      IOW$
          L,S1       A1,3,A0
          JZ         A1,4,X11
          TE,U       A1,4
        ER         ERR$
      J      4,X11
        END      .

      SUBROUTINE PRINTE(BUFFER,NBERR,TYPE)
      COMMON                  KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER OUTBUF,DICTIO
      INTEGER TYPE,BUFFER
      DIMENSION BUFFER(1000)
      DIMENSION INTER(40),KLIGNE(80)
      DIMENSION KAR(6)
      EQUIVALENCE (DICTIO(6),NBVARI)
C     TYPE 1 = TERMINE L'IMPRESSION
C     TYPE 2 = TERMINE L'IMPRESSION   -  LIGNE ERREUR, LIGNE BLANCHE
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```
C      TYPE 3 = TERMINE L'IMPRESSION   -  CHANGE DE PAGE
C      TYPE 4 = IMPRESSION CARTE CONTROLE
C      TYPE 5 = IMPRESSION D'UNE CARTE
C      TYPE 6 = IMPRESSION D'UN ARTICLE EN FORMAT BANDE
10     FORMAT(1H180R1)
20     FORMAT(6H REJET,64X,5HREJET)
30     FORMAT(1H )
40     FORMAT(6H REJET6XI3,28H  ANNOTATION(S) MARQUEE(S) =,27X,
     15HREJET6XI3,28H  ANNOTATION(S) MARQUEE(S) =)
50     FORMAT(1H1,54X,I5,64X,I5//////)
60     FORMAT(1H 80R1)
65     FORMAT(1H ,62R1,7X,62R1)
70     FORMAT(1H ,I3,28H  ANNOTATION(S) MARQUEE(S) =,38XI3,28H  ANNOTATIO
     1N(S) MARQUEE(S) =)
       ITYPE=TYPE-4
       IF(ITYPE)75,75,90
75     ASSIGN 80 TO IRET
       GOTO600
80     INDIPR=0
       KLIGNE(62)=48
90     GOTO(100,150,550,250,350,800),TYPE
100    RETURN
800    N=BUFFER(1)-2
       IF(BUFFER(2)-2**7)805,810,810
805    N=N-NBVARI
810    M=BUFFER(3).AND.63
       IF(M-50)820,815,820
815    KLIGNE(62)=50
       BUFFER(3)=BUFFER(3)-(50-25)
820    DO890I=1,N
       M=BUFFER(I+2)
       DO825K=1,6
       KAR(7-K)=M.AND.63
825    M=M/2**6
       DO880K=1,6
       INDEXI=INDEXI+1
       INTER(INDEXI)=KAR(K)
       IF(40-INDEXI)860,860,830
830    IF(KAR(K)-48)840,860,840
840    IF(KAR(K)-49)880,860,880
860    ASSIGN 880 TO IRET
       GOTO600
880    CONTINUE
890    CONTINUE
       ITYPE=0
       ASSIGN 900 TO IRET
       GOTO600
900    ITYPE=6
       IF(BUFFER(2)-2**7)910,1050,1050
910    M=DICTIO(5)+1
       NBS=DICTIO(M)
       I=0
1030   I=I+1
       IMASK=2**30-1
       KI=BUFFER(N+I+2).AND.IMASK
       IF(KI-((((48*64+48)*64+48)*64+32)*64+1))920,1023,920
920    K=DICTIO(6+I*2)
       KM=DICTIO(8+I*2)
       IF(NBVARI-I)1040,925,927
925    KM=DICTIO(5)
927    IF(DICTIO(K)-KI)930,940,930
930    K=K+(DICTIO(K+1)-1)/6+3
       IF(KM-K)1040,1040,927
940    KM=BUFFER(N+I+2)/(2**30)
       IF(KM)945,948,945
945    KLIGNE(62)=KM
```

```
948   J=DICTIO(K+1)
      KM=6
950   IF(J-6)960,980,980
960   KM=J
980   KARAC=DICTIO(K+2)
      DO990L=1,KM
      KAR(KM+1-L)=KARAC.AND.63
990   KARAC=KARAC/2**6
      DO1020L=1,KM
      INDEXI=INDEXI+1
      INTER(INDEXI)=KAR(L)
      IF(39-INDEXI)1010,1000,1000
1000  IF(KAR(L)-48)1020,1010,1020
1010  ASSIGN 1020 TO IRET
      GOTO600
1020  CONTINUE
      K=K+1
      J=J-6
      IF(J)1022,1022,950
1022  INDEXI=INDEXI+1
      INTER(INDEXI)=27
1023  IF(NBS-I)1024,1024,1025
1024  ITYPE=0
1025  ASSIGN 1026 TO IRET
      GOTO600
1026  IF(ITYPE)1028,1027,1028
1027  M=M+1
      NBS=NBS+DICTIO(M)
1028  ITYPE=6
      IF(I.NE.NBVARI)GOTO 1030
      ITYPE=0
      ASSIGN 1050 TO IRET
      GOTO600
1040  PRINT20
      INDFIN=0
      INDEXI=0
1050  GOTO220
150   IF(BUFFER(1))160,190,160
160   IF(NBERR)170,180,170
170   PRINT40,NBERR,NBERR
      GOTO210
180   PRINT20
      GOTO210
190   IF(NBERR)200,220,200
200   PRINT70,NBERR,NBERR
210   NLIGNE=NLIGNE+1
220   PRINT30
      NLIGNE=NLIGNE+1
      RETURN
250   IF(KAFLD)280,260,280
260   DO270I=1,80
      M=KCARTE(I)
270   KCARTE(I)=ICARAC(M+1)
280   PRINT10,(KCARTE(I),I=1,80)
      INDFIN=0
      INDEXI=0
      INDIPR=0
      KLIGNE(62)=48
      RETURN
350   IF(IERR-48)360,370,360
360   KLIGNE(62)=IERR
      IERR=48
370   DO490J=1,80
      IF(INDIPR)380,380,410
380   IF(KCARTE(J)-48)390,490,390
390   IF(KCARTE(J)-INDCAR)400,490,400
```

```
400   IF(KCARTE(J)-11)405,490,405
405   INDIPR=1
410   INDEXI=INDEXI+1
      INTER(INDEXI)=KCARTE(J)
      IF(40-INDEXI)420,420,430
420   INDIPR=2
      GOTO450
430   IF(KCARTE(J)-48)440,450,440
445   IF(KCARTE(J)-11)490,450,490
440   IF(KCARTE(J)-INDCAR)445,450,445
450   ASSIGN 490 TO IRET
      GOTO600
490   CONTINUE
      RETURN
550   PRINT50,NPAGE,NPAGE
      NPAGE=NPAGE+1
      NLIGNE=0
      RETURN
600   IF(59-INDFIN-INDEXI)602,675,675
602   IF(60-INDFIN-INDEXI)610,604,610
604   IF(INTER(INDEXI)-48)610,606,610
606   INDEXI=INDEXI-1
610   DO620K2=INDFIN,60
620   KLIGNE(K2+1)=48
      IF(KAFLD)650,630,650
630   DO640K2=1,62
      M2=KLIGNE(K2)
640   KLIGNE(K2)=ICARAC(M2+1)
650   IF(45-NLIGNE)660,670,670
660   PRINT50,NPAGE,NPAGE
      NPAGE=NPAGE+1
      NLIGNE=0
670   PRINT65,(KLIGNE(K2),K2=1,62),(KLIGNE(K3),K3=1,62)
      NLIGNE=NLIGNE+1
      KLIGNE(62)=48
      INDFIN=0
675   IF(INDEXI)680,700,680
680   DO690K2=1,INDEXI
690   KLIGNE(INDFIN+K2)=INTER(K2)
      INDFIN=INDFIN+INDEXI
      INDEXI=0
      INDIPR=INDIPR-1
700   IF(ITYPE)710,710,720
710   IF(INDFIN)610,720,610
720   GOTOIRET
      END
```

Chapter 5

The Image Descriptions

In our system, no code names are used when data is punched. Plain language is punched as appears on the ERTS IMAGE DESCRIPTOR FORMS. Descriptors follow each other, from column 1 to column 80 of the card, spaced with a period (full-stop sign), until the end of the image description.

Blank fields are acceptable, if preceded and followed by a period. The order of the descriptors is of no importance within an image description.

On the contrary, a sequential order of input is mandatory for the different bands. This order is already followed by the investigator on the descriptor forms.

Master cards are needed to identify the beginning of a new description. In the beginning, our system was a soil information system. Therefore, the master cards are as follows:

- HORIZON/HRZ 1// for RBV1
- HORIZON/HRZ 2// for RBV2
- HORIZON/HRZ 3// for RBV3
- HORIZON/HRZ 4// for MSS4
- HORIZON/HRZ 5// for MSS5
- HORIZON/HRZ 6// for MSS6
- HORIZON/HRZ 7// for MSS7
- HORIZON/HRZ 8// for MSS COLOR COMPOSITE (4 + 5 + 7)
- HORIZON/HRZ 9// for RBV COLOR COMPOSITE
- HORIZON/HRZ 10// for spatial and temporal referencing

To introduce data in these master cards, replace the // by a / and terminate on a //

Another master card is identified by PROFIL/NO blank in columns 1-10 and is punched with the left-justified case number followed by a single slash in col. 11 sq. This card is also mandatory as the first card of each deck of descriptions in the different bands. It may be used for supplementary information. Several cards are eventually used, but the last character must be a single slash.

Example:

PROFIL/NO 32/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//

To obtain a wider application, programs will be updated to get rid of PROFIL and HORIZON. Candidates for substitution are: UNIT SUBUNIT, SCENE BAND, IMAGERY IMAGE.

Inclusion of coordinates and datum under number 10 has proved more economical than a separate module for spatial and temporal referencing, even if the standard record is longer.

We acknowledge, with thanks, receipt of a series of 32 ERTS IMAGE DESCRIPTOR FORMS kindly forwarded to us by Dr. Fernand Verger, Ecole Pratique des Hautes Etudes, ERTS-1 and -2 principal investigator of F R A L I T (French Atlantic Littoral).

A random sample of these forms is reproduced here. Our handwritten additional terms are solely to facilitate key-punching.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D
N
ID

DATE July 9 1973

PRINCIPAL INVESTIGATOR Dr Fernand VERGER

GSFC F-0429

ORGANIZATION Ecole Pratique des Hautes Etudes

Case 18

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS* Coastal Marsh	Sea	Island	DESCRIPTORS
1228 10300 4	✓	✓	✓	Littoral transport ; Sediment ; Shallow Water ; Coast ; Bay-Head Beach.
1228 10300 5	✓	✓	✓	Sediment ; Shallow Water; Coast ; Bay-Head Beach ;
1228 10300 6	✓	✓	✓	Harbor ; Coast Line ; Jetty ;
1228 10300 7	✓	✓	✓	Harbor ; Coast Line ; Jetty ;
Case 16 Hrz 10				8. March. 1973. 0deg W. 46min W. 50deg N. 16min N.

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO ERTS USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-2 (7/72)

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D
N
ID

DATE June 5 1973

PRINCIPAL INVESTIGATOR Dr Fernand VERGER

GSFC F-0429

ORGANIZATION Ecole Pratique des Hautes Etudes

Case 17

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS* Littoral Transport	Mud Flat	Coast Line	DESCRIPTORS
E 1228 - 10302 - 4	EEO	✓	✓	Salt Marsh; Bay-Head Beach; Dune; Island; Shallow Water.
- 5	EEO	✓	✓	Salt Marsh; Harbor; Dam; Island; Bay; Estuary; Silt; Bay-Head Beach; Geology; Vegetation; Coastal Plain; Coastal Marsh; Shallow Water.
- 6	✓	EEO	✓	Island; Salt Marsh; Meander; Bay; Estuary; Silt; Coastal Plain; Shallow Water.
- 7	✓	EEO	✓ EEO	Harbor; Dam; Island; Bay; Estuary; River; Geology; Coastal Plain; Silt; Coastal Marsh.
10				8. March. 1973. 1 deg W. 25 min W. 47 deg N. 51 min N.

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO ERTS USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D
N
ID

DATE June 6. 1973

PRINCIPAL INVESTIGATOR Dr Fernand VERGER

GSFC F-0429

ORGANIZATION Ecole Pratique des Hautes Etudes

Case 10

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Littoral Transport	Bay-Head Beach	Coastal Marsh	
1228 - 10305 - 4	EEO	✓	✓	Coastal Dune ; Lake ; Coastal Plain ; Island; Estuary ; Shallow Water;
- 5	EEO	~~✓ EEO~~	~~✓ EEO~~	Coastal Dune ; Lake ; Coastal Plain ; Island; Estuary ; Gulf ;
- 6	✓	✓	✓	Meander ; Coastal Dune; Lake ; Island ; Estuary Tidal Flat ; Urban Area Gulf ; Coast Line ; Mud Flat ;
- 7	✓	✓	✓	Meander ; Coastal Dune; Lake ; Island ; Estuary ; Tidal Flat ; Urban Area ;Gulf ; Coast Line Mud Flat ;
10				8. March. 1973. 2deg W. 2min W. 47 deg N. 26 min N.

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO ERTS USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-8 (7/72)

Underneath sample from the input listing shows how key-desk operators have punched the three preceding forms in 47 cards.

```
- HORIZON/HRZ 10//
CASE 15.18.NOVEMBER.1972.1DEG E.33MIN E.48DEG N.41MIN N.
PROFIL/NO 16/DR VERGER/FRALIT/
- HORIZON/HRZ 4/MSS4//
CASE 16.COASTAL MARSH.SEA.ISLAND.LITTORAL TRANSPORT.SEDIMENT.SHALLOW WATER.
.COAST.BAY-HEAD BEACH.
- HORIZON/HRZ 5/MSS5//
CASE 16.COASTAL MARSH.SEA.ISLAND.SEDIMENT.SHALLOW WATER.COAST.BAY-HEAD BEACH.
- HORIZON/HRZ 6/MSS6//
CASE 16.COASTAL MARSH.SEA.ISLAND.HARBOR.COAST LINE.JETTY.
- HORIZON/HRZ 7/MSS7//
CASE 16.COASTAL MARSH.SEA.ISLAND.HARBOR.COAST LINE.JETTY.
- HORIZON/HRZ 10//
CASE 16.
.8.MARCH.1973.0DEG W.46MIN W.50DEG N.16MIN N.
PROFIL/NO 17/DR VERGER/FRALIT/
- HORIZON/HRZ 4/MSS4//
CASE 17.LITTORAL TRANSPORT.EEO.MUD FLAT.COAST LINE.SALT MARSH.
.BAY-HEAD BEACH.DUNE.ISLAND.SHALLOW WATER.
- HORIZON/HRZ 5/MSS5//
CASE 17.LITTORAL TRANSPORT.EEO.MUD FLAT.COAST LINE.SALT MARSH.HARBOR.DAM.
.ISLAND.BAY.ESTUARY.SILT.BAY-HEAD BEACH.GEOLOGY.VEGETATION.COASTAL PLAIN.
.COASTAL MARSH.SHALLOW WATER.
- HORIZON/HRZ 6/MSS6//
CASE 17.LITTORAL TRANSPORT.MUD FLAT.EEO.COAST LINE.ISLAND.SALT MARSH.MEANDER.
.BAY.ESTUARY.SILT.COASTAL PLAIN.SHALLOW WATER.
- HORIZON/HRZ 7/MSS7//
CASE 17.LITTORAL TRANSPORT.MUD FLAT.EEO.COAST LINE.HARBOR.DAM.ISLAND.BAY.
.ESTUARY.RIVER.GEOLOGY.COASTAL PLAIN.SILT.COASTAL MARSH.
- HORIZON/HRZ 10//
CASE 17.8.MARCH.1973.1DEG W.25MIN W.48DEG N.51MIN N.
PROFIL/NO 18/DR VERGER/FRALIT/
- HORIZON/HRZ 4/MSS4//
CASE 18.LITTORAL TRANSPORT.EEO.BAY-HEAD BEACH.COASTAL MARSH.COASTAL DUNE.LAKE.
.COASTAL PLAIN.ISLAND.ESTUARY.SHALLOW WATER.
- HORIZON/HRZ 5/MSS5//
CASE 18.LITTORAL TRANSPORT.EEO.BAY-HEAD BEACH.COASTAL MARSH.COASTAL DUNE.LAKE.
.COASTAL PLAIN.ISLAND.ESTUARY.GULF.
- HORIZON/HRZ 6/MSS6//
CASE 18.LITTORAL TRANSPORT.BAY-HEAD BEACH.COASTAL MARSH.MEANDER.COASTAL DUNE.LAK
E.
.ISLAND.ESTUARY.TIDAL FLAT.URBAN AREA.GULF.COAST LINE.MUD FLAT.
- HORIZON/HRZ 7/MSS7//
CASE 18.LITTORAL TRANSPORT.BAY-HEAD BEACH.COASTAL MARSH.MEANDER.
.COASTAL DUNE.LAKE.ISLAND.ESTUARY.TIDAL FLAT.URBAN AREA.
.GULF.COAST LINE.MUD FLAT.
- HORIZON/HRZ 10//
CASE 18.8.MARCH.1973.2DEG W.2MIN W.
.47DEG N.26MIN N.
PROFIL/NO 19/DR VERGER/FRALIT/
- HORIZON/HRZ 4/MSS4//
CASE 19.SHALLOW WATER.COASTAL MARSH.COASTAL DUNE.BAY-HEAD BEACH.LONGSHORE BAR.
.LITTORAL TRANSPORT.CONIFER.ISLAND.
- HORIZON/HRZ 5/MSS5//
CASE 19.SHALLOW WATER.COASTAL MARSH.COASTAL DUNE.BAY-HEAD BEACH.LONGSHORE BAR.
.LITTORAL TRANSPORT.CONIFER.ISLAND.
- HORIZON/HRZ 6/MSS6//
CASE 19.COASTAL MARSH.COASTAL DUNE.BAY-HEAD BEACH.
.LONGSHORE BAR.CONIFER.HARBOR.ISLAND.
- HORIZON/HRZ 7/MSS7//
CASE 19.COASTAL MARSH.COASTAL DUNE.COAST LINE.CONIFER.HARBOR.ISLAND.
- HORIZON/HRZ 10//
CASE 19.8.MARCH.1973.2DEG W.38MIN W.46DEG N.2MIN N.
PROFIL/NO 20/DR VERGER/FRALIT/
- HORIZON/HRZ 4/MSS4//
CASE 20.SEA.
```

Constraints in the master cards have already been underlined. Descriptors, on the other hand, are punched more freely:

1/ The order of descriptors is indifferent;

2/ First descriptor begins in col. 1 ;

3/ Separator is a period;

4/ Blanks between two periods are accepted;

5/ Synonyms are found in the repertoire.

Punched deck is inserted on tape, in flip-flop mode, with a few control cards.

SYSTEM AND PROGRAM CONTROL CARDS

INSERT IMAGE DESCRIPTIONS

```
        1         2         3         4         5         6         7         8
2345678901234567890123456789012345678901234567890123456789012345678901234567890
RUN,J ORSIDA,TP0160,ORSTOM                              026 OR 029
ASG,T ENTREE.,8C,155L                                     OR 175L
ASG,T SORTIE.,8C,175E                                     AND 155E
XQT DGX.DGX
140174
DONNEE/I
I M A G E   D E S C R I P T I O N S   D E C K   P U N C H E D   I N   C O L. 1-80
FIN
FIN
```

Under the control of these above cards, the program prints and annotates all discrepancies between punched data and the standard data in the repertoire.

The same output 6" x 8" appears on the left and right half side of each page. The pages are numbered. There is a new page for each case. Output does not change the order of input descriptors.

A record may be rejected (REJET) for obvious reasons:

(1) No blank space in the band master card - HORIZON/

(2) More than 10 records in a case.

(3) No sequential ordering of the cases.

(4) No sequential ordering of the records.

(5) No descriptors after the band master card.

(6) No double slash in the band master card (see record 10 of case 3).

Invalid descriptors are annotated three times. Firstly, with a letter A, in the right margin, secondly, with an equality sign instead of a period, in the description, and thirdly, with the total number of equality signs at the end of the description.

Example: 3 ANNOTATIONS MARQUEES =

The valid portion of the description is loaded on tape. Invalid data is not loaded.

Let us examine a few annotations in the following pages of computer output.

Case 1 MSS4, 5, and 6: Stratus is not in vocabulary.

case 2 MSS4, and 5: A hyphen is missing in bay-head beach.

Case 6 MSS7: A letter h is missing in highway.

Case 6 10: No space between deg and N.

Case 8 MSS4, and 5: Bay-head beach.

Case 8 MSS7: Island twice.

Case 11 MSS4: Outlier.

Case 15 MSS4, and 6: Unspecified clouds not in vocabulary.

Cases 25 and 27 MSS4, 5, and 6: Stratus.

Case 31 MSS4, 5, 6, and 7: Tidal marsh not in vocabulary.

Data not in the vocabulary or in the repertoire may remain in the card desk. This leaves us with a small number of corrections: bay-head beach, highway, outlier.

PROFIL/NO 1/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 1.LITTORAL TRANSPORT.TIDAL FLAT.SHALLOW WATER.MUD FLAT.INSHORE ZONE.SEDIMENT.ISLAND.ADVANCING SHORELINE.SALT MARSH.STRATUS=CLOUD STREETS. A ✓
1 ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 5/MSS5//
CASE 1.LITTORAL TRANSPORT.TIDAL FLAT.COASTAL MARSH.SHALLOW WATER.MUD FLAT.INSHORE ZONE.COAST LINE.ISLAND.ADVANCING SHORELINE.SALT MARSH.DAM.HARBOR.STRATUS=CLOUD STREETS. A ✓
1 ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 7/MSS7//
CASE 1.TIDAL FLAT.EEO.COASTAL MARSH.MUD FLAT.COAST LINE. ISLAND.ADVANCING SHORELINE.HARBOR.STRATUS=CLOUD STREETS. A ✓
1 ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 10//
CASE 1.23.AUGUST.1972.2DEG W.39MIN W.48DEG N.58MIN N.

PROFIL/NO 2/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 2.ISLAND.TOMBOLO.SHALLOW WATER.SEDIMENT.BAY-HEAD BEACH= A —
1 ANNOTATION(S) MARQUEE(S) =✓

- HORIZON/HRZ 5/MSS5//
CASE 2.COASTAL MARSH.ISLAND.TOMBOLO.BAY-HEAD BEACH=FOREST. VEGETATION.MEANDER. A —
1 ANNOTATION(S) MARQUEE(S) =✓

- HORIZON/HRZ 6/MSS6//
CASE 2.COASTAL MARSH.ISLAND.TOMBOLO.COAST.COAST LINE.

- HORIZON/HRZ 7/MSS7//
CASE 2.COASTAL MARSH.ISLAND.TOMBOLO.LAKE.COAST.COAST LINE.

- HORIZON/HRZ 10//
CASE 2.23.AUGUST.1972.3DEG W.16MIN W.47DEG N.33MIN N.

PROFIL/NO 3/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 3.SEA.

- HORIZON/HRZ 5/MSS5//
CASE 3.SEA.

- HORIZON/HRZ 6/MSS6//
CASE 3.SEA.

- HORIZON/HRZ 7/MSS7//
CASE 3.SEA.

- HORIZON/HRZ 10/ CASE 3.23.AUGUST.1972.3DEG W.52MIN W.46DEG N.8MIN N.
REJET

PROFIL/NO 4/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 4.SEA.

- HORIZON/HRZ 5/MSS5//
CASE 4.SEA.

- HORIZON/HRZ 6/MSS6//
CASE 4.SEA.

- HORIZON/HRZ 7/MSS7//
CASE 4.SEA.

- HORIZON/HRZ 10//
CASE 4.4DEG W.27MIN W.44DEG N.43MIN N.23.AUGUST.1972.

PROFIL/NO 5/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 5.MEANDER.CROPLAND.FOREST.CORN.AIRFIELD.HIGHWAY.

- HORIZON/HRZ 5/MSS5//
CASE 5.MEANDER.CROPLAND.FOREST.AIRFIELD.HIGHWAY.
AGRICULTURE.SUBURBAN AREA.URBAN AREA.

- HORIZON/HRZ 6/MSS6//
CASE 5.MEANDER.CROPLAND.FOREST.ALLUVIAL PLAIN.ALLUVIAL
TERRACE.CUMULUS.CLOUD STREETS.DECIDUOUS.CONIFER.CITY.URBAN
AREA.INDUSTRIAL AREA.

- HORIZON/HRZ 7/MSS7//
CASE 5.MEANDER.EEO.CROPLAND.ALLUVIAL PLAIN.ALLUVIAL
TERRACE.MARSH.DECIDUOUS.CONIFER.CITY.URBAN AREA.SUBURBAN
AREA.INDUSTRIAL AREA.

- HORIZON/HRZ 10//
CASE 5.25.SEPTEMBER.1972.1DEG E.37MIN E.48DEG N.45MIN N.

PROFIL/NO 6/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 6.COAST LINE.FOREST.LONGSHORE CURRENT.TIDAL FLAT.DUNE.
LAKE.ALLUVIAL TERRACE.ESTUARY.CONIFER.RAILROAD.

- HORIZON/HRZ 5/MSS5//
CASE 6.COAST LINE.FOREST.VINEYARD.ESTUARY.LAKE.MEANDER.
ALLUVIAL TERRACE.DUNE.MUD FLAT.CONIFER.DECIDUOUS.HIGHWAY.
RAILROAD.

- HORIZON/HRZ 6/MSS6//
CASE 6.COAST LINE.FOREST.VINEYARD.LAKE.TIDAL FLAT.DUNE.
MEANDER.ISLAND.ESTUARY.ALLUVIAL TERRACE.CONIFER.CORN.URBAN
AREA.HIGHWAY.CANAL.

- HORIZON/HRZ 7/MSS7//
CASE 6.COAST LINE.FOREST.VINEYARD.LAKE.TIDAL FLAT.DUNE.
MEANDER.ISLAND.ESTUARY.ALLUVIAL TERRACE.CONIFER.CORN. A H
IRRIGATION.URBAN AREA.HIGWAY=CANAL.
1 ANNOTATION(S) MARQUEE(S) = ✓

- HORIZON/HRZ 10//
CASE 6.25.SEPTEMBER.1972.0DEG W.9MIN W.44DEGN=29MIN N. A b
1 ANNOTATION(S) MARQUEE(S) =

PROFIL/NO 7/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 7.LITTORAL TRANSPORT.EEO.TIDAL FLAT.COASTAL MARSH.
SHALLOW WATER.MUD FLAT.INSHORE ZONE.ADVANCING SHORELINE.
SALT MARSH.COASTAL DUNE.DAM.HARBOR.

- HORIZON/HRZ 5/MSS5//
CASE 7.LITTORAL TRANSPORT.EEO.TIDAL FLAT.COASTAL MARSH.
SHALLOW WATER.MUD FLAT.INSHORE ZONE.ADVANCING SHORELINE.
SALT MARSH.COASTAL DUNE.DAM.HARBOR.

- HORIZON/HRZ 6/MSS6//
CASE 7.LITTORAL TRANSPORT.TIDAL FLAT.COASTAL MARSH.EEO.
SHALLOW WATER.MUD FLAT.COAST LINE.HARBOR.DAM.

- HORIZON/HRZ 7/MSS7//
CASE 7.TIDAL FLAT.COASTAL MARSH.MUD FLAT.COAST LINE.HARBOR.
DAM.

- HORIZON/HRZ 10//
CASE 7.27.SEPTEMBER.1972.1DEG W.10MIN W.48DEG N.50MIN N.

PROFIL/NO 8/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 8.ESTUARY.ISLAND.BAY-HEAD BEACH=COASTAL CURRENT. A -
COASTAL DUNE.LITTORAL CURRENT.LITTORAL TRANSPORT.INLET.
SHALLOW WATER.
1 ANNOTATION(S) MARQUEE(S) = ✓

- HORIZON/HRZ 5/MSS5//
CASE 8.ESTUARY.COASTAL MARSH.EEO.ISLAND.FAULT.BAY-HEAD A -
BEACH=COASTAL CURRENT.COASTAL DUNE.INLET.LITTORAL
TRANSPORT.HARBOR.CONIFER.DECIDUOUS.
1 ANNOTATION(S) MARQUEE(S) = ✓

- HORIZON/HRZ 6/MSS6//
CASE 8.ESTUARY.COASTAL MARSH.ISLAND.HARBOR.TIDAL FLAT.LAKE.
URBAN AREA.

- HORIZON/HRZ 7/MSS7//
CASE 8.ESTUARY.COASTAL MARSH.ISLAND.HARBOR.CONIFER. A
DECIDUOUS.LAKE.ISLAND=URBAN AREA.
1 ANNOTATION(S) MARQUEE(S) = ✓

- HORIZON/HRZ 10//
CASE 8.27.SEPTEMBER.1972.1DEG W.47MIN W.47DEG N.25MIN N.

PROFIL/NO 9/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 9.SEA.

- HORIZON/HRZ 5//
CASE 9.SEA.

- HORIZON/HRZ 6//
CASE 9.SEA.

- HORIZON/HRZ 7//
CASE 9.SEA.

- HORIZON/HRZ 10//
28.SEPTEMBER.1972.3DEG W.50MIN W.45DEG N.59MIN N.CASE 9.

PROFIL/NO 10/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
CASE 10.VALLEY.FOREST.RIVER.MEANDER.ALLUVIAL PLAIN.
CROPLAND.COAST LINE.

- HORIZON/HRZ 5//
CASE 10.VALLEY.FOREST.RIVER.MEANDER.ALLUVIAL PLAIN.
CROPLAND.

- HORIZON/HRZ 6//
CASE 10.VALLEY.FOREST.RIVER.MEANDER.TRIBUTARY.ALLUVIAL
PLAIN.LAKE.PLAIN.PENEPLAIN.FAULT.HORST.SYNCLINE.CROPLAND.

- HORIZON/HRZ 7//
CASE 10.VALLEY.FOREST.RIVER.MEANDER.TRIBUTARY.ALLUVIAL
PLAIN.LAKE.ALLUVIAL TERRACE.FAULT.HORST.SYNCLINE.PLAIN.
PENEPLAIN.CROPLAND.GRASSLAND.

- HORIZON/HRZ 10//
CASE 10.1.NOVEMBER.1972.0DEG E.7MIN E.48DEG N.38MIN N.

PROFIL/NO 11/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 11.TRIBUTARY.CROPLAND.GEOLOGY.EEO.MEANDER.MATURE STREAM.ALLUVIAL PLAIN.OUTLIER=CUESTA.FOREST.COAST LINE. A I
SHALLOW WATER.COASTAL MARSH.
1 ANNOTATION(S) MARQUEE(S) = ✓

- HORIZON/HRZ 5/MSS5//
CASE 11.TRIBUTARY.EEO.CROPLAND.GEOLOGY.MATURE STREAM..
MEANDER.CONIFER.DECIDUOUS.TERRACE.FAULT.COAST LINE.DUNE.
COASTAL MARSH.LAKE.FOREST.

- HORIZON/HRZ 6/MSS6//
CASE 11.TRIBUTARY.CROPLAND.GEOLOGY.DAM.LAKE.URBAN AREA.
FOREST.HIGHWAY.

- HORIZON/HRZ 7/MSS7//
CASE 11.TRIBUTARY.CROPLAND.GEOLOGY.MEANDER.MATURE STREAM.
DAM.LAKE.URBAN AREA.FOREST.HIGHWAY.RAILROAD.

- HORIZON/HRZ 10//
CASE 11.1.NOVEMBER.1972.0DEG W.29MIN W.47DEG N.13MIN N.

PROFIL/NO 12/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
CASE 12.COAST.COASTAL MARSH.SHALLOW WATER.TIDAL FLAT.
CONIFER.SEDIMENT.

- HORIZON/HRZ 5//
CASE 12.COAST.COASTAL MARSH.SHALLOW WATER.TIDAL FLAT.
CONIFER.SEDIMENT.BARRIER BEACH.

- HORIZON/HRZ 6//
CASE 12.COAST.

- HORIZON/HRZ 7//
CASE 12.COAST.COASTAL MARSH.

- HORIZON/HRZ 10//
CASE 12.1DEG W.57MIN W.47DEG N.10MIN N.2.NOVEMBER.1972.

PROFIL/NO 13/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
CASE 13.SEA.ISLAND.SHALLOW WATER.COASTAL CURRENT.COASTAL
DUNE.LITTORAL TRANSPORT.

- HORIZON/HRZ 5//
CASE 13.SEA.ISLAND.

- HORIZON/HRZ 7//
CASE 13.SEA.ISLAND.COAST LINE.

- HORIZON/HRZ 10//
CASE 13.2DEG W.33MIN W.45DEG N.46MIN N.2.NOVEMBER.1972.

PROFIL/NO 14/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
CASE 14.SNOW.MEANDER.ALTOCUMULUS.ANTICLINE.BROKEN CLOUDS.
CUESTA.FOREST.PARALLEL DRAINAGE.

- HORIZON/HRZ 5//
CASE 14.SNOW.MEANDER.RURAL AREA.AGRICULTURE.ANTICLINE.
BROKEN CLOUDS.CITY.CUESTA.FOREST.HIGHWAY.LONGSHORE CURRENT.
LITTORAL TRANSPORT.PLATEAU.SYNCLINAL VALLEY.

- HORIZON/HRZ 6//
CASE 14.SNOW.MEANDER.RURAL AREA.AGRICULTURE.CITY.COAST.
COASTAL DUNE.CROPLAND.HIGHWAY.INDUSTRIAL AREA.PLATEAU.
RECTANGULAR DRAINAGE.SUBURBAN AREA.

- HORIZON/HRZ 7//
CASE 14.SNOW.MEANDER.RURAL AREA.AGRICULTURE.ALTOCUMULUS.
ANTICLINE.BROKEN CLOUDS.COASTAL DUNE.CROPLAND.CUESTA.
HIGHWAY.INDUSTRIAL AREA.MARSH.PLAIN.PLATEAU.RECTANGULAR
DRAINAGE.

- HORIZON/HRZ 10//.
CASE 14.18.NOVEMBER.1972.2DEG E.12MIN E.50DEG N.6MIN N.

PROFIL/NO 15/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
CASE 15.MEANDER.CLOUDS=CUESTA.DENDRITIC DRAINAGE.FOREST. A ✓
GEOGRAPHY.HIGHWAY.HYDROLOGY.PLATEAU.
  1 ANNOTATION(S) MARQUEE(S) = ✓

- HORIZON/HRZ 5//
CASE 15.MEANDER.RURAL AREA.AGRICULTURE.ALLUVIAL PLAIN.
CUESTA.DENDRITIC DRAINAGE.FOREST.GEOGRAPHY.HIGHWAY.
HYDROLOGY.PLATEAU.VALLEY.

- HORIZON/HRZ 6//
CASE 15.MEANDER.RURAL AREA.AGRICULTURE.CONIFER.CLOUDS= A ✓
CROPLAND.CITY.CUESTA.DECIDUOUS.DENDRITIC DRAINAGE.FOREST.
GEOGRAPHY.HIGHWAY.HYDROLOGY.INDUSTRIAL AREA.MEADOWLAND.
PLATEAU.VALLEY.VEGETATION.
  1 ANNOTATION(S) MARQUEE(S) = ✓

- HORIZON/HRZ 7//
CASE 15.MEANDER.RURAL AREA.AGRICULTURE.CONIFER.CORN.
CROPLAND.CITY.CUESTA.DECIDUOUS.FOREST.GRASSLAND.HIGHWAY.
HYDROLOGY.INDUSTRIAL AREA.MEADOWLAND.PLATEAU.VALLEY.
VEGETATION.

- HORIZON/HRZ 10//
CASE 15.18.NOVEMBER.1972.1DEG E.33MIN E.48DEG N.41MIN N.

PROFIL/NO 16/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 16.COASTAL MARSH.SEA.ISLAND.LITTORAL TRANSPORT.
SEDIMENT.SHALLOW WATER.COAST.BAY-HEAD BEACH.

- HORIZON/HRZ 5/MSS5//
CASE 16.COASTAL MARSH.SEA.ISLAND.SEDIMENT.SHALLOW WATER.
COAST.BAY-HEAD BEACH.

- HORIZON/HRZ 6/MSS6//
CASE 16.COASTAL MARSH.SEA.ISLAND.HARBOR.COAST LINE.JETTY.

- HORIZON/HRZ 7/MSS7//
CASE 16.COASTAL MARSH.SEA.ISLAND.HARBOR.COAST LINE.JETTY.

- HORIZON/HRZ 10//
CASE 16.8.MARCH.1973.0DEG W.46MIN W.50DEG N.16MIN N.

PROFIL/NO 17/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 17.LITTORAL TRANSPORT.EEO.MUD FLAT.COAST LINE.SALT
MARSH.BAY-HEAD BEACH.DUNE.ISLAND.SHALLOW WATER.

- HORIZON/HRZ 5/MSS5//
CASE 17.LITTORAL TRANSPORT.EEO.MUD FLAT.COAST LINE.SALT
MARSH.HARBOR.DAM.ISLAND.BAY.ESTUARY.SILT.BAY-HEAD BEACH.
GEOLOGY.VEGETATION.COASTAL PLAIN.COASTAL MARSH.SHALLOW
WATER.

- HORIZON/HRZ 6/MSS6//
CASE 17.LITTORAL TRANSPORT.MUD FLAT.EEO.COAST LINE.ISLAND.
SALT MARSH.MEANDER.BAY.ESTUARY.SILT.COASTAL PLAIN.SHALLOW
WATER.

- HORIZON/HRZ 7/MSS7//
CASE 17.LITTORAL TRANSPORT.MUD FLAT.EEO.COAST LINE.HARBOR.
DAM.ISLAND.BAY.ESTUARY.RIVER.GEOLOGY.COASTAL PLAIN.SILT.
COASTAL MARSH.

- HORIZON/HRZ 10//
CASE 17.8.MARCH.1973.1DEG W.25MIN W.48DEG N.51MIN N.

PROFIL/NO 18/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 18.LITTORAL TRANSPORT.EEO.BAY-HEAD BEACH.COASTAL MARSH.COASTAL DUNE.LAKE.COASTAL PLAIN.ISLAND.ESTUARY. SHALLOW WATER.

- HORIZON/HRZ 5/MSS5//
CASE 18.LITTORAL TRANSPORT.EEO.BAY-HEAD BEACH.COASTAL MARSH.COASTAL DUNE.LAKE.COASTAL PLAIN.ISLAND.ESTUARY.GULF.

- HORIZON/HRZ 6/MSS6//
CASE 18.LITTORAL TRANSPORT.BAY-HEAD BEACH.COASTAL MARSH. MEANDER.COASTAL DUNE.LAKE.ISLAND.ESTUARY.TIDAL FLAT.URBAN AREA.GULF.COAST LINE.MUD FLAT.

- HORIZON/HRZ 7/MSS7//
CASE 18.LITTORAL TRANSPORT.BAY-HEAD BEACH.COASTAL MARSH. MEANDER.COASTAL DUNE.LAKE.ISLAND.ESTUARY.TIDAL FLAT.URBAN AREA.GULF.COAST LINE.MUD FLAT.

- HORIZON/HRZ 10//
CASE 18.8.MARCH.1973.2DEG W.2MIN W.47DEG N.26MIN N.

PROFIL/NO 19/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 19.SHALLOW WATER.COASTAL MARSH.COASTAL DUNE.BAY-HEAD BEACH.LONGSHORE BAR.LITTORAL TRANSPORT.CONIFER.ISLAND.

- HORIZON/HRZ 5/MSS5//
CASE 19.SHALLOW WATER.COASTAL MARSH.COASTAL DUNE.BAY-HEAD BEACH.LONGSHORE BAR.LITTORAL TRANSPORT.CONIFER.ISLAND.

- HORIZON/HRZ 6/MSS6//
CASE 19.COASTAL MARSH.COASTAL DUNE.BAY-HEAD BEACH.LONGSHORE BAR.CONIFER.HARBOR.ISLAND.

- HORIZON/HRZ 7/MSS7//
CASE 19.COASTAL MARSH.COASTAL DUNE.COAST LINE.CONIFER. HARBOR.ISLAND.

- HORIZON/HRZ 10//
CASE 19.8.MARCH.1973.2DEG W.38MIN W.46DEG N.2MIN N.

PROFIL/NO 20/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 20.SEA.

- HORIZON/HRZ 5/MSS5//
CASE 20.SEA.

- HORIZON/HRZ 6/MSS6//
CASE 20.SEA.

- HORIZON/HRZ 7/MSS7//
CASE 20.SEA.

- HORIZON/HRZ 10//
CASE 20.8.MARCH.1973.3DEG W.11MIN W.44DEG N.37MIN N.

PROFIL/NO 21/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 21.BAY-HEAD BEACH.EEO.MARSH.LITTORAL TRANSPORT.
AGRICULTURE.HARBOR.ISLAND.FOREST.

- HORIZON/HRZ 5/MSS5//
CASE 21.BAY-HEAD BEACH.MARSH.EEO.LITTORAL TRANSPORT.
BATHOLITH.FOREST.HARBOR.ISLAND.JETTY.

- HORIZON/HRZ 6/MSS6//
CASE 21.BAY-HEAD BEACH.MARSH.LITTORAL TRANSPORT.ESTUARY.
CLOUD STREETS.FOREST.TOMBOLO.HARBOR.ISLAND.

- HORIZON/HRZ 10//
CASE 21.9.MARCH.1973.2DEG W.11MIN W.50DEG N.17MIN N.

PROFIL/NO 22/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 22.LITTORAL TRANSPORT.EEO.COASTAL MARSH.SHALLOW WATER.
ISLAND.SALT MARSH.DUNE.ADVANCING SHORELINE.BAY-HEAD BEACH.

- HORIZON/HRZ 5/MSS5//
CASE 22.LITTORAL TRANSPORT.EEO.COASTAL MARSH.SHALLOW WATER.
ISLAND.HARBOR.DAM.SALT MARSH.DUNE.ADVANCING SHORELINE.
HYDROLOGY.BAY-HEAD BEACH.

- HORIZON/HRZ 6/MSS6//
CASE 22.LITTORAL TRANSPORT.COASTAL MARSH.SHALLOW WATER.
ISLAND.COAST LINE.HARBOR.DAM.HYDROLOGY.

- HORIZON/HRZ 10//
CASE 22.9.MARCH.1973.2DEG W.50MIN W.48DEG N.52MIN N.

PROFIL/NO 23/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 23.ESTUARY.TOMBOLO.COASTAL MARSH.BARRIER BEACH.CAPE.
COAST.ISLAND.CONTINENTAL SHELF.CURRENT.MUD.OPEN PIT MINE.

- HORIZON/HRZ 5/MSS5//
CASE 23.ESTUARY.TOMBOLO.EEO.COASTAL MARSH.BARRIER BEACH.
CAPE.COAST.ISLAND.CURRENT.DUNE.HIGHWAY.OPEN PIT MINE.

- HORIZON/HRZ 6/MSS6//
CASE 23.ESTUARY.TOMBOLO.COASTAL MARSH.CAPE.COAST.ISLAND.
DAM.FAULT.LAKE.HARBOR.

- HORIZON/HRZ 10//
CASE 23.9.MARCH.1973.3DEG W.27MIN W.47DEG N.28MIN N.

```
PROFIL/NO 24/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 24.SEA.MUD.CURRENT.CONTINENTAL SHELF.

- HORIZON/HRZ 5/MSS5//
CASE 24.SEA.

- HORIZON/HRZ 6/MSS6//
CASE 24.SEA.

- HORIZON/HRZ 10//
CASE 24.9.MARCH.1973.4DEG W.3MIN W.46DEG N.3MIN N.



PROFIL/NO 25/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 25.ESTUARY.COASTAL MARSH.CUMULONIMBUS.STRATUS=                    A
  1  ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 5/MSS5//
CASE 25.ESTUARY.COASTAL MARSH.CUMULONIMBUS.STRATUS=                    A
  1  ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 6/MSS6//
CASE 25.ESTUARY.COASTAL MARSH.CUMULONIMBUS.STRATUS=CLOUD               A
STREETS.RIVER.
  1  ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 7/MSS7//
CASE 25.ESTUARY.COASTAL MARSH.CUMULONIMBUS.AGRICULTURE.
CLOUD STREETS.RIVER.

- HORIZON/HRZ 10//
CASE 25.4.JUNE.1973.



PROFIL/NO 26/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 26.DAM.FEO.HARBOR.ESTUARY.COASTAL PLAIN.COASTAL DUNE.
CITY.CROPLAND.RURAL AREA.SEA WALL.JETTY.

- HORIZON/HRZ 5/MSS5//
CASE 26.DAM.FEO.HARBOR.ESTUARY.COASTAL PLAIN.SEA.CANAL.
OUTLET.SEA WALL.JETTY.

- HORIZON/HRZ 6/MSS6//
CASE 26.DAM.FEO.HARBOR.ESTUARY.SEA.CITY.CANAL.COAST LINE.
OUTLET.SEA WALL.JETTY.

- HORIZON/HRZ 10//
CASE 26.10.JULY.1973.
```

PROFIL/NO 27/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 27.ESTUARY.EEO.JETTY.MEANDER.RURAL AREA.SCATTERED CLOUDS.STRATUS=TIDAL FLAT. A
1 ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 5/MSS5//
CASE 27.ESTUARY.EEO.COASTAL MARSH.COASTAL DUNE.AGRICULTURE. ALLUVIAL PLAIN.CUMULUS.FOREST.MEANDER.RURAL AREA.STRATUS= VEGETATION. A
1 ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 6/MSS6//
CASE 27.ESTUARY.EEO.COASTAL MARSH.COASTAL DUNE.CANAL. CUMULUS.HARBOR.INDUSTRIAL AREA.JETTY.MEANDER.SCATTERED CLOUDS.STRATUS=URBAN AREA.VALLEY.VEGETATION. A
1 ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 7/MSS7//
CASE 27.ESTUARY.EEO.COASTAL MARSH.AGRICULTURE.CANAL. CUMULUS.HARBOR.INDUSTRIAL AREA.JETTY.MEANDER.RURAL AREA. SCATTERED CLOUDS.URBAN AREA.

- HORIZON/HRZ 10//
CASE 27.10.JULY.1973.

PROFIL/NO 28/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 28.MEANDER.RURAL AREA.FAULT.DECIDUOUS.VEGETATION. GRASSLAND.ESTUARY.AGRICULTURE.URBAN AREA.

- HORIZON/HRZ 5/MSS5//
CASE 28.MEANDER.RURAL AREA.FAULT.DECIDUOUS.VEGETATION. VALLEY.GRASSLAND.ESTUARY.AGRICULTURE.URBAN AREA.

- HORIZON/HRZ 6/MSS6//
CASE 28.MEANDER.RURAL AREA.FAULT.EEO.VALLEY.COAST LINE. ESTUARY.AGRICULTURE.URBAN AREA.INDUSTRIAL AREA.

- HORIZON/HRZ 7/MSS7//
CASE 28.MEANDER.RURAL AREA.FAULT.EEO.VALLEY.COAST LINE. ESTUARY.AGRICULTURE.URBAN AREA.INDUSTRIAL AREA.

- HORIZON/HRZ 10//
CASE 28.10.JULY.1973.

PROFIL/NO 29/DR VERGER/FRALIT/

- HORIZON/HRZ 5/MSS5//
CASE 29.MEANDER.AGRICULTURE.CITY.CROPLAND,FOREST. VEGETATION.VALLEY.

- HORIZON/HRZ 7/MSS7//
CASE 29.MEANDER.AGRICULTURE.CITY.CROPLAND.FOREST.VALLEY.

- HORIZON/HRZ 10//
CASE 29.11.JULY.1973.

```
PROFIL/NO 30/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 30.COASTAL PLAIN.LITTORAL TRANSPORT.VALLEY.VEGETATION.
CONIFER.FOREST.URBAN AREA.VINEYARD.LAKE.AGRICULTURE.
HIGHWAY.

- HORIZON/HRZ 5/MSS5//
CASE 30.COASTAL PLAIN.LITTORAL TRANSPORT.VALLEY.VEGETATION.
CONIFER.FOREST.URBAN AREA.VINEYARD.LAKE.AGRICULTURE.
HIGHWAY.

- HORIZON/HRZ 6/MSS6//
CASE 30.COASTAL PLAIN.LITTORAL TRANSPORT.VALLEY.COAST LINE.
LAKE.TIDAL FLAT.CONIFER.

- HORIZON/HRZ 7/MSS7//
CASE 30.COASTAL PLAIN.LITTORAL TRANSPORT.VALLEY.COAST LINE.
LAKE.TIDAL FLAT.CONIFER.

- HORIZON/HRZ 10//
CASE 30.11.JULY.1973.


PROFIL/NO 31/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 31.COASTAL MARSH.TIDAL MARSH=ESTUARY.AGRICULTURE.CAPE.   A
COASTAL CURRENT.COASTAL DUNE.FOREST.ISLAND.LITTORAL
TRANSPORT.SALT MARSH.SHALLOW WATER.
  1  ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 5/MSS5//
CASE 31.COASTAL MARSH.TIDAL MARSH=EEO.ESTUARY.BAY.DUNE.       A
MARSH.SALT MARSH.TIDAL FLAT.SEA.VALLEY.
  1  ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 6/MSS6//
CASE 31.COASTAL MARSH.TIDAL MARSH=ESTUARY.DAM.DUNE.FOREST.    A
LAKE.RURAL AREA.SEA.VALLEY.
  1  ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 7/MSS7//
CASE 31.COASTAL MARSH.TIDAL MARSH=ESTUARY.DUNE.FOREST.RURAL   A
AREA.SEA.URBAN AREA.VALLEY.
  1  ANNOTATION(S) MARQUEE(S) =

- HORIZON/HRZ 10//
CASE 31.11.JULY.1973.


PROFIL/NO 32/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CASE 32.ESTUARY.COASTAL DUNE.FOREST.LAKE.MARSH.SALT MARSH.
SUBURBAN AREA.

- HORIZON/HRZ 5/MSS5//
CASE 32.ESTUARY.COASTAL DUNE.FOREST.CUMULUS.SUBURBAN AREA.
VINEYARD.

- HORIZON/HRZ 6/MSS6//
CASE 32.ESTUARY.COASTAL DUNE.FOREST.ALLUVIAL PLAIN.CAPE.
DUNE.CROPLAND.RURAL AREA.TIDAL FLAT.SALT MARSH.

- HORIZON/HRZ 7/MSS7//
CASE 32.ESTUARY.COASTAL DUNE.FOREST.EEO.CAPE.DUNE.RURAL
AREA.URBAN AREA.SALT MARSH.

- HORIZON/HRZ 10//
CASE 32.11.JULY.1973.
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It should be stressed that corrections require cautious manipulation of the card decks. Faulty cards are replaced as follows:

- One valid card for one faulty, when the resulting number of characters (and blank spaces) is smaller or equal;
- Two valid cards for one faulty, when correction introduces a greater number of characters.

Such a procedure is standard when blank columns between separators are accepted. Furthermore, partial duplication of cards reduces manual intervention.

Corrected cases remain ordered as before.

SYSTEM AND PROGRAM CONTROL CARDS

MODIFY IMAGE DESCRIPTIONS

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
"RUN,G ORSIDA,TP0160,ORSTOM                              026 OR 029
"ASG,T ENTREE.,8C,155L                                     OR 175L
"ASG,T SORTIE.,8C,175E                                     AND 155E
"XQT DGX.DGX
*140174
*DONNFE/M
 M O D I F I E D   I M A G E   D E S C R I P T I O N S   C A S E S
*FIN
"FIN
```

A printed description of the entire case (image descriptions and coordinates) is standard output. Annotations appear once again for the remaining unimportant discrepancies and require no further intervention.

The data file is now ready for printing.

SYSTEM AND PROGRAM CONTROL CARDS

PRINT IMAGE DESCRIPTIONS

```
        1         2         3         4         5         6
123456789012345678901234567890123456789012345678901234567890123456789012
"RUN,G ORSIDA,TP0160,ORSTOM                                  026 OR 029
"ASG,T ENTREE.,8C,175L                                        OR 155L
"ASG,T SORTIE.,8C,155E                                        AND 175E
"XQT DGX.DGX
*140174
*DONNEE/P/
                                        IN COL. 11-14  LEFT-JUSTIFIED
                                              C A S E   N U M B E R
                                        ONE CARD FOR EACH CASE
*FIN
"FIN
```

Printing follows a standard order of the descriptors and is freed from all discrepancies.

Forms received from Dr. Verger are presented as computer output on next pages.

Term EEO deserves a short comment, as it informs only on the presence of at least one excellent example of keyword in the description. Looking at the first listing (output from tape loading) is necessary when identification of the corresponding descriptor is required.

PROFIL/NO 1/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
ADVANCING SHORELINE.
CLOUD STREETS.
INSHORE ZONE.ISLAND.
LITTORAL TRANSPORT.
MUD FLAT.
SALT MARSH.SEDIMENT.SHALLOW WATER.
TIDAL FLAT.
1031-10350.

- HORIZON/HRZ 5/MSS5//
ADVANCING SHORELINE.
CLOUD STREETS.COASTAL MARSH.COAST LINE.
DAM.
HARBOR.
INSHORE ZONE.ISLAND.
LITTORAL TRANSPORT.
MUD FLAT.
SALT MARSH.SHALLOW WATER.
TIDAL FLAT.
1031-10350.

- HORIZON/HRZ 7/MSS7//
ADVANCING SHORELINE.
CLOUD STREETS.COASTAL MARSH.COAST LINE.
HARBOR.
ISLAND.
MUD FLAT.
TIDAL FLAT.
EXCELLENT EXAMPLE OF KEYWORD.
1031-10350.

- HORIZON/HRZ 10//
23.AUGUST.1972.
48DEG N.58MIN N.2DEG W.39MIN W.
1031-10350.

PROFIL/NO 2/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
BAY-HEAD BEACH.
ISLAND.
SEDIMENT.SHALLOW WATER.
TOMBOLO.
1031-10352.

- HORIZON/HRZ 5/MSS5//
BAY-HEAD BEACH.
COASTAL MARSH.
FOREST.
ISLAND.
MEANDER.
TOMBOLO.
VEGETATION.
1031-10352.

- HORIZON/HRZ 6/MSS6//
COAST.COASTAL MARSH.COAST LINE.
ISLAND.
TOMBOLO.
1031-10352.

- HORIZON/HRZ 7/MSS7//
COAST.COASTAL MARSH.COAST LINE.
ISLAND.
LAKE.
TOMBOLO.
1031-10352.

- HORIZON/HRZ 10//
23.AUGUST.1972.
47DEG N.33MIN N.3DEG W.16MIN W.
1031-10352.

PROFIL/NO 3/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
SEA.
1031-10355.

- HORIZON/HRZ 5/MSS5//
SEA.
1031-10355.

- HORIZON/HRZ 6/MSS6//
SEA.
1031-10355.

- HORIZON/HRZ 7/MSS7//
SEA.
1031-10355.

- HORIZON/HRZ 10//
23.AUGUST.1972.
46DEG N.8MIN N.3DEG W.52MIN W.
1031-10355.

PROFIL/NO 4/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
SEA.
1031-10361.

- HORIZON/HRZ 5/MSS5//
SEA.
1031-10361.

- HORIZON/HRZ 6/MSS6//
SEA.
1031-10361.

- HORIZON/HRZ 7/MSS7//
SEA.
1031-10361.

- HORIZON/HRZ 10//
23.AUGUST.1972.
44DEG N.43MIN N.4DEG W.27MIN W.
1031-10361.

PROFIL/NO 5/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
AIRFIELD.
CORN.CROPLAND.
FOREST.
ROAD.
MEANDER.
1064-10175.

- HORIZON/HR7 5/MSS5//
AGRICULTURE.AIRFIELD.
CROPLAND.
FOREST.
ROAD.
MEANDER.
SUBURBAN AREA.
URBAN AREA.
1064-10175.

- HORIZON/HR7 6/MSS6//
ALLUVIAL PLAIN.ALLUVIAL TERRACE.
CITY.CLOUD STREETS.CONIFER.CROPLAND.CUMULUS.
DECIDUOUS.
FOREST.
INDUSTRIAL AREA.
MEANDER.
URBAN AREA.
1064-10175.

- HORIZON/HRZ 7/MSS7//
ALLUVIAL PLAIN.ALLUVIAL TERRACE.
CITY.CONIFER.CROPLAND.
DECIDUOUS.
INDUSTRIAL AREA.
MARSH.MEANDER.
SUBURBAN AREA.
URBAN AREA.
EXCELLENT EXAMPLE OF KEYWORD.
1064-10175.

- HORIZON/HR7 10//
25.SEPTEMBER.1972.
48DEG N.45MIN N.1DEG E.37MIN E.
1064-10175.

PROFIL/NO 6/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
ALLUVIAL TERRACE.
COAST LINE.CONIFER.
DUNE.
ESTUARY.
FOREST.
LAKE.LONGSHORE CURRENT.
RAILROAD.
TIDAL FLAT.
1064-10190.

- HORIZON/HRZ 5/MSS5//
ALLUVIAL TERRACE.
COAST LINE.CONIFER.
DECIDUOUS.DUNE.
ESTUARY.
FOREST.
ROAD.
LAKE.
MEANDER.MUD FLAT.
RAILROAD.
VINEYARD.
1064-10190.

- HORIZON/HRZ 6/MSS6//
ALLUVIAL TERRACE.
CANAL.COAST LINE.CONIFER.CORN.
DUNE.
ESTUARY.
FOREST.
ROAD.
ISLAND.
LAKE.
MEANDER.
TIDAL FLAT.
URBAN AREA.
VINEYARD.
1064-10190.

- HORIZON/HRZ 7/MSS7//
ALLUVIAL TERRACE.
CANAL.COAST LINE.CONIFER.CORN.
DUNE.
ESTUARY.
FOREST.
ROAD.
IRRIGATION.ISLAND.
LAKE.
MEANDER.
TIDAL FLAT.
URBAN AREA.
VINEYARD.
1064-10190.

- HORIZON/HRZ 10//
25.SEPTEMBER.1972.
44DEG N.29MIN N.0DEG W.9MIN W.
1064-10190.

PROFIL/NO 7/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
ADVANCING SHORELINE.
COASTAL DUNE.COASTAL MARSH.
DAM.
HARBOR.
INSHORE ZONE.
LITTORAL TRANSPORT.
MUD FLAT.
SALT MARSH.SHALLOW WATER.
TIDAL FLAT.
EXCELLENT EXAMPLE OF KEYWORD.
1066-10291.

- HORIZON/HRZ 5/MSS5//
ADVANCING SHORELINE.
COASTAL DUNE.COASTAL MARSH.
DAM.
HARBOR.
INSHORE ZONE.
LITTORAL TRANSPORT.
MUD FLAT.
SALT MARSH.SHALLOW WATER.
TIDAL FLAT.
EXCELLENT EXAMPLE OF KEYWORD.
1066-10291.

- HORIZON/HRZ 6/MSS6//
COASTAL MARSH.COAST LINE.
DAM.
HARBOR.
LITTORAL TRANSPORT.
MUD FLAT.
SHALLOW WATER.
TIDAL FLAT.
EXCELLENT EXAMPLE OF KEYWORD.
1066-10291.

- HORIZON/HRZ 7/MSS7//
COASTAL MARSH.COAST LINE.
DAM.
HARBOR.
MUD FLAT.
TIDAL FLAT.
1066-10291.

- HORIZON/HRZ 10//
27.SEPTEMBER.1972.
48DEG N.50MIN N.1DEG W.10MIN W.
1066-10291.

PROFIL/NO 8/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
BAY-HEAD BEACH.
COASTAL CURRENT.COASTAL DUNE.
ESTUARY.
INLET.ISLAND.
LITTORAL CURRENT.LITTORAL TRANSPORT.
SHALLOW WATER.
1066-10294.

- HORIZON/HRZ 5/MSS5//
BAY-HEAD BEACH.
COASTAL CURRENT.COASTAL DUNE.COASTAL MARSH.CONIFER.
DECIDUOUS.
ESTUARY.
FAULT.
HARBOR.
INLET.ISLAND.
LITTORAL TRANSPORT.
EXCELLENT EXAMPLE OF KEYWORD.
1066-10294.

- HORIZON/HRZ 6/MSS6//
COASTAL MARSH.
ESTUARY.
HARBOR.
ISLAND.
LAKE.
TIDAL FLAT.
URBAN AREA.
1066-10294.

- HORIZON/HRZ 7/MSS7//
COASTAL MARSH.CONIFER.
DECIDUOUS.
ESTUARY.
HARBOR.
ISLAND.
LAKE.
URBAN AREA.
1066-10294.

- HORIZON/HRZ 10//
27.SEPTEMBER.1972.
47DEG N.25MIN N.1DEG W.47MIN W.
1066-10294.

PROFIL/NO 9/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
SEA.
1067-10355.

- HORIZON/HRZ 5//
SEA.
1067-10355.

- HORIZON/HRZ 6//
SEA.
1067-10355.

- HORIZON/HRZ 7//
SEA.
1067-10355.

- HORIZON/HRZ 10//
28.SEPTEMBER.1972.
45DEG N.59MIN N.3DEG W.50MIN W.
1067-10355.

PROFIL/NO 10/DR VERGER/FRALIT/ .

- HORIZON/HRZ 4//
ALLUVIAL PLAIN.
COAST LINE.CROPLAND.
FOREST.
MEANDER.
RIVER.
VALLEY.
1101-10241.

- HORIZON/HRZ 5//
ALLUVIAL PLAIN.
CROPLAND.
FOREST.
MEANDER.
RIVER.
VALLEY.
1101-10241.

- HORIZON/HRZ 6//
ALLUVIAL PLAIN.
CROPLAND.
SYNCLINE.
FAULT.FOREST.
HORST.
LAKE.
MEANDER.
PENEPLAIN.PLAIN.
RIVER.
TRIBUTARY.
VALLEY.
1101-10241.

- HORIZON/HRZ 7//
ALLUVIAL PLAIN.ALLUVIAL TERRACE.
CROPLAND.
SYNCLINE.
FAULT.FOREST.
GRASSLAND.
HORST.
LAKE.
MEANDER.
PENEPLAIN.PLAIN.
RIVER.
TRIBUTARY.
VALLEY.
1101-10241.

- HORIZON/HRZ 10//
1.NOVEMBER.1972.
48DEG N.38MIN N.0DEG E.7MIN E.
1101-10241.

PROFIL/NO 11/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
ALLUVIAL PLAIN.
COASTAL MARSH.COAST LINE.CROPLAND.CUESTA.
FOREST.
GEOLOGY.
MATURE STREAM.MEANDER.
OUTLIER.
SHALLOW WATER.
TRIBUTARY.
EXCELLENT EXAMPLE OF KEYWORD.
1101-10244.

- HORIZON/HRZ 5/MSS5//
COASTAL MARSH.COAST LINE.CONIFER.CROPLAND.
DECIDUOUS.DUNE.
FAULT.FOREST.
GEOLOGY.
LAKE.
MATURE STREAM.MEANDER.
TERRACE.TRIBUTARY.
EXCELLENT EXAMPLE OF KEYWORD.
1101-10244.

- HORIZON/HRZ 6/MSS6//
CROPLAND.
DAM.
FOREST.
GEOLOGY.
ROAD.
LAKE.
TRIBUTARY.
URBAN AREA.
1101-10244.

- HORIZON/HRZ 7/MSS7//
CROPLAND.
DAM.
FOREST.
GEOLOGY.
ROAD.
LAKE.
MATURE STREAM.MEANDER.
RAILROAD.
TRIBUTARY.
URBAN AREA.
1101-10244.

- HORIZON/HRZ 10//
1.NOVEMBER.1972.
47DEG N.13MIN N.0DEG W.29MIN W.
1101-10244.

PROFIL/NO 12/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
COAST.COASTAL MARSH.CONIFER.
SEDIMENT.SHALLOW WATER.
TIDAL FLAT.
1102-10302.

- HORIZON/HRZ 5//
BARRIER BEACH.
COAST.COASTAL MARSH.CONIFER.
SEDIMENT.SHALLOW WATER.
TIDAL FLAT.
1102-10302.

- HORIZON/HRZ 6//
COAST.
1102-10302.

- HORIZON/HRZ 7//
COAST.COASTAL MARSH.
1102-10302.

- HORIZON/HRZ 10//
2.NOVEMBER.1972.
47DEG N.10MIN N.1DEG W.57MIN W.
1102-10302.

PROFIL/NO 13/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
COASTAL CURRENT.COASTAL DUNE.
ISLAND.
LITTORAL TRANSPORT.
SEA.SHALLOW WATER.
1102-10305.

- HORIZON/HRZ 5//
ISLAND.
SEA.
1102-10305.

- HORIZON/HRZ 7//
COAST LINE.
ISLAND.
SEA.
1102-10305.

- HORIZON/HRZ 10//
2.NOVEMBER.1972.
45DEG N.46MIN N.2DEG W.33MIN W.
1102-10305.

PROFIL/NO 14/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
ALTOCUMULUS.ANTICLINE.
BROKEN CLOUDS.
CUESTA.
FOREST.
MEANDER.
PARALLEL DRAINAGE.
SNOW.
1118-10181.

- HORIZON/HRZ 5//
AGRICULTURE.ANTICLINE.
BROKEN CLOUDS.
CITY.CUESTA.
FOREST.
ROAD.
LITTORAL TRANSPORT.LONGSHORE CURRENT.
MEANDER.
PLATEAU.
RURAL AREA.
SNOW.SYNCLINAL VALLEY.
1118-10181.

- HORIZON/HRZ 6//
AGRICULTURE.
CITY.COAST.COASTAL DUNE.CROPLAND.
ROAD.
INDUSTRIAL AREA.
MEANDER.
PLATEAU.
RECTANGULAR DRAINAGE.RURAL AREA.
SNOW.SUBURBAN AREA.
1118-10181.

- HORIZON/HRZ 7//
AGRICULTURE.ALTOCUMULUS.ANTICLINE.
BROKEN CLOUDS.
COASTAL DUNE.CROPLAND.CUESTA.
ROAD.
INDUSTRIAL AREA.
MARSH.MEANDER.
PLAIN.PLATEAU.
RECTANGULAR DRAINAGE.RURAL AREA.
SNOW.
1118-10181.

- HORIZON/HRZ 10//
18.NOVEMBER.1972.
50DEG N.6MIN N.2DEG E.12MIN E.
1118-10181.

PROFIL/NO 15/DR VERGER/FRALIT/

- HORIZON/HRZ 4//
CUESTA.
DENDRITIC DRAINAGE.
FOREST.
GEOGRAPHY.
ROAD.HYDROLOGY.
MEANDER.
PLATEAU.
1118-10184.

- HORIZON/HRZ 5//
AGRICULTURE.ALLUVIAL PLAIN.
CUESTA.
DENDRITIC DRAINAGE.
FOREST.
GEOGRAPHY.
ROAD.HYDROLOGY.
MEANDER.
PLATEAU.
RURAL AREA.
VALLEY.
1118-10184.

- HORIZON/HRZ 6//
AGRICULTURE.
CITY.CONIFER.CROPLAND.CUESTA.
DECIDUOUS.DENDRITIC DRAINAGE.
FOREST.
GEOGRAPHY.
ROAD.HYDROLOGY.
INDUSTRIAL AREA.
MEADOWLAND.MEANDER.
PLATEAU.
RURAL AREA.
VALLEY.
VEGETATION.
1118-10184.

- HORIZON/HRZ 7//
AGRICULTURE.
CITY.CONIFER.CORN.CROPLAND.CUESTA.
DECIDUOUS.
FOREST.
GRASSLAND.
ROAD.HYDROLOGY.
INDUSTRIAL AREA.
MEADOWLAND.MEANDER.
PLATEAU.
RURAL AREA.
VALLEY.
VEGETATION.
1118-10184.

- HORIZON/HRZ 10//
18.NOVEMBER.1972.
48DEG N.41MIN N.1DEG E.33MIN E.
1118-10184.

PROFIL/NO 16/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
BAY-HEAD BEACH.
COAST.COASTAL MARSH.
ISLAND.
LITTORAL TRANSPORT.
SEA.SEDIMENT.SHALLOW WATER.
1228-10300.

- HORIZON/HRZ 5/MSS5//
BAY-HEAD BEACH.
COAST.COASTAL MARSH.
ISLAND.
SEA.SEDIMENT.SHALLOW WATER.
1228-10300.

- HORIZON/HRZ 6/MSS6//
COASTAL MARSH.COAST LINE.
HARBOR.
ISLAND.
JETTY.
SEA.
1228-10300.

- HORIZON/HRZ 7/MSS7//
COASTAL MARSH.COAST LINE.
HARBOR.
ISLAND.
JETTY.
SEA.
1228-10300.

- HORIZON/HRZ 10//
8.MARCH.1973.
50DEG N.16MIN N.0DEG W.46MIN W.
1228-10300.

PROFIL/NO 17/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
BAY-HEAD BEACH.
COAST LINE.
DUNE.
ISLAND.
LITTORAL TRANSPORT.
MUD FLAT.
SALT MARSH.SHALLOW WATER.
EXCELLENT EXAMPLE OF KEYWORD.
1228-10302.

- HORIZON/HRZ 5/MSS5//
BAY.BAY-HEAD BEACH.
COASTAL MARSH.COASTAL PLAIN.COAST LINE.
DAM.
ESTUARY.
GEOLOGY.
HARBOR.
ISLAND.
LITTORAL TRANSPORT.
MUD FLAT.
SALT MARSH.SHALLOW WATER.SILT.
VEGETATION.
EXCELLENT EXAMPLE OF KEYWORD.
1228-10302.

- HORIZON/HRZ 6/MSS6//
BAY.
COASTAL PLAIN.COAST LINE.
ESTUARY.
ISLAND.
LITTORAL TRANSPORT.
MEANDER.MUD FLAT.
SALT MARSH.SHALLOW WATER.SILT.
EXCELLENT EXAMPLE OF KEYWORD.
1228-10302.

- HORIZON/HRZ 7/MSS7//
BAY.
COASTAL MARSH.COASTAL PLAIN.COAST LINE.
DAM.
ESTUARY.
GEOLOGY.
HARBOR.
ISLAND.
LITTORAL TRANSPORT.
MUD FLAT.
RIVER.
SILT.
EXCELLENT EXAMPLE OF KEYWORD.
1228-10302.

- HORIZON/HRZ 10//
8.MARCH.1973.
48DEG N.51MIN N.1DEG W.25MIN W.
1228-10302.

PROFIL/NO 18/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
BAY-HEAD BEACH.
COASTAL DUNE.COASTAL MARSH.COASTAL PLAIN.
ESTUARY.
ISLAND.
LAKE.LITTORAL TRANSPORT.
SHALLOW WATER.
EXCELLENT EXAMPLE OF KEYWORD.
1228-10305.

- HORIZON/HRZ 5/MSS5//
BAY-HEAD BEACH.
COASTAL DUNE.COASTAL MARSH.COASTAL PLAIN.
ESTUARY.
GULF.
ISLAND.
LAKE.LITTORAL TRANSPORT.
EXCELLENT EXAMPLE OF KEYWORD.
1228-10305.

- HORIZON/HRZ 6/MSS6//
BAY-HEAD BEACH.
COASTAL DUNE.COASTAL MARSH.COAST LINE.
ESTUARY.
GULF.
ISLAND.
LAKE.LITTORAL TRANSPORT.
MEANDER.MUD FLAT.
TIDAL FLAT.
URBAN AREA.
1228-10305.

- HORIZON/HRZ 7/MSS7//
BAY-HEAD BEACH.
COASTAL DUNE.COASTAL MARSH.COAST LINE.
ESTUARY.
GULF.
ISLAND.
LAKE.LITTORAL TRANSPORT.
MEANDER.MUD FLAT.
TIDAL FLAT.
URBAN AREA.
1228-10305.

- HORIZON/HRZ 10//
8.MARCH.1973.
47DEG N.26MIN N.2DEG W.2MIN W.
1228-10305.

PROFIL/NO 19/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
BAY-HEAD BEACH.
COASTAL DUNE.COASTAL MARSH.CONIFER.
ISLAND.
LITTORAL TRANSPORT.LONGSHORE BAR.
SHALLOW WATER.
1228-10311.

- HORIZON/HRZ 5/MSS5//
BAY-HEAD BEACH.
COASTAL DUNE.COASTAL MARSH.CONIFER.
ISLAND.
LITTORAL TRANSPORT.LONGSHORE BAR.
SHALLOW WATER.
1228-10311.

- HORIZON/HRZ 6/MSS6//
BAY-HEAD BEACH.
COASTAL DUNE.COASTAL MARSH.CONIFER.
HARBOR.
ISLAND.
LONGSHORE BAR.
1228-10311.

- HORIZON/HRZ 7/MSS7//
COASTAL DUNE.COASTAL MARSH.COAST LINE.CONIFER.
HARBOR.
ISLAND.
1228-10311.

- HORIZON/HRZ 10//
8.MARCH.1973.
46DEG N.2MIN N.2DEG W.38MIN W.
1228-10311.

PROFIL/NO 20/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
SEA.
1228-10314.

- HORIZON/HRZ 5/MSS5//
SEA.
1228-10314.

- HORIZON/HRZ 6/MSS6//
SEA.
1228-10314.

- HORIZON/HRZ 7/MSS7//
SEA.
1228-10314.

- HORIZON/HRZ 10//
8.MARCH.1973.
44DEG N.37MIN N.3DEG W.11MIN W.
1228-10314.

PROFIL/NO 21/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
AGRICULTURE.
BAY-HEAD BEACH.
FOREST.
HARBOR.
ISLAND.
LITTORAL TRANSPORT.
MARSH.
EXCELLENT EXAMPLE OF KEYWORD.
1229-10354.

- HORIZON/HRZ 5/MSS5//
BATHOLITH.BAY-HEAD BEACH.
FOREST.
HARBOR.
ISLAND.
JETTY.
LITTORAL TRANSPORT.
MARSH.
EXCELLENT EXAMPLE OF KEYWORD.
1229-10354.

- HORIZON/HRZ 6/MSS6//
BAY-HEAD BEACH.
CLOUD STREETS.
ESTUARY.
FOREST.
HARBOR.
ISLAND.
LITTORAL TRANSPORT.
MARSH.
TOMBOLO.
1229-10354.

- HORIZON/HRZ 10//
9.MARCH.1973.
50DEG N.17MIN N.2DEG W.11MIN W.
1229-10354.

PROFIL/NO 22/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
ADVANCING SHORELINE.
BAY-HEAD BEACH.
COASTAL MARSH.
DUNE.
ISLAND.
LITTORAL TRANSPORT.
SALT MARSH.SHALLOW WATER.
EXCELLENT EXAMPLE OF KEYWORD.
1229-10361.

- HORIZON/HRZ 5/MSS5//
ADVANCING SHORELINE.
BAY-HEAD BEACH.
COASTAL MARSH.
DAM.DUNE.
HARBOR.HYDROLOGY.
ISLAND.
LITTORAL TRANSPORT.
SALT MARSH.SHALLOW WATER.
EXCELLENT EXAMPLE OF KEYWORD.
1229-10361.

- HORIZON/HRZ 6/MSS6//
COASTAL MARSH.COAST LINE.
DAM.
HARBOR.HYDROLOGY.
ISLAND.
LITTORAL TRANSPORT.
SHALLOW WATER.
1229-10361.

- HORIZON/HRZ 10//
9.MARCH.1973.
48DEG N.52MIN N.2DEG W.50MIN W.
1229-10361.

PROFIL/NO 23/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
BARRIER BEACH.
CAPE.COAST.COASTAL MARSH.CONTINENTAL SHELF.CURRENT.
ESTUARY.
ISLAND.
MUD.
OPEN PIT MINE.
TOMBOLO.
1229-10363.

- HORIZON/HRZ 5/MSS5//
BARRIER BEACH.
CAPE.COAST.COASTAL MARSH.CURRENT.
DUNE.
ESTUARY.
ROAD.
ISLAND.
OPEN PIT MINE.
TOMBOLO.
EXCELLENT EXAMPLE OF KEYWORD.
1229-10363.

- HORIZON/HRZ 6/MSS6//
CAPE.COAST.COASTAL MARSH.
DAM.
ESTUARY.
FAULT.
HARBOR.
ISLAND.
LAKE.
TOMBOLO.
1229-10363.

- HORIZON/HRZ 10//
9.MARCH.1973.
47DEG N.28MIN N.3DEG W.27MIN W.
1229-10363.

PROFIL/NO 24/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CONTINENTAL SHELF.CURRENT.
MUD.
SEA.
1229-10370.

- HORIZON/HRZ 5/MSS5//
SEA.
1229-10370.

- HORIZON/HRZ 6/MSS6//
SEA.
1229-10370.

- HORIZON/HRZ 10//
9.MARCH.1973.
46DEG N.3MIN N.4DEG W.3MIN W.
1229-10370.

PROFIL/NO 25/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
COASTAL MARSH.CUMULONIMBUS.
ESTUARY.
1316-10192.

- HORIZON/HRZ 5/MSS5//
COASTAL MARSH.CUMULONIMBUS.
ESTUARY.
1316-10192.

- HORIZON/HRZ 6/MSS6//
CLOUD STREETS.COASTAL MARSH.CUMULONIMBUS.
ESTUARY.
RIVER.
1316-10192.

- HORIZON/HRZ 7/MSS7//
AGRICULTURE.
CLOUD STREETS.COASTAL MARSH.CUMULONIMBUS.
ESTUARY.
RIVER.
1316-10192.

- HORIZON/HRZ 10//
4.JUNE.1973.
1316-10192.

PROFIL/NO 26/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
CITY.COASTAL DUNE.COASTAL PLAIN.CROPLAND.
DAM.
ESTUARY.
HARBOR.
JETTY.
RURAL AREA.
SEA WALL.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10172.

- HORIZON/HRZ 5/MSS5//
CANAL.COASTAL PLAIN.
DAM.
ESTUARY.
HARBOR.
JETTY.
OUTLFT.
SEA.SEA WALL.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10172.

- HORIZON/HRZ 6/MSS6//
CANAL.CITY.COAST LINE.
DAM.
ESTUARY.
HARBOR.
JETTY.
OUTLFT.
SEA.SEA WALL.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10172.

- HORIZON/HRZ 10//
10.JULY.1973.
1352-10172.

PROFIL/NO 27/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
ESTUARY.
JETTY.
MEANDER.
RURAL AREA.
SCATTERED CLOUDS.
TIDAL FLAT.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10174.

- HORIZON/HRZ 5/MSS5//
AGRICULTURE.ALLUVIAL PLAIN.
COASTAL DUNE.COASTAL MARSH.CUMULUS.
ESTUARY.
FOREST.
MEANDER.
RURAL AREA.
VEGETATION.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10174.

- HORIZON/HRZ 6/MSS6//
CANAL.COASTAL DUNE.COASTAL MARSH.CUMULUS.
ESTUARY.
HARBOR.
INDUSTRIAL AREA.
JETTY.
MEANDER.
SCATTERED CLOUDS.
URBAN AREA.
VALLEY.
VEGETATION.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10174.

- HORIZON/HRZ 7/MSS7//
AGRICULTURE.
CANAL.COASTAL MARSH.CUMULUS.
ESTUARY.
HARBOR.
INDUSTRIAL AREA.
JETTY.
MEANDER.
RURAL AREA.
SCATTERED CLOUDS.
URBAN AREA.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10174.

- HORIZON/HRZ 10//
10.JULY.1973.
1352-10174.

PROFIL/NO 28/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
AGRICULTURE.
DECIDUOUS.
ESTUARY.
FAULT.
GRASSLAND.
MEANDER.
RURAL AREA.
URBAN AREA.
VEGETATION.
1352-10181.

- HORIZON/HRZ 5/MSS5//
AGRICULTURE.
DECIDUOUS.
ESTUARY.
FAULT.
GRASSLAND.
MEANDER.
RURAL AREA.
URBAN AREA.
VALLEY.
VEGETATION.
1352-10181.

- HORIZON/HRZ 6/MSS6//
AGRICULTURE.
COAST LINE.
ESTUARY.
FAULT.
INDUSTRIAL AREA.
MEANDER.
RURAL AREA.
URBAN AREA.
VALLEY.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10181.

- HORIZON/HRZ 7/MSS7//
AGRICULTURE.
COAST LINE.
ESTUARY.
FAULT.
INDUSTRIAL AREA.
MEANDER.
RURAL AREA.
URBAN AREA.
VALLEY.
EXCELLENT EXAMPLE OF KEYWORD.
1352-10181.

- HORIZON/HRZ 10//
10.JULY.1973.
1352-10181.

PROFIL/NO 29/DR VERGER/FRALIT/

- HORIZON/HRZ 5/MSS5//
AGRICULTURE.
CITY.CROPLAND.
FOREST.
MEANDER.
VALLEY.
VEGETATION.
1353-10235.

- HORIZON/HRZ 7/MSS7//
AGRICULTURE.
CITY.CROPLAND.
FOREST.
MEANDER.
VALLEY.
1353-10235.

- HORIZON/HRZ 10//
11.JULY.1973.
1353-10235.

PROFIL/NO 30/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
AGRICULTURE.
COASTAL PLAIN.CONIFER.
FOREST.
ROAD.
LAKE.LITTORAL TRANSPORT.
URBAN AREA.
VALLEY.
VEGETATION.VINEYARD.
1353-10242.

- HORIZON/HRZ 5/MSS5//
AGRICULTURE.
COASTAL PLAIN.CONIFER.
FOREST.
ROAD.
LAKE.LITTORAL TRANSPORT.
URBAN AREA.
VALLEY.
VEGETATION.VINEYARD.
1353-10242.

- HORIZON/HRZ 6/MSS6//
COASTAL PLAIN.COAST LINE.CONIFER.
LAKE.LITTORAL TRANSPORT.
TIDAL FLAT.
VALLEY.
1353-10242.

- HORIZON/HRZ 7/MSS7//
COASTAL PLAIN.COAST LINE.CONIFER.
LAKE.LITTORAL TRANSPORT.
TIDAL FLAT.
VALLEY.
1353-10242.

- HORIZON/HRZ 10//
11.JULY.1973.
1353-10242.

PROFIL/NO 31/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
AGRICULTURE.
CAPE.COASTAL CURRENT.COASTAL DUNE.COASTAL MARSH.
ESTUARY.
FOREST.
ISLAND.
LITTORAL TRANSPORT.
SALT MARSH.SHALLOW WATER.
1353-10244.

- HORIZON/HRZ 5/MSS5//
BAY.
COASTAL MARSH.
DUNE.
ESTUARY.
MARSH.
SALT MARSH.SEA.
TIDAL FLAT.
VALLEY.
EXCELLENT EXAMPLE OF KEYWORD.
1353-10244.

- HORIZON/HRZ 6/MSS6//
COASTAL MARSH.
DAM.DUNE.
ESTUARY.
FOREST.
LAKE.
RURAL AREA.
SEA.
VALLEY.
1353-10244.

- HORIZON/HRZ 7/MSS7//
COASTAL MARSH.
DUNE.
ESTUARY.
FOREST.
RURAL AREA.
SEA.
URBAN AREA.
VALLEY.
1353-10244.

- HORIZON/HRZ 10//
11.JULY.1973.
1353-10244.

PROFIL/NO 32/DR VERGER/FRALIT/

- HORIZON/HRZ 4/MSS4//
COASTAL DUNE.
ESTUARY.
FOREST.
LAKE.
MARSH.
SALT MARSH.SUBURBAN AREA.
1353-10251.

- HORIZON/HRZ 5/MSS5//
COASTAL DUNE.CUMULUS.
ESTUARY.
FOREST.
SUBURBAN AREA.
VINEYARD.
1353-10251.

- HORIZON/HRZ 6/MSS6//
ALLUVIAL PLAIN.
CAPE.COASTAL DUNE.CROPLAND.
DUNE.
ESTUARY.
FOREST.
RURAL AREA.
SALT MARSH.
TIDAL FLAT.
1353-10251.

- HORIZON/HRZ 7/MSS7//
CAPE.COASTAL DUNE.
DUNE.
ESTUARY.
FOREST.
RURAL AREA.
SALT MARSH.
URBAN AREA.
EXCELLENT EXAMPLE OF KEYWORD.
1353-10251.

- HORIZON/HRZ 10//
11.JULY.1973.
1353-10251.

Translated output in a foreign language is obtained by means of the reference number to the equivalent repertoire (e.g. the 150175 repertoire). All other control cards remain unchanged.

SYSTEM AND PROGRAM CONTROL CARDS

TRANSLATE IMAGE DESCRIPTIONS

```
        1         2         3         4         5         6
123456789012345678901234567890123456789012345678901234567890123456789012
"RUN,G ORSIDA,TP0160,ORSTOM                                  .026 OR 029
"ASG,T ENTREE.,8C,155L                                        OR 175L
"ASG,T SORTIE.,8C,175E                                        AND 155E
"XQT DGX.DGX
*150175
*DONNEE/P/
                                        IN COL. 11-14  LEFT-JUSTIFIED
                                              C A S E    N U M B E R
                                          ONE CARD FOR EACH CASE
*FIN
"FIN
```

To delete image descriptions, use the following system and program control cards:

DELETE IMAGE DESCRIPTIONS

```
        1         2         3         4         5         6
123456789012345678901234567890123456789012345678901234567890123456789012
"RUN,C ORSIDA,TP0160,ORSTOM                                  026 OR 029
"ASG,T ENTREE.,8C,175L                                        OR 155L
"ASG,T SORTIE.,8C,155E                                        AND 175E
"XQT DGX.DGX
*140174
*DONNEE/A/
                                        IN COL. 11-14  LEFT-JUSTIFIED
                                              C A S E    N U M B E R
                                          ONE CARD FOR EACH CASE
*FIN
"FIN
```

To insert 32 cases or ERTS image descriptor FORMS requires 30 seconds CPU and approximately 400 cards. To be more precise, only 119 image descriptions and 25 complete spatial and temporal referencing records were inserted (no RBV was available, because the ERTS Catalog, which is used for geographical coordinates, was not the most recent (May 31, 1973)). Printing CPU time or tanslation time is faster: 19 seconds.

Chapter 6

The Descriptors Program

by

A. Giey, Régie Informatique, Paris, 1969

---

12 seconds CPU compilation time
69 K
5 Fastrand tracks
stored on tape No 5755, file No 16

	ELEMENTNAME	VERSION	TYPE	instructions
I	LGX	DONNEE	FOR SYMB	62
J	KREAD	DONNEE	FOR SYMB	48
K	KCONTR		FOR SYMB	67
L	PROFIL		FOR SYMB	59
M	HORIZN		FOR SYMB	115
B	INIT		see chapter 4	
C	LSVIO		see chapter 4	
G	MTRANS		see chapter 4	
H	PRINT		see chapter 4	

```
      COMMON                KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER OUTBUF,DICTIO
      DIMENSION KZONE(510)
      INTEGER RJCTR,RJPRF,RJHRZ,ANNUL
      NERROR=1                                                    6 2
      CALL INIT(1)
      ANNUL=KREAD(0)
      CALL IOD(0,0,0,1,0,5,RJCTR)
      IF(RJCTR)500,20,500
20    CALL KCONTR(ANNUL,INSERT,NOPRF,NOHRZ,RJCTR)
      CALL PRINTE(0,0,4)
      RJPRF=0
      RJHRZ=0
      NUMPRF=0
      IF(RJCTR-2)25,300,25
25    I=KREAD(0)
      IF(RJCTR)50,30,50
30    IF(IRUPT-4)50,40,50
40    KZONE(2)=0
      CALL IOD(KZONE(1),ANNUL,INSERT,NOPRF,NOHRZ,1,RJCTR)
50    CALL PRINTE(RJCTR,0,2)
      IF(RJCTR)55,60,55
52    INDEXC=81
      I=KREAD(0)
55    IF(IRUPT-4)52,60,52
60    GOTO(80,90,190,20),IRUPT
80    RJPRF=1
      GOTO100
90    RJPRF=0
100   CALL PRINTE(0,0,3)
110   CALL PROFIL(NUMERO,KZONE(1))
      IF(NUMERO)125,125,115
115   IF(NOPRF)116,118,116
116   IF(NUMERO-NOPRF)125,118,125
118   IF(IRUPT-3)125,130,120
120   IF(NOPRF)130,125,130
125   RJPRF=1
130   IF(RJCTR+RJPRF)140,135,140
135   CALL IOD(KZONE(1),ANNUL,INSERT,NOPRF,NOHRZ,1,RJPRF)
140   CALL PRINTE(RJCTR+RJPRF,0,2)
      NUMPRF=NUMERO
180   IF(IRUPT-3)60,200,60
190   CALL PRINTE(0,0,3)
200   RJHRZ=0
      CALL HORIZN(NUMERO,KZONE(1),NERRHZ)
      IF(NUMERO)210,205,210
205   RJHRZ=1
210   IF(NOPRF)215,220,215
215   NUMPRF=NOPRF
220   IF(RJCTR+RJPRF+RJHRZ)240,230,240
230   CALL IOD(KZONE(1),ANNUL,INSERT,NUMPRF,NOHRZ,1,RJHRZ)
240   CALL PRINTE(RJCTR+RJPRF+RJHRZ,NERRHZ,2)
      GOTO180
300   CALL IOD(0,0,0,0,0,2,0)
      CALL PRINTE(0,0,3)
      STOP
500   NERROR=NERROR+1
      PRINT550,NERROR
550   FORMAT(//8H ERROR  ,1I2)
      STOP
      END
```

```
      FUNCTION KREAD(N)
      COMMON                KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER OUTBUF,DICTIO
      IRUPT=1
      IF(81-INDEXC)1,1,20
1     READ2,(KCARTE(J),J=1,80)
2     FORMAT(80R1)
      IF(KAFLD)4,9,4
9     DO3J=1,80
      M=KCARTE(J).AND.63
3     KCARTE(J)=KARACT(M+1)
4     DO5J=1,80
      IF(KCARTE(J)-48)6,5,6
5     CONTINUE
      GOTO1
6     IF(KCARTE(1)-44)11,7,11
7     M=0
      DO8J=2,7
8     M=M*(2**6)+KCARTE(J)
      IF(M-((((20*64+38)*64+37)*64+37)*64+21)*64+21))80,10,80
80    IF(M-((((22*64+25)*64+37)*64+48)*64+48)*64+48))18,10,18
10    IRUPT=4
      GOTO18
11    IF(KCARTE(1)-32)15,12,15
12    M=0
      DO120J=2,6
120   M=M*(2**6)+KCARTE(J)
      IF(M-(((48*64+24)*64+38)*64+41)*64+25))15,13,15
13    M=0
      DO130J=7,10
130   M=M*(2**6)+KCARTE(J)
      IF(M-((57*64+38)*64+37)*64+49))18,14,18
14    IRUPT=3
      GOTO18
15    IF(KCARTE(1)-39)18,16,18
16    M=0
      DO160J=2,6
160   M=M*(2**6)+KCARTE(J)
      IF(M-(((41*64+38)*64+22)*64+25)*64+35))18,17,18
17    IRUPT=2
18    INDEXC=INDEXC-80
20    KREAD=KCARTE(INDEXC)
      INDEXC=INDEXC+N
      IF(81-INDEXC)21,21,22
21    CALL PRINTE(0,0,5)
22    RETURN
      END

      SUBROUTINE KCONTR(ANNUL,INSERT,NOPRF,NOHRZ,ERR)
      COMMON                KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER OUTBUF,DICTIO
      INTEGER ANNUL,ERR
      ERR=0
      NOPRF=0
      NOHRZ=0
      INDCAR=48
      M=0
      DO10J=1,5
10    M=M*64+KCARTE(J)
      IF(M-((((44*64+20)*64+38)*64+37)*64+37))320,20,320
20    IF((KCARTE(6)*64+KCARTE(7))*64+KCARTE(8)-((21*64+21)*64+49))
     1300,30,300
30    INSERT=1
      ANNUL=1
```

```
      IF(KCARTE(9)-36)40,80,40
40    IF(KCARTE(9)-25)60,50,60
50    ANNUL=0
      GOTO80
60    IF(KCARTE(9)-17)65,75,65
65    IF(KCARTE(9)-39)300,70,300
70    ANNUL=0
75    INSERT=0
80    DO100J=10,79
      IF(KCARTE(J)-48)90,100,90
90    IF(KCARTE(J)-49)300,110,300
100   CONTINUE
      GOTO310
110   J=J+1
      DO130M=J,79
      IF(KCARTE(M)-48)120,130,120
120   IF(KCARTE(M)-49)140,300,140
130   CONTINUE
      GOTO310
140   DO170J=M,79
      IF(KCARTE(J)-48)150,180,150
150   IF(KCARTE(J)-49)160,180,160
160   IF(9-KCARTE(J))300,170,170
170   NOPRF=NOPRF*64+KCARTE(J)
      GOTO290
180   DO200M=J,79
      IF(KCARTE(M)-48)190,200,190
190   IF(KCARTE(M)-49)300,210,300
200   CONTINUE
      GOTO290
210   M=M+1
      DO230J=M,79
      IF(KCARTE(J)-48)220,230,220
220   IF(KCARTE(J)-49)240,300,240
230   CONTINUE
      GOTO290
240   DO270M=J,80
      IF(KCARTE(M)-48)250,280,250
250   IF(KCARTE(M)-49)260,280,260
260   IF(9-KCARTE(M))300,270,270
270   NOHPZ=NOHR7*64+KCARTE(M)
280   IF(2**6-NOHRZ)300,290,290
290   IF(2**30-NOPRF)300,300,310
300   ERR=1
310   INDEXC=81
      RETURN
320   IF(M-(((44*64+22)*64+25)*64+37)*64+48))300,330,300
330   ERR=2
      GOTO310
      END


      SUBROUTINE PROFIL(NUMERO,KZONE)
       COMMON                KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER OUTBUF,DICTIO
      DIMENSION KZONE(510)
      INTEGER CARACT
      INDCAR=49
      KZONE(1)=0
      KZONE(2)=0
      IND=1
      CARACT=KCARTE(1)
      INDEXC=2
      DO280I=3,510
      KZONE(I)=0
      DO270K=1,6
```

```
      KZONE(I)=KZONE(I)*(2**6)+CARACT
      KZONE(1)=KZONE(1)+1
      CARACT=KREAD(1)
      IF(IRUPT-2)60,60,300
60    GOTO(70,100,170,190,220),IND
70    IF(CARACT-49)270,80,270
80    IND=2
      GOTO270
90    CARACT=KREAD(1)
100   IF(CARACT-48)110,90,110
110   IF(CARACT-49)120,90,120
120   IF(IRUPT-2)140,140,300
140   IF(CARACT-37)150,160,150
150   IND=1
      GOTO270
160   IND=3
      GOTO270
170   IF(CARACT-38)150,180,150
180   IND=4
      GOTO270
190   IF(CARACT-48)210,270,210
210   IND=5
220   IF(CARACT-48)230,150,230
230   IF(CARACT-49)240,80,240
240   IF(9-CARACT)250,260,260
250   KZONE(2)=0
      GOTO150
260   KZONE(2)=KZONE(2)*(2**6)+CARACT
270   CONTINUE
280   CONTINUE
290   NUMERO=0
      RETURN
300   IF(IND-2)290,310,290
310   NUMERO=KZONE(2)
      IF(2**30-NUMERO)290,290,320
320   I=(KZONE(1)-1)/6+1
      K=6*I-KZONE(1)
      KZONE(1)=I+2
      IF(K)325,340,325
325   DO330J=1,K
330   KZONE(I+2)=KZONE(I+2)*(2**6)+48
340   KZONE(2)=KZONE(2)+2**30
      RETURN
      END

      SUBROUTINE HORIZN(NUMERO,KZONE,NERRHZ)
      COMMON                KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER OUTBUF,DICTIO
      DIMENSION KZONE(510),KINTER(25)
      EQUIVALENCE(DICTIO(6),NBVARI)
      INTEGER CARACT
      INDCAR=48
      NERRHZ=0
      KZONE(1)=1
      KZONE(2)=0
      IND=1
      CARACT=KCARTE(1)
      INDEXC=2
      DO320I=3,14
      KZONE(I)=0
      DO310K=1,6
      KZONE(I)=KZONE(I)*(2**6)+CARACT
50    CARACT=KREAD(1)
      IF(IRUPT-1)60,60,330
60    GOTO(70,80,340,110,170,180,190,220),IND
```

```
70    IF(CARACT-49)310,300,310
80    IF(CARACT-49)90,300,90
90    IND=4
      GOTO110
100   CARACT=KREAD(1)
110   IF(CARACT-48)140,100,140
140   IF(IRUPT-1)150,150,330
150   IF(CARACT-24)160,300,160
160   IND=1
      GOTO70
170   IF(CARACT-41)160,300,160
180   IF(CARACT-57)160,300,160
190   IF(CARACT-48)210,310,210
210   IND=8
220   IF(CARACT-48)230,160,230
230   IF(CARACT-49)240,160,240
240   IF(9-CARACT)250,260,260
250   KZONE(2)=0
      GOTO160
260   KZONE(2)=KZONE(2)*(2**6)+CARACT
      GOTO310
300   IND=IND+1
310   KZONE(1)=KZONE(1)+1
320   CONTINUE
      KZONE(2)=0
      GOTO340
330   NUMERO=0
      RETURN
340   NUMERO=KZONE(2)
      IF(NUMERO-2**6)360,360,350
350   NUMERO=0
360   I=(KZONE(1)-1)/6+1
      K=6*I-KZONE(1)
      I=I+2
      IF(K)365,375,365
365   DO370J=1,K
370   KZONE(I)=KZONE(I)*(2**6)+48
375   KZONE(1)=I+NBVARI
      DO380K=1,NBVARI
380   KZONE(I+K)=(((48*64+48)*64+48)*64+32)*64+1
      CARACT=KREAD(81-INDEXC)
      CALL PRINTE(0,0,1)
      INDCAR=27
400   CARACT=KREAD(1)
      IF(CARACT-48)410,400,410
410   IF(CARACT-27)420,400,420
420   IF(IRUPT-1)620,430,620
430   NC=1
      DO440J=1,25
440   KINTER(J)=0
      IND=0
      DO510J=1,25
      DO500K=1,6
      KINTER(J)=KINTER(J)*(2**6)+CARACT
450   CARACT=KREAD(1)
      IF(IRUPT-1)460,460,455
455   NERRHZ=NERRHZ+1
      NUMERO=0
      GOTO620
460   IF(IND)465,470,465
465   IND=0
      IF(CARACT-48)490,450,490
470   IF(CARACT-48)490,480,490
480   IND=1
      GOTO500
490   IF(CARACT-27)500,520,500
```

```
500   NC=NC+1
510   CONTINUE
520   J=DICTIO(4)
      DO580K=1,NBVARI
530   IF(DICTIO(J+1)-NC)540,560,540
540   J=J+(DICTIO(J+1)-1)/6+3
      IF(J-DICTIO(5))550,580,580
550   IF(J-DICTIO(8+2*K))530,580,530
560   L=(DICTIO(J+1)-1)/6+1
      DO570M=1,L
      IF(DICTIO(J+M+1)-KINTER(M))540,570,540
570   CONTINUE
      GOTO590
580   CONTINUE
      NERRHZ=NERRHZ+1
      KCARTE(INDEXC-1)=11
      IERR=17
      GOTO400
590   IF(KZONE(I+K)-((((48*64+48)*64+48)*64+32)*64+1))600,610,600
600   NERRHZ=NERRHZ+1
      KCARTE(INDEXC-1)=11
      IERR=17
      KZONE(I+K)=17*(2**30)+KZONE(I+K)
      GOTO400
610   KZONE(I+K)=DICTIO(J)
      GOTO400
620   RETURN
      END
```

Chapter 7

Image Selection

In the preceding chapters we have seen how the two magnetic tapes were loaded, in flip-flop mode, with the repertoire and the first bundle of descriptions. One tape is now used for retrieval. Retrieval is performed by the selection program on the basis of a Boolean expression containing whatever appears in the repertoire: descriptors in plain language or in code; spatial and temporal referencing; identification numbers, etc.

Relationships, operations, variables, data, are the four terms associated in the Boolean expression. The separator is a period.

Relationships.

Six types of relationship are available:

greater than	code PG
less than	code PP
greater than or equal to	code GE
less than or equal to	code PE
equal to	code EG
not equal to	code IG

Operations.

Two operators:	and	code ET
	or	code OU

Variables.

The list of descriptors is offering a wide range of selection procedures. Apart from geographical selection within an area formed by two longitudes and two latitudes (expressed in degrees Greenwich and minutes) and, apart from simple case selection, the descriptors

ACCLINAL VALLEY
ACTIVE GLACIER
ACTIVE VOLCANO
ACTINIFORM CLOUDS
ADOBE FLAT
ADVANCING GLACIER
ADVANCING SHORELINE
AERIAL IMAGERY USED
AGRICULTURE
AIRFIELD
ALFALFA
ALGAL BLOOM
ALLUVIAL CONE
ALLUVIAL FAN
ALLUVIAL FLAT
ALLUVIAL PLAIN
ALLUVIAL TERRACE
ALTOCUMULUS
ALTOSTRATUS
ANACLINAL STREAM
ANACLINAL VALLEY
ANNULAR DRAINAGE PATTERN
ANTICLINAL MOUNTAIN
ANTICLINAL VALLEY
ANTICLINE
ANTICLINORIUM
ANVILS
AQUIFER
ARROYO
ATOLL
ATOLL REEF
AVALANCHE
AVALANCHE SCAR
AXIAL STREAM
BACK BAY
BACKSHORE
BADLAND
BAJADA
BARBED TRIBUTARY
BARCHAN
BARLEY
BARRENS
BARRIER BAR
BARRIER BEACH
BARRIER FLAT
BARRIER ISLAND
BARRIER LAGOON
BARRIER LAKE
BARRIER REEF
BASIN
BASIN AND RANGE
BATHOLITH
BAY
BAY-HEAD BAR
BAY-HEAD BEACH
BAY-HEAD DELTA
BAY ICE
BAYMOUTH BAR
BAYOU
BED
BEDROCK
BELT
BELTED PLAIN
BILLOW
BILLOW CLOUD
BIOLUMINESCENCE
BIRD-FOOT DELTA
BRAIDED STREAM
BRIDGE
BROKEN CLOUDS
BRUSH
BUTTE
CALDERA
CANAL
CAPE
CARTOGRAPHY
CATCHMENT AREA
CAY
CHAOTIC CLOUD PATTERN
CHAPERRAL
CINDER CONE
CIRQUE
CIRROCUMULUS
CIRROSTRATUS
CIRRUS
CIRRUS SHIELD
CITRUS
CITY
CLEARING
CLOSED BASIN
CLOSED FAULT
CLOSED FOLD
CLOUD STREETS
COAST
COASTAL CURRENT
COASTAL DUNE
COASTAL MARSH
COASTAL PLAIN
COAST LINE
COLD FRONT
CONE
CONIFER
CONSEQUENT LAKE
CONSEQUENT STREAM
CONSEQUENT VALLEY
CONTACT
CONTINENTAL SHELF
COPSES
CORAL READ
CORAL REEF
CORN
COTTON
COULEE
CRATER
CROPLAND
CROSS-BEDDING
CROSS-FAULT
CUESTA
CUMULONIMBUS
CUMULUS
CURRENT
CUSP
CYCLONE
DAM
DECIDUOUS
DELTA
DELTAIC COASTAL PLAIN
DENDRITIC DRAINAGE
DEPRESSION
DESERT
DESERTLINE
DIKE
DISEASED VEGETATION
DIVIDE
DOME
DORMANT VEGETATION
DROUGHT CONDITIONS
DRUMLIN
DUNE
EARTHQUAKE DAMAGE
ECHELON FAULT
EDDY
SYNCLINE
END MORAINE
ENTRENCHED STREAM
EROSION
ESKER
ESTUARY
FALL LINE
FALLOW FIELD
FAN
FAULT
FINGER LAKE
FIORD
FIRE
FIREBREAK
FIRE DAMAGE
FLOOD
FLOOD DAMAGE
FLOODPLAIN
FOG
FOLD
FOREST
FOREST FIRE
FOREST FIRE DAMAGE
FROST DAMAGE
FRONTAL WAVE
FROZEN LAKE
FROZEN SOIL
GAP
GEOFRACTURE
GEOGRAPHY
GEOLOGY
GEOSYNCLINE
GLACIER
GRABEN
GRASS
GRASSLAND
GRAVEL DEPOSIT
GROUND TRUTH USED
GULF
HARBOR
HARDWOOD FOREST
HAY
HAZE
ROAD
HOGBACK
HORST
HOURGLASS VALLEY
HURRICANE
HURRICANE DAMAGE
HYDROLOGY
ICE
ICEBERG
ICE FLOE
ICE JAM
ICE PACK
ICE SHELF

INDUSTRIAL AREA
INLET
INLIER
INSECT DAMAGE
INSHORE ZONE
INSEQUENT STREAM
INTERLACING DRAINAGE
INTERMONTANE FLOOR
INTRUSION
IPRIGATION
ISLAND
ISLAND ARC
ISTHMUS
JET STREAM INDICATED
JETTY
KAME
KARST
KELP
KETTLE
KLIPPE
LAGOON
LAKE
LAKE BED
LANDSLIDE
LATERITE
LATTICE DRAINAGE PATTERN
LAVA
LEE WAVE
LINEAMENT
LITTORAL CURRENT
LITTORAL DRIFT
LITTORAL TRANSPORT
LOCUST SWARM
LOCUST DAMAGE
LONGSHORE BAR
LONGSHORE CURRENT
LUMBERING AREA
MAAR
MARSH
MASSIF
MATURE STREAM
MATURE VEGETATION
MEADOWLAND
MEANDER
METEOR CRATER
METEOROLOGY
METROPOLITAN AREA
MICROWAVE DATA USED
MILLET
MINE
MONOCLINAL VALLEY
MORAINAL DELTA
MORAINAL LAKE
MORAINE
MOUNTAIN
MUD
MUD FLAT
MUSKEG
NAPPE
NUNATAK
OASIS
OATS
OCCLUDED FRONT
OCEANOGRAPHY
OIL FIELD
OIL SLICK
OPEN PIT MINE
ORCHARD
OROGRAPHIC CLOUD
OUTLET
OUTLIER
OUTWASH PLAIN
PARALLEL DRAINAGE
PARK
PASTURE
PEDIMENT
PEDIPLAIN
PENEPLAIN
PENINSULA
PERMAFROST
PIEDMONT
PIEDMONT PLAIN
PIEDMONT SCARP
PINNACLE
PLAIN
PLANKTON BLOOM
PLATEAU
PLAYA
PLAYA LAKE
PLOWED FIELD
POTATOES
PRAIRIE
PRESSURE RIDGE
PROTOZOANS
QUARRY
RADIAL DRAINAGE PATTERN
RAILROAD
RAIN FOREST
RAISED REEF
RANGELAND
RAPIDS
RECTANGULAR DRAINAGE
RED TIDE
REEF
RESIDENTIAL AREA
RETROGRESSIVE SHORELINE
RICE
RIDGE
RIFT
RIFT VALLEY
RIVER
RUNOFF
RURAL AREA
RUST
SALINE DOME
SALINE SOIL
SALT
SALT FLAT
SALT MARSH
SAVANNAH
SCAR
SCATTERED CLOUDS
SCRUB
SEA
SEA GRASS
SEA WALL
SECONDARY FRONT
SEDIMENT
SHALLOW WATER
SHIELD
SHIPYARD
SHOAL
SILT
SINK
SLASH
SLICK
SMOG
SMOKE
SNOW
SNOW PACK
SOIL
SOYBEAN
SPLIT
SPRING
SQUALL LINE
STATIONARY FRONT
STEP FAULT
STEPPE
STOSS-AND-LEE TOPOGRAPHY
STRAIT
STRATH
STREAM
SUBURBAN AREA
SUGAR BEET
SUGAR CANE
SYNCLINAL VALLEY
SYNCLINORIUM
TERRACE
TIDAL FLAT
TIDAL WAVE
TIDAL WAVE DAMAGE
THRUST FAULT
TIMBERLINE
TOBACCO
TOMBOLO
TORNADO
TORNADO DAMAGE
TOWERING CUMULI
TRANSVERSE FAULT
TRANSVERSE VALLEY
TRELLISED DRAINAGE
TRENCH
TRIBUTARY
TSUNAMI
TSUNAMI DAMAGE
TUNDRA
TYPHOON
TYPHOON DAMAGE
UPWELLING
URBAN AREA
VALLEY
VEGETATION
VINEYARD
VOLCANO
WARM FRONT
WAVE

DAY
MONTH
YEAR
DEG N
DEG S
MIN N
MIN S
DEG E
DEG W
MIN E
MIN W
CASE

themselves may be used in the Boolean expression. The variables appear, therein, in plain language or in code and the two modes may be mixed.

Data.

Data also is in numerical code or in plain language. Input tape for selection has codes 1 for all descriptors really used in the descriptions. Therefore, a condition for selection is indifferently written

descriptor = 1

or same descriptor ≠ -1

to select all images with this descriptor.

Example: DUNE.EG.1.

For more than one descriptor, the conditions are linked by OU

first descriptor = 1

OU second descriptor = 1

OU third descriptor = 1

to select all images with all three descriptors.

Example: DUNE.EG.1.OU.CONIFER.EG.1.OU.DECIDUOUS.EG.1.

The triplet 'variable, relationship, data' is called a condition. Conditions are linked by operations. Operator ET has priority, as no parentheses are available. Separator is a period (full-stop sign) between variable, relationship, data, operator, variable, etc. When more than one card is needed to punch the Boolean expression, it is optional:

. to punch in col. 1 to 80 and proceed to col. 1 of next card;

. to end punching the first card after a period and commence the next card with a period.

Notice that the first card of the Boolean expression begins in col. 1 without a period.

Up to 100 conditions may be introduced in a single expression.

SYSTEM AND PROGRAM CONTROL CARDS

RETRIEVAL OF IMAGE DESCRIPTIONS

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
"RUN,J ORSIDA,TP0160,ORSTOM                              026 OR 029
"ASG,T ENTREE.,8C,175L          (or 155L)
"ASG,T 15.,8C,3886E
"XQT SGT.SGT
*140174
*TRAVAIL      alphanumeric identification of job in col. 10-80.
*386
 S E L E C T I O N  C A R D S  P U N C H E D  COL. 1-80
*FIN
"FIN
```

(PRINTED OUTPUT ON TERMINAL, TAPE OUTPUT IN COMPUTER ROOM)

Example.

Retrieval of descriptions of Dr. Verger in coded form without coordinates.

```
"RUN,J ORSGT.TP0160,ORSTOM
"ASG,T ENTREE.,8C,175L
"ASG,T 15.,8C,3886E
"XQT SGT.SGT
*140174
*TRAVAIL 1 A 32
*386
CASE.GE.CASE 1.ET.CASE.PE.CASE 32.
.ET.YEAR.EG.-1.
*FIN
"FIN
```

- Case numbers range 1 to 32.
- Data tape No 175 is used.
- Tape No 3886 for output, under logical No 15.
- Selection Program SGT in absolute form is on Fastrand.
- Repertoire No 140174
- Job identification is'32 cases are available'.
- Record has 386 binary descriptors.
- Variable name is CASE.
- First two conditions are equivalent to $1 \leq \text{Case} \leq 32$
- Third condition excludes all spatial and temporal referencing, YEAR = -1 meaning year is missing.

The Boolean expression may be written in the language of an equivalent repertoire. The repertoire control card must correspond. Printed input and output are in the same language.

Faulty selection is diagnosed by an error code number.

Error 2 Card *FIN is missing.

Error 3 The Boolean expression stops on an operator.

Error 4 The Boolean expression exceeds 100 conditions.

Error 5 One operator is wrong (e.g. and).

Error 6 Mis-spelling of data.

Error 8 Unknown variable (e.g. stratus).

Error 9 Faulty construction of the Boolean expression (e.g. priority rule neglected).

Error 10 The repertoire reference card is missing.

Simultaneous listing of the descriptions and encoding of a tape reel is standard output.

The output "card" model for tape output is in format 14I5, I4, I1, I5

14I5 for descriptors or spatial and temporal referencing

1I4 for case number

1I1 for band number or coordinates

code 1 = RBV1

2 = RBV2

3 = RBV3

4 = MSS4

5 = MSS5

6 = MSS6

7 = MSS7

8 = MSS COLOR COMPOSITE

9 = RBV COLOR COMPOSITE

0 = COORDINATES

1I5 for 'card' count

An image description loaded on tape in coded form covers 29 'cards'; as many as 1484 descriptions may be selected and loaded; card count can reach 43036. The last card of record contains the case number in col. 26-30 - which is the last variable in repertoire - and is completed with zeros in col. 35, 40, 45, 50, 55, 60, 65, 70.

Codes may be found in the repertoire.

Order of output is as follows: binary, nominal, ordinal and interval variables.

In ist actual presentation, the repertoire has only binary (descriptors) and interval variables (spatial and temporal referencing).

Tape output and printed output differ slightly in content:

. Tape output is restricted to the selected images.

. Printed output in plain language is extended to all images and coordinates of a case, when at least one image of that case is selected. The selected images are marked S in the right margin. The same printed output appears on the left and right half side of each page.

. Printed output in coded form covers only the selected first and last image, and gives the total number of selected images.

An example of printed output is given on the following pages. This is case number 15 or product 1118 - 10184 images MSS 4, 5, 6, and 7 selected. Two encoded records, out of 119, image MSS 4 of case number 1 and MSS 7 of case number 32, are indicators that tape was loaded with the entire subsample of 119 encoded image descriptions from cases 1 to 32.

PROFIL/NO 15/DR VERGER/FRALIT/

- HORIZON/HRZ 4// S
CUESTA.
DENDRITIC DRAINAGE.
FOREST.
GEOGRAPHY.
ROAD.HYDROLOGY.
MEANDER.
PLATEAU.
1118-10184.

- HORIZON/HRZ 5// S
AGRICULTURE.ALLUVIAL PLAIN.
CUESTA.
DENDRITIC DRAINAGE.
FOREST.
GEOGRAPHY.
ROAD.HYDROLOGY.
MEANDER.
PLATEAU.
RURAL AREA.
VALLEY.
1118-10184.

- HORIZON/HRZ 6// S
AGRICULTURE.
CITY.CONIFER.CROPLAND.CUESTA.
DECIDUOUS.DENDRITIC DRAINAGE.
FOREST.
GEOGRAPHY.
ROAD.HYDROLOGY.
INDUSTRIAL AREA.
MEADOWLAND.MEANDER.
PLATEAU.
RURAL AREA.
VALLEY.
VEGETATION.
1118-10184.

- HORIZON/HRZ 7// S
AGRICULTURE.
CITY.CONIFER.CORN.CROPLAND.CUESTA.
DECIDUOUS.
FOREST.
GRASSLAND.
ROAD.HYDROLOGY.
INDUSTRIAL AREA.
MEADOWLAND.MEANDER.
PLATEAU.
RURAL AREA.
VALLEY.
VEGETATION.
1118-10184.

- HORIZON/HRZ 10//
18.NOVEMBER.1972.
48DEG N.41MIN N.1DEG E.33MIN E.
1118-10184.

0	0	0	0	0	0	1	0	0	0	0	0	0	000014	1
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	2
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	3
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	4
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	5
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	6
0	0	0	0	0	0	0	0	1	0	0	0	0	000014	7
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	8
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	9
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	10
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	11
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	12
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	13
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	14
0	0	0	0	0	0	0	1	0	0	0	0	0	100014	15
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	16
0	0	0	0	0	0	1	0	0	0	0	0	0	000014	17
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	18
0	0	0	1	0	0	0	0	0	0	0	0	0	000014	19
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	20
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	21
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	22
0	0	0	0	0	0	0	0	0	1	0	0	0	000014	23
0	0	0	0	1	1	0	0	0	0	0	0	0	000014	24
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	25
0	0	0	0	0	0	0	1	0	0	0	0	0	000014	26
0	0	0	0	0	0	0	0	0	0	0	0	0	000014	27
0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-100014	28
-1	-1	-1	-1	-1	1	0	0	0	0	0	0	0	000014	29
3451														
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3423
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3424
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3425
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3426
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3427
0	0	0	0	1	0	0	0	0	0	0	0	0	000327	3428
0	0	0	0	0	0	0	0	0	0	0	1	0	000327	3429
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3430
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3431
0	0	0	0	0	0	0	0	0	0	0	0	1	000327	3432
0	0	0	0	0	0	0	1	0	0	0	0	0	000327	3433
0	0	0	0	0	0	0	0	1	0	0	0	0	000327	3434
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3435
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3436
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3437
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3438
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3439
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3440
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3441
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3442
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3443
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3444
0	0	0	1	0	0	0	0	0	1	0	0	0	000327	3445
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3446
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3447
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3448
0	0	0	0	0	0	0	0	0	0	0	0	0	000327	3449
1	0	0	0	0	0	0	1	-1	-1	-1	-1	-1	-100327	3450
-1	-1	-1	-1	-1	32	0	0	0	0	0	0	0	000327	3451

119 ENREGISTREMENTS

Chapter 8

The Selection Program

by

A. Giey, Régie Informatique, Paris, 1969

---

13 seconds CPU compilation time
80 K
7 Fastrand tracks
stored on tape No 5755, file No 16

	ELEMENTNAME	VERSION	TYPE	INSTRUCTIONS
N	LGT	SELECT	FOR SYMB	294
B	INIT		see chapter 4	
C	LSVIO		see chapter 4	
D	KREAD	REPERT	SEE chapter 4	
G	MTRANS		see chapter 4	
H	PRINT		see chapter 4	

```
      COMMON                  KARACT(64),ICARAC(64),KCARTE(80),INDEXC,
     1IRUPT,KAFLD,IERR,INDCAR,NPAGE,INBUF(511),OUTBUF(510),DICTIO(60000)
      INTEGER DICTIO,OUTBUF
      INTEGER CARACT,RESULT,CARTE
      DIMENSION KZONEP(510),KZONEH(5200),MZONE(300),CARTE(75)
      DIMENSION ITRADU(500),KZONET(500)
      EQUIVALENCE (KZONEP(1),OUTBUF(1))
      NPACK=0
      DEFINE FILE 2(43036,76,U,ID)
      NOCART=1
      NERROR=1
      INDEOF=2**34
      CALL INIT(I)
      CALL IOD (0,0,0,I,0,3,L)
      IF(L)1600,1,1000
1     CARACT=0
      DO4L=1,5
4     CARACT=CARACT*(2**6)+KREAD(1)
      IF(CARACT-((((44*64+51)*64+41)*64+17)*64+53))1500,5,1500
5     CARACT=0
      DO6L=1,4
6     CARACT=CARACT*(2**6)+KREAD(1)
      IF(CARACT-(((17*64+25)*64+35)*64+48))1500,7,1500
7     IF(KAFLD)10,8,10
8     DO9L=1,80
      J=KCARTE(L)
9     KCARTE(L)=ICARAC(J+1)
11    FORMAT(80R1)
10    INDEXC=81
      NZERO=0
      CARACT=KREAD(1)
      IF(CARACT-44)1500,12,1500
12    DO16L=1,3
      CARACT=KREAD(1)
      IF(9-CARACT)1500,14,14
14    NZERO=NZERO*10+CARACT
16    CONTINUE
      INDEXC=81
      J=1
      NBVARI=DICTIO(6)
      NCAQ=(NBVARI+0.1)/14
      NCAR=NCAQ*14
      IF(NBVARI-NCAR)851,850,851
 850  NCA=NCAQ
      GOTO 852
851   NCA=NCAQ+1
852   INX=1
13    IDECIM=0
      ASSIGN 15 TO IRET
      GOTO400
15    IF(CARACT-44)20,1500,20
20    GOTO(30,30,80),INX
30    IF(N-3)60,40,60
40    DO50K=1,NBVARI
      IF(DICTIO(5+K*2)-KZONEH(1))50,70,50
50    CONTINUE
```

```
60    IF(INX-1)1501,80,1501
70    INX=2
      GOTO120
80    INX=3
      I=DICTIO(3)
      DO110K=1,NBVARI
      IF(N-DICTIO(I))110,90,110
90    L=(N-1)/6+1
      DO100M=1,L
      IF(KZONEH(M)-DICTIO(I+M))110,100,110
100   CONTINUE
      GOTO120
110   I=I+(DICTIO(I)-1)/6+2
      GOTO1501
120   MZONE(J)=K
      ASSIGN 130 TO IRET
      GOTO400
130   IF(CARACT-44)140,1501,140
140   IF(N-2)1502,150,1502
150   K=1
      IF(KZONEH(1)-(21*64+23))160,210,160
160   K=2
      IF(KZONEH(1)-(25*64+23))170,210,170
170   K=3
      IF(KZONEH(1)-(39*64+39))180,210,180
180   K=4
      IF(KZONEH(1)-(39*64+23))190,210,190
190   K=5
      IF(KZONEH(1)-(39*64+21))200,210,200
200   K=6
      IF(KZONEH(1)-(23*64+21))1502,210,1502
210   MZONE(J+2)=K*2**18
      IDECIM=1
      ASSIGN 220 TO IRET
      GOTO400
220   IF(CARACT-44)225,1501,225
225   IF(KZONEH(1)-(32*64+1))235,230,235
230   KZONEH(1)=-1
      GOTO268
235   IF(IDECIM)240,245,240
240   IF(4-N)1503,268,268
245   K=MZONE(J)
      I=DICTIO(6+2*K)
      L=DICTIO(8+2*K)
      IF(NBVARI-K)255,250,255
250   L=DICTIO(5)
255   IF(N-DICTIO(I+1))265,258,265
258   K=(N-1)/6+1
      DO260M=1,K
      IF(KZONEH(M)-DICTIO(I+M+1))265,260,265
260   CONTINUE
      KZONEH(1)=DICTIO(I)
      GOTO268
265   I=I+(DICTIO(I+1)-1)/6+3
      IF(I-L)255,1503,1503
268   MZONE(J+1)=KZONEH(1)
      IDECIM=0
```

```
      ASSIGN 270 TO IRET
      GOTO400
270   IF(CARACT-44)280,320,280
280   IF(2-N)1504,290,1504
290   K=0
      IF(KZONEH(1)-(38*64+52))300,310,300
300   K=1
      IF(KZONEH(1)-(21*64+51))1504,310,1504
310   MZONE(J+2)=MZONE(J+2)+K
      J=J+3
      IF(300-J)1505,1505,13
320   IF(N)1506,330,1506
330   MZONE(J+2)=MZONE(J+2)+1
      NCOND=J+2
      DO340K=1,3
340   CARACT=CARACT*2**6+KREAD(1)
      IF(CARACT-(((44*64+22)*64+25)*64+37))1507,350,1507
350   K1=2**6-1
      K2=K1*2**6
      K3=K2*2**6
      NPRE=0
      DO390IRANG=1,NBVARI
      NGR=2**20
      DO380I=1,NBVARI
      K=DICTIO(5+2*I)
      K4=K.AND.K3
      K5=K.AND.K2
      K6=K.AND.K1
      K=K4+K5/2**6+K6*2**6
      IF(K-NPRE)380,380,360
360   IF(NGR-K)380,380,370
370   NGR=K
      J=I
380   CONTINUE
      NPRE=NGR
390   ITRADU(IRANG)=J
      GOTO500
400   N=0
      I=1
410   CARACT=KREAD(1)
      IF(CARACT-48)420,410,420
420   IF(CARACT-27)430,410,430
430   IF(CARACT-44)440,490,440
440   KZONEH(I)=0
      DO480K=1,6
      IF(IDECIM)450,465,450
450   IF(9-CARACT)455,465,465
455   IDECIM=0
465   KZONEH(I)=KZONEH(I)*2**6+CARACT
      N=N+1
      CARACT=KREAD(1)
      IF(CARACT-27)470,490,470
470   IF(CARACT-44)480,490,480
480   CONTINUE
      I=I+1
      GOTO440
490   GOTOIRET
```

```
500   IF(INBUF(2)-INDEOF)504,800,800
504   IF(INBUF(2)-2**30)1500,1500,506
506   N=INBUF(1)
      DO508I=1,N
508   KZONEP(I)=INBUF(I)
      K=1
      J=1
      NHRZ=0
510   K=K+N
      IF(INBUF(K))518,512,518
512   CALL IOD(0,0,0,0,0,6,L)
      IF(L)1600,514,1600
514   IF(INBUF(2)-2**7)516,530,530
516   K=1
518   N=INBUF(K)
      DO520I=1,N
520   KZONEH(J+I-1)=INBUF(K+I-1)
      J=J+N
      NHRZ=NHRZ+1
      IF(NHRZ-10)510,510,1500
530   IND=0
      IADDR=0
      DO700N=1,NHRZ
      K=KZONEH(IADDR+1)-NBVARI+IADDR
      RESULT=1
      DO600I=1,NCOND,3
      J=MZONE(I)
      MRELAT=MZONE(I+2)/2**18
      IMASK=2**24-1
      MREFER=KZONEH(K+J).AND.IMASK
      IF(MREFER-(((48*64+48)*64+32)*64+1))540,535,540
535   MREFER=-1
540   GOTO(550,551,552,553,554,555),MRELAT
550   IF(MREFER-MZONE(I+1))560,570,560
551   IF(MREFER-MZONE(I+1))570,560,570
552   IF(MREFER-MZONE(I+1))570,560,560
553   IF(MREFER-MZONE(I+1))560,560,570
554   IF(MREFER-MZONE(I+1))570,570,560
555   IF(MREFER-MZONE(I+1))560,570,570
560   RESULT=0
570   M=MZONE(I+2).AND.63
      IF(M)600,580,600
580   IF(RESULT)620,590,620
590   RESULT=1
600   CONTINUE
610   IF(RESULT)620,700,620
620   IND=1
      KZONEH(IADDR+3)=KZONEH(IADDR+3)+(50-25)
      DO625I=1,NBVARI
      J=ITRADU(I)
625   KZONET(I)=KZONEH(K+J)
      MZERO=NZERO
      DO690I=1,NBVARI,14
      DO640J=1,14
      KARAC=KZONET(I+J-1)
      DO630L=1,5
      CARTE(5*J+1-L)=KARAC.AND.63
```

```
630   KARAC=KARAC/2**6
      IF(MZERO)634,634,631
631   IF(CARTE(5*J-1)-32)634,633,634
633   CARTE(5*J-1)=48
      CARTE(5*J)=0
634   MZERO=MZERO-1
      IF(CARTE(5*J-4)-48)632,640,632
632   DO635L=1,4
      IF(CARTE(5*J-5+L))640,635,640
635   CARTE(5*J-5+L)=48
640   CONTINUE
      KARAC=KZONEP(2)
      DO650L=1,4
      CARTE(75-L)=KARAC.AND.63
650   KARAC=KARAC/2**6
      CARTE(75)=KZONEH(IADDR+2).AND.63
      IF(KAFLD)680,660,680
660   DO670J=1,75
      L=CARTE(J)
670   CARTE(J)=ICARAC(L+1)
680   WRITE(15,685)CARTE,NOCART
      WRITE(2'NOCART)CARTE,NOCART
685   FORMAT(75R1,I5)
690   NOCART=NOCART+1
      IF(NOCART.GT.43036)GOTO 800
700   IADDR=IADDR+KZONEH(IADDR+1)
      IF(IND)710,500,710
710   CALL PRINTE(0,0,3)
      CALL PRINTE(KZONEP(1),0,6)
      K=1
      DO750N=1,NHRZ
      CALL PRINTE(KZONEH(K),0,6)
750   K=K+KZONEH(K)
      GOTO500
800   WRITE(6,830)
830   FORMAT(1H1)
      DO 693 IJ=1,NCA
      READ(2'IJ)CARTE,NOC
693   WRITE(6,695)CARTE,NOC
695   FORMAT(1X,75R1,I5)
      NOCART=NOCART-1
      WRITE(6,840)NOCART
840   FORMAT(1X,I4)
      NCP=NOCART
      NCM=NOCART-NCA+1
      DO 810 IJ=NCM,NCP
      READ(2'IJ)CARTE,NOC
810   WRITE(6,695)CARTE,NOC
      NEN=(NOCART+0.1)/NCA
      WRITE(6,820)NEN
820   FORMAT(1H1,I4,' ENREGISTREMENTS')
      STOP
1000  NERROR=NERROR+1
1500  NERROR=NERROR+1
1501  NERROR=NERROR+1
1502  NERROR=NERROR+1
1503  NERROR=NERROR+1
```

```
1504   NERROR=NERROR+1
1505   NERROR=NERROR+1
1506   NERROR=NERROR+1
1507   NERROR=NERROR+1
       PRINT1520,NERROR
1520   FORMAT(//8H ERREUR ,I2)
       STOP
1600   PRINT1610
1610   FORMAT(//10H ERREUR ES)
       END
```

Chapter 9

Cross-tabulation of descriptors with bands

Selection output tape is used, under logical tape number 15, with program BMD08D received from the U.C.L.A. Health Sciences Computing Facility ten years ago (W. J. Dixon, ed.; 1964).

Faced with a single nominal base variable (band) and a large number of binary variables (descriptors), we use program BMD08D to compute two-way frequency tables of the form:

	all bands 1 2 ... 9	row totals
a given descriptor present 1 absent 0	frequencies of images	
column totals		grand total

The program does this on no more than 1484 image descriptions and 10 well choosen and labeled descriptors, under control of 1 to 10 I-type format cards.

Punching these format cards requires an annotated copy of the descriptors reference list subdivided into the 29 'cards' of selection output. We have seen that the band number appears in column 75 of all 'cards'.

Dixon, W. J. ed. (1964). BMD Biomedical Computer Programs. First edition. U.C.L.A., Los Angeles.

ACCLINAL VALLEY (card 1)
ACTIVE GLACIER
ACTIVE VOLCANO
ACTINIFORM CLOUDS
ADOBE FLAT
ADVANCING GLACIER
ADVANCING SHORELINE
AERIAL IMAGERY USED
AGRICULTURE
AIRFIELD
ALFALFA
ALGAL BLOOM
ALLUVIAL CONE
ALLUVIAL FAN

ALLUVIAL FLAT (card 2)
ALLUVIAL PLAIN
ALLUVIAL TERRACE
ALTOCUMULUS
ALTOSTRATUS
ANACLINAL STREAM
ANACLINAL VALLEY
ANNULAR DRAINAGE PATTERN
ANTICLINAL MOUNTAIN
ANTICLINAL VALLEY
ANTICLINE
ANTICLINORIUM
ANVILS
AQUIFER

ARROYO (card 3)
ATOLL
ATOLL REEF
AVALANCHE
AVALANCHE SCAR
AXIAL STREAM
BACK BAY
BACKSHORE
BADLAND
BAJADA
BARBED TRIBUTARY
BARCHAN
BARLEY
BARRENS

BARRIER BAR (card 4)
BARRIER BEACH
BARRIER FLAT
BARRIER ISLAND
BARRIER LAGOON
BARRIER LAKE
BARRIER REEF
BASIN
BASIN AND RANGE
BATHOLITH
BAY
BAY-HEAD BAR
BAY-HEAD BEACH
BAY-HEAD DELTA

BAY ICE (card 5)
BAYMOUTH BAR
BAYOU
BED
BEDROCK
BELT
BELTED PLAIN
BILLOW
BILLOW CLOUD
BIOLUMINESCENCE
BIRD-FOOT DELTA
BRAIDED STREAM
BRIDGE
BROKEN CLOUDS

BRUSH (card 6)
BUTTE
CALDERA
CANAL
CAPE
CARTOGRAPHY
CATCHMENT AREA
CAY
CHAOTIC CLOUD PATTERN
CHAPERRAL
CINDER CONE
CIRQUE
CIRROCUMULUS
CIRROSTRATUS

CIRRUS (card 7)
CIRRUS SHIELD
CITRUS
CITY
CLEARING
CLOSED BASIN
CLOSED FAULT
CLOSED FOLD
CLOUD STREETS
COAST
COASTAL CURRENT
COASTAL DUNE
COASTAL MARSH
COASTAL PLAIN

COAST LINE (card 8)
COLD FRONT
CONE
CONIFER
CONSEQUENT LAKE
CONSEQUENT STREAM
CONSEQUENT VALLEY
CONTACT
CONTINENTAL SHELF
COPSES
CORAL READ
CORAL REEF
CORN
COTTON

COULEE (card 9)
CRATER
CROPLAND
CROSS-BEDDING
CROSS-FAULT
CUESTA
CUMULONIMBUS
CUMULUS
CURRENT
CUSP
CYCLONE
DAM
DECIDUOUS
DELTA

DELTAIC COASTAL PLAIN
DENDRITIC DRAINAGE
DEPRESSION (card 10)
DESERT
DESERTLINE
DIKE
DISEASED VEGETATION
DIVIDE
DOME
DORMANT VEGETATION
DROUGHT CONDITIONS
DRUMLIN
DUNE
EARTHQUAKE DAMAGE

ECHELON FAULT (card 11)
EDDY
SYNCLINE
END MORAINE
ENTRENCHED STREAM
EROSION
ESKER
ESTUARY
FALL LINE
FALLOW FIELD
FAN
FAULT
FINGER LAKE
FIORD

FIRE (card 12)
FIREBREAK
FIRE DAMAGE
FLOOD
FLOOD DAMAGE
FLOODPLAIN
FOG
FOLD
FOREST
FOREST FIRE
FOREST FIRE DAMAGE
FROST DAMAGE
FRONTAL WAVE
FROZEN LAKE

FROZEN SOIL (card 13)
GAP
GEOFRACTURE
GEOGRAPHY
GEOLOGY
GEOSYNCLINE
GLACIER
GRABEN
GRASS
GRASSLAND
GRAVEL DEPOSIT
GROUND TRUTH USED
GULF
HARBOR

HARDWOOD FOREST (card 14)
HAY
HAZE
ROAD
HOGBACK
HORST
HOURGLASS VALLEY
HURRICANE
HURRICANE DAMAGE
HYDROLOGY
ICE
ICEBERG
ICE FLOE
ICE JAM

ICE PACK (card 15)
ICE SHELF

5X

INDUSTRIAL AREA
INLET
INLIER
INSECT DAMAGE
INSHORE ZONE
INSEQUENT STREAM
INTERLACING DRAINAGE
INTERMONTANE FLOOR
INTRUSION
IPRIGATION
ISLAND
ISLAND ARC — card 16
ISTHMUS
JET STREAM INDICATED
JETTY
KAME
KARST
KELP
KETTLE
KLIPPE
LAGOON
LAKE
LAKE BED
LANDSLIDE
LATERITE
LATTICE DRAINAGE PATTERN
LAVA — card 17
LEE WAVE
LINEAMENT
LITTORAL CURRENT
LITTORAL DRIFT
LITTORAL TRANSPORT
LOCUST SWARM
LOCUST DAMAGE
LONGSHORE BAR
LONGSHORE CURRENT
LUMBERING AREA
MAAR
MARSH
MASSIF — card 18
MATURE STREAM
MATURE VEGETATION
MEADOWLAND
MEANDER
METEOR CRATER
METEOROLOGY
METROPOLITAN AREA
MICROWAVE DATA USED
MILLET
MINE
MONOCLINAL VALLEY
MORAINAL DELTA
MORAINAL LAKE
MORAINE
MOUNTAIN — card 19
MUD
MUD FLAT
MUSKEG
NAPPE
NUNATAK
OASIS
OATS
OCCLUDED FRONT
OCEANOGRAPHY
OIL FIELD
OIL SLICK
OPEN PIT MINE
ORCHARD — card 20
OROGRAPHIC CLOUD
OUTLET
OUTLIER
OUTWASH PLAIN
PARALLEL DRAINAGE
PARK
PASTURE
PEDIMENT
PEDIPLAIN
PENEPLAIN
PENINSULA
PERMAFROST
PIEDMONT
PIEDMONT PLAIN — card 21
PIEDMONT SCARP
PINNACLE
PLAIN
PLANKTON BLOOM
PLATEAU
PLAYA
PLAYA LAKE
PLOWED FIELD
POTATOES
PRAIRIE
PRESSURE RIDGE
PROTOZOANS
QUARRY
RADIAL DRAINAGE PATTERN
RAILROAD — card 22
RAIN FOREST
RAISED REEF
RANGELAND
RAPIDS
RECTANGULAR DRAINAGE
RED TIDE
REEF
RESIDENTIAL AREA
RETROGRESSIVE SHORELINE
RICE
RIDGE
RIFT
RIFT VALLEY — card 23
RIVER
RUNOFF
RURAL AREA
RUST
SALINE DOME
SALINE SOIL
SALT
SALT FLAT
SALT MARSH
SAVANNAH
SCAR
SCATTERED CLOUDS
SCRUB
SEA — card 24
SEA GRASS
SEA WALL
SECONDARY FRONT
SEDIMENT
SHALLOW WATER
SHIELD
SHIPYARD
SHOAL
SILT
SINK
SLASH
SLICK
SMOG
SMOKE — card 25
SNOW
SNOW PACK
SOIL
SOYBEAN
SPLIT
SPRING
SQUALL LINE
STATIONARY FRONT
STEP FAULT
STEPPE
STOSS-AND-LEE TOPOGRAPHY
STRAIT
STRATH
STREAM — card 26
SUBURBAN AREA
SUGAR BEET
SUGAR CANE
SYNCLINAL VALLEY
SYNCLINORIUM
TERRACE
TIDAL FLAT
TIDAL WAVE
TIDAL WAVE DAMAGE
THRUST FAULT
TIMBERLINE
TOBACCO
TOMBOLO
TORNADO — card 27
TORNADO DAMAGE
TOWERING CUMULI
TRANSVERSE FAULT
TRANSVERSE VALLEY
TRELLISED DRAINAGE
TRENCH
TRIBUTARY
TSUNAMI
TSUNAMI DAMAGE
TUNDRA
TYPHOON
TYPHOON DAMAGE
UPWELLING
URBAN AREA — card 28
VALLEY
VEGETATION
VINEYARD
VOLCANO
WARM FRONT
WAVE
5X
DAY
MONTH
YEAR
DEG N
DEG S
MIN N
MIN S — card 29
DEG E
DEG W
MIN E
MIN W
CASE
40X

This is an example of 5 frequency tables presented for expository purposes only, as the grand total gives 119 image descriptions,

		MSS4	MSS5	MSS6	MSS7	
bay-head beach	1	8	8	3	1	20
	0	23	24	26	26	99
		31	32	29	27	119

coastal dune	1	8	6	5	4	23
	0	23	26	24	23	96

coastal marsh	1	10	15	11	12	48
	0	21	17	18	15	71

coast line	1	4	4	10	11	29
	0	27	28	19	16	90

littoral transport	1	12	10	6	3	31
	0	19	22	23	24	88

Cross-tabulation program BMD08D allows for descriptor stacking. Each successive descriptor i, j, l, m, n, is nested within the preceding.

Let us take an example with 2 descriptors: conifer, deciduous. Cross-tabulation with band gives.

		MSS4	MSS5	MSS6	MSS7	
conifer	1	◇4	6	5	6	21
	0	27	26	24	21	98
		31	32	29	27	119
deciduous	1	1	4	2	□3	10
	0	30	28	27	24	109

Descriptor stacking provides 4 rows in a factorial way.

conifer with deciduous	11	0	3	2	3	8
conifer without deciduous	10	◇4	3	3	3	13
deciduous without conifer	01	1	1	0	□0	2
	00	26	25	24	21	96

Despite the small number of images, two cells at last, marked ◇ and □, show how advantageous this special feature of BMD08D can be.

Moreover, stacking is permissible with 2, 3, 4, or 5 descriptors, building two-way tables with respectively 4, 8, 16, and 32 rows. Rows of zero frequency may be deleted under control of the PROBLM card (punch a zero in column 27).

Identification of the rows follows a factorial arrangement:

	2^5				
	i	j	l	m	n
32	1	1	1	1	1
31	1	1	1	1	0
30	1	1	1	0	1
29	1	1	1	0	0
28	1	1	0	1	1
27	1	1	0	1	0
26	1	1	0	0	1
25	1	1	0	0	0
24	1	0	1	1	1
23	1	0	1	1	0
22	1	0	1	0	1
21	1	0	1	0	0
20	1	0	0	1	1
19	1	0	0	1	0
18	1	0	0	0	1
17	1	0	0	0	0
16	0	1	1	1	1
15	0	1	1	1	0
14	0	1	1	0	1
13	0	1	1	0	0
12	0	1	0	1	1
11	0	1	0	1	0
10	0	1	0	0	1
9	0	1	0	0	0
8	0	0	1	1	1
7	0	0	1	1	0
6	0	0	1	0	1
5	0	0	1	0	0
4	0	0	0	1	1
3	0	0	0	1	0
2	0	0	0	0	1
1	0	0	0	0	0

2^4			
i	j	l	m
1	1	1	1
1	1	1	0
1	1	0	1
1	1	0	0
1	0	1	1
1	0	1	0
1	0	0	1
1	0	0	0
0	1	1	1
0	1	1	0
0	1	0	1
0	1	0	0
0	0	1	1
0	0	1	0
0	0	0	1
0	0	0	0

2^3		
i	j	l
1	1	1
1	1	0
1	0	1
1	0	0
0	1	1
0	1	0
0	0	1
0	0	0

2^2	
i	j
1	1
1	0
0	1
0	0

SYSTEM AND PROGRAM CONTROL CARDS

---

10 DESCRIPTORS AND 2^5 STACKED DESCRIPTORS CROSS-TABULATED WITH BANDS

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
@RUN,C ORSIDA,TP0160,ORSTOM                                                  029
@ASG,T A.,8C,1321L
@MOVE A.,10
@COPIN A.,
@FREE A.
@ASG,T 15.,8C,3886L                                                 format
@XQT .BMD08D   images                                               cards
PROBLMSIDA__ 11___/  1 +1 1 12                                115__  1 OF 29
RANGES     1     0     1     0     1     0     1     0     1     0    2 OF 29
RANGES     1     0     1     0     1     0     1     0     1     0    3 OF 29
RANGES     9     1    32     1                                      4 OF 29
LABELS    1____ A   ten four-letter codes to identify all descriptors:  5 OF 29
LABELS    2____ B                                                   6 OF 29
LABELS    3____ C                                                   7 OF 29
LABELS    4____ D                                                   8 OF 29
LABELS    5____ E                                                   9 OF 29
LABELS    6____ F                                                  10 OF 29
LABELS    7____ G                                                  11 OF 29
LABELS    8____ H                                                  12 OF 29
LABELS    9____ I                                                  13 OF 29
LABELS   10____ J                                                  14 OF 29
LABELS   11  BAND                                                  15 OF 29
LABELS   12______X  five one-letter codes to identify stacked descriptors  16 OF 29
(                                               i  j  l  m  n      17 OF 29
                                                                   18 OF 29
   i-type format cards                                             19 OF 29
                                                                   20 OF 29
                                                                   21 OF 29
                                                                   22 OF 29
                                                                   23 OF 29
                                                                   24 OF 29
              i     j     l     m     n        numerical codes     25 OF 29
                                                                   26 OF 29
TRNGEN 1285  _     _     _     _     __                            27 OF 29
SELECT 1111  1  2  3  4  5  6  7  8  9 10 12                       28 OF 29
FINISH                                                             29 OF 29
@FIN
--------------------------------------------------------------------------------
                                                         for 2^4 replace
RANGES     9     1    16     1                                 card  4 OF 29
LABELS   12____ X                                                  16 OF 29
TRNGEN 1284  _     _     _     __                                  27 OF 29
--------------------------------------------------------------------------------
                                                         for 2^3 replace
RANGES     9     1     8     1                                cards  4 OF 29
LABELS   12___  X                                                  16 OF 29
TRNGEN 1283  _     _     __                                        27 OF 29
--------------------------------------------------------------------------------
                                                         for 2^2 replace
RANGES     9     1     4     1                                cards  4 OF 29
LABELS   12__   X                                                  16 OF 29
TRNGEN 1282  _     __                                              27 OF 29
--------------------------------------------------------------------------------
```

Example:

10 descriptors and 2^2 stacked descriptors cross-tabulated with bands

BYHB = BAY-HEAD BEACH
CDNE = COASTAL DUNE
CMSH = COASTAL MARSH
CTLN = COAST LINE
CNIF = CONIFER
CRPL = CROPLAND
DAM = DAM
DCDU = DECIDUOUS
DUNE = DUNE
LITT = LITTORAL TRANSPORT

EH = CONIFER STACKED WITH DECIDUOUS

```
"RUN,C ORSIDA,TP0160,ORSTOM                                                    029
"ASG,T A.,8C,1321L
"MOVE A.,10
"COPIN A.,
"FREE A,
"ASG,T 15.,8C,3886L
"XQT .BMD08D
PROBLMSIDA 1 11 119  1 +1 1 12                                  115 2 1 OF 29
RANGES     1     0     1     0     1     0     1     0     1     0     2 OF 29
RANGES     1     0     1     0     1     0     1     0     1     0     3 OF 29
RANGES     9     1     4     1                                         4 OF 29
LABELS   1BYHB A                                                      5 OF 29
LABELS   2CDNE B                                                      6 OF 29
LABELS   3CMSH C                                                      7 OF 29
LABELS   4CTLN D                                                      8 OF 29
LABELS   5CNIF E                                                      9 OF 29
LABELS   6CRPL F                                                     10 OF 29
LABELS   7DAM  G                                                     11 OF 29
LABELS   8DCDU H                                                     12 OF 29
LABELS   9DUNE I                                                     13 OF 29
LABELS  10LITT J                                                     14 OF 29
LABELS  11  BAND                                                     15 OF 29
LABELS  12EH   X                                                     16 OF 29
(///60X,I5///55X,2I5/I5,10X,I5/10X,I5,40X,2I5/60X,I5///////30X,I5,39X,I117 OF 29
/////////////)                                                      18 OF 29
TRNGEN 1282  5     8                                                27 OF 29
SELECT 1111  1  2  3  4  5  6  7  8  9 10 12                        28 OF 29
FINISH                                                              29 OF 29
"FIN
```

output on next 4 pages

(4 seconds CPU execution time)

```
BMD08D - CROSS TABULATION WITH VARIABLE STACKING - VERSION OF DEC.  4, 1964
HEALTH SCIENCES COMPUTING FACILITY,UCLA
PROBLEM CODE . . . . . . . . SIOA 1
NO. OF VARIABLES . . . . . .   11
NO. OF CASES . . . . . . . .  119
NO. OF TRNGEN CARD(S) . . . .   1
NO. OF VARIABLE FORMAT CARD(S)  2
```

9 9

```
CARD      K        TRANS    ORIG.     ORIG. VAR(J)
 NO.  VARIABLE     CODE    VAR(I)    OR CONSTANT      VAR(L)      VAR(M)      VAR(N)
  1      12         92        5            8             0           0           0
```

```
        RYHB A IS CROSS TABULATED WITH          BAND    OR,

VARIABLE  1 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS=  119

VARIABLE MAXIMUM MINIMUM  (AS SPECIFIED)
     1        1       0
    11        9       1

( 1)                 (EXTREME RIGHT VALUE IS ROW TOTAL)
RYHB A
   1 *                 8  8  3  1          20
   0 *                23 24 26 26          99
      ***********************************
 (11)     1     3     5     7     9
  BAND       2     4     6     8

COLUMN    0     0    32    27     0
 TOTAL       0    31    29     0

GRAND TOTAL =    119
```

```
        CONF B IS CROSS TABULATED WITH          BAND    OR,

VARIABLE  2 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS=  119

VARIABLE MAXIMUM MINIMUM  (AS SPECIFIED)
     2        1       0
    11        9       1

( 2)                 (EXTREME RIGHT VALUE IS ROW TOTAL)
CONF B
   1 *                 8  6  5  4          23
   0 *                23 26 24 23          96
      ***********************************
 (11)     1     3     5     7     9
  BAND       2     4     6     8

COLUMN    0     0    32    27     0
 TOTAL       0    31    29     0

GRAND TOTAL =    119
```

CMSH C IS CROSS TABULATED WITH BAND OR.

VARIABLE 3 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

VARIABLE	MAXIMUM	MINIMUM	(AS SPECIFIED)
3	1	0	
11	9	1	

(3) (EXTREME RIGHT VALUE IS ROW TOTAL)

CMSH C					
1 *	10	15	11	12	48
0 *	21	17	18	15	71

(11)	1	3	5	7	9
BAND	2	4	6	8	
COLUMN	0	0	32	27	0
TOTAL	0	31	29	0	

GRAND TOTAL= 119

CTLN D IS CROSS TABULATED WITH BAND OR,

VARIABLE 4 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

VARIABLE	MAXIMUM	MINIMUM	(AS SPECIFIED)
4	1	0	
11	9	1	

(4) (EXTREME RIGHT VALUE IS ROW TOTAL)

CTLN D					
1 *	4	4	10	11	29
0 *	27	28	19	16	90

(11)	1	3	5	7	9
BAND	2	4	6	8	
COLUMN	0	0	32	27	0
TOTAL	0	31	29	0	

GRAND TOTAL= 119

CNIF E IS CROSS TABULATED WITH BAND OR.

VARIABLE 5 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

VARIABLE	MAXIMUM	MINIMUM	(AS SPECIFIED)
5	1	0	
11	9	1	

(5) (EXTREME RIGHT VALUE IS ROW TOTAL)

CNIF E					
1 *	4	6	5	6	21
0 *	27	26	24	21	98

(11)	1	3	5	7	9
BAND	2	4	6	8	

CRPL F IS CROSS TABULATED WITH BAND OR,

VARIABLE 6 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

VARIABLE	MAXIMUM	MINIMUM (AS SPECIFIED)
6	1	0
11	9	1

(6) (EXTREME RIGHT VALUE IS ROW TOTAL)

CRPL F					
1 *	4	4	6	6	20
0 *	27	23	23	21	99

(11) BAND	1 2	3 4	5 6	7 8	9
COLUMN TOTAL	0 0	0 31	32 29	27 0	0

GRAND TOTAL = 119

DAM G IS CROSS TABULATED WITH BAND OR,

VARIABLE 7 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

VARIABLE	MAXIMUM	MINIMUM (AS SPECIFIED)
7	1	0
11	9	1

(7) (EXTREME RIGHT VALUE IS ROW TOTAL)

DAM G					
1 *	2	5	6	3	16
0 *	29	27	23	24	103

(11) BAND	1 2	3 4	5 6	7 8	9
COLUMN TOTAL	0 0	0 31	32 29	27 0	0

OCDU H IS CROSS TABULATED WITH BAND OR,

VARIABLE 8 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

VARIABLE	MAXIMUM	MINIMUM (AS SPECIFIED)
8	1	0
11	9	1

(8) (EXTREME RIGHT VALUE IS ROW TOTAL)

OCDU H					
1 *	1	4	2	3	10
0 *	30	28	27	24	109

(11) BAND	1 2	3 4	5 6	7 8	9

DUNE I IS CROSS TABULATED WITH BAND OR.

VARIABLE 9 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

9 12

VARIABLE MAXIMUM MINIMUM (AS SPECIFIED)
9 1 0
11 9 1

(9) (EXTREME RIGHT VALUE IS ROW TOTAL)
DUNE I
1 * 3 5 3 3 14
0 * 28 27 26 24 105
****
(11) 1 3 5 7 9
BAND 2 4 6 8

COLUMN 0 0 32 27 0
TOTAL 0 31 29 0

LITT J IS CROSS TABULATED WITH BAND OR.

VARIABLE 10 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

VARIABLE MAXIMUM MINIMUM (AS SPECIFIED)
10 1 0
11 9 1

(10) (EXTREME RIGHT VALUE IS ROW TOTAL)
LITT J
1 * 12 10 6 3 31
0 * 19 22 23 24 88
****
(11) 1 3 5 7 9
BAND 2 4 6 8

COLUMN 0 0 32 27 0
TOTAL 0 31 29 0

FH X IS CROSS TABULATED WITH BAND OR.

VARIABLE 12 IS CROSS TABULATED WITH VARIABLE 11

NUMBER OF REPLICATIONS= 119

VARIABLE MAXIMUM MINIMUM (AS SPECIFIED)
12 4 1
11 9 1

(12) (EXTREME RIGHT VALUE IS ROW TOTAL)
FH X
4 * 3 2 3 8
3 * 4 3 3 3 13
2 * 1 1 2
1 * 26 25 24 21 96
****
(11) 1 3 5 7 9
BAND 2 4 6 8

Chapter 10

The BMD08D Program

by

W. J. Dixon, ed., Health Sciences Computing Facility, Department of Preventive Medicine and Public Health, School of Medicine, University of California, Los Angeles, 1964.

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33 K
stored on tape No 1321, file No 11

ELEMENTNAME	VERSION	TYPE	instructions
D8IO	PROG	SYMBOLIC	30
AND		SYMBOLIC	19
OR		SYMBOLIC	19
BOOL		SYMBOLIC	20
COMPL		SYMBOLIC	9
NTAB		SYMBOLIC	19
D83	PROG	SYMBOLIC	50
D84	PROG	SYMBOLIC	16
D86	PROG	SYMBOLIC	12
D87	PROG	SYMBOLIC	34
D85	PROG	SYMBOLIC	147
D82	PROG	SYMBOLIC	86
D08	PROG	SYMBOLIC	353
BMD08D		SYMBOLIC	3

```
      D8IO
 + 3
 + 2
 + 1
NTAB$* + 2
 + DRUM1
 + DRUM2
 + DRUM3
 + DRUM4
 + 1
 + 2
 + 'E'
 + 'F'
 + 'G'
DRUM1 + 03000000
 + 03250000
 + 03000000
 RES 4
DRUM2 + 03250000
 + 03520000
 + 03250000
 RES 4
DRUM3 + 03520000
 + 03770000
 + 03520000
 RES 4
DRUM4 + 03770000
 + 04240000
 + 03770000
 RES 4
       END
```

```
.       AND    SUBROUTINE
.       THE FOLLOWING CALLING SEQUENCE IS GENERATED IN THE MAIN PROGRAM
.       A.      LMJ B11,AND
.       A+1     L(A)
.       A+2     L(B)
.       A+3     NOP
.       A+4     RETURN
.       A IS BROUGHT TO A0, ANDED WITH B, AND THE RESULT
.       RETURNED TO A0 PRIOR TO EXIT.
B11       EQU       11
A0        EQU       12
A1        EQU       13
$(1).
AND*      NOP       0
          L         A0,*0,B11          GET A
          AND       A0,*1,B11          AND A WITH B
          S         A1,A0              STORE RESULT IN A0
          J         3,B11              EXIT
          END
```

```
.         OR   SUBROUTINE
.       THE FOLLOWING CALLING SEQUENCE IS GENERATED IN THE MAIN PROGRAM
.       A       LMJ B11,OR
.       A+1     L(A)
.       A+2     L(B)
.       A+3     NOP
.       A+4     RETURN
.       A IS BROUGHT TO A0, ORED WITH B, AND THE RESULT
.       RETURNED TO A0 PRIOR TO EXIT.
B11       EQU       11
A0        EQU       12
A1        EQU       13
$(1).
OR*       NOP       0
          L         A0,*0,B11          GET A
          OR        A0,*1,B11          OR A WITH B
          S         A1,A0              STORE RESULT IN A0
          J         3,B11              EXIT
          END


.         BOOL    FUNCTION
.       BOOL(A)=A                      FOR  A EQUAL ZERO
.       BOOL(A)=L                      FOR  POS. A
.       BOOL(A)=-L                     FOR  NEG. A
.       WHERE L IS THE LARGEST POSSIBLE INTEGER VALUE.
.       FUNCTION VALUE IS RETURNED IN A0
.
A0        EQU       12
B11       EQU       11
$(2)      LIT
$(1).
BOOL*     NOP
          L         A0,*0,B11          GET FUNCTION ARGUMENT
          JZ        A0,2,B11
          JN        A0,$+3
          L         A0,(0377777777777)
          J         2,B11
          LN        A0,(0377777777777)
          J         2,B11
          END


.         COMPLEMENT  SUBROUTINE
.
B11       EQU       11
A0        EQU       12
$(1).
COMPL*    NOP       0
          LN        A0,*0,B11          LOAD NUMBER AND COMPLEMENT
          J         2,B11              EXIT
          END
```

```
        +3
        +2
        +1
NTAB$*   +2
        + 'A'
        + 'B'
        + 'C'
        + 'D'
        +1
        +2
        + 'E'
        + 'F'
        + 'G'
        + DRUM1
DRUM1    +  03000000
       + 03010000
       + 03000000
        RES 4
        END
```

D83

```
CRDLBL
C       SUBROUTINE TO READ IN LABELS CARDS, STORE THEM IN ARRAY,
C       AND SUBSTITUTE NUMBERS FOR UNLABELED VARIABLES
C       NVAR IS TOTAL NUMBER OF VARIABLES
C       NLBVAR IS NUMBER OF LABELED VARIABLES EXPECTED
C
        SUBROUTINE RDLBL(NLBVAR,NVAR,ARRAY)
C       EQUIVALENCE INTEGER AND FLOATING NAMES SO THAT INTEGER SUBTRACTION
C       MAY BE USED TO TEST ALPHABETIC EQUALITY
        DIMENSION ARRAY(1),IDUM(7),DUMY(7)
        EQUIVALENCE(LABEL,ALABEL)
C       DIMENSION ARRAY(1),IDUM(7),DUMY(7)
        DATA Q000HL/6HLAB   /
        ALABEL=(+Q000HL)
C       NUMBER VARIABLES
        DO 1 I=1,NVAR
    1   ARRAY(I)=ANUMB(I)
C       IF NO LABELS, RETURN
        IF(NLBVAR) 9,9,2
    2   N=0
C       READ 1 LABELS CARD
   20   READ  (5,3)ITEST,(IDUM(J),DUMY(J),J=1,7)
    3   FORMAT(A3,3X,7(I4,A6))
C   .   TEST FOR 'LAB' IN FIRST 3 COLS.
        IF(ITEST-LABEL) 4,6,4
C       ERROR--PRINT MESSAGE AND QUIT
    4   WRITE (6,5)
    5   FORMAT(36H0LABELS CARD NOT FOUND WHEN EXPECTED)
        CALL EXIT
C       EXAMINE 7 FIELDS
    6   DO 8 J=1,7
        K=IDUM(J)
C       TEST INDEX.  IF 0, IGNORE.  IF ILLEGAL, PRINT MESSAGE AND
C       IGNORE EXCEPT TO COUNT
        IF(K) 11,8,10
   10   IF(K-NVAR) 7,7,11
   11   WRITE (6,12)K,DUMY(J)
   12   FORMAT(18H0LABELS CARD INDEX,I7,18H INCORRECT. LABEL ,A6,9H IGNORE
       1D.)
        GO TO 13
C       MOVE LABEL TO ARRAY
    7   ARRAY(K)=DUMY(J)
C       STEP NUMBER OF VARIABLES
   13   N=N+1
C       TEST FOR END. IF END, RETURN. IF NOT, SCAN OTHER FIELDS.
        IF(N-NLBVAR) 8,9,9
    8   CONTINUE
        GO TO 20
    9   RETURN
        END
```

D84

```
CTPWD    SUBROUTINE TPWD FOR BMD08D          VERSION OF SEPT. 26, 1963
      SUBROUTINE TPWD(NT1,NT2)
      IF(NT1)40,10,12
 10   NT1=5
 12   IF(NT1-NT2)14,19,14
   14 IF(NT2-5) 15,19,40
   15 REWIND NT2
   19 IF(NT1-5)18,24,18
 18   IF(NT1-6)22,40,22
 22   REWIND NT1
 24   NT2=NT1
 28   RETURN
 40   WRITE (6,49)
      CALL EXIT
 49   FORMAT(25H ERROR ON TAPE ASSIGNMENT)
      END
```

D86

```
CVFCHCK    SUBROUTINE TO CHECK FOR PROPER NUMBER OF VARIABLE FORMAT CRDS
      SUBROUTINE VFCHCK(NVF)
      IF(NVF)10,10,20
 10   WRITE (6,4000)
      NVF=1
 50   RETURN
C
 20   IF(NVF-10)50,50,10
C
 4000 FORMAT(1H023X71HNUMBER OF VARIABLE FORMAT CARDS INCORRECTLY SPECIF
     1IED, ASSUMED TO BE 1.)
      END
```

D87

```
ALPH     + 0
TEMP     + 0
XR1      + 36
B1       EQU 1
B11      EQU 11
A1       EQU 14
A2       EQU 15
A3       EQU 16
A6       EQU 17
SIXTY    +060
TEN      +010
BLANK    +'     '
ANUMB*   LA      A2,*0,B11          .LOAD ARGUMENT  I
         LX      B1,XR1
START    LA      A1,TEMP
         DI      A1,10,,14
         TLE     A2,7,,14           . IS REMAINDER LESS THAN 7
         AA      A2,TEN             .ADD 60. OR 70
         AA      A2,SIXTY
         LA      A3,ALPH            .SHIFT 2AND 3 SIX PLACES
         DSL     A2,6
         SA      A3,ALPH
         SA      A1,A2
         ANX     B1,6,,14
         TZ      A1
         J       START
         LA      A2,BLANK
         LA      A6,B1
         SA      A6,NEXT,,1
NEXT     DSL     A2,B1
         SSC     A3,24
         SA      A3,*0,B11
       J  2,B11
       END
```

```
CTRNGEN        SUBROUTINE  TRNGEN  FOR  BMD08D      DECEMBER 4, 1964
      SUBROUTINE TRNGEN(NVG,NVAR)                                    10  7
      DIMENSION MRANGX(40),MRANGY(100),JOUTX(50), LXX(10) ,
     1IOUTY( 50),              KPOINT(100,40),MARGY(100),MARGX(40),
     2IDATA(19000)         ,NEW(100),MMAX(100),MMIN(100),LEVEL(22),
     3ITEM( 50),ASK(120), FMT(120)
C THE FOLLOWING STATEMENT(S) HAVE BEEN MANUFACTURED BY THE TRANSLATOR TO
C   COMPENSATE FOR THE FACT THAT EQUIVALENCE DOES NOT REORDER COMMON---
      COMMON  ASK     , FMT
      COMMON                  MRANGY    ,JOUTX     ,IOUTY     ,KPOINT
      COMMON MARGY,MARGX
      COMMON ISTART,IEND      ,IDATA     ,MMAX      ,MMIN      ,ITEM
      COMMON  NTOT    , LIMITY , LIMITX , MAXX    , MAXY    , MINX
      COMMON  MINY    , NEWX   , NEWY   , JUNKX   , IOVER   , JUNKXY
      COMMON  JSTART,JEND
C     DIMENSIONIX(1500),IY(1500),MRANGX(40),MRANGY(100),JOUTX( 50),
C    1IOUTY( 50),              KPOINT(100,40),MARGY(100),MARGX(40),
C    2IDATA(19000)         ,NEW(100),MMAX(100),MMIN(100),LEVEL(22),
C    3ITEM( 50),ASK(120), FMT(120)
C    4 , LXX(10)
C     COMMON IX,IY,MRANGX,MRANGY,JOUTX,IOUTY,       KPOINT,MARGY,MARGX,
C    1IDATA,FMT,NEW,MMAX,MMIN,LEVEL,ITEM,ASK,NTOT,LIMITY,LIMITX,MAXX,
C    2MAXY,MINX,MINY,NEWX,NEWY,JUNKX,IOVER
C    3,JUNKXY
      EQUIVALENCE(ASK,NEW),(MRANGX,FMT(51)),(LEVEL,FMT(91)),(D123,ID1)
C
      DATA Q000HL/6HTRNGEN/
      D123=(+Q000HL)
      WRITE (6,103)
      DO 1050 LL=1,NVG
      READ  (5,101)KODE,NEN,ICODE,NA,NB,NC,ND,NE,(LXX(I),I=3,7)
      IF(KODE-ID1)400,401,400
  400 NVAR=-NVAR
      GO TO 125
C
  401 WRITE (6,102)LL,NEN,ICODE,NA,NB,NC,ND,NE                  ,(LXX(I),I
     1=3,7 )
      K=NA
      NV=NTOT*NEN-NTOT
      IE=NTOT*NA
      IS=IE-NTOT+1
      MB=NTOT*NB-NTOT
      IF(82-ICODE)601,601,600
  601 MMIN(NEN)=1
      MMAX(NEN)=(MMAX(NA)-MMIN(NA)+1)*(MMAX(NB)-MMIN(NB)+1)
      IF(83-ICODE)602,602,209
  602 MMAX(NEN)=MMAX(NEN)*(MMAX(NC)-MMIN(NC)+1)
      IF(84-ICODE)603,603,209
  603 MMAX(NEN)=MMAX(NEN)*(MMAX(ND)-MMIN(ND)+1)
      IF(85-ICODE)900,604,209
  604 MMAX(NEN)=MMAX(NEN)*(MMAX(NE)-MMIN(NE)+1)
      GO TO 209
  600 IF(ICODE-16) 69,69,208
   69 ICODE=ICODE-7
      GO TO 6
  208 IF(ICODE-41)210,210,900
```

```
  210 ICODE=ICODE-30
      IF(ICODE-10)900,6,6
  209 ICODE=ICODE-70
      IF(12-ICODE)205,205,900
  205 MC=NTOT*NC-NTOT
      MD=NTOT*ND-NTOT
      ME=NTOT*NE-NTOT
    6 DO 1000 J=IS,IE
      NV=NV+1
      IF(ICODE*(ICODE-16))402,900,900
  402 GO TO (10,20,30,40,50,60,400,70,80,81,82,90,100,110,120 ),ICODE
   10 IDATA(NV)=IDATA(J)+NB
      GO TO 1000
   20 IDATA(NV)=IDATA(J)*NB
      GO TO 1000
   30 IF(IDATA(J)) 31,32,31
   32 IDATA(NV)=0
      GO TO 1000
   31 IDATA(NV)=IDATA(J)**NB
      GO TO 1000
   40 MB=MB+1
      IDATA(NV)=IDATA(J)+IDATA(MB)
      GO TO 1000
   50 MB=MB+1
      IDATA(NV)=IDATA(J)-IDATA(MB)
      GO TO 1000
   60 MB=MB+1
      IDATA(NV)=IDATA(J)*IDATA(MB)
      GO TO 1000
   70 IF(IDATA(J)-NB) 32 ,301,301
  301 IDATA(NV)=1
      GO TO 1000
   80 MB=MB+1
      IF(IDATA(J)-IDATA(MB)) 32,301,301
   81 IF(IDATA(J)-ND) 211,212,211
  211 IF(NC-2) 1000,217,217
  217 IF(IDATA(J)-NE) 213,212,213
  213 IF(NC-3) 1000,218,218
  218 DO 214 LYNN =3,NC
      IF(IDATA(J)-LXX(LYNN)) 214,212,214
  214 CONTINUE
      GO TO 1000
  212 IDATA(NV)=NB
      GO TO 1000
   82 IF(IDATA(J)) 1000,215,1000
  215 IF(ISIGN(9,IDATA(J))) 216,1000,1000
  216 IDATA(NV)=NB
      GO TO 1000
   90 MB=MB+1
      IDATA(NV)=(MMAX(NB)-MMIN(NB)+1)*(IDATA(J)-MMIN(K))+IDATA(MB)-MMIN(
     1NB)+1
      GO TO 1000
  100 MB=MB+1
      MC=MC+1
      IDATA(NV)=(MMAX(NC)-MMIN(NC)+1)*(MMAX(NB)-MMIN(NB)+1)*(IDATA(J)-MM
     1IN(K))+(MMAX(NC)-MMIN(NC)+1)*(IDATA(MB)-MMIN(NB))+IDATA(MC)-MMIN(N
     2C)+1
```

```
      GO TO 1000
  110 MB=MB+1
      MC=MC+1
      MD=MD+1
      IDATA(NV)=(MMAX(ND)-MMIN(ND)+1)*(MMAX(NC)-MMIN(NC)+1)*(MMAX(NB)-MM
     1IN(NB)+1)*(IDATA(J)-MMIN(K))+(MMAX(ND)-MMIN(ND)+1)*(MMAX(NC)-MMIN(
     2NC)+1)*(IDATA(MB)-MMIN(NB))+(MMAX(ND)-MMIN(ND)+1)*(IDATA(MC)-MMIN(
     3NC))+IDATA(MD)-MMIN(ND)+1
      GO TO 1000
  120 MB=MB+1
      MC=MC+1
      MD=MD+1
      ME=ME+1
      IDATA(NV)=(MMAX(NE)-MMIN(NE)+1)*(MMAX(ND)-MMIN(ND)+1)*(MMAX(NC)-MM
     1IN(NC)+1)*(MMAX(NB)-MMIN(NB)+1)* (IDATA(J)-MMIN(K))+(MMAX(NE)-MMIN
     2(NE)+1)*(MMAX(ND)-MMIN(ND)+1)*(MMAX(NC)-MMIN(NC)+1)*(IDATA(MB)-MMI
     3N(NB))+(MMAX(NE)-MMIN(NE)+1)*(MMAX(ND)-MMIN(ND)+1)*(IDATA(MC)-MMIN
     4(NC))+(MMAX(NE)-MMIN(NE)+1)*(IDATA(MD)-MMIN(ND))+IDATA(ME)
     5 -MMIN(NE)+1
 1000 CONTINUE
      GO TO 1050
  900 WRITE(6,4000)
      NVAR=-NVAR
 1050 CONTINUE
  101 FORMAT(A6,I3,I2,I3,9I6)
  102 FORMAT(2H  I2,2I8,I10,I13,3I10,I5,7I6)
  103 FORMAT(46H0CARD      K       TRANS    ORIG.  ORIG. VAR(J)/74H  NO.
     1 VARIABLE   CODE   VAR(I)   OR CONSTANT   VAR(L)    VAR(M)    VAR(
     2N))
 4000 FORMAT(129H0ILLEGAL TRANSGENERATION CODE SPECIFIED ON THE CARD LIS
     XTED ABOVE. PROGRAM WILL PROCEED TO NEXT PROBLEM CARD (IF ANY) OR T
     XERMINATE)
  125 RETURN
      END
```

```
CCROSS          SUBROUTINE CROSS FOR BMD08D       DECEMBER   4, 1964
      SUBROUTINE CROSS
      DIMENSION MRANGX(40),MRANGY(100),JOUTX(50) ,
     1IOUTY( 50),              KPOINT(100,40),MARGY(100),MARGX(40),
     2IDATA(19000)          ,NEW(100),MMAX(100),MMIN(100),LEVEL(22),
     3ITEM( 50),ASK(120), FMT(120)
C THE FOLLOWING STATEMENT(S) HAVE BEEN MANUFACTURED BY THE TRANSLATOR TO
C   COMPENSATE FOR THE FACT THAT EQUIVALENCE DOES NOT REORDER COMMON---
      COMMON  ASK     , FMT
      COMMON                    MRANGY    ,JOUTX    ,IOUTY    ,KPOINT
      COMMON MARGY,MARGX
      COMMON ISTART,IEND        ,IDATA    ,MMAX     ,MMIN     ,ITEM
      COMMON  NTOT    , LIMITY , LIMITX , MAXX    , MAXY    , MINX
      COMMON  MINY    , NEWX    , NEWY    , JUNKX   , IOVER   , JUNKXY
      COMMON  JSTART,JEND
C     DIMENSIONIX(1500),IY(1500),MRANGX(40),MRANGY(100),JOUTX( 50),
C    1IOUTY( 50),              KPOINT(100,40),MARGY(100),MARGX(40),
C    2IDATA(19000)          ,NEW(100),MMAX(100),MMIN(100),LEVEL(22),
C    3ITEM( 50),ASK(120), FMT(120)
C     COMMON IX,IY,MRANGX,MRANGY,JOUTX,IOUTY,       KPOINT,MARGY,MARGX,
C    1IDATA,FMT,NEW,MMAX,MMIN,LEVEL,ITEM,ASK,NTOT,LIMITY,LIMITX,MAXX,
C    2MAXY,MINX,MINY,NEWX,NEWY,JUNKX,IOVER
C    3,JUNKXY
      EQUIVALENCE(ASK,NEW),(MRANGX,FMT(51)),(LEVEL,FMT(91))
C
C     GENERATERANGE
C
      MRANGX(1)=MINX
      MRANGY(1)=MINY
      MINX1=MINX-1
      MINY1=MINY-1
      LIMITX=MAXX-MINX+1
      LIMITY=MAXY-MINY+1
      JUNKXY=0
      JUNKX=0
      IF(LIMITY-100)2,2,10
 2    DO 3 I=2,LIMITX
    3 MRANGX(I)=MRANGX(I-1)+1
      DO 4 I=2, LIMITY
    4 MRANGY(I)=MRANGY(I-1)+1
C
C     INITIALIZATION
C
      DO5JPOINT=1,LIMITX
      DO5IPOINT=1,LIMITY
    5 KPOINT(IPOINT,JPOINT)=0
C
C     COMPUTE FREQUENCYMATRIXANDEXTREMEVALUES
C
      J=JSTART
      DO 12 LPOINT = ISTART, IEND
      IF(IDATA(LPOINT) - MAXX) 6,8,7
    6 IF(IDATA(LPOINT) - MINX) 7,8,8
    7 JUNKXY=JUNKXY+1
      IF(JUNKXY-49) 18,18,12
   18 JUNKX=JUNKX+1
```

```
      JOUTX(JUNKX) = IDATA(LPOINT)
      IOUTY(JUNKX) = IDATA(J)
      ITEM(JUNKX) = LPOINT - ISTART + 1
      GOTO12
C
 10   JUNKXY=-2
      GO TO 19
C
    8 IF(IDATA(J) - MAXY) 9,11,7
    9 IF(MINY - IDATA(J)) 11,11,7
   11 IIX=IDATA(LPOINT) - MINX1
      IIY=IDATA(J)-MINY1
      KPOINT(IIY,IIX)=KPOINT(IIY,IIX)+1
   12 J= J+1
      DO14JYY=1,LIMITY
      DO14JXX=1,LIMITX
      KPOINT(JYY,JXX)=MIN0(KPOINT(JYY,JXX),999)
   14 CONTINUE
      DO15I=1,LIMITY
   15 MARGY(I)=0
      DO16I=1,LIMITX
   16 MARGX(I)=0
      DO17I=1,LIMITY
      DO17J=1,LIMITX
      MARGY(I)=MARGY(I)+KPOINT(I,J)
      MARGX(J)=MARGX(J)+KPOINT(I,J)
   17 CONTINUE
 19   RETURN
      END
```

```
CBMD08D   CROSS TABULATION WITH VARIABLE STACKING   DECEMBER 4, 1964
      DIMENSION MRANGX(40),MRANGY(100),JOUTX(50),WORD(100),
     1IOUTY( 50),              KPOINT(100,40),MARGY(100),MARGX(40),
     2IDATA(19000)         ,NEW(100),MMAX(100),MMIN(100),LEVEL(22),
     3ITEM( 50),ASK(120), FMT(120)
C THE FOLLOWING STATEMENT(S) HAVE BEEN MANUFACTURED BY THE TRANSLATOR TO
C   COMPENSATE FOR THE FACT THAT EQUIVALENCE DOES NOT REORDER COMMON---
      COMMON  ASK    , FMT
      COMMON                  MRANGY   ,JOUTX    ,IOUTY    ,KPOINT
      COMMON  MARGY ,MARGX
      COMMON  ISTART,IEND     ,IDATA    ,MMAX     ,MMIN     ,ITEM
      COMMON  NTOT   , LIMITY , LIMITX , MAXX   , MAXY   , MINX
      COMMON  MINY   , NEWX   , NEWY   , JUNKX  , IOVER  , JUNKXY
      COMMON  JSTART,JEND
C     DIMENSIONIX(1500),IY(1500),MRANGX(40),MRANGY(100),JOUTX( 50),
C    1IOUTY( 50),              KPOINT(100,40),MARGY(100),MARGX(40),
C    2IDATA(19000)         ,NEW(100),MMAX(100),MMIN(100),LEVEL(22),
C    3ITEM( 50),ASK(120), FMT(120)
C    4 ,WORD(100)
C     COMMON IX,IY,MRANGX,MRANGY,JOUTX,IOUTY,KPOINT,       MARGY,MARGX,
C    1IDATA,FMT,NEW,MMAX,MMIN,LEVEL,ITEM,ASK,NTOT,LIMITY,LIMITX,MAXX,
C    2MAXY,MINX,MINY,NEWX,NEWY,JUNKX,IOVER
C    3,JUNKXY
      EQUIVALENCE (A123,IA1),(B123,IB1),(C123,IC1),(E123,IE1),(ASK,NEW),
     1(MRANGX,FMT(51)),(LEVEL,FMT(91))
C
C
  209 FORMAT(76H1BMD08D - CROSS TABULATION WITH VARIABLE STACKING - VERSI
     1ION OF DEC.  4, 1964/
     240H HEALTH SCIENCES COMPUTING FACILITY,UCLA/14H PROBLEM CODE 7(2H,I
     3 )A6,/18H NO. OF VARIABLES 6(2H. )I4,/14H NO. OF CASES 8(2H. )I4,/I
     424H NO. OF TRNGEN CARD(S). 3(2H. )I4,/32H NO. OF VARIABLE FORMAT CI
     5ARD(S) I2,//)
C
  101 FORMAT(9H0VARIABLEI3,33H IS CROSS TABULATED WITH VARIABLEI3//)
  102 FORMAT(2H0(I2,1H)13X34H(EXTREME RIGHT VALUE IS ROW TOTAL))
  103 FORMAT(6H RANGE)
  137 FORMAT(3H  (I2,1H)I5,17I6)
  138 FORMAT(8H  RANGE  18I6//)
  139 FORMAT(7H0COLUMNI4,17I6)
  140 FORMAT(8H  TOTAL  18I6//)
  141 FORMAT(13H0GRAND TOTAL=I6//)
  142 FORMAT(3X,I5,9X,I6,10X,I6)
  146 FORMAT(19H0VALUES NOT ENTEREDI4)
  147 FORMAT(11H   CASE NO.5X,8HVARIABLEI3,5X,8HVARIABLEI3)
  148 FORMAT(2A6,I3,I4,I3,I3,I2,I3,I2,34X,3I2)
  149 FORMAT(A6,10I6)
  150 FORMAT(12A6)
  151 FORMAT(2I2,4I5)
  154  FORMAT(61H0(THE FOLLOWING COMPUTATIONS ARE BASED ON ALL DATA AS ENI
     1TERED/49H EVEN IF SOME ARE EXCLUDED FROM THE ABOVE TABLE).//
     225H CORRELATION COEFFICIENT F7.4,/
     32(6H MEAN(,I3,2H)=,F15.5,3X,3HSD(,I3,2H)=,F15.5,/),//)
  155 FORMAT(10H SELECTIONI4,1H-I2//)
  156 FORMAT(1H0)
  157 FORMAT(A6,I3,I2,20I3)
```

```
  158 FORMAT(12I6)
  159 FORMAT(22H0NO ENTRY IN THE TABLE//)
  205 FORMAT(45H0CONTROL CARDS INCORRECTLY ORDERED OR PUNCHED)
  214 FORMAT(23H CHI-SQUARE (OF TABLE) F15.5,/
     14H DF=I5)
  215 FORMAT(26H0CHI-SQUARE NOT COMPUTABLE)
 2000 FORMAT(24H NUMBER OF REPLICATIONS=I5//)
 2001 FORMAT(41H VARIABLE MAXIMUM MINIMUM  (AS SPECIFIED))
 2002 FORMAT(1H I6,2I8)
 4001 FORMAT(7X,112A1)
 5054 FORMAT(10H0VARIABLE I3,4H OR I3,31H HAVE RANGE GREATER THAN LIMITSI
     1//)
 7002 FORMAT(1H05X,A6,24H IS CROSS TABULATED WITH6X,A6,3X,3HOR,)
 7007 FORMAT(1H A6)
 7011 FORMAT(1H A6,1X,18I6,//)
C
      DATA Q000HL/6HI3,   /
      P1=(+Q000HL)
      DATA Q001HL/6H3X,   ./
      P2=(+Q001HL)
      DATA Q002HL/6HFINISH/
      A123=(+Q002HL)
      DATA Q003HL/6HPROBLM/
      B123=(+Q003HL)
      DATA Q004HL/6HRANGES/
      C123=(+Q004HL)
      DATA Q005HL/6HSELECT/
      E123=(+Q005HL)
      NTAPE=5
   10 READ  (5,148)KODE,COB,NVAR,NTOT,NSEL,NADD,IZERO,          NAMES,MA
     1D,NVG,MTAPE,MFMT
      ASSIGN 2115 TO KHIPRN
      IF(KODE-IA1)201,202,201
  201 IF(KODE-IB1)203,204,203
  203 WRITE (6,205)
  202 CALL EXIT
  204 CALL TPWD(MTAPE,NTAPE)
      IF((NVAR-1)*(NVAR-101)) 6002,203,203
 6002 IF(NADD) 6003,6003,6004
 6003 IF(NVAR*NTOT-19000) 6004,6004,203
 6004 IF(NSEL-99) 6005,6005,203
 6005 IJK=NADD+NVAR
      IF(IJK-101)  206,203,203
  206 IF(NTOT*(NTOT-1501))2075,203,203
 2075 IF((IJK*NTOT)-19000)207,207,203
  207 CALL VFCHCK(MFMT)
  208 WRITE (6,209)COB,NVAR,NTOT,NVG,MFMT
      DO 1 I=1,19000
    1 IDATA(I)=0
      I2=0
      I3=(IJK+4)/5
      DO 7400 L=1,I3
      I1=I2+1
      I2=I2+5
      READ  (5,149)KODE,(MMAX(I),MMIN(I),I=I1,I2)
      IF(KODE-IC1)203,7400,203
 7400 CONTINUE
```

```
 7500 CALL RDLBL(NAMES,IJK,WORD)
 7000 MFMT=MFMT*12
      READ  (5,150)(FMT(I),I=1,MFMT)
      DO110J=1,NTOT
      READ  (NTAPE,FMT)(NEW(I),I=1,NVAR)
      DO110I=1,NVAR
      LL=NTOT*I-NTOT+J
  110 IDATA(LL)=NEW(I)
      DATA Q006HL/6H*     /
      ASK(1)=(+Q006HL)
      DO 4000 I=2,120
 4000 ASK(I)=ASK(1)
  118 IF(NVG) 203,3002,3003
 3003 CALL TRNGEN(NVG,NVAR)
      IF(NVAR)2090,2090,210
 2090 IF(-NSEL)2091,10,10
 2091 DO 2095 I=1,NSEL
 2095 READ(5,157) KODE
      GO TO 10
  210 IF((IJK-1)*(IJK-101)) 6006,203,203
 6006 NVAR=IJK
 3002 IF(MAD-1) 9002,8000,9002
 9002 NNN=1
 9004 IF(NNN-NSEL) 9003,9003,10
 9003 READ  (5,157)KODE,NEXT,NUM,(LEVEL(I),I=1,NUM)
      IF(KODE-IF1)203,8001,203
 8000 N123=NVAR-1
      NEXT=1
 9005 IF(NEXT-N123) 8001,8001,10
 8001 MAXX=MMAX(NEXT)
      MINX=MMIN(NEXT)
      IEND  =NTOT*NEXT
      ISTART=IEND-NTOT+1
      NEWX=NEXT
      IF(MAD-1) 8002,8003,8002
 8002 MUCH=1
 9006 IF(MUCH-NUM) 8004,8004,1010
 8003 N124=NEXT+1
      LOVE=N124
 9007 IF(LOVE-NVAR)9994,9994,8010
 8004 LOVE=LEVEL(MUCH)
 9994 JEND  =NTOT*LOVE
      JSTART=JEND-NTOT+1
      MAXY=MMAX(LOVE)
      MINY=MMIN(LOVE)
      NEWY=LOVE
      JESUS=MAXX-MINX
      IF(JESUS-34) 5050,5050,5051
 5051 JESUS=MAXY-MINY
      IF(JESUS-34) 5052,5052,5053
 5053 WRITE (6,5054)NEWY,NEWX
      GO TO 64
C
 5052 LOOK=-9
      IT=NEWY
      NEWY=NEWX
      NEWX=IT
```

```
      IT=MAXX
      MAXX=MAXY
      MAXY=IT
      IT=MINX
      MINX=MINY
      MINY=IT
      IT=ISTART
      ISTART=JSTART
      JSTART=IT
      IT=IEND
      IEND=JEND
      JEND=IT
5050  CALL CROSS
      IF(-JUNKXY)5500,5500,5053
5500  IF(-NAMES)7004,7003,7003
7004  WRITE (6,7002)WORD(NEWY),WORD(NEWX)
7003  WRITE (6,101)NEWY,NEWX
      WRITE (6,2000)NTOT
      WRITE (6,2001)
      WRITE (6,2002)NEWY,MAXY,MINY
      WRITE (6,2002)NEWX,MAXX,MINX
      WRITE (6,156)
      ITOTAL=0
      DO66I=1,LIMITX
   66 ITOTAL=ITOTAL+MARGX(I)
      IF(ITOTAL) 67, 67, 68
   67 WRITE (6,159)
      GO TO 64
   68 WRITE (6,102)NEWY
      IF(-NAMES)7006,7005,7005
7006  WRITE (6,7007)WORD(NEWY)
      GO TO 7008
7005  WRITE (6,103)
7008  IF(IZERO-1) 5000,6000,5000
5000  J1=0
      DO 180 I=1,LIMITY
      IF(MARGY(I)) 180, 180, 170
  170 J1=J1+1
      MRANGY(J1)=MRANGY(I)
      DO 175 J=1,LIMITX
  175 KPOINT(J1,J)=KPOINT(I,J)
      MARGY(J1)=MARGY(I)
  180 CONTINUE
      LIMITY=J1
      J1=0
      DO 190 I=1,LIMITX
      IF(MARGX(I)) 190, 190, 181
  181 J1=J1+1
      MRANGX(J1)=MRANGX(I)
      DO 185 J=1,LIMITY
  185 KPOINT(J,J1)=KPOINT(J,I)
      MARGX(J1)=MARGX(I)
  190 CONTINUE
      LIMITX=J1
6000  J1=LIMITX
      IMAXY=LIMITY+1
      DATA BLANK/0050505050505/
```

```
      DO 191 I=1,50
  191 FMT(I)=BLANK
      DATA Q000CT/0510505050505/
      FMT(1)=Q000CT
      DATA Q007HL/6H I5,  /
      FMT(2)=(+Q007HL)
      DATA Q008HL/6H3H *  /
      FMT(3)=(+Q008HL)
      J1=J1+4
      DATA Q009HL/6HI5,   /
      FMT(J1)=(+Q009HL)
      J1=J1+1
      DATA Q001CT/0400505050505/
      FMT(J1)=Q001CT
      DIV=ITOTAL
      CHISQ=0.0
      DO 211 I=1,LIMITY
      DO 211 J=1,LIMITX
      SUB=FLOAT(MARGY(I)*MARGX(J))/DIV
      IF(SUB) 203,212,213
  213 FREQ=KPOINT(I,J)
  211 CHISQ=CHISQ+(FREQ-SUB)**2/SUB
 1915 DO99LL=1,LIMITY
      K=IMAXY-LL
      DO 196 J=1,LIMITX
      IF(KPOINT(K,J)-1) 192,195,195
  192 FMT(J+3)=P2
      GO TO 196
  195 FMT(J+3)=P1
  196 CONTINUE
      J1=0
      DO 199 J=1,LIMITX
      IF(KPOINT(K,J)-1) 199,198,198
  198 J1=J1+1
      KPOINT(K,J1)=KPOINT(K,J)
  199 CONTINUE
      IF(J1) 5001,5001,5002
 5001 WRITE (6,FMT)MRANGY(K),MARGY(K)
      GO TO 99
 5002 WRITE (6,FMT)MRANGY(K),(KPOINT(K,J),J=1,J1),MARGY(K)
   99 CONTINUE
      NASK=8+3*LIMITX
      WRITE (6,4001)(ASK(I),I=1,NASK)
      ITEST=LIMITX
      JTEST=2*(LIMITX/2)
      IF(ITEST-JTEST)60,60,61
   60 LLLT=LIMITX/2
      LLLB=LLLT
      GOTO65
  212 ASSIGN 2125 TO KHIPRN
      GO TO 1915
C
   61 LLLT=LIMITX/2+1
      LLLB=LLLT-1
   65 WRITE (6,137)NEWX,(MRANGX(2*I-1),I=1,LLLT)
      IF(-NAMES)7010,7009,7009
 7010 WRITE (6,7011)WORD(NEWX),(MRANGX(2*I),I=1,LLLB)
```

```
      GO TO 7012
7009  WRITE (6,138)(MRANGX(2*I),I=1,LLLB)
7012  WRITE (6,139)(MARGX (2*I-1),I=1,LLLT)
      WRITE (6,140)(MARGX(2*I),I=1,LLLB)
      WRITE (6,141)ITOTAL
      GO TO KHIPRN,(2115,2125)
2115  NDF=(LIMITY-1)*(LIMITX-1)
      WRITE (6,214)CHISQ,NDF
      GO TO 64
2125  WRITE (6,215)
      ASSIGN 2115 TO KHIPRN
   64 SUMX=0.0
      SUMY=0.0
      SUMX2=0.0
      SUMY2=0.0
      SUMXY=0.0
      J=JSTART
      DO 69 I=ISTART,IEND
      X=IDATA(I)
      Y=IDATA(J)
      SUMX=SUMX+X
      SUMY=SUMY+Y
      SUMX2=SUMX2+(X**2)
      SUMXY=SUMXY+(X*Y)
      SUMY2=SUMY2+(Y**2)
   69 J=J+1
      FNTOT=NTOT
      SCUMX=SUMX/FNTOT
      SCUMY=SUMY/FNTOT
      PUSY=SQRT((SUMY2-SUMY**2/FNTOT)/(FNTOT-1.0))
      PUSX=SQRT((SUMX2-SUMX**2/FNTOT)/(FNTOT-1.0))
      TOP=FNTOT*SUMXY-SUMX*SUMY
      BOT=(FNTOT*SUMX2-SUMX**2)*(FNTOT*SUMY2-SUMY**2)
      BOT=SQRT(BOT)
      RXY=TOP/BOT
   75 IF(JUNKXY) 1000,1000,76
   76 WRITE (6,146)JUNKXY
      IF(JUNKXY-50) 77,77,1000
   77 WRITE (6,147)NEWY, NEWX
      DO 78 I=1,JUNKX
   78 WRITE (6,142)ITEM(I),IOUTY(I),JOUTX(I)
 1000 WRITE (6,154)RXY,NEWX,SCUMX,NEWX,PUSX,NEWY,SCUMY,NEWY,PUSY
      IF(LOOK) 5056,5057,5057
 5056 LOOK=0
      IT=NEWY
      NEWY=NEWX
      NEWX=IT
      IT=MAXX
      MAXX=MAXY
      MAXY=IT
      IT=MINX
      MINX=MINY
      MINY=IT
      IT=ISTART
      ISTART=JSTART
      JSTART=IT
      IT=IEND
```

```
      IEND=JEND
      JEND=IT
 5057 IF(MAD-1) 9010,9011,9010
 9010 MUCH=MUCH+1
      GO TO 9006
 1010 NNN=NNN+1
      GO TO 9004
 9011 LOVE=LOVE+1
      GO TO 9007
 8010 NEXT=NEXT+1
      GO TO 9005
      END
```

```
.BMD08D
 IN     D83/PROG,D84/PROG
 IN     D86/PROG,D87/PROG,D85/PROG,D82/PROG,          D08/PROG
```

Chapter 11

The S Test

The results obtained by cross-tabulation, or some results at least, lead us to cast the image frequencies in a two-way layout having n rows and k columns. The rows represent the descriptors used for selection and the columns represent the bands.

Now consider a given row i and a given column j

$$1 \leq i \leq n$$

$$1 \leq j \leq k$$

At the intersection of row i with column j there is a cell frequency X_{ij}

Due to computer constraints

$$0 \leq X_{ij} \leq 999$$

So we have the two-way layout

	1	2	...	k
1	X_{11}	X_{12}	...	X_{1k}
2	X_{21}	X_{22}	...	X_{2k}
⋮	⋮	⋮		⋮
n	X_{n1}	X_{n2}	...	X_{nk}

where n = 3(1)11 descriptors

k = 3(1)9 bands

we way wish to test if there is a difference between the bands, as regards to the identification of the selected descriptors. As the investigator examines simultaneously the images in the k bands, there is strong evidence in support of related or matched descriptions, opposed to a more questionable independance between descriptions.

We will consider the distribution-free S test of Friedman, Kendall, Babington-Smith (M. Hollander and D.A. Wolfe, 1973).

Procedure:

1/ The two-way layout of X_{ij} frequencies is replaced by a table of within-row ranks, i.e. from the lowest to the highest frequency of each descriptor. An r_{ij} is substituted for each X_{ij} . Average ranks are used for ties. Furthermore, we note:

g_i the number of tied groups with descriptor i

l_i (letter l) is a given group of tied frequencies

$t_{\ell i}$ the size of the ℓth tied group with descriptor i

Note that untied frequencies of descriptor i are counted as ties of size 1. Therefore

$$1 \leq \ell_i \leq g$$

2/ Rank totals are summed up for each band

$$R_{.j} = \sum_{i=1}^{n} r_{ij}$$

The overall mean of the ranks is

$$R_{..} = \frac{k+1}{2}$$

3/ We now compute S'

$$S' = \frac{12 \sum_{j=1}^{k} (R_{.j} - n R_{..})^2}{n k (k+1) - \left[1 / (k-1) \right] \sum_{i=1}^{n} \left\{ \left(\sum_{\ell_i=1}^{g_i} t_{\ell_i}^3 \right) - k \right\}}$$

to one decimal place.

Expression between braces is zero for each descriptor without tied frequencies. When all descriptors are void of ties, then S' reduces to S

$$S = \left[\frac{12}{n k (k+1)} \sum_{j=1}^{k} R_{.j}^{2} \right] - 3n(k+1)$$

4/ A table of critical values at the 1 percent probability level (only value 6.0 is at the higher level .028) is used to test S' . When S' is greater than critical value found for given n and k, then S' is significant and there is a difference between bands.

n \ k	3	4	5	6	7	8	9
3	6.0	8.2	10.1	15.1	16.8	18.5	20.1
4	7.8	9.3	11.0	15.1	16.8	18.5	20.1
5	8.3	9.7	11.5	15.1	16.8	18.5	20.1
6	8.7	10.0	13.3	15.1	16.8	18.5	20.1
7	8.6	10.4	13.3	15.1	16.8	18.5	20.1
8	9.0	10.4	13.3	15.1	16.8	18.5	20.1
9	8.7	11.3	13.3	15.1	16.8	18.5	20.1
10	9.0	11.3	13.3	15.1	16.8	18.5	20.1
11	9.0	11.3	13.3	15.1	16.8	18.5	20.1

Reference

Hollander, M. and Wolfe, D. A. [1973]. Nonparametric statistical methods. Wiley, New York.

As an exercice, without significance in remote sensing as the image frequencies are small, we will take an example of small size

$$n = 4$$

$$k = 4$$

1/ The two-way layout of frequencies

		MSS4	MSS5	MSS6	MSS7
descriptors:	bay-head beach	8	8	3	1
	coastal dune	8	6	5	4
	littoral transport	12	10	6	3
	conifer, no deciduous	4	3	3	3

and the corresponding layout of ranks

				g	t_1	t_2	t_3
3.5	3.5	2	1	3	2	1	1
4	3	2	1	void			
4	3	2	1	void			
4	2	2	2	2	3	1	

2/ Column totals are 15.5 11.5 8 5

and $R_{\bullet\bullet} = 2.5$

3/ S' is computed as explained above

$$S' = \frac{12\left[(15.5 - 10)^2 + (11.5 - 10)^2 + (8 - 10)^2 + (5 - 10)^2\right]}{4\,(4)\,(5) - \left(\frac{1}{3}\right)\left\{\left[\left(2^3 + 1^3 + 1^3\right) - 4\right] + \left[\left(3^3 + 1^3\right) - 4\right]\right\}} = 10.5$$

4/ Entering table with $n = 4$ and $k = 4$, we notice S' is greater than critical value 9.3 and we conclude, for expository purposes only, that there is a significant difference between bands.

The S Test Program

by

A. Giey, Régie Informatique, Paris, 1974

```
"RUN,C ORSIDA,TP0160,ORSTOM                                    EN CODE 029 POUR RV
"FOR,I .S,.S
C                              ******  S-TEST  ******
      DIMENSION MASTCD(11),INROW(9),INDESC(8),TRANK(9),CRITIC(11,9)
      DATA ((CRITIC(I,J),I=3,11),J=3,9)/6.,7.8,8.3,8.7,8.6,9.,8.7,2*9.,
     18.2,9.3,9.7,10.,2*10.4,3*11.3,10.1,11.,11.5,6*13.3,9*15.1,9*16.8,
     29*18.5,9*20.1/  (TRANK(J),J=1,9)/9*0./  TSIZE/0./
 1    FORMAT(11A6/2I2)
 2    FORMAT(1H1,11A6/1H0,2I2//)
 3    FORMAT(9I3,1X,8A6)
 4    FORMAT(1H ,T30,8A6,T2,9I3)
 5    FORMAT(5H0S' =,F8.1,18H  ** BETWEEN BANDS)
 6    FORMAT(5H0S' =,F8.1,37H  IS NOT SIGNIFICANT AT THE .01 LEVEL)
      READ 1,MASTCD,NROW,KCOL            @ READ,PRINT AND CHECK THE MASTER
      PRINT2,MASTCD,NROW,KCOL            @     AND DIMENSION CARDS
      IF(NROW.LT.3.OR.NROW.GT.11.OR.KCOL.LT.3.OR.KCOL.GT.9) STOP
      DO 11 I=1,NROW                     @ DO ROW BY ROW
      READ3,INROW,INDESC                 @ READ
      PRINT4,INDESC,(INROW(J),J=1,KCOL)  @ AND PRINT THE CURRENT DATA CARD
      R = KCOL                           @ R= RANK
 7    MAXI = -2**34                      @
      DO 8 J=1,KCOL                      @ SEARCH THE FREQUENCY FOR R RANK
 8    MAXI = MAX0(MAXI,INROW(J))         @
      X = 0.                             @
      DO 9 J=1,KCOL                      @
      IF(INROW(J).EQ.MAXI) X=X+1.        @ COMPUTE THE SIZE FOR THIS GROUP
 9    CONTINUE                           @
      TSIZE = X*X*X+TSIZE                @ ADD SIZE POWER 3 TO TSIZE
      R = R-X                            @
      X = (2.*R+X+1.)/2.                 @ COMPUTE RANK AVERAGE OF GROUP
      DO 10 J=1,KCOL                     @
      IF(INROW(J).NE.MAXI) GOTO 10       @
      INROW(J) = -2**34                  @ CLEAR FREQUENCIES OF RANK R
      TRANK(J) = TRANK(J)+X              @ ADD RANK AVERAGE BY COLUMN
 10   CONTINUE                           @
      IF(R),,7                           @ CONTINUE FOR A LOWER RANK
 11   CONTINUE                           @ AGAIN FOR NEXT ROW
      X = 0.                             @
      R = NROW*(KCOL+1)/2.               @ COMPUTE S'
      DO 12 J=1,KCOL                     @
 12   X = (TRANK(J)-R)*(TRANK(J)-R)+X    @
      X = 12.*X/((KCOL+1)*KCOL*NROW-(TSIZE-NROW*KCOL)/(KCOL-1))
      IF(X.LT.CRITIC(NROW,KCOL))GOTO13   @ COMPARE S' TO THE CRITICAL VALUE
      PRINT5,X                           @ IF S' IS SIGNIFICANT
      STOP                               @
 13   PRINT6,X                           @ IF S' IS NOT SIGNIFICANT
      STOP                               @
      END                                @
"XQT
THE S TEST    ERTS-1 FRALIT  MSS4,5,6,7
 4 4
  8  8  3  1                  BAY-HEAD BEACH
  8  6  5  4                  COASTAL DUNE
 12 10  6  3                  LITTORAL TRANSPORT
  4  3  3  3                  CONIFER, NO DECIDUOUS
"FIN
```

THE S TEST ERTS-1 FRALIT MSS4,5,6,7

4 4

8	8	3	1	BAY-HEAD BEACH
8	6	5	4	COASTAL DUNE
12	10	6	3	LITTORAL TRANSPORT
4	3	3	3	CONIFER, NO DECIDUOUS

S' = 10.5 ** BETWEEN BANDS

@FIN