VOS 4.0 List of Programs

This is a list of the general application programs contained in the P2 library for version 4.0 of the VICAR Open Source release.

General application programs operate on any VICAR image, subject to various restrictions. Most of these programs are restricted to 8-bit and/or 16-bit data while a few handle the full range of data types (32-bit integer, single and double precision floating point, complex). Most of the programs are restricted to monochrome (single band) images while a few operate on multispectral data.

Each program is listed only once under one of the functional areas below. Functions which deal primarily with monochrome images appear first, followed by functions for multispectral images and functions for graphical and tabular data.

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1.2. Program Listing

1.2.1. Utilities

VICAR help:

NUT	On-line VICAR tutorial
NUTINP	Called by NUT
NUTPROMPT	Called by NUT

VICAR utilities:

CHKSPACE	Return amount of available space on specified disk
COMMON_SUBPDF	Various sub-PDFs for use by menu-driven PDFs
COPY	Copy all or part of a labeled or unlabeled image
DATETIME	Print current date and time: dd-mmm-yy hh:mm:ss
FILE2TCL	Determine various file parameters
RUN_ISQL	Enter or delete data in Sybase catalog
TCLMATH	Evaluate math expressions on tcl real variables
TEMPNAME	Append ZZZ extension to filename to make it a temporary file
COMPRS	Create a compressed output file by compressing the input file

VICAR procedure generation:

CNT	Return number of files in a list created by SRCH
COMMENT	Display comments during execution of a procedure
FORM	Return image format and size as TAE variables
GETLAB	Copy a VICAR label item to a TAE variable
LAB2TCL	Copy VICAR label items to TAE variables
MAKESRCHLIST	Output a list of all files in a directory in SRCH format
MAXMIN	Compute min and max DN and ouput as TAE variables
NXT	Return data for next file in a SRCH list
RESET	Reset the next file pointer of a SRCH list
TRANSLOG	Translate a logical name
USERNAME	Return current userID
WILDCARD	Find all files matching a wildcarded string

Manipulating ASCII files:

ADDTOFILE	Append a string to an ASCII file
CREATEFILE	Create an empty file
COLUMNAR	Concatenate two ascii files left-to-right
HEADERGEN	Output multiple records of an ASCII file as a single record
TABULATE	Concatenate ASCII files into tab-delimited file
TYPETEXT	Output ASCII text file to terminal and session log

Data conversion:

CCOMP	Convert image from complex to real format or vice-versa
CFORM	Convert image between data types with optional scaling
DDD2VIC	Convert Mars Global Surveyor "ddd" format data to VICAR
FITSIN	Convert FITS data to VICAR format (P3)
GTGEN	Create a GeoTIFF label from parameter input
GTLIST	List image mapping info from a GeoTIFF label
IMG2ASCII	Convert image data to ASCII text file
ISISLAB	Prints PDS label and history objects of an ISIS cube
PIC2VIC	Convert PIC format images to VICAR
PSCRIPT	Prepare a VICAR image for output to a Postscript printer
VIC2PIC	Convert VICAR images to PIC format
VTIFF	Convert images between VICAR and TIFF format
VTIFF3O	Convert images between VICAR and GeoTIFF format

1.2.2. Displaying images, text, and graphics

Image displays:

EDIMAGE	Interactive image annotation and editing
HICCUP	Create histogram file for halfword image
HISTGEN	Create histogram file for byte or halfword image
MASKV	Create an image display for film recording
PRINTPIX	Print a grey level display of an image
QB	Sequential display of a list of files (Quick Browse)
XVD	Interactive image display

Pixel listings and plots:

LIST	Print the DN values of an image area
EZLIST	Similar to LIST, but output may be an ASCII text file
LISTBITS	Print the DN values of an image area in binary
QPLOT	TAE procedure which calls QPLOT2
QPLOT2	Line or spectral plots to VRDI, Tektronix, Regis, Printronix

Label processing and display:

CLEANLABEL	Remove duplicate label items from an image's history label
GTIGEOLO	Parse a MIL-STD-2500 image header IGEOLO field
GTLABFIX	Convert property label values from exponent to decimal format
LABEL	Print or edit the VICAR label
LABLIST	Print VGR or GLL SSI flight label
LABSWTCH	Switch the history labels of two VICAR images
LABVFY	Verify that an image label contains a specified string

Text and graphics overlays:

ADL	Draw line between two points in image

CROSSHAIR	Plot a crosshair at the given location on a VICAR file
CLABEL	Copy label from a "CONTOUR" file to a "POLYSCRB" file
CONLAB	Image contouring procedure (calls CONTOUR)
CONTOUR	Create a graphics file of contours or "isolines"
FONT	Superimpose text on images in various font styles and sizes
GRID	Superimpose a user defined reference grid on a byte image
MAPGRID	Overlay a uniform grid on an image
MSSVIEW	Draw scatterplot in center of MSS image
OVERLAY	Overlay a latitude-longitude grid on an image
ZCIRCLE	Zero out a circular or elliptical area of an image

See also: EDIMAGE

1.2.3. Generic tools

Generating synthetic images:

ELLIPSE	Create synthetic images of oblate spheroids
FRACGEN	Simulate elevation data via fractional brownian motion
GEN	Create synthetic (ramp) image
GENTHIS	Create image from input DN list
RADAGEN	Synthesize a radar image from an elevation map
RANDPIXEL	Fill a blank image with random data points
SHP2RAST	Rasterize shape data to 1x1 degree cell files
SPOT	Synthesize images of spots of various sizes and profiles
TARGET	Create test targets for optical systems of known MTFs
WEDGE	Create a pie wedge image

Image statistics:

ASCHIST	Create a tab-delimited ASCII histogram file
AVGPIX	Read a list of VICAR byte image filenames and calculate their average DN
ENTROPY	Compute image entropy
HIST	Print histogram of byte, integer, or floating point image
LAVE	Compute mean or sigma for each line or column of an image
MEDVAL	Accept a VICAR image and estimate the median DN value by binning DNs
MOORESC	Count overlap of Moore regions for clustering
PIXGRAD	Compute the magnitude and gradient of an image
PIXSTAT	Compute statistical data in a local area about a pixel
IMGSTAT	Output image representing local min, max, mean, or sigma

Mathematical and logical operations:

AVERAGE	Average up to 48 images into one image
DIFPIC	Compute difference between two images
F2	Perform mathematical and logical operations on images
RATIO	Compute ratio between two images

SC2RPC	Compute RPC from spacecraft ephemeris, camera model
SCINTERP	Interpolate two ephemerides/attitudes to sc2rpc vectors

Constrast enhancement:

ASTRTCHR	Convert floating point images by byte via histogram scaling
FIT	Convert halfword images to byte via histogram scaling
HSTRETCH	Modify specific DN values of an image
STRETCH	Image contrast enhancement
STRETVAR	Linear contrast enhancement as a function of line number
VLOOKUP	Modify DNs of B/W or multispectral images via table lookup

Color reconstruction:

COLORFIT	Replace missing image of color triplet via numerical fit
COLORME	Color balancing of uncalibrated RGB images
COLORRGB	Convert n multispectral images into RGB or XYZ tristimulus
COLORT	Transform color triplets between RGB and other color domains
COLORT2	Transform color, like COLORT but for half/full/real data
DNTOXYY	Convert multispectral images to xyY color space
GIACONDA	Color transformation to reproduce specified spectra
RGB2ISH	Convert between RGB and ISH color spaces.
RGB2PSEUDO	Create pseudo-color rendering of an RGB color triplet
RGBTOXYY	RGB to xyY color transformation
SPECTOXYY	Create xyY color triplet from registered color n-tuplet
TRISTIM	Compute tristimulus values and chromaticity coordinates
TRUCOLOR	Color reconstruction of designated spectra
XYY2HDTV	Convert xyY color triplet to RGB triplet for HDTV
XYYTOSPEC	Convert an xyY color triplet to an RGB triplet
YFIT	Autostretch of the tristimulus Y element of a xyY triplet

Digital filters:

APODIZE	Reduce ringing on the edge of image during filtering
BOXFLT2	High-pass or low-pass filter
CONCOMP1	Removes high frequency noise components from an image
FILTER	General purpose digital filter
MEDIAN	Median filter
SBOXFLT	Highpass filter (TAE procedure which calls BOXFLT2)
SHADOW	Brighten shadows preserving details of the image
SHADY	Add contour lines and/or shading to an image
SHADY2	Simulate shadows from illumination at given azimuth-elevation
TFILT	High-pass filter with thresholding to prevent ringing of limb

Fast Fourier Transforms:

FFT11	1-D FFT

FFT1PIX	Convert a 1-D FFT to an amplitude and/or phase image
FFT2	2-D FFT procedure (calls FFT22)
FFT22	2-D FFT
FFTADD	Add 2 FFTs
FFTFIT	Modify 2-D FFT to force images to have identical power spectra
FFTFLIP	Translate 2-D FFT axes so DC term is in center of output
FFTMAGIC	Compute amplitude of an FFT from the phase or vice-versa
FFTPIC	Convert a 2-D FFT to an amplitude and/or phase image
IFFT	Interactive modification of FFT
POWER	Compute 1-D power spectrum of an image area
SWAP	Swap the quadrants of an image or complex FFT

Image Restoration:

CLEAN	Restore image by iteratively deconvolving a pt spread function
FIL2	Compute filter weights to deconvolve an image
FILTER2	Image restoration procedure (calls FIL2 and FILTER)
MEM	Non-linear deconvolution using Maximum Entropy Method
OTF1	Compute optical transfer function
PSF	Extract the point spread function from an image
RESTORW	TAE image restoration procedure (calls OTF1 and WIENER)
SPARSE	Simulate effect of a sparse aperture
WIENER	Restore an FFT image by using the Wiener noise additive model
WNR2005	Restore an FFT image by using the Wiener noise additive model

Image blemish removal:

BLEMPIC	Create image display of CCD camera blemishes
DESTRIPE	Remove striping in images caused by variations in detector response.
DS4	Remove 6-line striping from LandSat images
QSA	Add or subtracts constants to image areas
REPAIR	Locate and interpolates over bad lines
SARGON	Interpolate over polygonal regions of an image (interactive)
SARGONB	Interpolate over polygonal regions of an image (batch)
ZFILL	Interpolate over zero regions of an image

See also: EDIMAGE

Image noise reduction/simulation:

ADDNOISE	Add gaussian noise, shot noise, or bit errors to image
ADESPIKE	Remove single-pixel spikes from an image
DENOISETV	Perform impulse noise removal using total variation minimization.
DESPIKE	Remove single-pixel spikes from an image
GAMMA	Perform gamma correction.
GAUSNOIS	Create Gaussian noise image
JPEGFIX	Reduce blockiness introduced by severe JPEG compression

MINFILT	Radiation noise suppression
POLYNOIS	Generate a noise image of specified noise spectra
REMNOISE	Remove single-pixel spikes from an image
REMRAY	Remove cosmic ray and radiation noise from an image
TVREG	Reduce noise by Total Variation minimization

Image concatenation:

APPEND	Concatenate up to 30 images vertically
MSS	Concatenate up to 30 images horizontally
CONCAT	Concatenate images of the same size
VICCUB	Combines multiple images into one multi-band image

Image orientation:

FLOT	Rotate or reflects image by 90 or 180 degrees
ROTATE	Rotate an image 90 degrees
ROTATE2	Rotate an image by an arbitrary angle (calls GEOMA)

Image magnification and reduction:

BICUBIC	Integral image enlargement via cubic convolutional filter
FFTMAG	Enlarge images by 2**N using Sampling Theorem
INSERT	Enlarge image in line direction
SIZE	Enlarge or reduce an image via bilinear interpolation

Geometric transformations (rubber sheeting):

GEOM	Geometric transformation (calls LGEOM or MGEOM)
GEOMA	Geometry transform of an image, randomly spaced points
GEOMV	High-resolution geometric transformations on images
LGEOM	Geometric transformation of an image, uniform grid
MGEOM	Geometric transformation of an image, uniform grid
POLYGEOM	Geometric transformation of tiepoints
TIECONV	Prepare a gridded dataset for GEOM programs

1.2.4. Image registration and mosaicking

Image navigation:

EPHEMERIS	Returns ephemeris for a planet as seen from another planet
FARENC	Correct camera pointing by fitting limb
GETLL	Convert line-sample to lat-lon and output to TAE variable
GETPC	Output planet center line-sample coordinates as TAE variable
GSPICE	Print SPICE data for an image
HORIZON	Detect strong and weak horizon borders for martian images
MAKECK	Create an empty SPICE C-kernel
NAV	Correct camera pointing by fitting limb, ring, or stars

NAV2	Correct camera pointing by tiepoint registration
OMC	Coordinate transformation of C-matrices and position vectors
PERSLAB	Store navigation data for a flight image into VICAR label
RINGORBS	Generate the Ring Orbital Elements file (for NAV)
SPICE	Print SPICE data for an image

Image registration:

AUTOMATCH	Find matching tiepoints in a sequence of images
CORNER	Locate candidate tiepoints by scanning an image for corners
LINEMTCH	1-d line matching of an image pair (correlation)
MANMATCH	Find matching tiepoints in a sequence of images (interactive)
PICMATCH	Find matching tiepoints in an image pair
PICREG	Find matching tiepoints in an image pair (interactive)
POLYREG	Perform affine transformation on a set of tiepoints
TIECONM	Compute geometric distortion from randomly spaced ties
TIEPARM	Compute geometric distortion parameters from tiepoints
TIEPLOT	Plot tiepoints stored in an IBIS file as vector displacements
TP	Find matching tiepoints in a sequence of images (interactive)

Map projections:

GEOMREC	Transform slant range radar data to ground range
MAP3	Standard cartographic projections
MAPCOORD	Convert from lat-lon to line-samp or vice-versa
MAPLABPROG	Store projection data into label
MAPTRAN	Convert images from one projection to another
POLARECT	Rectangular to polar projection and vice-versa
POLARECT2	Convert images to polar coordinates and back
POLYMAP	Convert tiepoints from one projection to another
POLYPMAP	Convert tiepoints from lat-lon to line-sample
PTP	Project an image from one perspective to another
SINPROJ	Sinusoidal projection
TRICOEF	Compute coefficients for conformal and authalic projections

Map projections of Irregularly Shaped Objects (ISOs):

AREAISO	Compute AUXiliary lat-lons for Irregularly Shaped Objects
AUXILIARY	Compute conformal-to-planetocentric auxiliary ISO coords
EFGISO	Compute E, F, and G components of projected ISOs.
MAPAUX	Map projection of irregularly shaped objects (ISOs).
SNYDER	Compute centric coordinates for ISOs.

Mosaic generation (IBIS):

FEATHERV	Mosaic images using Moore distance feathering
GEOMZ	Brightness transformation (rubber-sheeting of DN axis)

MASKMOS	Create an image mask to aid in mosaicking
RAPIDMOS	Assemble registered images into a mosaic

Mosaic generation (multimission):

FASTMOS	Assemble registered images into a mosaic
GTAPPEND	Concatenate images in a top to bottom fashion
GTMSS	Concatenate images in a left to right fashion
IBISGCP	Specify ground control points
IBISNAV	Copy SPICE data to an IBIS file
IBISUPDATE	Store corrected camera pointing into a C-kernel
INSECT	Mosaic two images
MOSPLOT	Plot footprints, overlap files, or error vectors for mosaics
NEWMOS	Assemble registered images into a mosaic

1.2.5. Calibrating the camera and target

Geometric calibration:

FIXLOC	Edit tiepoints
GETLOC	Extract tiepoints for a subarea of a grid target
GRIDGEN	Synthesize image of a grid target
GRIDLOCB	Locate intersections on a grid-target image
INTERLOC	Locate intersections on a grid-target image (interactive)
LOCUS2	Perform a least squares fit between two tiepoint files
MARK	Scribe rectangles about specified pixel locations
RADDIST	Project uniform grid of tiepoints to simulate optical distortions
SKEW	Linear transformation of tiepoints
XLOCUS	Apply tranform (computed by LOCUS2) on grid locations

Radiometric calibration:

BLEMGEN	Create blemish file for GLL SSI and Cassini ISS cameras
DC	Compute dark current frame from light transfer sequence
CCDNOISE	Measure noise and system gain (CCD camera)
CCDRECIP	Measure shutter offset (CCD camera)
CCDSLOPE	Measure light transfer slope and offset (CCD camera)
FCNPOLAR	Fit polarization data to determine polarization axis of a filter
GALGEN	Create radiometric and dark-current files for GLL & Cassini
LTGEN	Create a light-transfer or reciprocity file
MOMGEN	Compute moments for image areas of light-transfer sequence
MOMGEN2	TAE procedure to process light transfer or reciprocity data
MOMLIST	Print or output to a text file contents of Light Transfer File
NIMSR2IOF	Convert a NIMS radiance cube to "I/F"
PICSUM	Compute sum of multiple images and flags saturated pixels
SIGNAL	Output light transfer data for a pixel to a text file
SRCHEDGE	Get angle of image divided diagonally into light & dark areas

Photometric function:

PHODEM	Demonstrate use of menu-driven PDFs
PHOPDF	Contain sub-PDFs specific to each photometric function
PHOTTEST	Generate synthetic data for testing PHOTFIT2
PHOTFIT2	Fit photometric function to data in catalog
PHOTFUNC	Photometric function correction of flight images

1.2.6. Miscellaneous

Atmospheric feature tracking:

DVECTOR	Draw vectors representing tiepoint displacements
MORPH	Create intermediate images between two images
TPTEDT2	Identify and removes erroneous tiepoints

Astronomy:

STARCAT3	Locate and catalogs stars in an image

Super-resolution:

SUPERRES	Combine many images to create super-resolution image

Focus analysis:

BESTFOCUS	Convert focus stack to best-focus image and depth map
BESTSCALE	Rescale images to the same size for BESTFOCUS

Elevation maps:

LSTOXYZ	Converts tiepoints to xyz planet coordinates
SDSEMS	Accept a DEM image and calculate its standard deviation of scene elevation relative to mean slope based on the Ancillary Geographic Product ATBD
TOPOMAP	Generate relative elevation maps from tiepoint data
TOTOPO	Converts tiepoints from xyz to line-samp of topomap

Stereo images:

CORRELATE1D	Compute 1-D correlated tiepoints between images
DISPARITY	Combines two disparity images into radial disparity
MPFTPT1	Compute line/sample disparity of each pixel of a stereo pair
STEREOCAM	Convert tiepoint locations to xyz coordinates for a stereo pair
XYZSUN	Convert stereo tiepoint data of the Sun to xyz coordinates

1.2.7. Multispectral data

Multispectral data utilities:

HIST2D	Create 2-D histogram file of multispectral data
INSERT3D	Insert a band into a 3-d multispectral file
TRAN	Convert multispectral data between BSQ, BIL, BIP, MSS fmts

Principal component transformation:

EIGEN	TAE procedure which calls EIGENVEC and XFORM
EIGENVEC	Computes principle components transformation matrix
XFORM	TAE procedure which calls XFORMAP or XFORMEM

Multispectral classification:

CLASSIFIER	Classify multispectral image pixels based on classes generated by clusterer.
CLUSAN	Apply clustering algorithm to multispectral data
CLUSTERER	Perform K-Means clustering on data produced by sampler.
CLUSTEST	Compute statistical significance of cluster in a state file
FASTCLAS	Bayesian maximum likelihood multispectral classifier
IBISCLST2	Calculate clusters from (x,y) points based on radial distance.
IBISCLST3	Calculate clusters from (x,y) points based on line/samp distance.
SAMPLER	Produce sample of image pixels used for statistical analysis.
STATPLT	Plot a classification statistics file
STATS	Compute statistics of training areas
USTATS	Perform unsupervised clustering on multispectral data

1.2.8. Graphics and tabular data

IBIS interface file operators:

AGGRG	Form aggregates of columns in an IBIS interface file
AGGRG2	Form aggregates of columns in an IBIS interface file
EDIBIS	Interactive editing of IBIS interface and graphics files
IBIS	Create, copies, concatenates, prints, and deletes IBIS files
IBIS2TCL	Copy IBIS tabular data to TAE variables
IBISLSQ	Perform least-square fits of specified columns
IBISREGR	Perform linear regression on IBIS tabular data
IBISSTAT	Compute various statistics of IBIS tabular data
MF	Math and logical operations on columns (FORTRAN)
MF3	Math and logical operations on columns (C)
MFD	Math and logical operations on double-precision tabular data
MULTOVLY	Compute n-dimensional histogram of n input images
ROWOP	Delete or select rows, or make multiple copies of rows
SORT	Sort rows of tabular data on one or more key columns

TRANSCOL	Convert long columns of data to smaller columns
XYZPIC2	Convert IBIS table to image
ZIPCOL	Copy columns from one IBIS file to another
ZIPCOL2	Create IBIS table from existing IBIS file(s)

IBIS graphics file operators:

POLYGEN	Generate an IBIS graphics file from user parameter list
GRUTIL	2-d and 3-d IBIS graphics-1 utility (append, convert)
GF	Perform math and logical operations on an IBIS graphics-1 file
POLYCLIP	Clip graphics elements to fit within a window
PLTGRAF	Plot a graphics-1 file inside a labeled box

IBIS file conversion routines:

ACOPIN	Convert an ASCII file into an IBIS table file
ARC2GRAF	Convert 2-D ARC/INFO point files to IBIS Graphics-1 format
GRAF2ARC	Convert IBIS Graphics-1 files to ARC/INFO format
GRAFIMG	Convert image data to a gridded 3-D graphics-1 file
MARKIBIS	Convert tiepoints from Mark to IBIS format or vice-versa
MSSIBIS	Copy data from MSS format to interface files
OLDGEOMA2IBIS	Convert (obsolete) GEOMA parameters to IBIS format
PERSPEC	Convert 3D graphics-1 file to true 2D perspective file
PIXMAP	Convert map coordinates in an IBIS file using a GeoTIFF label
RASTOGRAF	Convert graphics from raster to IBIS Graphics 1 format
TOIBIS	Convert data from image format to IBIS format
VQUIC	Convert ASCII file into an IBIS file

Displaying IBIS graphics or tabular data:

PAINT	Paint each region of an image a different color
POLYPNT	Convert IBIS polygon file to image format
POLYSCRB	Convert a Graphics-1 file to image format
PLOT3D	Plot a 3-d IBIS file
PLOTINT	Plot an IBIS interface file
XYZPIC	Convert a 3-D graphics-1 file into an image
ZINTERP	Interpolate over random elevation data to create an image

1.2.9. Project-specific Programs

Cassini Mission:

TABLESEARCH	TAE proc to extract point response data from a CASPRF file

Galileo Mission:

GALSOS	Radiometric correction of Galileo SSI images
GLLPSF	Create an SSI point spread function file

NIMSCMM2	Create a NIMS cube from Phase 2 EDRs
RVISIS2	Simplified interface for VISIS2
VISIS2	Converts GLL NIMS cubes between VICAR and ISIS formats
VISISX	Converts VICAR 3-D image to ISIS Cube file and vice-versa

Magellan Mission:

SIZEMGN	Resize an image (see SIZE) with Magellan-specific features

Viking Orbiter Mission:

BLEMVORB	VO camera blemish removal
DROPOUT	Fill in data gaps in VO images
RESLOCVO	Locate reseau on Viking Orbiter images
RESSAR75	Remove reseau from Viking Orbiter images
SOS	Radiometric correction of Viking Orbiter images

Voyager Mission:

VGRCDCOPY	Convert a VGR image archived on CDROM to a VICAR image
VGRFILLIN	Fill in data gaps in VGR (EDR) images
CAMPARAM	Copy camera params from VGR label to TAE local variables
RESLOC	Locate reseau on VGR images
RESSAR77	Remove reseau from VGR images
OSBLEMLOC	Convert VGR blemish locations from image to object space
FICOR77	Radiometric correction of VGR images
FIXVGR	Scale VGR images to correct for FICOR77 scaling error
PHOTLIST	Print phase, incidence, and emission angles for a VGR image