

## The NOAO Packages IRAF Version 2.10

- **noao:**

artdata	-	Artificial data generation package	[up]
astrometry	-	Astrometry package	
astutil	-	Astronomical utilities package	[up]
digiphot	-	Digital stellar photometry package	[up]
focas	-	Faint object classification and analysis package	
imred	-	Image reductions package	[up]
mtlocal	-	Magtape i/o for special NOAO format tapes	[up]
nobsolete	-	Obsolete tasks to be phased out in a future release	[up]
nproto	-	Prototype (temporary, contributed) tasks	[up]
observatory	-	Examine and define observatory parameters	[up]
onedspec	-	One dimensional spectral red & analysis package	[up]
rv	-	Radial velocity analysis package	[up]
surfphot	-	Galaxy isophotal analysis package	
twodspec	-	Two dimensional spectral red & analysis package	[up]

- **noao.artdata:**

gallist	-	Make an artificial galaxies list
mk1dspec	-	Make/add artificial 1D spectra
mk2dspec	-	Make/add artificial 2D spectra using 1D spectra templates
mkechelle	-	Make artificial 1D and 2D echelle spectra
mkexamples	-	Make artificial data examples
mkheader	-	Append/replace header parameters
mknoise	-	Make/add noise and cosmic rays to 1D/2D images
mkobjects	-	Make/add artificial stars and galaxies to 2D images
mkpattern	-	Make/add patterns to images
starlist	-	Make an artificial star list

- **noao.astutil:**

airmass	-	Compute the airmass at a given elevation above the horizon
asttimes	-	Compute UT, Julian day, epoch, and sidereal time
ccdtime	-	Compute time required to observe star of given magnitude
galactic	-	Convert ra, dec to galactic coordinates
gratings	-	Compute and print grating parameters
pdm	-	Find periods in light curves by Phase Dispersion Minimization
precess	-	Precess a list of astronomical coordinates
rvcorrect	-	Compute radial velocity corrections
setairmass	-	Compute effective airmass and middle UT for an exposure
setjd	-	Compute and set Julian dates in images

- **noao.digiphot:**

apphot	-	Aperture Photometry Package
daophot	-	Dao Crowded-Field Photometry Package
photcal	-	Photometric Calibration Package
ptools	-	Photometry Tools Package

- **noao.digiphot.apphot:**

- aptest - Run basic tests on the apphot package tasks
- center - Compute accurate centers for a list of objects
- centerpars - Edit the centering parameters
- daofind - Find stars in an image using the DAO algorithm
- datapars - Edit the data dependent parameters
- fitpsf - Model the stellar psf with an analytic function
- fitsky - Compute sky values in a list of annular or circular regions
- fitskypars - Edit the sky fitting parameters
- phot - Measure magnitudes for a list of stars
- photpars - Edit the photometry parameters
- polymark - Create polygon lists for polyphot
- polyphot - Measure magnitudes inside a list of polygonal regions
- polypars - Edit the polyphot parameters
- qphot - Measure quick magnitudes for a list of stars
- radprof - Compute the stellar radial profile of a list of stars
- wphot - Measure magnitudes for a list of stars with weighting
  
- lintran - Linearly transform a coordinate list
- pexamine - Interactively examine or edit an apphot output file
- txdump - Dump select fields from an apphot output file

- **noao.digiphot.daophot:**

- addstar - Add artificial stars to an image using the computed psf
- allstar - Group and fit psf to multiple stars simultaneously
- centerpars - Edit the centering algorithm parameters
- daofind - Find stars in an image using the DAO algorithm
- daopars - Edit the daophot algorithms parameter set
- daotest - Run basic tests on the daophot package tasks
- datapars - Edit the data dependent parameters
- fitskypars - Edit the sky fitting algorithm parameters
- group - Group stars based on positional overlap and signal/noise
- nstar - Fit the psf to groups of stars simultaneously
- peak - Fit the psf to single stars
- phot - Compute sky values and initial magnitudes for a list of stars
- photpars - Edit the photometry parameters
- psf - Fit the point spread function
- seepsf - Compute an image of the point spread function
- substar - Subtract the fitted stars from the original image
  
- pappend - Concatenate a list of daophot databases
- pconvert - Convert a text database to a tables database
- pdump - Print selected fields from a list of daophot databases
- grpselect - Select groups of a specified size from a daophot database
- pexamine - Interactively examine and edit a daophot database
- prenumber - Renumber stars in a daophot database
- pselect - Select records from a daophot database
- psort - Sort a daophot database

- **noao.digiphot.ptools:**

- istable - Is a file a table or text database file ?
- pappend - Concatenate a list of apphot/daophot databases

- pconvert - Convert from an apphot/daophot text to tables database
- pdump - Print selected columns of a list of daophot/apphot databases
- prenumber - Renumber a list of apphot/daophot databases
- pexamine - Interactively examine and edit an apphot/daophot database
- pselect - Select records from a list of apphot/daophot databases
- psort - Sort a list of apphot/daophot databases
- pttest - Run basic tests on the ptools package tasks
  
- tbappend - Concatenate a list of apphot/daophot tables databases
- tbdump - Print selected columns of a list of tables databases
- tbrenumber - Renumber a list of apphot/daophot tables databases
- tbselect - Select records from a list of apphot/daophot tables databases
- tbsort - Sort a list of apphot/daophot tables databases
  
- txappend - Concatenate a list of apphot/daophot text databases
- txdump - Print selected columns of a list of apphot/daophot text databases
- txrenumber - Renumber a list of apphot/daophot text databases
- txselect - Select records from a list of apphot/daophot text databases
- txsort - Sort a list of apphot/daophot text databases

• **noao.imred:**

- argus - CTIO ARGUS reduction package
- bias - General bias subtraction tools
- ccdred - Generic CCD reductions
- ctioslit - CTIO spectrophotometric reduction package
- doi - Density to Intensity reductions for photographic plates
- echelle - Echelle spectra reductions (slit and FOE)
- generic - Generic image reductions tools
- hydra - KPNO HYDRA (and NESSIE) reduction package
- iids - KPNO IIDS spectral reductions
- irred - KPNO IR camera reductions
- irs - KPNO IRS spectral reductions
- kpnocoude - KPNO coude reduction package (slit and 3 fiber)
- kpnoslit - KPNO low/moderate dispersion slits (Goldcam, RCspec, Whitecam)
- specred - Generic slit and fiber spectral reduction package
- vtel - Solar vacuum telescope image reductions

• **noao.imred.argus:**

- apall - Extract 1D spectra (all parameters in one task)
- apdefault - Set the default aperture parameters
- apedit - Edit apertures interactively
- apfind - Automatically find spectra and define apertures
- aprecenter - Recenter apertures
- apresize - Resize apertures
- apsum - Extract 1D spectra
- aptrace - Trace positions of spectra
  
- bplot - Batch plots of spectra
- continuum - Fit the continuum in spectra
- dispcor - Dispersion correct spectra
- dopcor - Doppler correct spectra
- identify - Identify features in spectrum for dispersion solution

- msrespld - Create 1D response spectra from flat field and sky spectra
- refspectra - Assign wavelength reference spectra to other spectra
- reidentify - Automatically identify features in spectra
- sapertures - Set or change aperture header information
- sarith - Spectrum arithmetic
- scombine - Combine spectra having different wavelength ranges
- scopy - Select and copy apertures in different spectral formats
- setairmass - Compute effective airmass and middle UT for an exposure
- setjd - Compute and set Julian dates in images
- slist - List spectrum header parameters
- specplot - Stack and plot multiple spectra
- splot - Preliminary spectral plot/analysis
  
- doargus - Process ARGUS spectra
- demos - Demonstrations and tests

• **noao.imred.bias:**

- colbias - Fit and subtract an average column bias
- linebias - Fit and subtract an average line bias

• **noao.imred.ccdred:**

- badpiximage - Create a bad pixel mask image from a bad pixel file
- ccdgroups - Group CCD images into image lists
- ccdedit - CCD image header editor
- ccdinstrument - Review and edit instrument translation files
- ccdlist - List CCD processing information
- ccdproc - Process CCD images
- ccdtest - CCD test and demonstration package
- combine - Combine CCD images
- cosmicrays - Detect and replace cosmic rays
- darkcombine - Combine and process dark count images
- flatcombine - Combine and process flat field images
- mkfringecor - Make fringe correction images from sky images
- mkillumcor - Make flat field illumination correction images
- mkillumflat - Make illumination corrected flat fields
- mkskycor - Make sky illumination correction images
- mkskyflat - Make sky corrected flat field images
- setinstrument - Set instrument parameters
- zerocombine - Combine and process zero level images

ADDITIONAL HELP TOPICS

- ccdgeometry - Discussion of CCD coordinate/geometry keywords
- ccdtypes - Description of the CCD image types
- flatfields - Discussion of CCD flat field calibrations
- guide - Introductory guide to using the CCDRED package
- instruments - Instrument specific data files
- package - CCD image reduction package
- subsets - Description of CCD subsets

- **noao.imred.ccdred.ccdtest:**

- artobs - Create an artificial CCD observation
- demo - Run a demonstration of the CCD reduction package
- mkimage - Make or modify an image with simple values
- subsection - Create an artificial subsection CCD observation

- **noao.imred.ctioslit:**

- apall - Extract 1D spectra (all parameters in one task)
- apdefault - Set the default aperture parameters
- apedit - Edit apertures interactively
- apfind - Automatically find spectra and define apertures
- aprecenter - Recenter apertures
- apresize - Resize apertures
- apsum - Extract 1D spectra
- aptrace - Trace positions of spectra
  
- bplot - Batch plot of spectra with SPLOT
- calibrate - Apply extinction and flux calibrations to spectra
- continuum - Fit and normalize the continuum of multispec spectra
- deredden - Apply interstellar extinction corrections
- dispcor - Dispersion correct spectra
- dopcor - Doppler correct spectra
- identify - Identify arc lines and determine a dispersion function
- refspectra - Assign reference spectra to object spectra
- reidentify - Reidentify arc lines and determine new dispersion functions
- sarith - Spectrum arithmetic
- scombine - Combine spectra
- scopy - Copy spectra including aperture selection and format changes
- sensfunc - Create sensitivity function
- setairmass - Compute effective airmass and middle UT for an exposure
- setjd - Compute and set Julian dates in images
- slist - List spectral header elements
- speplot - Stack and plot multiple spectra
- splot - Plot and analysis spectra
- standard - Identify standard stars to be used in sensitivity calc
  
- doslit - Process CTIO slit spectra
- demos - Demonstrations and tests

- **noao.imred.dtoi:**

- dematch - Match a list of density values to exposure values
- hdfit - Fit a curve to density, log exposure values
- hdshift - Align related HD curves
- hdoi - Apply DTOI transformation to density image
- selftest - Self test program to check DTOI transformation
- spotlist - Generate a list of calibration spot values

- **noao.imred.echelle:**

- apall - Extract 1D spectra (all parameters in one task)
- apdefault - Set the default aperture parameters and apitable
- apedit - Edit apertures interactively

apfind	-	Automatically find spectra and define apertures
apfit	-	Fit 2D spectra and output the fit, difference, or ratio
apflatten	-	Remove overall spectral and profile shapes from flat fields
apmask	-	Create an IRAF pixel list mask of the apertures
apnormalize	-	Normalize 2D apertures by 1D functions
aprecenter	-	Recenter apertures
apresize	-	Resize apertures
apscatter	-	Fit and subtract scattered light
apsum	-	Extract 1D spectra
aptrace	-	Trace positions of spectra
bplot	-	Batch plots of spectra
calibrate	-	Apply extinction and flux calibrations to spectra
continuum	-	Fit the continuum in spectra
deredden	-	Apply interstellar extinction corrections
dispcor	-	Dispersion correct spectra
dopcor	-	Doppler correct spectra
ecidentify	-	Identify features in spectrum for dispersion solution
ecreidentify	-	Automatically reidentify features in spectra
refspectra	-	Assign wavelength reference spectra to other spectra
sarith	-	Spectrum arithmetic
scombine	-	Combine spectra
scopy	-	Select and copy apertures in different spectral formats
sensfunc	-	Compute sensitivity function
setairmass	-	Compute effective airmass and middle UT for an exposure
setjd	-	Compute and set Julian dates in images
slist	-	List spectrum header parameters
specplot	-	Stack and plot multiple spectra
splot	-	Preliminary spectral plot/analysis
standard	-	Identify standard stars to be used in sensitivity calc
doeclit	-	Process Echelle slit spectra
dofoe	-	Process Fiber Optic Echelle (FOE) spectra
demos	-	Demonstrations and tests

• **noao.imred.generic:**

background	-	Fit and subtract a line or column background
cosmicrays	-	Detect and replace cosmic rays
darksub	-	Scale and subtract a dark count image
flat1d	-	Make flat field by fitting a 1D func. to the lines or columns
flatten	-	Flatten images using a flat field
normalize	-	Normalize images
normflat	-	Create a flat field by normalizing and replacing low values

• **noao.imred.hydra:**

apall	-	Extract 1D spectra (all parameters in one task)
apdefault	-	Set the default aperture parameters
apedit	-	Edit apertures interactively
apfind	-	Automatically find spectra and define apertures
aprecenter	-	Recenter apertures
apresize	-	Resize apertures
apscatter	-	Fit and remove scattered light

apsum	-	Extract 1D spectra
aptrace	-	Trace positions of spectra
bplot	-	Batch plots of spectra
continuum	-	Fit the continuum in spectra
dispcor	-	Dispersion correct spectra
dopcor	-	Doppler correct spectra
identify	-	Identify features in spectrum for dispersion solution
msresp1d	-	Create 1D response spectra from flat field and sky spectra
refspectra	-	Assign wavelength reference spectra to other spectra
reidentify	-	Automatically identify features in spectra
sapertures	-	Set or change aperture header information
sarith	-	Spectrum arithmetic
scombine	-	Combine spectra having different wavelength ranges
scopy	-	Select and copy apertures in different spectral formats
setairmass	-	Compute effective airmass and middle UT for an exposure
setjd	-	Compute and set Julian dates in images
slist	-	List spectrum header parameters
specplot	-	Stack and plot multiple spectra
splot	-	Preliminary spectral plot/analysis
dohydra	-	Process HYDRA spectra
demos	-	Demonstrations and tests

• **noao.imred.iids:**

addsets	-	Add subsets of strings of spectra
batchred	-	Batch processing of IIDS/IRS spectra
bplot	-	Batch plots of spectra
bswitch	-	Beam-switch strings of spectra to make obj-sky pairs
calibrate	-	Apply sensitivity correction to spectra
coefs	-	Extract mtn reduced coefficients from henear scans
coincor	-	Correct spectra for detector count rates
continuum	-	Fit the continuum in spectra
deredden	-	Apply interstellar extinction corrections
dispcor	-	Dispersion correct spectra
dopcor	-	Doppler correct spectra
extinct	-	Use BSWITCH for extinction correction
flatdiv	-	Divide spectra by flat field
flatfit	-	Sum and normalize flat field spectra
identify	-	Identify features in spectrum for dispersion solution
lcalib	-	List calibration file data
mkspec	-	Generate an artificial spectrum
names	-	Generate a list of image names from a string
powercor	-	Apply power law correction to mountain reduced spectra
process	-	A task generated by BATCHRED
refspectra	-	Assign reference spectra to object spectra
reidentify	-	Automatically identify features in spectra
scombine	-	Combine spectra having different wavelength ranges
sensfunc	-	Create sensitivity function
setairmass	-	Compute effective airmass and middle UT for an exposure
setjd	-	Compute and set Julian dates in images
sinterp	-	Interpolate a table of x,y pairs to create a spectrum
slist1d	-	List spectral header elements

- specplot - Stack and plot multiple spectra
- splot - Preliminary spectral plot/analysis
- standard - Identify standard stars to be used in sensitivity calc
- subsets - Subtract pairs in strings of spectra
- sums - Generate sums of object and sky spectra by aperture

• **noao.imred.irred:**

- center - Compute accurate centers for a list of objects
- centerpars - Edit the centering parameters
- datapars - Edit the data dependent parameters
- flatten - Flatten images using a flat field
- iralign - Align the image produced by irmosaic
- irmatch1d - Align and intensity match the image produced by irmosaic (1D)
- irmatch2d - Align and intensity match the image produced by irmosaic (2D)
- irmosaic - Mosaic an ordered list of images onto a grid
- mosproc - Prepare images for quick look mosaicing
- txdump - Select fields from the center task output text file

• **noao.imred.irs:**

- addsets - Add subsets of strings of spectra
- batchred - Batch processing of IIDS/IRS spectra
- bplot - Batch plots of spectra
- bswitch - Beam-switch strings of spectra to make obj-sky pairs
- calibrate - Apply sensitivity correction to spectra
- coefs - Extract mtn reduced coefficients from henear scans
- continuum - Fit the continuum in spectra
- deredden - Apply interstellar extinction corrections
- dispcor - Dispersion correct spectra
- dopcor - Doppler correct spectra
- extinct - Use BSWITCH for extinction correction
- flatdiv - Divide spectra by flat field
- flatfit - Sum and normalize flat field spectra
- identify - Identify features in spectrum for dispersion solution
- lcalib - List calibration file data
- mkspec - Generate an artificial spectrum
- names - Generate a list of image names from a string
- process - A task generated by BATCHRED
- refspectra - Assign reference spectra to object spectra
- reidentify - Automatically identify features in spectra
- scombine - Combine spectra having different wavelength ranges
- sensfunc - Create sensitivity function
- setairmass - Compute effective airmass and middle UT for an exposure
- setjd - Compute and set Julian dates in images
- sinterp - Interpolate a table of x,y pairs to create a spectrum
- slist1d - List spectral header elements
- specplot - Stack and plot multiple spectra
- splot - Preliminary spectral plot/analysis
- standard - Identify standard stars to be used in sensitivity calc
- subsets - Subtract pairs in strings of spectra
- sums - Generate sums of object and sky spectra by aperture



- **noao.imred.kpnocode:**

- apall - Extract 1D spectra (all parameters in one task)
- apdefault - Set the default aperture parameters
- apedit - Edit apertures interactively
- apfind - Automatically find spectra and define apertures
- aprecenter - Recenter apertures
- apresize - Resize apertures
- apsum - Extract 1D spectra
- aptrace - Trace positions of spectra
  
- bplot - Batch plot of spectra with SPLOT
- calibrate - Apply extinction and flux calibrations to spectra
- continuum - Fit and normalize the continuum of multispec spectra
- deredden - Apply interstellar extinction corrections
- dispcor - Dispersion correct spectra
- dopcor - Doppler correct spectra
- identify - Identify arc lines and determine a dispersion function
- msresp1d - Create fiber response spectra from flat field and sky spectra
- refspectra - Assign reference spectra to observations
- reidentify - Reidentify arc lines and determine new dispersion functions
- sapertures - Set or change aperture header information
- sarith - Spectrum arithmetic
- scombine - Combine spectra
- scopy - Copy spectra including aperture selection and format changes
- sensfunc - Create sensitivity function
- setairmass - Compute effective airmass and middle UT for an exposure
- setjd - Compute and set Julian dates in images
- slist - List spectrum headers
- specplot - Stack and plot multiple spectra
- splot - Plot and analyze spectra
- standard - Identify standard stars to be used in sensitivity calc
  
- do3fiber - Process KPNO coude three fiber spectra
- doslit - Process KPNO coude slit spectra
- demos - Demonstrations and tests

- **noao.imred.kpnoslit:**

- apall - Extract 1D spectra (all parameters in one task)
- apdefault - Set the default aperture parameters
- apedit - Edit apertures interactively
- apfind - Automatically find spectra and define apertures
- aprecenter - Recenter apertures
- apresize - Resize apertures
- apsum - Extract 1D spectra
- aptrace - Trace positions of spectra
  
- bplot - Batch plot of spectra with SPLOT
- calibrate - Apply extinction and flux calibrations to spectra
- continuum - Fit and normalize the continuum of multispec spectra
- deredden - Apply interstellar extinction corrections
- dispcor - Dispersion correct spectra
- dopcor - Doppler correct spectra
- identify - Identify arc lines and determine a dispersion function

refspectra	-	Assign reference spectra to observations
reidentify	-	Reidentify arc lines and determine new dispersion functions
sarith	-	Spectrum arithmetic
scombine	-	Combine spectra
scopy	-	Copy spectra including aperture selection and format changes
sensfunc	-	Create sensitivity function
setairmass	-	Compute effective airmass and middle UT for an exposure
setjd	-	Compute and set Julian dates in images
slist	-	List spectrum headers
specplot	-	Stack and plot multiple spectra
splot	-	Plot and analyze spectra
standard	-	Identify standard stars to be used in sensitivity calc
doslit	-	Process slit spectra
demos	-	Demonstrations and tests

• **noao.imred.specred:**

apall	-	Extract 1D spectra (all parameters in one task)
apdefault	-	Set the default aperture parameters and apidtable
apedit	-	Edit apertures interactively
apfind	-	Automatically find spectra and define apertures
apfit	-	Fit 2D spectra and output the fit, difference, or ratio
apflatten	-	Remove overall spectral and profile shapes from flat fields
apmask	-	Create and IRAF pixel list mask of the apertures
apnormalize	-	Normalize 2D apertures by 1D functions
aprecenter	-	Recenter apertures
apresize	-	Resize apertures
apscatter	-	Fit and subtract scattered light
apsum	-	Extract 1D spectra
aptrace	-	Trace positions of spectra
bplot	-	Batch plot of spectra with SPLOT
calibrate	-	Extinction and flux calibrate spectra
continuum	-	Fit the continuum in spectra
deredden	-	Apply interstellar extinction correction
dispcor	-	Dispersion correct spectra
dopcor	-	Doppler correct spectra
fitprofs	-	Fit gaussian profiles
identify	-	Identify features in spectrum for dispersion solution
msresp1d	-	Create 1D response spectra from flat field and sky spectra
refspectra	-	Assign wavelength reference spectra to other spectra
reidentify	-	Automatically reidentify features in spectra
sapertures	-	Set or change aperture header information
sarith	-	Spectrum arithmetic
scombine	-	Combine spectra
scopy	-	Select and copy apertures in different spectral formats
sensfunc	-	Compute instrumental sensitivity from standard stars
setairmass	-	Compute effective airmass and middle UT for an exposure
setjd	-	Compute and set Julian dates in images
sfit	-	Fit spectra and output fit, ratio, or difference
skysub	-	Sky subtract extracted multispec spectra
slist	-	List spectrum header parameters
specplot	-	Scale, stack, and plot multiple spectra

- plot - Preliminary spectral plot/analysis
- standard - Tabulate standard star counts and fluxes
  
- dofibers - Process fiber spectra
- doslit - Process slit spectra

• **noao.imred.vtel:**

- destreak - Destreak He 10830 grams.
- destreak5 - First pass processing CL script for 10830 grams.
- dicoplot - Make dicomed plots of carrington maps.
- fitslogr - Make a log of certain header parameters from a FITS tape.
- getsqib - Extract the squibby brightness image from a full disk scan.
- makehelium - CI script for processing destreaked 10830 grams(second pass).
- makeimages - CI script for processing magnetograms into projected maps
- merge - Merge daily grams into a Carrington map.
- mrotlogr - Log some header parameters from a FITS rotation map tape.
- mscan - Read all sector scans on a tape and put them into images.
- pimtext - Put text directly into images using a pixel font.
- putsqib - Merge a squibby brightness image into a full disk image.
- quickfit - Fit an ellipse to the solar limb.
- readvt - Read a full disk tape and produce an IRAF image.
- rmap - Map a full disk image into a 180 by 180 flat image.
- syndico - Make dicomed print of daily grams 18 cm across.
- tcopy - Tape to tape copy routine.
- trim - Set all pixels outside the limb to 0.0 (use sqib for limb).
- unwrap - Remove effects of data wraparound on continuum scans.
- vtblink - Blink daily grams on the IIS to check for registration.
- vtexamine - Examine a vacuum telescope tape, print headers and profile.
- writetape - CI script to write 5 full disk grams to tape.
- writevt - Write an IRAF image to tape in vacuum telescope format.

• **noao.mtlocal:**

- ldumpf - List the permanent files on a Cyber DUMPF tape
- r2df - Convert a CTIO 2-d frutti image into an IRAF image
- rcamera - Convert a CAMERA image into an IRAF image
- rdumpf - Convert IPPS rasters from a DUMPF tape to IRAF images
- ridsfile - Convert IDSFILES from a DUMPF tape to IRAF images
- ridsmtn - Convert mountain format IDS/IRS data to IRAF images
- ridsout - Convert a text file in IDSOUT format to IRAF images
- rpds - Convert a PDS image into an IRAF image
- rrcopy - Convert IPPS rasters from an RCOPY tape to IRAF images
- widstape - Convert ONEDSPEC spectra to IDSOUT text format

• **noao.nproto:**

- binpairs - Bin pairs of (x,y) points in log separation
- findgain - Estimate the gain and readnoise of a CCD
- findthresh - Estimate a CCD's sky noise from the gain and readnoise
- iralign - Align the mosaiced image produced by irmosaic
- irmatch1d - Align and intensity match image produced by irmosaic (1D)
- irmatch2d - Align and intensity match image produced by irmosaic (2D)
- irmosaic - Mosaic an ordered list of images onto a grid

- linpol - Calculate polarization frames and Stoke's parameters
- slitpic - Generate IRAF image of aperture slit mask

• **noao.onedspec:**

- bplot - Batch plots of spectra
- calibrate - Apply extinction and flux calibrations to spectra
- continuum - Fit the continuum in spectra
- deredden - Apply interstellar extinction correction
- dispaxis - Dispersion axis parameters for 2D images
- dispcor - Dispersion correct spectra
- dopcor - Apply doppler corrections
- fitprofs - Fit gaussian profiles
- identify - Identify features in spectrum for dispersion solution
- lcalib - List calibration file data
- mkspec - Generate an artificial spectrum
- names - Generate a list of image names from a string
- ndprep - Make neutral density filter calibration image
- refspectra - Assign wavelength reference spectra to other spectra
- reidentify - Automatically identify features in spectra
- sapertures - Set or change aperture header information
- sarith - Spectrum arithmetic
- scombine - Combine spectra having different wavelength ranges
- scopy - Select and copy apertures in different spectral formats
- sensfunc - Create sensitivity function
- setairmass - Compute effective airmass and middle UT for an exposure
- setjd - Compute and set Julian dates in images
- sfit - Fit spectra and output fit, ratio, or difference
- sinterp - Interpolate a table of x,y pairs to create a spectrum
- slist - List spectrum header parameters
- specplot - Stack and plot multiple spectra
- splot - Preliminary spectral plot/analysis
- standard - Identify standard stars to be used in sensitivity calc

ADDITIONAL HELP TOPICS

- package - Discussion and overview of package including sections on: spectral formats, dispersion coordinates, and units

• **noao.rv:**

- continpars - Edit continuum subtraction parameters
- filtpars - Edit the filter function parameters
- fxcor - Radial velocities via Fourier cross correlation
- keywpars - Translate the image header keywords used in RV package
- rvcorrect - Compute radial velocity corrections

• **noao.twodspec:**

- apextract - Aperture Extraction Package
- longslit - Longslit Package

- **noao.twodspec.apextract:**

apall	-	Extract 1D spectra (all parameters in one task)
apdefault	-	Set the default aperture parameters and apidtable
apdemos	-	Various tutorial demonstrations
apedit	-	Edit apertures interactively
apfind	-	Automatically find spectra and define apertures
apfit	-	Fit 2D spectra and output the fit, difference, or ratio
apflatten	-	Remove overall spectral and profile shapes from flat fields
apmask	-	Create and IRAF pixel list mask of the apertures
apnormalize	-	Normalize 2D apertures by 1D functions
aprecenter	-	Recenter apertures
apresize	-	Resize apertures
apscatter	-	Fit and subtract scattered light
apsum	-	Extract 1D spectra
aptrace	-	Trace positions of spectra

ADDITIONAL HELP TOPICS

apbackground	-	Background subtraction algorithms
approfiles	-	Profile determination algorithms
apvariance	-	Extractions, variance weighting, cleaning, and noise model
package	-	Package parameters and general description of package

- **noao.twodspec.longslit:**

background	-	Fit and subtract a line or column background
extinction	-	Apply atmospheric extinction corrections to images
fitcoords	-	Fit user coordinates to image coordinates
fluxcalib	-	Apply flux calibration to images
identify	-	Identify features
illumination	-	Determine illumination calibration
reidentify	-	Reidentify features
response	-	Determine response calibration
setairmass	-	Compute effective airmass and middle UT for an exposure
setjd	-	Compute and set Julian dates in images
transform	-	Transform longslit images to user coordinates

Many of the tasks in the NOAO packages are visible in several different packages. Although these are the same tasks and provide the same functionality, the default parameters are often set differently to account for different instruments or uses.