

Wide-field Infrared Survey Explorer (WISE)

Artifact Identification Subsystem Interface Specification: (ARTID SIS)

Version 0.3

15-Nov-2008

Prepared by: Rosemary Alles



**Infrared Processing and Analysis Center
California Institute of Technology**

WSDC D-DI122

Approved/Read By:

Tim Conrow, WISE Science Data Center [Title]

Roc Cutri, WISE Science Data Center Manager

Tracey Evans, WISE Science Data Center [Title]

Sherry Wheelock, WISE Science Data Center [Title]

[Other Appropriate Names], WISE Science Data Center [Title]

Revision History

Date	Version/designation	Author	Description
09/15/08	Draft 0.1	Rosemary Alles	Initial Draft
10/15/08	Draft 0.2	Rosemary Alles	Modified per changes to ARTID subsystem.
11/15/08	art01	Rosemary Alles	Modified per discussion of previous (SIS) version with Tim/Roc

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1 Introduction

1.1 Document Scope

The ARTID frame pipeline subsystem ingests data (IPAC tables) generated from the WPHOT subsystem. ARTID processes the ingested data to produce its own (IPAC tables) output; sources affected by artifacts and spurious sources are flagged. This document describes the output generated by the ARTID frame pipeline subsystem. The document will also describe the utilities provided to unwrap the ARTID contamination and confusion map (cc_map). See the ARTID subsystem design and specification document (**WSDC D-D00X9**) for a description of the cc_map and cc_flag.

At present the document's scope does not extend to address the scan pipeline or co-add factors.

The **Wise Artifact Identification** subsystem will henceforth be referred to as **ARTID**.

1.2 Applicable Documents

This document conforms to the specifications in the following project documents:

1. **WSDC D-I107** (WPHOT SIS)
2. **WSDC D-D00X9** (ARTID SDS)

1.3 Acronyms and significant terms

Acronym	Description
ARTID	Artifact Identification (and flagging) for the WISE pipeline
WPHOT	Wise photometry sub system
WPRO	
cc_map	Confusion and contamination map (bit array) representing artifacts
cc_map_str	cc_map represented as a string
cc_flag	Confusion and contamination flag (a prioritized character per band)

2 The flags

2.1 The following table lists the characters used to represent each artifact in order of priority

Flag value (1 character per band). Upper case = real artifact Lower case = spurious	Nature of contamination or confusion
D or d	Nearby D iffraction spikes
L or l	Persistence (L atent) Image from Bright Star
G or g	Dichroic or filter G lints
H or h	Bright star H alos
O or o	Optical ghosts
E or e	Electronic ghosts
T or t	Transients
C or c	Confusion
S or s	Spurious

2.2 The cc_map – one for each band

An n [type: int] bit array will be assigned for each source (object) per band. The value of a named bit (on/off) will indicate contamination by a defined artifact. The numerical values given in the following table are the offsets of the named bits. For example, the named constant GLINT (2) corresponds to an integer value of $(1 \ll 2) = 0x4$.

Offset	FLAG Name	Description
0	DIFF_SPIKE	D iffraction Spike contamination
1	LATENT	L atent contamination
2	GLINT	G lint contamination

Offset	FLAG Name	Description
3	HALO	Halo contamination
4	OGHOST	Optical ghost contamination
5	EGHOST	Electronic ghost contamination
6	TRANSIENT	Transient contamination
7	CONFUSION	Confusion contamination
8	SPURIOUS	Spurious
9		

The `cc_map` is hence a bit array/bit map per band per source representing *all* artifacts affecting the source in that band. A *real source* identified as both contaminated by the proximity to a latent image *and* a diffraction spike will have its `cc_map` (confusion and contamination map) set as follows for the affected band:

S	C	T	E	O	H	G	L	D
0	0	0	0	0	0	0	1	1

The SPURIOUS (offset 8) or position (S) column (above) specifies the artifact as real (non-spurious).

An analogous spurious artifact will be set as follows:

s	c	t	e	o	h	g	l	d
1	0	0	0	0	0	0	1	1

2.3 `cc_map_str` – one for each band

The `cc_map_str` is a string representation of the `cc_map`. A source affected by the (example) artifacts describes in the above section would thus be represented as follows:

- A real sources affected by a latent and diffraction spike: **DL**
- A spurious source affected by a latent and diffraction spike: **dl**

2.4 `cc_flag` – one for all four bands

The `cc_flag` is a four-character string representative of a prioritized set (of four) artifacts affecting a source in each of the bands. The order of artifact priority is as set forth in **table 2.1**. Hence, a real source affected by only a diffraction spike in band 1, only a latent and glint in band 2, only a glint in band 3 and by no artifact in band 4 will be represented as follows: **DLG0**. The `cc_flag` for a similar spurious source is as follows: **dlg0**. The last character is both cases is a zero(0).

3 Description of the output table from ARTID

At present, ARTID produces its own tables and does not append to the ingested WPHOT table. This design specification may change. Types adhere to the following size (in bytes) and alignment.

Type	Size	Alignment
char	1	1
short	2	2
Int	4	4
Long	8	8
Long Long	8	8
float	4	4
double	8	8
Long double	10	16
Void*	8	8

3.1 Comments

Nsrc: The number of sources in the table

3.2 Table columns – see next page.

All columns with <n> repeat for the number of bands.

Column# and name	Description	Units	Type	Format
1. Source ID	A unique string identifying the source.	—	—	<scanID><frameNum>-<sourceID>-<vsn> (TBD) Here <sourceID>-<vsn> is the runid or the version number of the pipeline run. e.g. 01301b027-001237-1 The final format is TBD.
2. ra (optional)	Right ascension (J2000)	deg	double	e16.9 (actual precision = 7)
3. dec (optional)	Declination (J2000)	deg	double	e16.9 (actual precision = 7)
4. w<n>pro (optional)	WPRO flux in mag units, band-n	mag	double	e16.4 (actual precision = 3)
5. x_<n> (optional)	x-pixel coordinate, band-n, frame-1	pix	double	e16.4 (actual precision = 3)
6. y_<n> (optional)	y-pixel coordinate, band-n, frame-1	pix	double	e16.4 (actual precision = 3)
7. w<n>cc_map	Bit array or cc_map for the source in band n. The map describes the types of artifact contaminating the source. n = [1,2,3,4]	bit	int	I12
8. w<n>cc_map_str	Character array representative of w<n>cc_map. n = [1,2,3,4]		string	c12
cc_flag	Four(4) Character array of prioritized artifact affecting the source		string	c12

4 Unwrapping the contamination map

4.1 Code for the packing/Unpacking of the `cc_map`

The following pseudo-code (resembling C) roughly corresponds to the packing and unpacking of the `cc_map`:

```
var |= FLAG;
    //Set the FLAG bit in the variable var
if(var & FLAG)
    //Is var's FLAG bit set?
var &= ~FLAG; //Clear the FLAG bit in the variable var
```

To pack: (example)

```
If (source_contaminated_by_latent()) {
    source->flags |= SOURCE_LATENT;
}
and
if (!source_contaminated_by_latent()) {
    source->flags &= ~SOURCE_LATENT;
}
```

To Unpack: (example)

```
if (source->flags & SOURCE_LATENT) {
    // Do something
}
```

4.2 ARTID lib functions corresponding to the above

See (refer) to the ARTID lib functions document. The library is a C (functions) library which may be compiled (using `-D[efines]`) to generated executables that may be used in a script.

5 Sample output table (section)

\int Nsrc = 3794

ra	dec	w1mpro	w1cc_map	w1cc_map_str	cc_flags
real	real	real	int	char	char
deg	deg	mag	bit		
3.455926939e+02	2.726147050e+01	6.8720e+00	1	D	D000
3.455933318e+02	2.725983860e+01	1.1554e+01	1	D	D000
3.459053146e+02	2.729545050e+01	7.6790e+00	1	D	D000
3.459062523e+02	2.729378380e+01	1.2356e+01	1	D	D000
3.464369948e+02	2.714112680e+01	7.6660e+00	1	D	D000
3.457183000e+02	2.737099990e+01	7.6440e+00	1	D	D000
3.457192384e+02	2.737016660e+01	1.1927e+01	1	D	D000
3.455256195e+02	2.732343020e+01	7.8870e+00	1	D	D000
3.455266391e+02	2.732160790e+01	1.2130e+01	1	D	D000
3.454434769e+02	2.744718240e+01	8.1460e+00	1	D	D000
3.461185207e+02	2.723939760e+01	8.1150e+00	1	D	D000
3.458044298e+02	2.716043560e+01	8.1590e+00	1	D	D000
3.459962371e+02	2.697081570e+01	8.0610e+00	1	D	D000
3.459484532e+02	2.715235230e+01	8.3160e+00	1	D	D000
3.457086912e+02	2.728346960e+01	9.0820e+00	1	D	D000
3.460781501e+02	2.729580410e+01	9.0490e+00	1	D	D000
3.458130748e+02	2.751814420e+01	9.0650e+00	1	D	D000
3.462932135e+02	2.717509340e+01	9.0050e+00	1	D	D000
3.459277125e+02	2.687626660e+01	9.2130e+00	1	D	D000
3.458059328e+02	2.760563670e+01	9.1410e+00	1	D	D000
3.460510413e+02	2.764371300e+01	9.2040e+00	1	D	D000
3.455067771e+02	2.731988910e+01	9.2480e+00	0	NULL	0000
3.457714076e+02	2.696715960e+01	8.9640e+00	1	D	D000
3.464373736e+02	2.728027690e+01	9.2380e+00	0	NULL	0000
3.457987233e+02	2.721401200e+01	9.3400e+00	1	D	D000
3.461856528e+02	2.775875390e+01	9.3580e+00	0	NULL	0000
3.460950452e+02	2.743817950e+01	9.4630e+00	0	NULL	0000
3.460570445e+02	2.699976540e+01	9.4590e+00	0	NULL	0000
3.461925821e+02	2.766512850e+01	9.3190e+00	0	NULL	0000