



## 12208 - Resolving Disks and Jets in a New, Benchmark Low-Mass Binary

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

### INVESTIGATORS

| <i>Name</i>                       | <i>Institution</i>                           | <i>E-Mail</i>             |
|-----------------------------------|----------------------------------------------|---------------------------|
| <b>Dr. John J. Bochanski (PI)</b> | <b>Massachusetts Institute of Technology</b> | <b>jjb@mit.edu</b>        |
| Ms. Dagny Looper (CoI)            | University of Hawaii                         | dagny@ifa.hawaii.edu      |
| Dr. Adam J. Burgasser (CoI)       | University of California - San Diego         | aburgasser@ucsd.edu       |
| Dr. Paul Kalas (CoI)              | University of California - Berkeley          | kalas@astron.berkeley.edu |
| Dr. Subhanjoy Mohanty (CoI)       | Imperial College of Science                  | s.mohanty@imperial.ac.uk  |

### VISITS

| <i>Visit</i> | <i>Targets used in Visit</i> | <i>Configurations used in Visit</i> | <i>Orbits Used</i> | <i>Last Orbit Planner Run</i> | <i>OP Current with Visit?</i> |
|--------------|------------------------------|-------------------------------------|--------------------|-------------------------------|-------------------------------|
| 01           | (3) TWA30-FIELD              | WFC3/UVIS                           | 1                  | 09-Jul-2010 23:39:13.0        | yes                           |
| 02           | (3) TWA30-FIELD              | WFC3/UVIS                           | 1                  | 09-Jul-2010 23:39:18.0        | yes                           |
| 03           | (3) TWA30-FIELD              | WFC3/UVIS                           | 1                  | 09-Jul-2010 23:39:22.0        | yes                           |

3 Total Orbits Used

### ABSTRACT

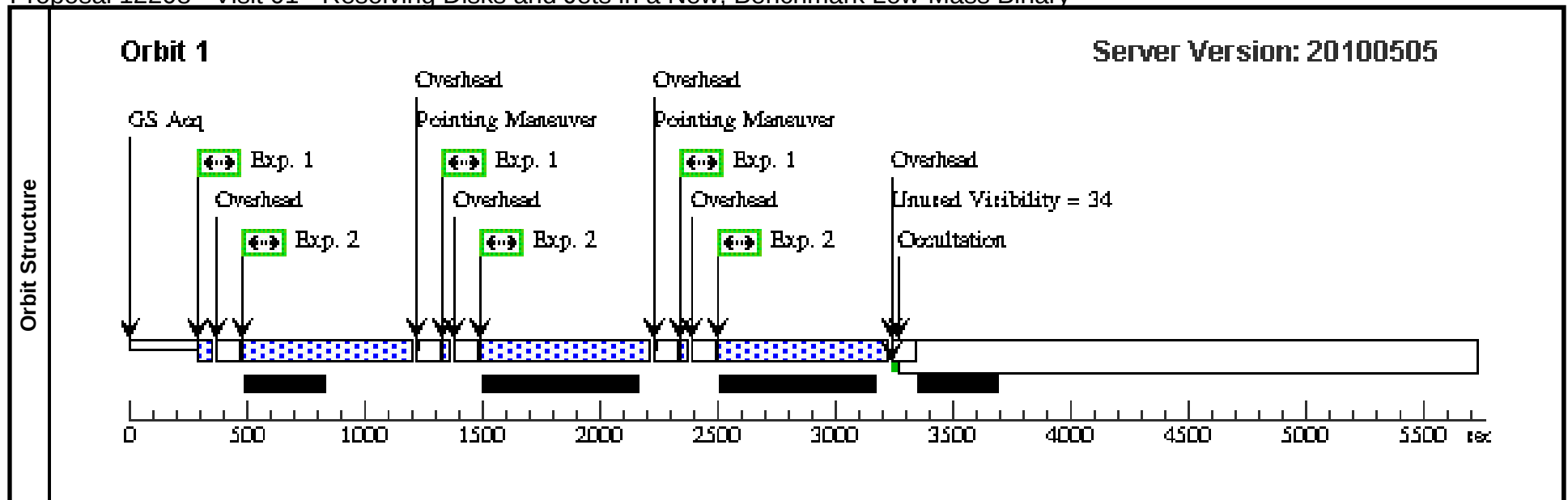
We propose to obtain high resolution imaging of two recently discovered TW Hydrae Association members, TWA 30A and B, which show clear spectroscopic evidence of accretion disks and outflows. With WFC3 imaging in three broad-band filters sampling forbidden emission lines, accretion signatures and scattered light, we will measure or constrain the physical extent and grain size of the circumstellar disks around these sources, the masses of the jets, associated mass loss rates and timescales between outflow events, the electron densities within any shocked regions, and the magnetic field topologies.

## **OBSERVING DESCRIPTION**

Our integration times were chosen to maximize the chances of finding resolved structure around TWA 30A and B. Since TWA 30A is fairly bright ( $R = 12.9$ ), it will saturate the UVIS detector fairly quickly, especially in the redder filters. Thus, we are taking a two-step approach to imaging the field. In each filter, three long and three short exposures will be obtained to fill a single orbit. The short exposures will not saturate, while the longer exposures will be more sensitive to faint structure. We will use fractional pixel dithers to improve PSF sampling, hot pixel and artifact rejection, and to fill any gaps between UVIS CCDs. The proposed exposure times, estimated with the online calculator are listed in Table 1. Including overheads, our proposal requires three orbits, one per filter.

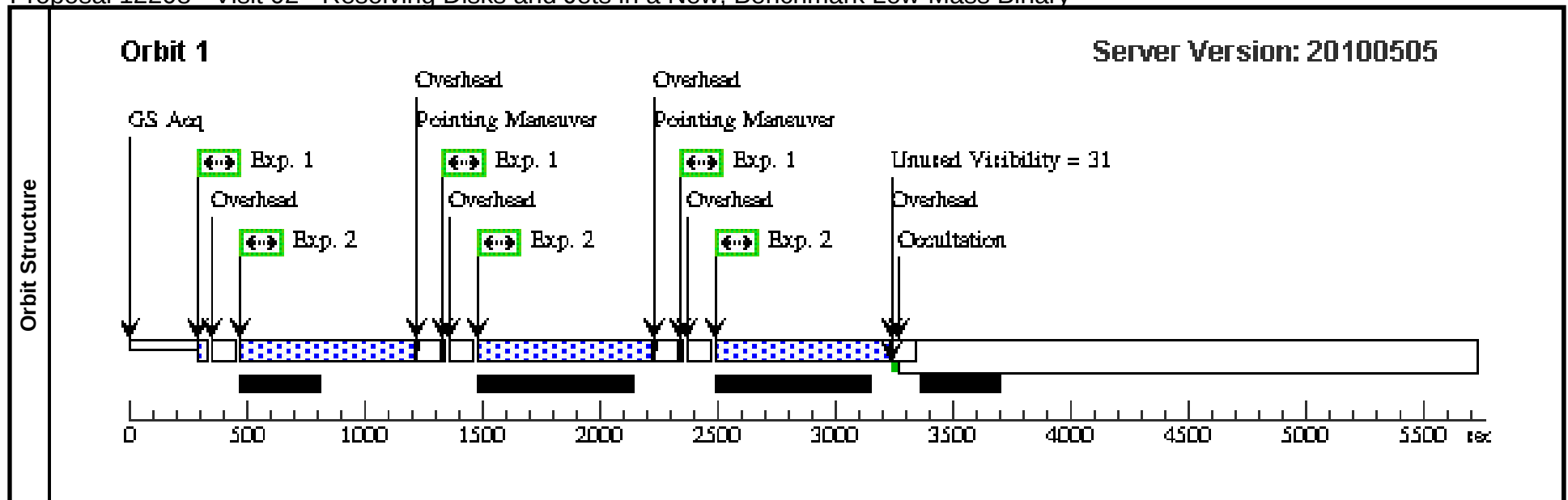
# Proposal 12208 (STScI Edit Number: 0, Created: Friday, July 9, 2010 10:39:26 PM EST) - Overview

|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         |                         |                              |           |  |
|---------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------|--------------------------|---------------|--------------------------------------------------------------------------------------------------------|---------------|-------------------------|-------------------------|------------------------------|-----------|--|
| Visit         | Proposal 12208, Visit 01                                                                                 |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         |                         | Sat Jul 10 03:39:27 GMT 2010 |           |  |
|               | Diagnostic Status: No Diagnostics                                                                        |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         |                         |                              |           |  |
|               | Scientific Instruments: WFC3/UVIS                                                                        |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         |                         |                              |           |  |
|               | Special Requirements: ORIENT 60D TO 180 D; ORIENT 270D TO 359.0 D                                        |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         |                         |                              |           |  |
| Patterns      | #                                                                                                        | Primary Pattern                                                                                                            |                                                                                     |                        |                          |               | Secondary Pattern                                                                                      |               |                         |                         |                              | Exposures |  |
|               | (1)                                                                                                      | Pattern Type=WFC3-UVIS-DITHER-<br>LINE-3PT<br>Purpose=DITHER<br>Number Of Points=3<br>Point Spacing=0.135<br>Line Spacing= |                                                                                     |                        |                          |               | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                         |                         |                              | (1-2)     |  |
| Fixed Targets | #                                                                                                        | Name                                                                                                                       | Target Coordinates                                                                  |                        | Targ. Coord. Corrections |               | Fluxes                                                                                                 |               | Miscellaneous           |                         |                              |           |  |
|               | (3)                                                                                                      | TWA30-FIELD                                                                                                                | RA: 11 32 18.6000 (173.0775000d)<br>Dec: -30 19 5.60 (-30.31822d)<br>Equinox: J2000 |                        |                          |               | V=14.4<br>R = 12.9,<br>B = 15.6,<br>J = 9.64,<br>K = 8.77                                              |               | Reference Frame: ICRS   |                         |                              |           |  |
|               | Comments: This position was selected to place both targets near the center of the UVIS1 and UVIS2 chips. |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         |                         |                              |           |  |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         |                         |                              |           |  |
| Exposures     | #                                                                                                        | Label                                                                                                                      | Target                                                                              | Config,Mode,Aperture   |                          | Spectral Els. | Opt. Params.                                                                                           | Special Reqs. | Groups                  | Exp. Time/[Actual Dur.] |                              | Orbit     |  |
|               | 1                                                                                                        | Short B                                                                                                                    | (3) TWA30-FIELD                                                                     | WFC3/UVIS, ACCUM, UVIS |                          | F475W         |                                                                                                        |               | Pattern 1, Exps 1-2 (1) | 30 Secs                 |                              |           |  |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         | [==>(Pattern 1)]        |                              |           |  |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         | [==>(Pattern 2)]        |                              |           |  |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         | [==>(Pattern 3)]        |                              | [1]       |  |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         |                         |                              |           |  |
|               | 2                                                                                                        | Long B                                                                                                                     | (3) TWA30-FIELD                                                                     | WFC3/UVIS, ACCUM, UVIS |                          | F475W         |                                                                                                        |               | Pattern 1, Exps 1-2 (1) | 720 Secs                |                              |           |  |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         | [==>(Pattern 1)]        |                              |           |  |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         | [==>(Pattern 2)]        |                              |           |  |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |               |                                                                                                        |               |                         | [==>(Pattern 3)]        |                              | [1]       |  |



# Proposal 12208 - Visit 01 - Resolving Disks and Jets in a New, Benchmark Low-Mass Binary

|               |                                                                                                          |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         |                         |  |                              |
|---------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------|--------------------------|--------------|-----------------------------------------------------------|-------------------------|-------------------------|--|------------------------------|
| Visit         | Proposal 12208, Visit 02                                                                                 |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         |                         |  | Sat Jul 10 03:39:28 GMT 2010 |
|               | Diagnostic Status: No Diagnostics                                                                        |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         |                         |  |                              |
|               | Scientific Instruments: WFC3/UVIS                                                                        |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         |                         |  |                              |
|               | Special Requirements: SAME ORIENT AS 01                                                                  |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         |                         |  |                              |
| Patterns      | #                                                                                                        | Primary Pattern                                                                                                                                                                                                                  |                                                                                     |                        |                          |              | Secondary Pattern                                         |                         |                         |  | Exposures                    |
|               | (1)                                                                                                      | Pattern Type=WFC3-UVIS-DITHER-LINE-3PT<br>Purpose=DITHER<br>Number Of Points=3<br>Point Spacing=0.135<br>Line Spacing=<br>Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |                                                                                     |                        |                          |              |                                                           |                         |                         |  | (1-2)                        |
| Fixed Targets | #                                                                                                        | Name                                                                                                                                                                                                                             | Target Coordinates                                                                  |                        | Targ. Coord. Corrections |              | Fluxes                                                    |                         | Miscellaneous           |  |                              |
|               | (3)                                                                                                      | TWA30-FIELD                                                                                                                                                                                                                      | RA: 11 32 18.6000 (173.0775000d)<br>Dec: -30 19 5.60 (-30.31822d)<br>Equinox: J2000 |                        |                          |              | V=14.4<br>R = 12.9,<br>B = 15.6,<br>J = 9.64,<br>K = 8.77 |                         | Reference Frame: ICRS   |  |                              |
|               | Comments: This position was selected to place both targets near the center of the UVIS1 and UVIS2 chips. |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         |                         |  |                              |
| Exposures     | #                                                                                                        | Label                                                                                                                                                                                                                            | Target                                                                              | Config,Mode,Aperture   | Spectral Els.            | Opt. Params. | Special Reqs.                                             | Groups                  | Exp. Time/[Actual Dur.] |  | Orbit                        |
|               | 1                                                                                                        | Short R                                                                                                                                                                                                                          | (3) TWA30-FIELD                                                                     | WFC3/UVIS, ACCUM, UVIS | F625W                    |              |                                                           | Pattern 1, Exps 1-2 (1) | 11 Secs                 |  |                              |
|               |                                                                                                          |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         | [==>(Pattern 1)]        |  |                              |
|               |                                                                                                          |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         | [==>(Pattern 2)]        |  |                              |
|               |                                                                                                          |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         | [==>(Pattern 3)]        |  | [1]                          |
|               | 2                                                                                                        | Long R                                                                                                                                                                                                                           | (3) TWA30-FIELD                                                                     | WFC3/UVIS, ACCUM, UVIS | F625W                    |              |                                                           | Pattern 1, Exps 1-2 (1) | 740 Secs                |  |                              |
|               |                                                                                                          |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         | [==>(Pattern 1)]        |  |                              |
|               |                                                                                                          |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         | [==>(Pattern 2)]        |  |                              |
|               |                                                                                                          |                                                                                                                                                                                                                                  |                                                                                     |                        |                          |              |                                                           |                         | [==>(Pattern 3)]        |  | [1]                          |



# Proposal 12208 - Visit 02 - Resolving Disks and Jets in a New, Benchmark Low-Mass Binary

|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         |                         |  |                              |
|---------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------|--------------------------|--------------|--------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|--|------------------------------|
| Visit         | Proposal 12208, Visit 03                                                                                 |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         |                         |  | Sat Jul 10 03:39:28 GMT 2010 |
|               | Diagnostic Status: No Diagnostics                                                                        |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         |                         |  |                              |
|               | Scientific Instruments: WFC3/UVIS                                                                        |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         |                         |  |                              |
|               | Special Requirements: SAME ORIENT AS 01                                                                  |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         |                         |  |                              |
| Patterns      | #                                                                                                        | Primary Pattern                                                                                                            |                                                                                     |                        |                          |              | Secondary Pattern                                                                                      |                         |                         |  | Exposures                    |
|               | (1)                                                                                                      | Pattern Type=WFC3-UVIS-DITHER-<br>LINE-3PT<br>Purpose=DITHER<br>Number Of Points=3<br>Point Spacing=0.135<br>Line Spacing= |                                                                                     |                        |                          |              | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |                         |                         |  | (1-2)                        |
| Fixed Targets | #                                                                                                        | Name                                                                                                                       | Target Coordinates                                                                  |                        | Targ. Coord. Corrections |              | Fluxes                                                                                                 |                         | Miscellaneous           |  |                              |
|               | (3)                                                                                                      | TWA30-FIELD                                                                                                                | RA: 11 32 18.6000 (173.0775000d)<br>Dec: -30 19 5.60 (-30.31822d)<br>Equinox: J2000 |                        |                          |              | V=14.4<br>R = 12.9,<br>B = 15.6,<br>J = 9.64,<br>K = 8.77                                              |                         | Reference Frame: ICRS   |  |                              |
|               | Comments: This position was selected to place both targets near the center of the UVIS1 and UVIS2 chips. |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         |                         |  |                              |
| Exposures     | #                                                                                                        | Label                                                                                                                      | Target                                                                              | Config,Mode,Aperture   | Spectral Els.            | Opt. Params. | Special Reqs.                                                                                          | Groups                  | Exp. Time/[Actual Dur.] |  | Orbit                        |
|               | 1                                                                                                        | Short I                                                                                                                    | (3) TWA30-FIELD                                                                     | WFC3/UVIS, ACCUM, UVIS | F814W                    |              |                                                                                                        | Pattern 1, Exps 1-2 (1) | 3 Secs                  |  |                              |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         | [==>(Pattern 1)]        |  |                              |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         | [==>(Pattern 2)]        |  |                              |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         | [==>(Pattern 3)]        |  | [1]                          |
|               | 2                                                                                                        | Long I                                                                                                                     | (3) TWA30-FIELD                                                                     | WFC3/UVIS, ACCUM, UVIS | F814W                    |              |                                                                                                        | Pattern 1, Exps 1-2 (1) | 750 Secs                |  |                              |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         | [==>(Pattern 1)]        |  |                              |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         | [==>(Pattern 2)]        |  |                              |
|               |                                                                                                          |                                                                                                                            |                                                                                     |                        |                          |              |                                                                                                        |                         | [==>(Pattern 3)]        |  | [1]                          |

