

# Diagnosing MAX Computer System Problems

Although MAX computers are inherently easy to install and use; occasionally a problem appears for which the underlying cause is hard to find. If you are having trouble diagnosing problems, try going step-by-step through the checklist below. MAX problems will always fall into one of the listed categories unless you are trying to interface with a Personal Computer. In that case you may also want to refer to JMI's document *Troubleshooting the SGT Connection*. Most of the items listed below have to do with alignment problems, which is where most complaints come from. Once your system is up and running you should be able to consistently get alignment warp factors of 0.5 or less.

## Mechanical Problems

### Mechanical Slippage

Do a visual check looking for bent or loose encoder brackets and loose connections to the encoder shafts.

Run the encoder test using the encoder mode as described in your *MAX Computer Operator's Guide*. Move as far as possible (up to 360°) in one direction and verify the reading against the known position. Next move back to the original position and verify the reading again. If you started at zero you should have returned to zero. It is important to check the reading in both directions to catch any free movement that is only noticed in one direction.

Do a visual check of the mechanical movement of your telescope concentrating on anything binding the encoders or brackets. Although it may not be visible, too much pressure on the encoder housing from the encoder mounting nut may cause binding of the internal parts of the encoder.

### Telescope Manufacturing Tolerances

All three axes (Polar or Right Ascension, Declination and Optical) must be perpendicular. When this is true of your telescope it is referred to as being orthogonal. If your system is not orthogonal you will *never* be able to get accurate pointing throughout the movement of the telescope.

## Encoder or Cable Problems

### Bad Encoders

Damaged encoders are very rare but a very strong surge of static electricity can do the job. The first step in verifying a bad encoder is to get one encoder working properly with the encoder mode. Once it is working, replace the good encoder with one you suspect is bad. Be sure to replace the encoder only and not the short "connector cable" between the encoder and encoder cable. This connector cable has a phone jack on one end and a blue flat 5-position jack on the other end that plugs directly into the encoder. If the response in encoder mode goes from normal to erratic or no response at all then you most likely have a bad encoder.

### Encoder Cables Swapped

With an equatorial system the longer wire on the cable is for Declination. For an Alt/Az system the longer cable wire is for Azimuth. Using the encoder mode check to make sure the cables are attached to the proper encoder. If they are swapped you will not be able to do a proper alignment.

### Bad Cables

A cable that has been wired backwards will show the reverse of normal rotational direction during the encoder test. This problem can be corrected by changing the sign of the corresponding axis under the setup mode or reversing the placement of the black and green wires in the blue connector attached to the encoder. Please refer to your *Max Computer Operator's Guide* for detailed instructions on using the setup mode.

A bad cable usually shows up when the encoder shaft is turned and you either see a slightly flashing display or no response at all. Visually check the connectors to see if you can see any obvious problems

such as wires not inserted far enough to make a connection. If the problem is at the encoder end of the cable, or in the short "connector cable" between the encoder and the encoder cable, you will see the results on only one axis. If it is on the computer end of the cable you may see the problem on both axes.

If you are unsure whether the problem exists in the cable or the encoder, swap the cable wires between Declination and Right Ascension. If that causes the problem to move from one axis to the other (but remaining on the same axis of the computer display), you most likely have a bad cable. If the problem stays with the same axis, try swapping the short "connector cable." The connector cable has a phone jack on one end and a blue flat 5-position jack on the other end that connects directly to the encoder. You may have to remove the encoder brackets to do this. If the problem still remains with the same axis, it indicates a bad encoder (or sometimes the MAX unit).

## MAX Computer Problems

### Incorrect Procedures

Using the setup mode, verify each encoder's sign and number of tics-per-revolution (or ratios on older systems). Don't be confused if the guide mode sends you in the wrong direction in right ascension when the actual error is in the sign for the declination axis. The reason for this is too complicated to explain here. Just remember that any incorrect settings will show up in the encoder test. (See the *MAX Computer Operator's Guide* for a complete explanation of the encoder test.)

Review the alignment procedure in your *MAX Computer Operator's Guide* making sure you understand each step.

An incorrect starting point when the systems asks you to "SET DEC=0," or set the scope "VERTICAL" or "LEVEL," will directly correlate to a bad warp factor. If you suspect the initial position to be incorrect, try moving a little in one direction and starting over. If the warp factor is worse, try a starting point that is a little bit in the other direction. If you are unsure about where to start you can find more information in JMI's documents titled *The Importance of the Initial NGC Alignment* and *Star Alignments with a German Equatorial Mount*.

If your mount does not show a zero Declination point, you can try one of two methods to find that position. The first method is to use a carpenter square to find 90°. With the second method you sight an object at approximately 90° Declination and make necessary adjustments in order to make sure the object stays centered while rotating in Right Ascension. Once you have verified the position, be sure to set your mechanical setting circles or mark the position so you can easily return to that point.

When using higher resolution encoders or smaller scopes there is a higher probability of moving too fast. If this happens your MAX will signal the problem by displaying "encoder error" or flashing an asterisk. At that point your alignment will be lost and you will have to restart the alignment procedure.

Sometimes it actually happens that people are sighting on the wrong stars. Try different stars or verify the star names using a star map.

If you are having trouble with a one-star alignment (intended for mounts that are perfectly polar aligned), make sure you first understand and can successfully complete a two-star alignment. This often uncovers problems that are not easily diagnosed with a one-star procedure.

### Computer Malfunction

A low battery will cause the computer to do strange things. Check the battery by replacing it with a new one. Always use an alkaline battery.

If the display acts erratic, check for cable problems as discussed in the Encoder and Cable Problems section above.

While malfunctions in the MAX Computer itself are rare, it does happen. In that case, the only practical solutions are to replace the chip(s) or replace the whole unit.

## JMI Telescopes

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