HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

D-SECRET

BIF-004-... 8 pages Copy 2

APPLICATION		REVISIONS			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVAL
1225676 1	9303.12AE19	—	INITIAL RELEASE PER ER 46107	6/21/68	

BYE 1255.68
Cy 2 Pgs 8

Gibbs thru SL-14

AUG 14 1968

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REV STATUS OF SHEETS	REV	—	—	—	—	—	—	—	—
	SHEET	1	2	3	4	5	6	7	8

UNLESS OTHERWISE SPECIFIED
TOLERANCES
.00 ± —
.000 ± —
ANGLES ± —
FINISHED SURFACE ROUGHNESS
CENTERS PERMISSIBLE
DIMENSIONS IN INCHES AND APPLY AFTER PROCESS

CONTRACT NO:
DRAWN 6-11-68
CHECKED 6-8
ISSUED 6/20/68
PROJECT APPD R.W. Dixon 6/20/68
APPROVED

Itek ITEK CORPORATION LEXINGTON, MASSACHUSETTS, 02173

OPTICAL ALIGNMENT PROCEDURE K ROTATOR ASSY.

SIZE A | CODE IDENT NO. 92208 | DWG NO. 122430

SCALE | REV | SHEET 1 OF 8

D-SECRET

1. The K-rotator assembly should be completely assembled. Care should be taken to adjust all mirrors to design dimensions.

2. Install the assembly on the alignment fixture (140359G1). Cams are supplied to position the assembly and the alignment equipment snugly against the locating edge of the key on the fixture.

3. Install the target mount fixture (141246P1) and mount the adjustable mirror target (K & E 716240). Install the centering bushing (140374P1) in the threaded hub of the K & E fixture to facilitate centering of the target. The bushing should be threaded into the hub until it is just flush with surface of the hub. Remove the keepers from the magnets on the fixture before installation.

4. Install the alignment telescope (Taylor-Hobson 112/636/638) in its support with the reticle cross lines in the horizontal and vertical planes and use it to adjust the K & E target. The target will be centered when the center mark on the target no longer moves laterally as the K-rotator housing is rotated. The autocollimation feature of the alignment telescope may be used to eliminate tilt. Set the telescope focus to infinity and adjust the target mirror tilt until the return image of the telescope reticle is superimposed upon the reticle.

5. When the target has been adjusted, translate the telescope laterally until the line-of-sight is aligned with the center of the displacement target.

6. Remove the K-rotator from the alignment fixture.

7. Install the collimator (Taylor-Hobson 112/782) in its support. The support should be installed on the alignment fixture using the set of holes closest to the K-rotator.

8. Align the collimator with the telescope line of sight. View the target at infinity to remove angular error. View the displacement target to reduce lateral error.

9. Replace the K-rotator on the alignment fixture and check the alignment of its rotation axis with the telescope line-of-sight. If satisfactory, remove the target mirror and its mounting fixture.

NOTE: Due to the construction of the K-rotator, it is impossible to separate adjustments for angular and displacement errors. It appears easier, therefore, to reduce angular and displacement errors with respect to the horizontal (or vertical) plane as a first step and to then reduce the angular and displacement errors within that plane with respect to the desired axis as established by the intersection of the telescope reticle cross lines. The following procedure will accomplish this.

10. Rotate the K-rotator housing until mirror M1 (see Figure 1) will be held in position by gravity when the adjustment locking screws are loosened. Loosen the locking screws with the Ash hex ball driver set supplied for this purpose.

11. Since access to the center jacking screw (S1, Figure 2) on mirror M1 is obstructed by a key, it would be best to make adjustments requiring use of this screw first. This screw is effective in reducing errors with respect to a horizontal plane if the K-rotator is positioned as suggested in step 10.

Using the special wrench provided, make an adjustment of the screw (S1)*. View both near and far collimator targets with the telescope to determine the effect of the adjustment. The adjustment should tend to move the targets into line with the horizontal cross line of the telescope reticle.

Movement of a single jacking screw produces a displacement of the mirror as well as a change of its angle. A change of angle affects the far target. The near target is affected by both the change in angle and the displacement. Therefore, if the change in angle has a desirable effect but the displacement tends to move

* It may be necessary to rotate the housing slightly to do this.

the near target in the wrong direction, the displacement may be nullified and the change in angle continued by moving the other two jacking screws (S2, S3) for mirror M1 in equal increments but in an opposite direction to the first screw. With one person observing the targets through the telescope and another making adjustments, it should be possible to align the targets approximately with the horizontal cross line of the telescope reticle . If perfect alignment with this cross line cannot be obtained, mirror M3 should be adjusted. Use the jacking screw (S4, Figure 3) nearest the collimator to move the targets toward the horizontal cross line.* Then return to adjusting mirror M1 until no further improvement can be obtained. Return then to mirror M3. Reiterate these steps until good alignment with the horizontal reference is obtained. Most of the adjustment may be accomplished with mirror M1. Mirror M3 should be adjusted sparingly to preserve the original mounting dimensions as closely as possible.

12. After the previous step has been completed, the mirrors should be adjusted to eliminate the errors within the horizontal plane. Use the jacking screws (S2, S3) nearest the collimator to tilt mirror M1. It will probably be necessary to move them in equal increments, but in opposite directions, to bring the targets as close as possible to the intersection of the telescope cross lines. When no further improvement can be obtained, adjust mirror M3. Use the jacking screw (S6) diagonally opposite to the one used in step 11. This will tend to produce motion in mirror M3 which will be orthogonal to the motion produced in step 11. This motion should be in a direction to move the targets toward the center of the telescope reticle. As in step 11, unlock the jacking screw, make a small adjustment, and relock the screw before viewing the effects. Move back and forth

*This screw should be unlocked, moved slightly, and then relocked before the effect of its motion is observed.

between the two mirrors with only small adjustments to mirror M3 until good alignment is secured.

13. Lock the jacking screws of mirror M1 one at a time. Observe to view any changes that may occur. If changes occur due to locking, they must be corrected by adjustment of the jacking screw.

14. Rotate the K-rotator housing. Observe any residual errors. Residual errors between the initial position and a position at 180 degrees of mechanical rotation may be split by adjustment. The same procedure may be followed for errors at mechanical rotations of 90 degrees and 270 degrees. This will distriubte the residual errors. If the servo system components have been assembled to the K-rotator it may not be possible to check the 180 degree position.

15. When finally aligned, the K-rotator shall exhibit the following maximum errors:

15.1 The axial image of the displacement target shall appear stationary within 0.001 inch total excursion as the K-rotator is rotated through 360 mechanical degrees. In other words, the excursions shall remain within a circle 0.001 inch in diameter.

15.2 The axial image of the target at infinity shall appear stationary within three arc minutes total excursion as the K-rotator moves through 360 mechanical degrees. Note that this tolerance is again a total tolerance and not a bilateral one.

16. A check list of the equipment required for this procedure follows.

16.1 Alignment telescope, Taylor-Hobson 112/636/638.

16.2 Collimator, Taylor-Hobson 112/782

16.3 Target mount fixture (141246P1).

16.4 Adjustable mirror target, K & E 716240.

16.5 Centering bushing (140374P1).

16.6 Ash hex ball driver set.

16.7 Jacking screw wrench.

16.8 Items 1, 2, 3, 10 and their associated hardware as shown on the moveable elements alignment fixture (140359G1).

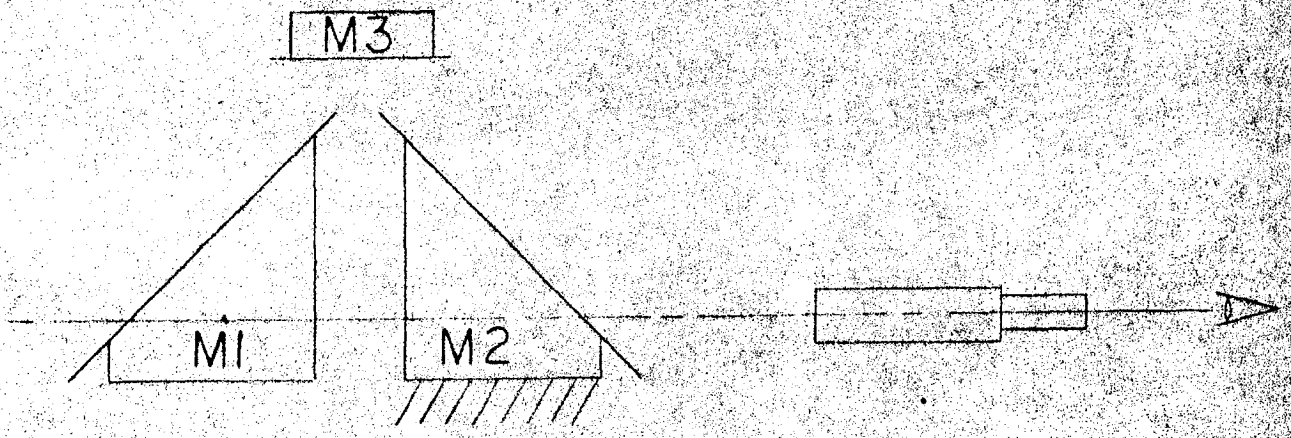

FIG. 1

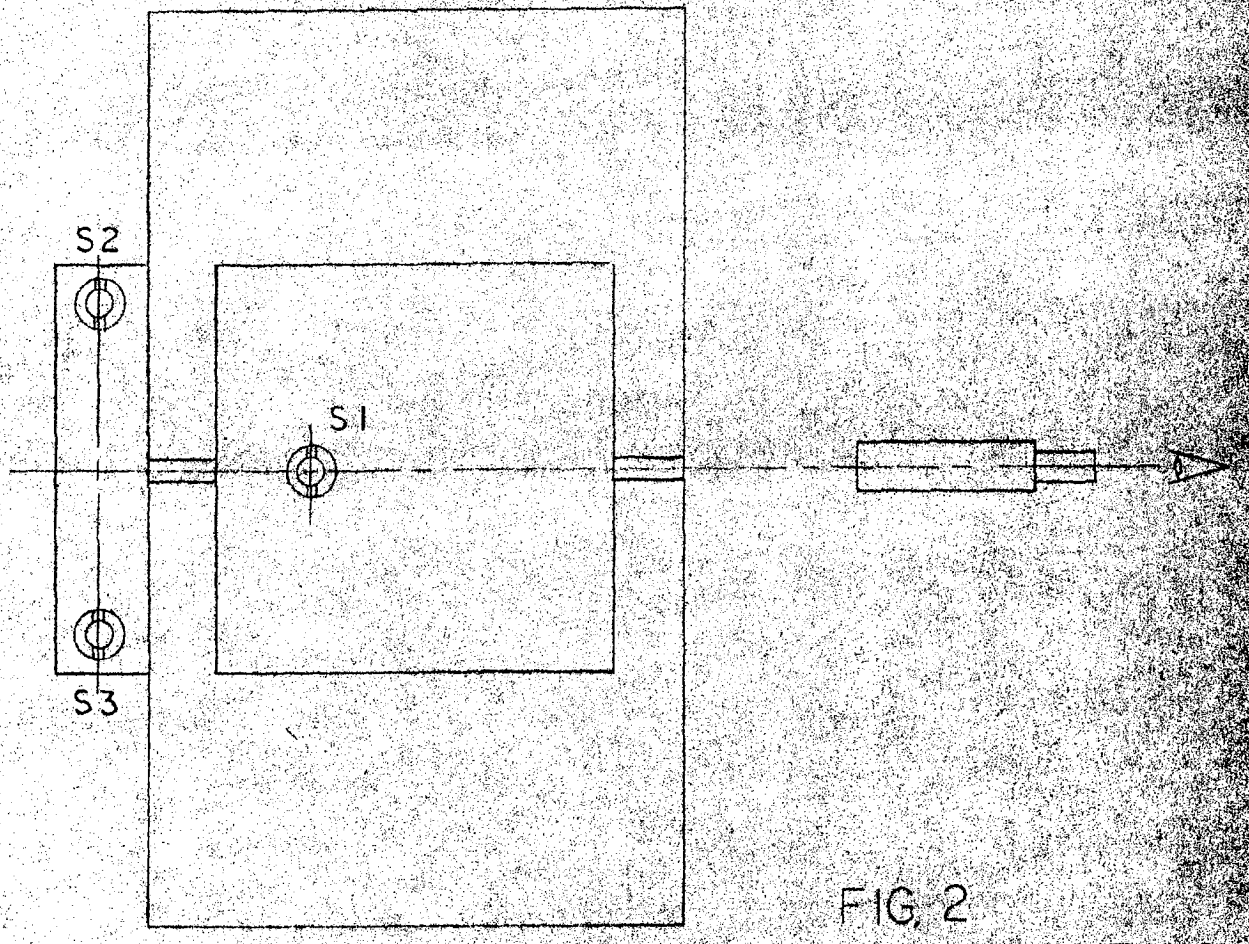

FIG. 2
ADJUSTING SCREWS
MIRROR M1

SIZE	CODE, IDENT NO.	DWG NO.
A	92208	122430
SCALE	WT	REV	SHEET 7

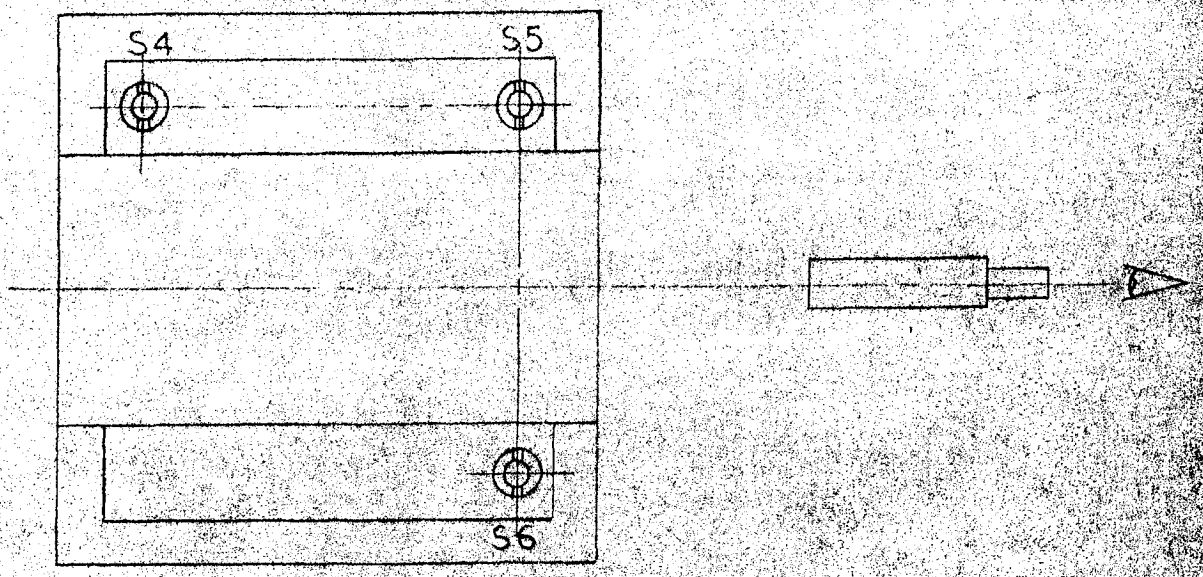

FIG. 3
ADJUSTING SCREWS
MIRROR M3

SIZE	CODE IDENT NO.	DWG NO.
A	92208	122430
SCALE	WT	REV / SHEET 8