

Film-Tech

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INSTRUCTION MANUAL

TU2000E

AUTOMATIC LENS/APERTURE CHANGER

REV. 10-90



BALLANTYNE➤
OF OMAHA, INC.

4350 McKinley Street
Omaha, Nebraska 68112
402/453-4444 Telex 484481

A member of the Strong International team

PREFACE

THE STRONG INTERNATIONAL TU2000E Automatic Lens/Aperture Changer, and the TU2000M Manual Lens/Aperture Changer, are designed for use with either the Simplex 35 Model 1050 or the Ballantyne PRO-35 projectors. The dual lens turret accommodates lenses of standard 2-25/32 inch diameter, and does not require use of a magnacom. Each lens barrel may be individually fine focused.

USERS of the TU2000M Manual Turret need consult only Page 6 of this manual for lens installation instructions. Replacement parts for both models are listed at the back of this booklet.

LENS AND APERTURE CHANGE of the TU2000E are simultaneous, and actuated by a momentary remote dry contact applied to the control chassis. A reset switch, located at the turret, permits override of a malfunctioning automation controller or missed cue.

A "THREAD-NORMAL" TOGGLE SWITCH on the front of the TU2000E turret opens the turret for ease of threading and lens cleaning.

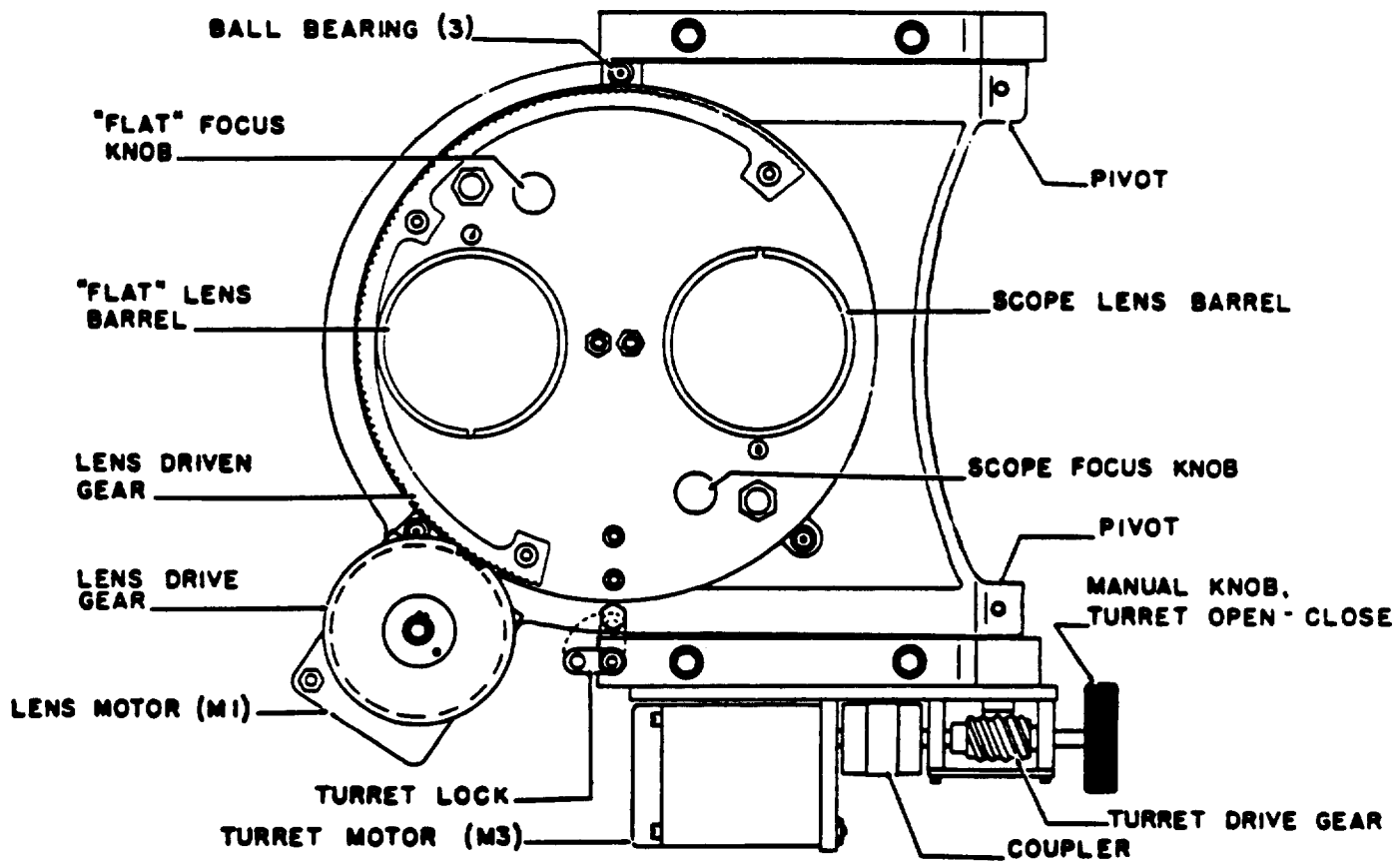
IN THE TU2000E, lens and aperture positions are held constant by use of constant-stall AC drive motors.

MANUAL LENS/APERTURE CHANGES are quickly performed in the event of a TU2000E motor failure. A knob on the front of the unit opens and closes the lens turret, and the lens and aperture can be manually set. The turret uses the greater weight of the anamorphic lens to counterbalance the smaller flat lens, and insure correct lens positioning.

WATER COOLED TRAPS are standard on Ballantyne PRO-35 projectors, and may be ordered as options for Simplex. A Simplex 1050 may also be re-fit at a later date for water cooled traps.

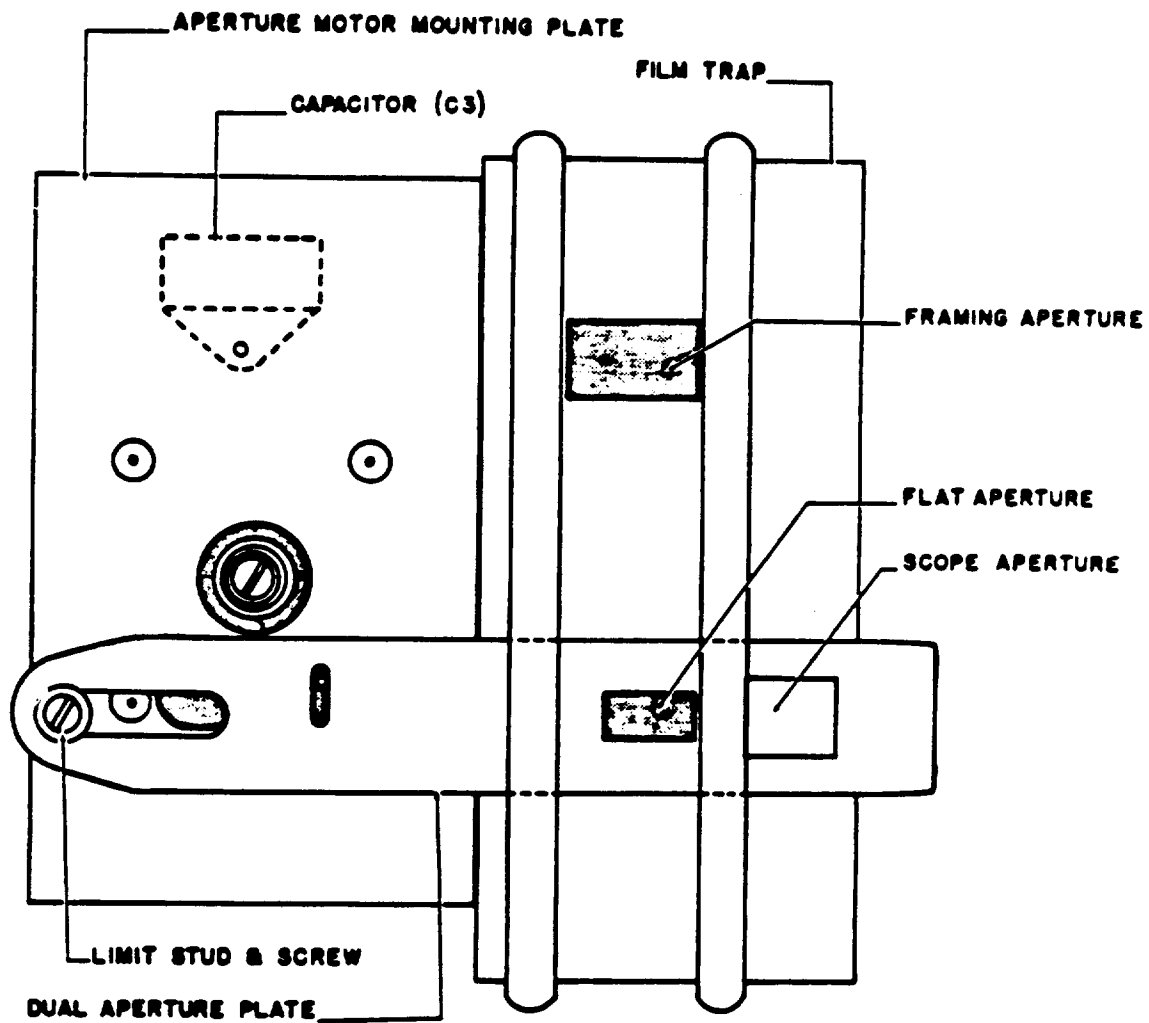
A TURRET LOCKING SOLENOID is available as a TU2000E option. This assembly is factory mounted when ordered with new equipment, but can be field retrofitted to existing TU2000E turrets.

IF AT ANY TIME you have a suggestion, or desire aid in securing anticipated results, please feel free to write directly to STRONG INTERNATIONAL, 4350 McKinley Street, Omaha, Nebraska 68112.



ILLUSTRATED IN "SCOPE" FORMAT

FIGURE 1



ILLUSTRATED IN "FLAT" FORMAT

FIGURE 2

INSTALLATION

THE CONTROL CHASSIS is packed separate from the projector mechanism. When supplied with a Strong console (VIP or Highlight), the chassis is factory mounted. When the projector is ordered without a Strong console, the chassis must be mounted inside the pedestal or console in a manner which permits access to the (2) terminal boards. DO NOT mount the chassis to a wall or the outside of the pedestal because of high voltage hazard to personnel from exposed 115 V.AC terminals.

CONNECTIONS TO THE TURRET are pre-wired and terminate in motor plugs or switches. The (3) motor plugs are keyed to prevent mismating plugs to their corresponding motors. Furthermore, the control wires are color coded as follows:

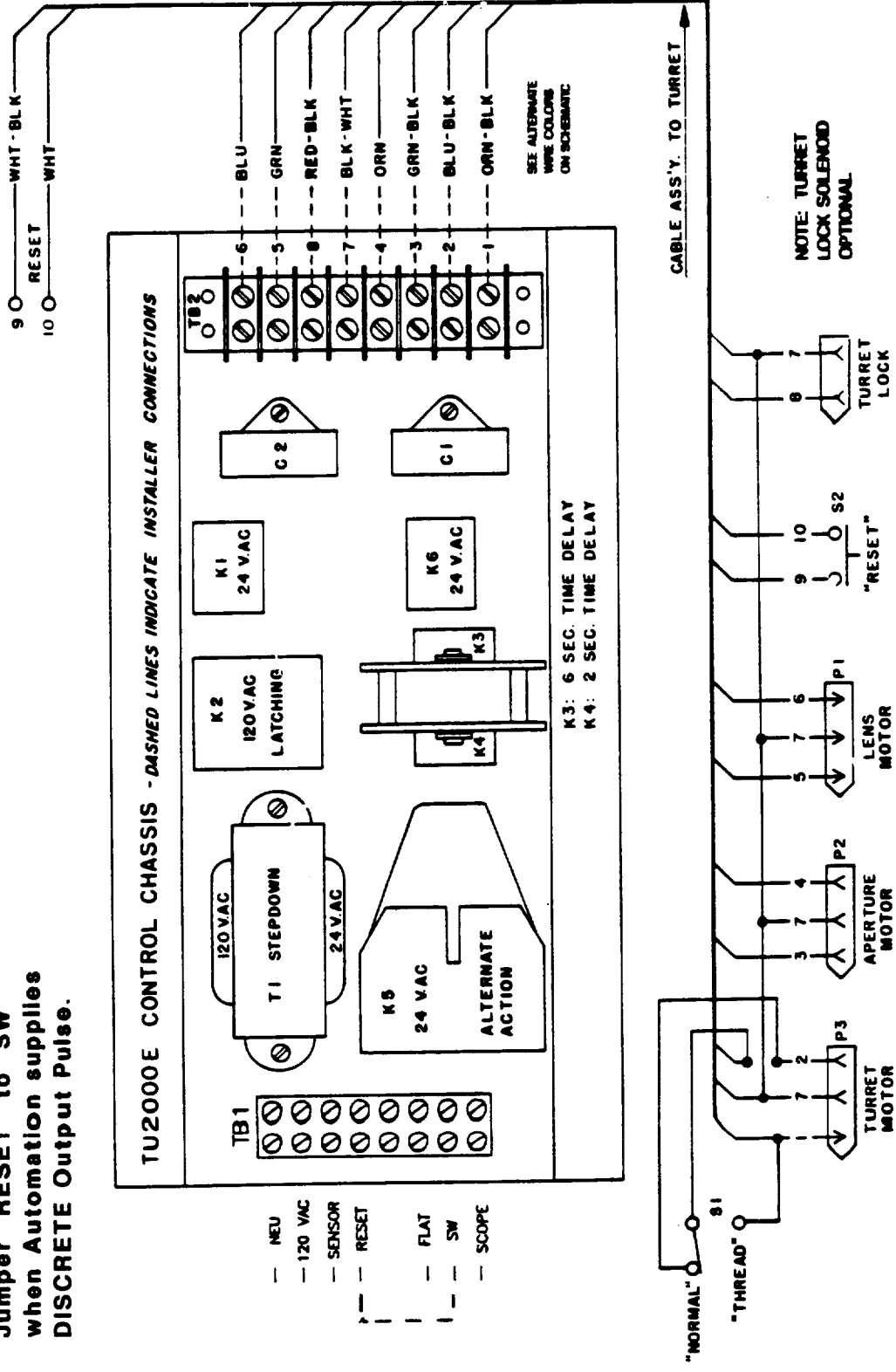
Turret Motor	Orn-Blk & Blu-Blk
Aperture Motor	Grn-Blk & Orange
Lens Motor	Green & Blue
AC Neutral	Blk-Wht & Wht Jumper

REMOVE the switch plate/turret drive cover and connect the plugs to their corresponding motor plugs. Mount the toggle switch to the THREAD-NORMAL switch opening, and the pushbutton switch to the RESET switch opening. Replace the cover.

RUN THE CABLE to the control chassis; shorten as required. The cable may be run in flexible conduit if desired or required by local code. Two cable/conduit strain relief clamps are provided. Strip off the plastic cable covering and connect the colored conductors to terminal board TB2 as illustrated on the Installation Diagram.

CONNECT A SWITCHED 115 V.AC LINE to TB1 as illustrated. Observe correct phasing to protect chassis components. Connect the RESET switch leads (Wht-Blk & White) and the cue sensor leads to TB1 as illustrated. DO NOT apply voltage to these (RESET/cue sensor) terminals.

Jumper "RESET" to "SW" when Automation supplies DISCRETE Output Pulse.



INSTALLATION WIRING DIAGRAM

LENS INSTALLATION

THE LENS BARRELS are marked "S" ("Scope", or anamorphic) and "F" ("Flat", or wide screen non-anamorphic) to indicate the correct lens positions. Lenses must be installed in the correct barrels, for both correct lens counterbalancing and aperture logic.

ENERGIZE THE TU2000E and press the RESET button to check operation. Note into which format the turret and aperture come to rest. Figure 1 illustrates the turret in "Scope" format, and Figure 2 illustrates the aperture in "Flat" format. With the aperture in "Flat" format, the lens barrel marked "F" will align to the front of the film gate. Reset as required to position the lens barrel and aperture in "Flat" format.

INSERT THE "FLAT" LENS into lens barrel "F". Center the focus adjustment, allowing equal travel forward and back. Ignite the lamphouse, start the projector motor, and project a picture to the screen. Move the lens inside the barrel until the sharpest focused picture is projected onto the screen. Securely tighten the lens locking knob on the top of the lens barrel.

RESET to "Scope" format. Repeat the above operation using the "scope" lens and anamorphic adapter, making certain that the picture is not only in focus, but also on the correct horizontal plane in relation to the anamorphic correction.

FILE APERTURE PLATES as required to size the picture to the screen and/or masking. NOTE: If projecting a white light while filing apertures, periodically close the lamphouse douser to permit the lens to cool.

OPERATION

WHEN USED WITH AN AUTOMATION CONTROLLER, carefully observe cueing instructions detailed by the manufacturer of the unit. The TU2000E requires a momentary dry contact to actuate lens change.

MAKE CERTAIN that the switched AC supply line to the TU2000E is energized. Check that the TU2000E is set in the correct format for the opening presentation. If not, press the RESET button.

PLACE THE "THREAD-NORMAL" SWITCH in the THREAD position to open the turret. After threading, return the switch to the NORMAL position to restore automatic operation.

START THE PRESENTATION in the normal manner. When a lens change cue is detected, the turret will open, the lenses will change by indexing 180 degrees, the aperture will change, and the turret will re-close. If a cue is missed, press the RESET button.

MANUAL OPERATION

IN THE EVENT OF A MOTOR FAILURE, the TU2000E can, without modification, be operated manually. Failure of the aperture motor will not affect operation of the turret or the lens indexing; however, if either a turret or lens motor should fail, it is advisable to de-energize the TU2000E, and perform all operations manually until a replacement motor is obtained.

THE TURRET can be opened and closed manually through use of the knob mounted to the gear train on the front of the projector. A manual turret lock secures the turret in place when the turret motor is disabled.

THE LENSES can be indexed manually with the turret in the open position. The weight of the anamorphic will hold both lenses in the correct position.

THE DUAL APERTURE PLATE can be pushed IN or pulled OUT manually to set the correct format.

MAINTENANCE

VERY LITTLE MAINTENANCE, aside from routine cleaning, is required to keep the TU2000E in good operating condition. All motors and bearings are sealed and permanently lubricated.

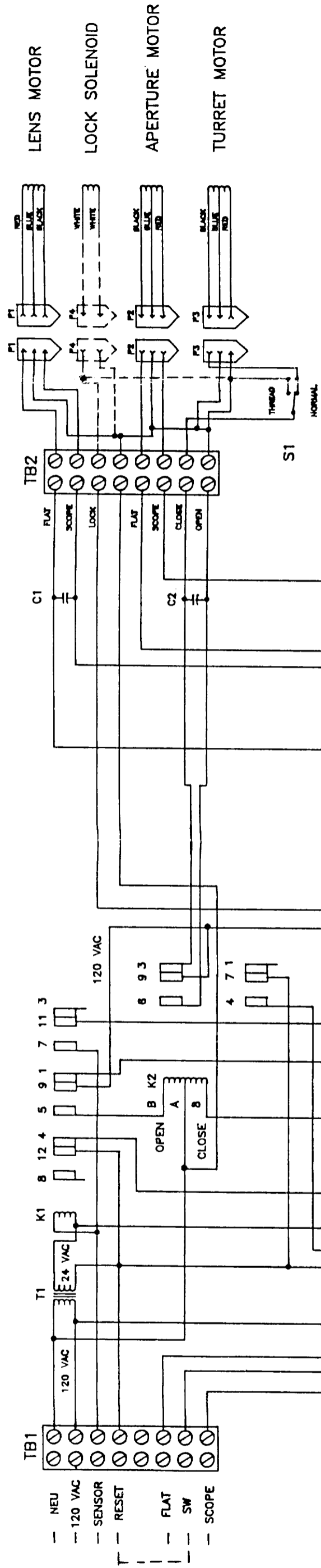
IT IS RECOMMENDED that the lens driven gear, mounted to the lens indexing plate, be regularly cleaned and left unlubricated. Oil or grease on this gear would attract and hold dirt, which in time might impair operation of the indexing plate.

THE INDEX STOPS, which set the horizontal position of the lenses, may require adjustment after extended use. The index stop for the "scope" lens barrel is set at the bottom of the turret, and the stop for the "flat" lens barrel is set at the top. After adjusting the stops, securely tighten the nylon set screw to maintain correct positioning.

THE NYLON HEX HEAD SCREW, mounted to the projector main frame, serves as a stop for the turret in the closed position. This position is set by tightening or loosening the screw. The lens **must** be aligned to the optical center of the projector. **Do not attempt to correct "keystoning" with this adjustment.** Securely tighten the locknut when the stop is correctly set.

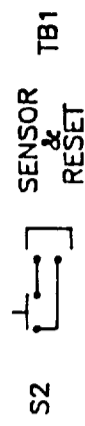
THE TURRET "OPEN" STOP is a nylon plug in the turret driven gear. At this point, the turret should be open approximately two inches, scaled between the lower mounting bar at the turret lock and the center of the turret at the index stop. This position is factory set by tightening the lower pivot set screw against the pivot shaft when the turret reaches the two inch distance with the turret driven gear at its stop. This screw should be checked periodically for tightness.

CLEAN LENSES as recommended by the lens manufacturer. Do not remove lenses from the turret for cleaning; doing so would alter the pre-set focus of the lenses. Place the turret THREAD-NORMAL switch in the THREAD position to open the turret for easy access to the rear surfaces of the lenses. Return the switch to the NORMAL position after cleaning the lenses.



Jumper "RESET" to "SW"
when Automation supplies
DISCRETE Output Pulse.

- K1 & K6 24VAC
- K2 24VAC LATCHING RELAY
- K3 & K4 24VAC TIME DELAY RELAYS
- K5 24VAC ALTERNATING IMPULSE RELAY



WIRE TERMINATION LIST

ALPHA CABLE	BELDEN CABLE	OPEN	RED	TURRET MOTOR
YELLOW	ORANGE/BLACK	CLOSE	BLACK	TURRET MOTOR
VIOLET	BLUE/BLACK	SCOPE	RED	APERTURE MOTOR
BROWN	GREEN/BLACK	FLAT	BLACK	APERTURE MOTOR
ORANGE	ORANGE	SCOPE	BLACK	LENS MOTOR
GREEN	GREEN	FLAT	RED	LENS MOTOR
BLUE	BLUE	COM		
GRAY	BLACK/WHITE	LOCK		LOCK SOLENOID
PINK	RED/BLACK	CUE		RESET SWITCH
WHITE	WHITE	CUE		RESET SWITCH
TAN	WHITE/BLACK	CUE		RESET SWITCH

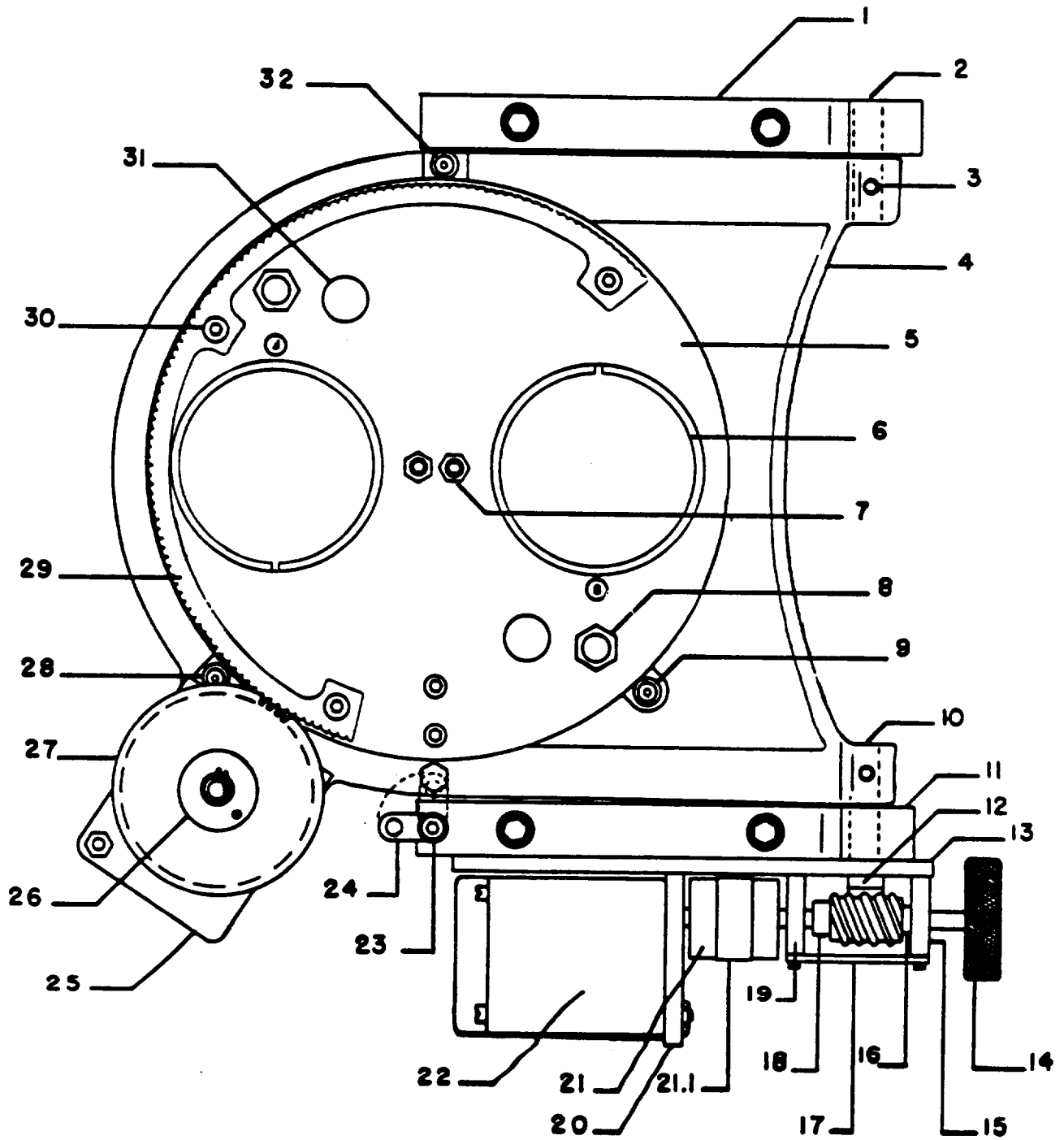
BALLANTYNE <i>of Canada</i>	
DATE: NONE	APPROVED BY: <i>John D. Poole</i>
DATE: 10/2/90	DATE: 11/0 YORK
TITLE: 110V TURRET CONTROL W/LOCK SOLENOID	

**PARTS LIST
WIRING DIAGRAM**

<u>Ref.</u> <u>Desig.</u>	<u>Part No.</u>	<u>Description</u>
-	22-70598	Control Chassis Wired Ass'y. (Complete)
C1,2	*	Capacitor, 250 V.AC, 1.2 MFD
C3	*	Capacitor, 250 V.AC, 1.5 MFD
K1,6	21-45029	Relay, 24 V.AC
-	21-40142	Relay Socket
K2	21-45041	Relay, 120 V.AC
-	21-40096	Relay Socket
K3,4	21-45039	Relay, Time Delay
-	21-08037	Relay Hold Down Bracket
-	21-58008	Spacer
K5	21-45040	Relay, 24 V.AC, Alternate Action
P1,2,3	21-40061	Plug, 3 Pin, Cable Ass'y.
-	21-40060	Plug, 3 Pin, Motor
-	21-82036	Pin, Female
-	21-82037	Pin, Male
S1	21-81144	Toggle Switch, THREAD-NORMAL
S2	72275000	Pushbutton Switch, RESET
T1	21-84008	Stepdown Transformer
TB1	21-82008	Barrier Strip, 4 Terminal
TB2	21-84006	Barrier Strip, 8 Terminal
-	22-40863	Chassis
-	22-70604	Interconnect Cable Ass'y.

- * C1 supplied with turret motor M3
- C2 supplied with lens motor M1
- C3 supplied with aperture motor M2

TURRET ASSEMBLY



PARTS LIST

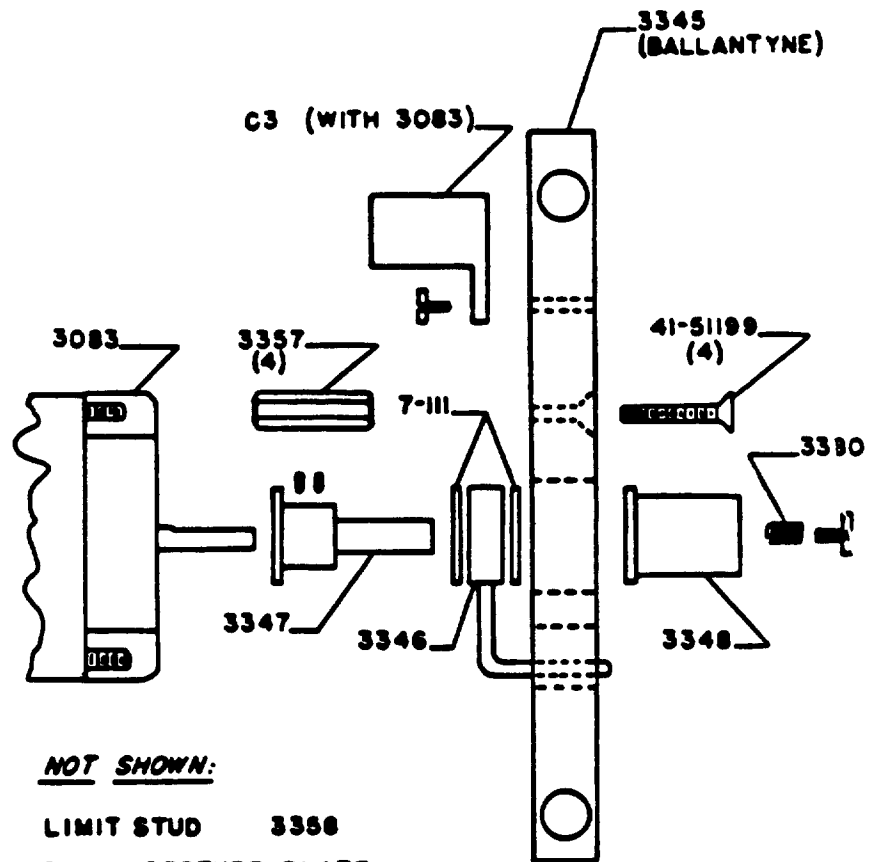
<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	5768	Turret Mounting Bracket (As Shown; Simplex)
1	5785	Turret Mounting Bracket (Ballantyne)
-	41-51230	Screw, 5/16-18 x 1-1/4"
2	5785	Pivot Pin
-	2926	Ball Bearing
-	2924	Snap Ring
3	41-51186	Set Screw, 1/4-20 x 3/8"
4	5777	Turret Casting
-	5784	Index Stop
-	41-51270	Set Screw, 10-32 x 3/4"
-	3047	Set Screw, 10-32 x 1/4" Nylon
5	5820	Lens Indexing Plate
-	5788	Index Stop
-	41-51209	Screw, 10-32 x 5/8" Soc. Hd.
-	2927	Roll Pin, 1/8" x 1/2"
6	5776	Lens Barrel Casting
-	5781	Lens Clamping Screw
-	4498	Knob, Lens Clamping Screw
7	P-1471	Jam Nut, 1/4-20 Nyloc
-	5760	Lens Barrel Positioning Stud
8	41-35054	Jam Nut, 3/8-24
-	5814	Stud, Spring Loading
-	5783	Spring
-	5759	Spring Cap
9	51-04023	Ball Bearing
-	41-51274	Screw, 10-32 x 1/2" Button Hd.
-	5834	Spacer Washer
10	5912	Pivot Shaft and Gear Ass'y. (Simplex)
10	5984	Pivot Shaft and Gear Ass'y. (Ballantyne)
-	41-51186	Set Screw, 1/4-20 x 3/8"
11	5768	Turret Mounting Bracket (As Shown; Simplex)
11	5766	Turret Mounting Bracket (Ballantyne)
12	5798	Spacer
-	3112	Fibre Washer
13	5770	Plate
14	5797	Knob
15	5771	Bearing Plate
-	2910	Ball Bearing
16	5799	Spacer
17	5773	Plate
18	5913	Shaft and Gear Ass'y.

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
19	5772	Bearing Plate
-	2910	Ball Bearing
20	5787	Motor Mounting Plate
21	--	Coupler (Order Components Only)
21	5775	Drive Collar
-	5774	Driven Collar
-	21-37042	Dowel Pin
21.1	5775	Clutch Bushing, Rubber
22	M3	Turret Motor (750 Bodine)
-	21-40060	Plug, 3 Pin
23	51-51048	Shoulder Screw
24	5914	Manual Turret Lock
-	1752	Nylon Screw, 1/4-20 x 1" Hex Hd.
25	5786	Motor Mounting Plate
-	M1	Lens Motor (748 Bodine)
-	21-40060	Plug, 3 Pin
26	5831	Brass Bushing
-	5833	Drive Hub
-	5832	Rubber Coupler
-	2923	Snap Ring
-	2927	Roll Pin, 1/8" x 1/2"
-	2969	Set Screw, 10-32 x 1/4"
27	5828	Lens Drive Gear
28	51-04023	Ball Bearing
-	41-51274	Screw, 10-32 x 1/2" Button Hd.
-	5834	Spacer Washer
29	5830	Lens Driven Gear
30	2976	Screw, 8-32 x 1/2" Flt. Soc. Hd.
31	5816	Focus Screw and Knob
-	5817	Focus Stud
-	5815	Plastic Button
32	51-04023	Ball Bearing
-	41-51274	Screw, 10-32 x 1/2" Button Hd.
-	5834	Spacer Washer
-	5780	Eccentric Bushing

NOT ILLUSTRATED

5825	Switch Plate/Turret Drive Cover
5827	Lens Drive Gear Cover
21-55004	Turret Lock Solenoid Assy. (Optional)

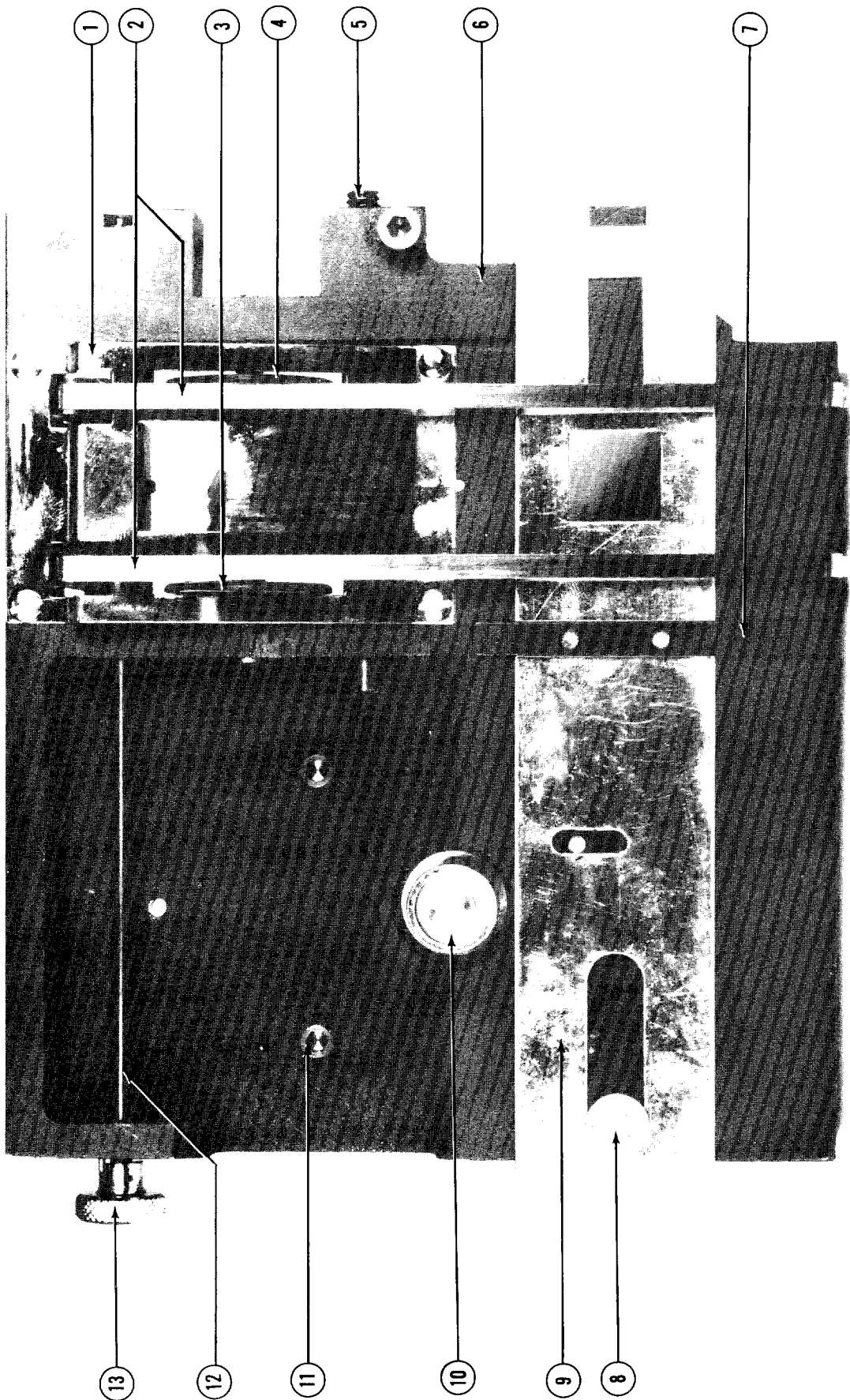
APERTURE ASSEMBLY



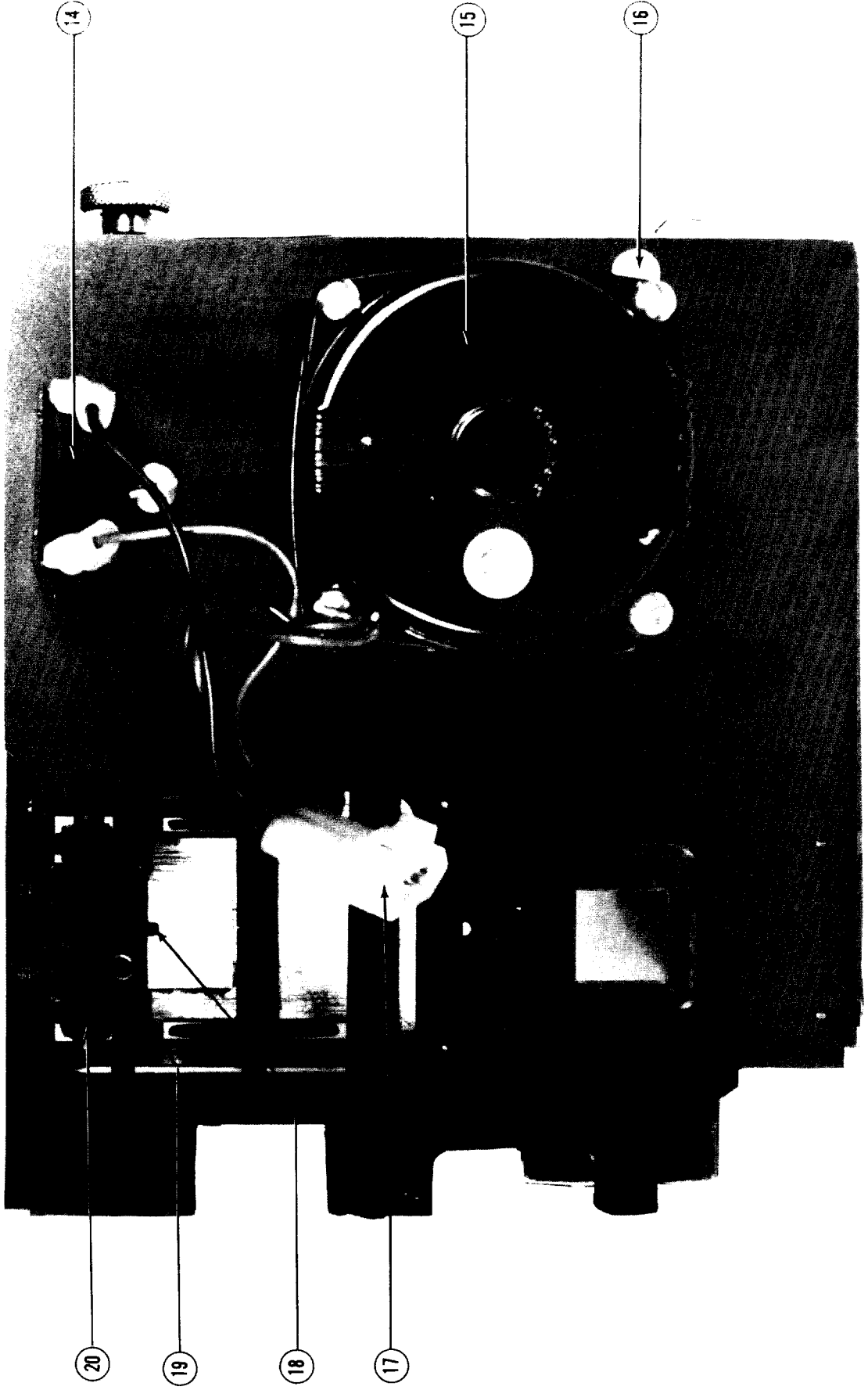
NOT SHOWN:

LIMIT STUD 3358
 DUAL APERTURE PLATE
 3377 (BALLANTYNE)
 P-9654 (SIMPLEX)

<u>Part No.</u>	<u>Description</u>
P-9603	Aperture Motor Mounting Plate (Simplex)
7-111	Fibre Washer
3083	Motor (M2)
3345	Aperture Motor Mounting Plate (Ballantyne)
3346	Aperture Drive Pin
3347	Aperture Drive Cam
3348	Bushing
3357	Hex Spacer
3380	Compression Spring



TU2000 FILM TRAP - SIMPLEX



TU2000 FILM TRAP - SIMPLEX

SIMPLEX FILM TRAP G-9829
Parts List

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	P-4071	Film Threading Guide
2	P-4078	Tension Strap, (2) Req'd.
3	G-4435	Outboard Lateral Guide Roller
4	P-4166	Inboard Lateral Guide Roller
-	P-1701	Compression Spring
-	P-4089	Retaining Ring
5	P-1981	Film Trap Mounting Stud
-	P-1556	Stud Retaining Ring
6	P-9821	Film Trap Casting
7	P-4088	Aperture Retaining Bar
8	3358	Aperture Stop Stud
-	41-51066	Screw, 8-32 x 3/8" Pan Hd.
-	P-4712	Screw, 8-32 x 1/4" Pan Hd.
9	P-9654	Dual Aperture Plate
10	3346	Aperture Plate Drive Collar
-	7-111	Fibre Washer, (2) Req'd.
-	3347	Motor Drive Shaft
11	41-51324	Screw, 8-32 x 3/8" Soc. Hed
-	41-51311	Screw, 8-32 x 1/2" Soc. Hd.
12	P-4074	Shaft, Cam Tensioning
13	P-4077	Knurled Knob, Tension Adjust
14	---	Motor Capacitor (with Item 15)
15	21-33009	Motor, 115 V.AC, 50/60 Hz.
16	41-51066	Screw, 8-32 x 3/8" Pan Hd.
-	P-4712	Screw, 8-32 x 1/4" Pan Hd.
17	21-40061	Molex Plug
-	G-9640	Motor Wire Harness Ass'y.
18	P-4092	Tensioning Cam
19	P-4075	Pressure Strap Arm Mounting Block
20	P-4073	Pressure Strap Arm
-	P-4074	Pressure Strap Pivot Arm
-	P-4090	Pivot Arm Retaining Ring
•	P-4079	Pressure Strap Tension Spring, Flat

**MANUAL TURRET
TU2000M
REPLACEMENT PARTS**

<u>Part No.</u>	<u>Description</u>
22-21113	Lower Catch
21-21114	Upper Catch
21-21115	Rotating Catch
21-21116	Rotating Catch Mount
51-58052	Compression Spring
21-37035	Dowel Pin, 3/16 x 1"
41-51350	Set Screw, 6-32 x 1/8" Soc. Hd.
