

STELRON CAM COMPANY

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T, BT OR SBT SERIES TRANSLATOR MAINTENANCE INSTRUCTIONS

Maintenance Instructions

Thank you for choosing a Stelron cam operated T, BT or SBT Series Translator. The Translator's design has been refined over many years to enhance its ruggedness, performance and serviceability. Proper installation and maintenance of this high performance drive will provide many millions of cycles of faithful service.

PRODUCT OVERVIEW

This device provides two independent linear axis of cam controlled movement. Any motion in a single plane (within the stroke and minimum cam angle limitations) is possible. The end plate, or output, is guided by precision linear bushings. The spread, or aspect ratio, of these bushings has been maximized for optimum stability, life and freedom from unwanted movement (shake) of the output member. The "X" axis cam follower is located on the carriage block and directly engages the "X" cam. This enhances the load capacity of this axis. The "Y" axis provides motion to the endplate through a needle bearing supported bell crank mechanism and a yoke assembly. Since the Translator utilizes a track type cam, some backlash can be expected. Consult Stelron for methods to minimize or eliminate backlash at the end positions. The Translator mechanism is housed in a rigid cast aluminum housing that can be mounted in any position.

Constant speed rotation of the input (cam) shaft produces a predetermined dual axis motion of the end plate. Units can also be cycled on demand where the input shaft is single cycled by the input drive. The following are just some of the many important features of this drive:

- 1) Hardened and CNC profile ground, large diameter cams.
- 2) Thompson Precision Class "A" linear bearings or Thompson Super Smart high performance linear bearings guide and support the load.
- 3) 60 Rockwell hardened class "L" linear shafting is standard for long life. Higher precision class "N" shafting is available.
- 4) All wear surfaces are rolling contact and hardened for long life.
- 5) Standard felt rod wipers retain light lubricant and exclude foreign matter. Viton seals are available. Additional suggested sealing method are outlined in this manual.
- 6) Output spring overload protection for "Y" axis in SBT series. Stelron slip clutch motor reducer package provides input overload protection.
- 7) Standard NEMA "C" frame motors.
- 8) Heavy cast aluminum universal mounting housings with machined surfaces and mounting holes available on six sides. Units can be mounted in any position.
- 9) Heavy Duty swing arm type micro switches with large diameter adjustable steel signal cams.
- 10) Hand knobs on all Stelron reducers for ease of set up and manual cycling.
- 11) Modified Sine acceleration generated by cam provides smooth, high speed transfers with minimal vibration.

WARNINGS TO THE USER

This unit is sized and warranted to handle a specific dynamic load. Loads increase directly in proportion to increased weight and strokes. Loads will increase with the square of the move time (or camshaft RPM). Move speed can markedly affect product life. Never run this unit faster, or increase the loads, without checking with Stelron first.

Backlash on the input or output of the unit will introduce "jerk" into the system, decreasing life and performance. Always try to minimize backlash. Any overload devices, whether provided by Stelron or not, cannot claim to protect operators or tooling from harm. These devices are meant to protect specific machine components from harm only.

Cycling on demand any faster than the control manufacturer specifies (30 cycles per minute for Danfoss C-2000 and KB-PI, 60 cycles per minute for Danfoss Cycletrol 150) will void control warranty and may cause pre-mature failure. Please consult Stelron if your cycling requirements exceed those mentioned above.

PRODUCT WARRANTY

Stelron products are warranted against defects in material and workmanship for a period of one year from shipment date. Warranty covers parts and labor at Stelron's factory and is based on Stelron's approval of accurate application data. Mis-use and mis-application, including overloading/overspeeding, are not covered by this warranty.

BREATHER PLACEMENT

The reducer housings are separate from the Translator in all Stelron products and the reducer must have a breather. Breathers are provided with any unit sold with a Stelron reducer. Place breathers at the highest of the available tapped holes in each of the respective housings. All Stelron units are shipped with pipe plugs installed in all possible breather locations at the factory. All holes can be used to facilitate filling and draining the units with lubricant.

Most reducers are shipped with oil. You should always check for the proper lubricant level before operating.

LUBRICATION INSTRUCTIONS

Stelron Translators require extreme pressure type grease lubrication at the cam follower and pivot grease fittings and light spindle oil to the felt linear rod wipers. The diagram below shows the application points for the two types of lubricant. The proper types of lubricant is as follows:

Grease Fittings: Exxon Lidok EPO (or equivalent). Available from Exxon distributors or Stelron.

Felt Rod Wipers: SAE 10Wt Oil

The input (cam) shaft bearings are sealed and require no attention.

Most Stelron reducers are shipped with lubrication filled to the proper initial level from the factory. Our initial fill is based on our understanding of the mounting position. The lubricant level should be checked by the user before running the drive and inspected daily during normal operation. The oil level in all Stelron reducers should always cover between 1/3 to 2/3 of the (larger) output gear.

The following lubrication schedule should be adhered to:

One shift operation - Lubricate every two months.

Two shifts operation - Lubricate every month.

Three shifts operation - Lubricate every two weeks.

High speeds, dirty or high heat conditions may require more frequent lubrication intervals.

OUTPUT CONNECTIONS

The endplate attaches to the end of the "Y" linear shafting via clamping screws and roll pins. Note the hardened linear shafting is annealed at the attaching point to allow drilling for the roll pins. The end user or machine builder can discard the supplied endplate and couple to the Translator in a different manner, if desired. To remove the endplate, loosen the two clamping screws, drive out the roll pins and slide the end plate off of the linear shafting.

The tooling/load should be centered over the Translator unless previously approved by Stelron. Any changes to load configurations (ie beam length, weight, load distribution) should be approved by Stelron. All connections must be tight and backlash free. The Translator is intended as a transfer device. Any work loads, pressing forces, shock loads, etc. must be carefully considered and approved by Stelron.

In walking beam applications it is suggested that product contact with the stationary tooling occurs towards the beginning or end of the stroke. This is when travel velocity is at a minimum and shock or bounce will be minimized. Stelron does produce "soft touch" motions where a slowing or stop occurs for product pickup/placing at predetermined points in the move. Consult Stelron motion worksheet for these pickup/placing points. Design tooling so that pickup/place points exactly coincide with Translator motion slowdown/stop (soft touch) points.

TIMING OF MULTIPLE UNITS

Precise timing and exact stroke length/motion matching of multiple units is imperative. Make sure that the motions and stroke lengths are identical on the units that are to work together. See "Timing Procedures" sheet that is part of this manual for specific timing information.

ELIMINATION OF BACKLASH AT END POSITIONS

Play or backlash has three possible sources:

- 1) Necessary clearance in the cam tracks.
- 2) Necessary clearance in the "Y" axis yoke assembly.
- 3) Necessary (but variable) clearance in the linear bearings.

Of the above sources, it is most practical for Stelron to minimize the clearance in the linear bearings by utilizing tighter fitting class "N" linear shafting. This requires hand fitting of the linear bearings but will minimize unwanted movement in the linear bearings only.

End stops can be fitted to Stelron Translators to minimize unwanted movement that originates in the cams and "Y" axis yoke. These are typically clamped to the linear bearing shafts inside the Translator housing and serve to locate the end position of the carriage block ("X" axis) and end plate ("Y" axis). End stops, when properly installed, will load the output towards one side of the cam (or yoke), eliminating the (necessary) clearance in the cam track (or yoke) at the end plate. Consult Stelron for additional information on end stops as unit damage can occur from improper installation.

Springs, or air springs, can also be used to eliminate backlash by, again, loading the mechanism to one side of the cam (or yoke track). The spring loaded "Y" axis on the SBT Translator is an example of this, though one side of the yoke is removed to facilitate overload protection for the "Y" axis. This method can be used successfully but is usually application specific.

OVERLOAD ADJUSTMENT

Stelron Translators are equipped with three types of overload protection:

- 1) Internal Spring Loaded "Y" axis on SBT Translator.
- 2) Internal Input Clutch in Gear Reducer ("S" prefix on reducer part number denotes this feature (ie SFLGR1-1..)).
- 3) Machine Builder External Tooling Protection.

The SBT "Y" axis spring overload acts as the "Y" axis extends out of the housing. If interference is encountered during this extension stroke, no more force is exerted than available from the spring. The spring is selected by Stelron based on application information. Most units are equipped with a movable collar that allows adjustment of the available spring force.

A separate instruction sheet is included for the slip clutch in the gear reducer (#2). Adjustment should be done with the actual loads and speeds that the drive will be run under.

The machine builder is encouraged to employ any application specific tooling protection that is feasible. Keep in mind the dynamic loads that will be generated when evaluating any design options. Adjustment should be done under the actual load of the drive at the actual production running speed.

TROUBLE SHOOTING

Unit Does Not Stop In Position, Accuracy Problems or Positioning is Erratic-

Make sure unit is stopping in dwell. This is the most common cause of problems in cam mechanisms. Rotate camshaft until movement has stopped on output. Rotate in same direction another 5-10 degrees. Unit should now be in dwell. Check that this is where the camshaft stops during normal cycle on demand operation. It should be very close. If it is not close, the signal cam may need to be adjusted (cycle on demand) or the Translator may be out of time (in a synchronous machine). The signal cam should send a stop signal so the motor stops the camshaft consistently in the dwell of the cam. Positioning problems occur when the motor stops the camshaft out of the dwell position. The dynamic braking function in the motor controller could be in deactivated by motor control settings or could be in operable. This will cause motor to "drift" pass the dwell in the cam.

While the Translator is in dwell, try to move the endplate, or output, while keeping the camshaft stationary. If excessive movement is possible (over 1/16”), there may be an internal wear in the Translator, usually worn followers or linear bearings. First check that all input and output connections to the drive are tight and free of windup and backlash. See repair instructions below if all connections are tight.

Motion Is Not Smooth -

Make sure there is no backlash or windup in both the input and output couplings. Translators usually exert a reversing torque on both input and output connections. Any looseness shows up as erratic motion and can significantly shorten life.

Indexes Too Slowly -

Check setting of input slip clutch in reducer. It may be slipping.

GENERAL REPAIR INSTRUCTIONS

Disassembly of the Translator-

Disconnect the tooling from the end plate and move aside. Gain sufficient access to the unit to remove the side cover. It is preferable, but not always necessary, to remove the Translator housing and work on a bench.

- 1) Loosen the clamping screws for the “X” linear shafts (see illustration).
- 2) Loosen all four screws at the bottom side of the Yoke block. Remove the two screws that thread into the bottom of the “Y” axis linear shafts (rods). Slide the Yoke assembly off of the “Y” rods and put it aside.
- 3) Slide the “X” shafts out of the housing. Support the carriage block when removing the shafts. Put the shafts aside in a clean place where they won’t be damaged.
- 4) Slide the “Y” linear shafts out of the carriage block and Translator housing. Support the carriage block while removing the rods.

The camshaft bearings in the Translator are considerably oversized relative to their expected loads. They usually do not need to be replaced. Note that no axial play is permitted in the Translator camshaft. Shims are used behind one of the bearing caps to eliminate axial movement.

The “X” and “Y” cams in a Translator are locked to the camshaft using a “Ringfedder” or taper-lock type of coupling. Larger units employ two cam blanks, one for the “X” and one for the “Y” axis. The angular rotation of these cams relative to each other is critical and must be maintained. The axial relationship of the cam blank(s) is also critical relative to the housing. If the cam(s) must be removed, measure and note these relationships carefully. It is recommended that Translators are sent back to Stelron when cams must be removed.

REPAIR PARTS

A bill of materials is provided detailing all parts used in Stelron Translators. Commercially available parts are available from Stelron or the manufacturer. Special parts, on the bill of material, are available from Stelron only. Please call Stelron, or your local Stelron sales engineer, for any additional help in diagnosing possible Translator problems.

Description	Qty	T, BT, SBT-10 Part No.	Qty	T, BT, SBT-20 Part No.	Qty	T, BT, SBT-30 Part No.	Qty	T, BT, SBT-30A Part No.
Housing	1	Specify model number	1	Specify model number	1	Specify model number	1	Specify model number
Top Plate	1	BT-1-3 (BT & SBT only)	1	BT-2-3 (BT & SBT only)	1	BT-3-3 (BT & SBT only)	1	BT-3A-3 (BT & SBT only)
Bearing Cover	1	LS2-104	1	LS3-106	1	LS4-104	1	LS4-104
Pivot Block	-	N/A	-	N/A	1	T-303	1	T-303
Carriage Block	1	T-112 or ST-112	1	T-214 or ST-214	1	T-304 or ST-304	1	T-304 or ST-304
Bell Crank	1	T-105	1	T-209	1	T-305 or T-305L	1	T-305 or T-305L
End Plate	1	T-113 or ST-113	1	T-215 or ST-215	1	T-306 or ST-306	1	T-306 or ST-306
Outer Yoke	1	T-114 or ST-114	1	T-211 or ST-211	1	T-307 or ST-307	1	T-307 or ST-307
Yoke Spacer	1	T-115 (T & BT only)	1	T-212 (T & BT only)	1	T-308 (T & BT only)	1	T-308 (T & BT only)
Inner Yoke	1	T-116 (T & BT only)	1	T-213 (T & BT only)	1	T-309 (T & BT only)	1	T-309 (T & BT only)
“Y” Axis Rod	2	BT-1-11	2	BT-2-6	2	BT-3-11	2	BT-3-11
Pivot Pin	1	T-107	1	T-210	1	T-312	1	T-312
“X-Y” Cam	1	(Specify)	1	(Specify)	1	(Specify)	1	(Specify)
Cam Shaft	1	BT-1-8	1	BT-2-8	1	BT-3-10	1	BT-3A-10
Spacer	-	N/A	-	N/A	3	BT-3A-16	3	BT-3A-16
Spring Retainer Block	-	N/A	1	ST-280	1	ST-380	1	ST-380
Spring & Spring Guide Rod	1	Specify model number	1	Specify model number	1	Specify model number	1	Specify model number
Mounting Plates (PR, QR)	2	BT-1-34	2	BT-2-34	2	BT-3A-34	2	BT-3A-34
Mounting Plates (SR, TR)	2	BT-1-35	2	BT-2-35	2	BT-3A-35	2	BT-3A-35
Mounting Plates (MR, NR)	2	BT-1-36	2	BT-2-36	2	BT-3A-36	2	BT-3A-36
“X” Cam Follower	1	CCF-1/2-SB	1	CCF-5/8-SB	1	CCF-3/4-SB	1	CCF-3/4-SB
Yoke Follower & “Y” Cam Follower	2	CCFH-1/2-S	2	CCFH-5/8-S	2	CCF-3/4-S	2	CCF-3/4-S
Cam Shaft Br’g. w/ Retainer	1	Z4993L03	1	Z4993L04	1	7516 DLG	1	7516 DLG
Cam Shaft Br’g. w.o./ Retainer	1	Z993L03	1	Z993L04	1	Z99R16	1	Z99R16
Thrust Washer	1	18842	1	18860	1	18870	1	18870
Roller Br’g. (Pivot Pin)	2	B-108	2	B-1210	2	B-1412	2	B-1412
Linear Ball Bushing (Carriage Blk.)	8	A61014	8	A-81420	8	A-122026	8	A-122026
Bearing Spacer	-	N/A	-	N/A	1	RSN-215	1	RSN-215

Lubrication Instructions for Translators

T, BT, SBT: Apply Exxon Lidok EPO (or equivalent) to all grease fittings.

Apply SAE 10 Spindle Oil (or equivalent) to Felt Wipers.

MotoReducers: All Models - Apply Mobil Oil 600W (or equivalent) to level hole.

Note: On all oil filled components breather must be installed at the highest level for mounting position.

Recommended Frequency of Inspection

Typical Usage

One Shift: Inspect at least once a month.

Two shifts: Inspect once every two weeks.

Three shifts: Inspect once a week.

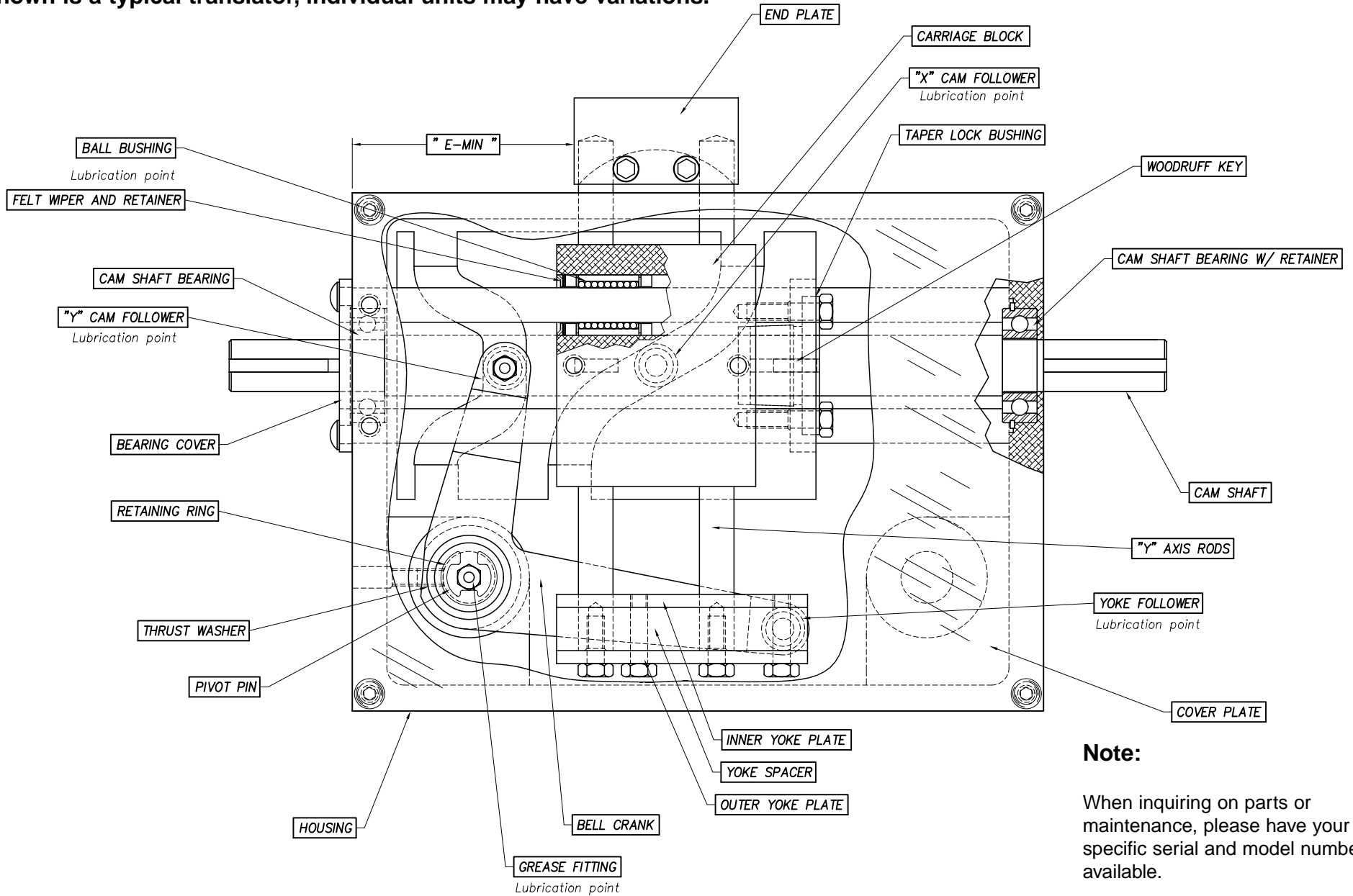
Severe duty: Inspect as often as necessary to maintain lubricity.

Lubrication

Mobil, U.S.A. Exxon, U.S.A. Master Lubricants, Phila. PA or

Stelron Components, Inc. 1495 MacArthur Blvd., Mahwah, NJ 07430
tel (201) 529-5450 fax (201) 529-5493

Shown is a typical translator, individual units may have variations.



Note:

When inquiring on parts or maintenance, please have your specific serial and model numbers available.

BT-10, -20, -30 Translator General Assembly