





**STERLING INSTRUMENT** offers a wide choice of Standard Gearheads and Speed Reducers in three standard sizes. However, in many applications a special unit is required. Below is a listing of some of the Special Applications Gearheads and Speed Reducers that **Sterling Instrument** can produce and for which designs exist:

- **Zero-Backlash Gearheads and Speed Reducers** for applications which require absolutely no lost motion throughout the Gear Train. Consult **Sterling Instrument** Engineering for the Gearhead & Speed Reducer sizes, ratios, and output loads where Zero Backlash is applicable.
- **Splined Shaft Gearheads and Speed Reducers** for applications which require direct meshing with other component parts of the Gear Train. Consult **Sterling Instrument** Engineering for the applicable Diametral Pitches and numbers of teeth.
- **Low-Backlash Gearheads and Speed Reducers** for applications which do not require Zero Backlash, but do require lower Backlash than standard units. Consult **Sterling Instrument** Engineering for the applicable Backlash Specifications and output loads.
- **Tandem Gearheads and Speed Reducers** for applications which require reduction ratios higher than shown in the tables of this catalog.
- **Exact Ratio Gearheads and Speed Reducers** for applications which require reduction ratios which are even integers.
- **Integral Slip Clutch Gearheads and Speed Reducers** for applications which require a built-in Torque Limiting Device.
- **Heavy-Duty Gearheads and Speed Reducers** for applications which require two to three times the available output Torque of standard Gearheads and Speed Reducers, available as a special order.

**Sterling Instrument** also builds Speed Increaseers.



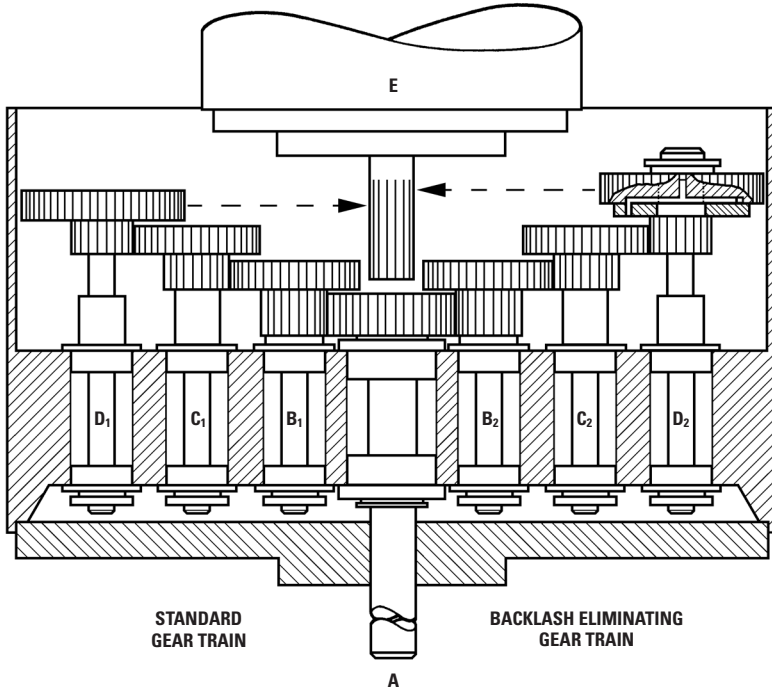
**Speed Reducers**  
MGX T-Series 1.4375" O.D.  
S9115A-T6...

For entire product line, technical information, 3D models and online buying, visit <https://shop.sdp-si.com/catalog/>



In many electromechanical instruments it is often necessary to use, as a component part of a system, a gear train which contributes a minimum amount of backlash or lost motion to the system in order to obtain maximum system accuracy. With this need in mind, **STERLING INSTRUMENT** has designed a gear train arrangement which completely eliminates backlash and lost mo-

tion from the entire gear train. At the same time, this gear system allows unusually high torque loads at the gear train output without overriding the spring loading of the system. The drawing below illustrates the application of this zero-backlash system to a gearhead or speed reducer.



The standard gear train (A, B<sub>1</sub>, C<sub>1</sub>, D<sub>1</sub>, E) is identical to that which is found in our standard catalog gearheads & speed reducers. Pinion & gear clusters B<sub>2</sub> & C<sub>2</sub>, in the backlash eliminating gear train, are duplicates of pinion & gear clusters B<sub>1</sub> & C<sub>1</sub>, in the standard gear train. The pinion of pinion & gear cluster D<sub>2</sub> is identical to the pinion of pinion & gear cluster D<sub>1</sub> with the addition of the torsion spring retaining slot in the end of the D<sub>2</sub> pinion. As per normal practice, the gear & pinion on the D<sub>1</sub> cluster are fastened together via press fitting & staking. The gear on the D<sub>2</sub> cluster is a slip fit on the mounting diameter of the D<sub>2</sub> pinion and axially retained on the mounting diameter by the torsion spring. Input pinion E and output gear A are common to both halves of the train.

In assembling the gearhead to a servomotor or to the input pinion of a speed reducer, the gear of cluster D<sub>1</sub> is restrained from rotation by inserting a wedge of a soft material (e.g., aluminum, nylon, etc.) thru the access

hole provided in the housing and into a tooth space. The gear of cluster D<sub>2</sub> is then rotated, in a direction which winds the torsion spring the desired number of teeth and restrained from rotating, using a second wedge thru the second access hole. Since all speed reducer input pinions and motor pinions have an odd number of teeth, it is easier to install the motor pinion or input pinion, if the D<sub>1</sub> & D<sub>2</sub> gears are held by the wedges in a position where a tooth space on one of the gears is opposite a tooth on the other gear. Once the pinion is meshed with the D<sub>1</sub> & D<sub>2</sub> gears and the pilot diameter of the motor or speed reducer input is seated within the gearhead shell, the wedges are released, completing the zero-backlash path.

- I
- R
- T
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

**STERLING INSTRUMENT** gearheads and speed reducers are made to the highest exacting standards of craftsmanship. The gearheads are attachable to the U.S. Bureau of Ordnance (Bu-Ord for short) frame size servomotors without modifications to the input pinions and without complicated adapters, screw threads, etc. by the versatile mounting clamps supplied. Mounting dimensions are identical to Bu-Ord OP 1755 motor dimensions.



**INCH COMPONENT**

Catalog Series	O.D. in.	Input Pinion		Description		Max. Weight oz.
		D.P.	Teeth	Backlash	Shaft Orientation	
<b>Gearhead Selection Guide</b>						
S9105A-T608	.50	120	13	LOW	IN-LINE OUTPUT	.5
S9108A-T612	.75					.95
S9111A-T617	1.0625			ZERO		1.5
S9111A-T619				2.5		
S9115A-T623	1.4375	96	15	LOW	4.0	
S9118A-T628	1.75					

Catalog Series	O.D. in.	Description			Max. Weight oz.
		Backlash	Shaft Termination	Shaft Orientation	
<b>Speed Reducer Selection Guide</b>					
S9105A-T6008	.50	LOW	DOUBLE-ENDED	IN-LINE OUTPUT	1.2
S9111A-T6017	1.0625				ZERO
S9111A-T6019		4.0			
S9115A-T6023	1.4375	LOW			5.5
S9118A-T6028	1.75				

Catalog Series	Design Style	Integrated Position Error
<b>Transducer Gearhead Selection Guide</b>		
S9111A-T640	Standard	40 arc minutes maximum
S9111A-T641	Anti-Backlash	30 arc minutes maximum
S9111A-T642	Zero-Backlash	15 arc minutes maximum

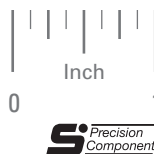


ANTI-BACKLASH T641 SERIES  
1.0625" OUTSIDE DIAMETER  
U.S. PAT. #2,892,357

PHONE: 516.328.3300 • FAX: 516.326.8827 • WWW.SDP-SI.COM

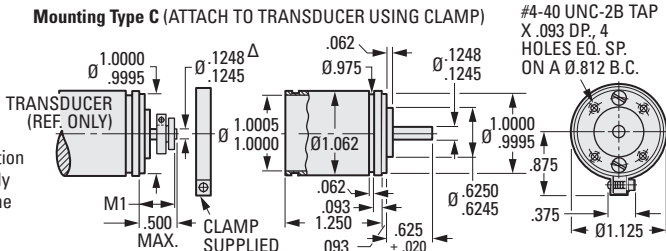
► SPECIFICATIONS:

- Maximum Operating Torque: 20 ozf in.
- Maximum Anti-Backlash Torque: 2 ozf in.
- Maximum Backlash: 10 arc minutes
- Maximum Total Transmission Error: 20 arc minutes
- Breakaway Torque: .07 ozf in.
- Integrated Position Error: 30 arc minutes
- Lubrication: Oil per MIL-L-6085
- Maximum Shaft End Play With 1 lbf Gage Load: .001 in.
- Maximum Shaft Radial Play With 4 ozf Gage Load: .001 in./in.

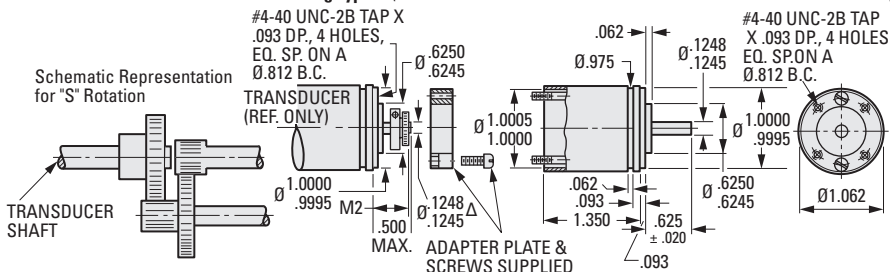


This **S** series is for use in applications that can tolerate a limited amount of backlash. This series finds wide usage in positioning servos in robotic systems. It is also used in position data transmitting loops and only slightly more expensive than the Standard Backlash series.

Mounting Type C (ATTACH TO TRANSDUCER USING CLAMP)



Mounting Type A (ATTACH TO TRANSDUCER USING ADAPTER PLATE AND SCREWS)



INCH COMPONENT		INCH COMPONENT		Rotation**	Output Gear 120 D.P.* No. of Teeth	Ratio To 1		
Catalog Number Mounting Type C	Type C Mounting Dist. M1	Catalog Number Mounting Type A	Type A Mounting Dist. M2					
S9111A-T641C02S	.540 Max.	S9111A-T641A02S	.640 Max.	S	33	2		
S9111A-T641C03S		S9111A-T641A03S			39	3		
S9111A-T641C04S		S9111A-T641A04S			44	4		
S9111A-T641C06S		S9111A-T641A06S			48	6		
S9111A-T641C08S		S9111A-T641A08S			52	8		
S9111A-T641C09S		S9111A-T641A09S			48	9		
S9111A-T641C10S		S9111A-T641A10S			50	10		
S9111A-T641C12S		S9111A-T641A12S			52	12		
S9111A-T641C12R		S9111A-T641A12R			.510 Max.	R	50	12
S9111A-T641C15R		S9111A-T641A15R					48	15
S9111A-T641C16R	S9111A-T641A16R	50	16					
S9111A-T641C20R	S9111A-T641A20R	50	20					
S9111A-T641C24R	S9111A-T641A24R	52	24					
S9111A-T641C30R	S9111A-T641A30R	50	30					
S9111A-T641C32R	S9111A-T641A32R	50	32					
S9111A-T641C36R	S9111A-T641A36R	52	36					

\* Supplied with gear clamp.  
 \*\* "S" indicates output rotates in the same direction as input; "R" denotes reverse rotation.  
 Δ For transducer shaft Ø.1200/.1195 add "Z" to the end of the part number. Example: S9111A-T642C30R2.  
 Other ratios and sizes available on special order.

I  
R  
T  
1  
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3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16