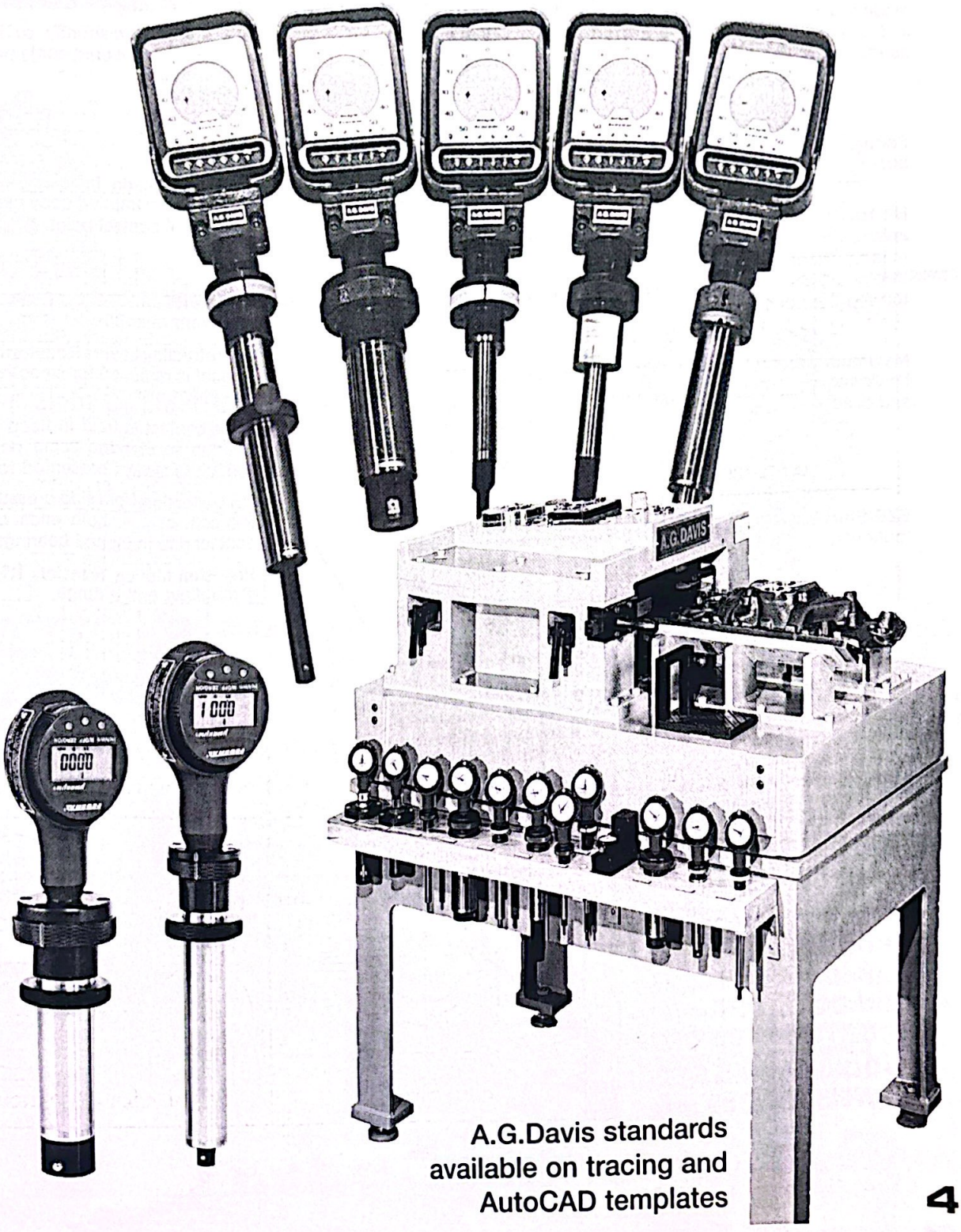
Indicator Sweep Gages

A.G. DAVIS
"Tooled for the 21st Century"

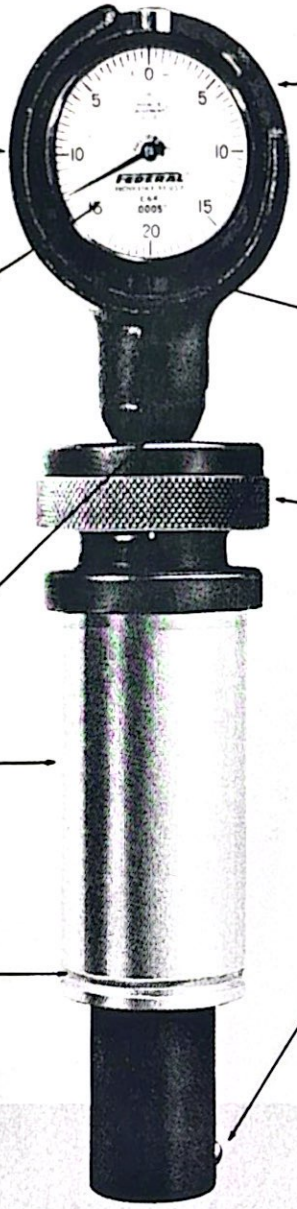
AA GAGE



A.G.Davis standards available on tracing and AutoCAD templates

DAVIS CHR-CUSTOM SWEEP GAGES

No other unit offers these features:



Interchangeable Indicator Housings for maximum economy. Loosen two screws to remove housing for **reuse** on CHR-Custom or CHR-10/20 economy series gages.

Maximum Indicator Protection with minimum size and weight. Five models allow selection of the size and type unit best suited to your needs.

Permanently lubricated and sealed bearing in rotating mechanism.

No Hidden Error in Rotating Mechanism. Preloaded dial indicator permits operator to check for wear in the rotating mechanism by merely turning the housing.

Maximum Wear Life; pilot tube is hardened steel, hard chrome plated and precision lapped.

EZE-Entry Lead for effortless loading (optional).

Dial / Electronic Indicator housing remains in one position, FACING THS OPERATOR, as the body is rotated.

Dirt Guard permanently seals unit against solid and fluid contaminates.

Contact Position Indicator; ground vee-notch on knurled body indicates position of contact point.

Tungsten Carbide Gage Contacts for maximum wear life.

No Retracting Levers Required; gage contact is radiused for smooth entry into piece part.

Gage contact is held in fixed radial position so that the same point of contact is always presented to part.

No Deflection from side pressure on the contact . . . both ends of the contact ride in lapped bearings.

Precision Motion Transfer, 1:1 ratio throughout entire range.

4 INTERCHANGEABLE INDICATOR HOUSINGS-*for maximum versatility*

- **PICK THE SIZE AND TYPE HOUSING BEST SUITED TO YOUR NEEDS**
- **HOUSINGS CAN BE USED *AND REUSED* ON BOTH CHR-CUSTOM AND CHR-10/20 SERIES STOCK SWEEP GAGES**

Model CHR-1
accommodates A.G.D. Group I. Dial Indicators
Bezel Diameter: 1-11/16"

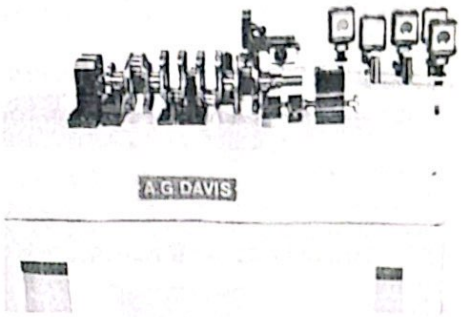
Model CHR-2
accommodates A.G.D. Group II. Dial Indicators
Bezel Diameter: 2-1/4"

Model CHR-FH
accommodates Federal 90° perpendicular type Dial Indicator
Bezel Diameter: 2-1/4"

FIXTURE APPLICATIONS OF DAVIS SWEEP GAGES

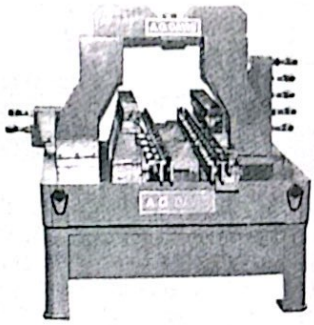
Crankshaft Gage

A.G. Davis crankshaft gage checks size, ovality and taper of main journal. Runout of intermediate journals.



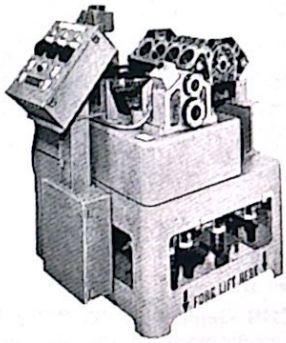
Six Cylinder Engine Block

Davis Sweep Gages check all bores and bearing faces in six cylinder engine block. Piece part is hydraulically clamped in A. G. Davis built fixture to simulate machining conditions.



Eight Cylinder Engine Block

A.G. Davis Sweep Gages check all bores and bearing surfaces.



and economy

Model CHR-M

accommodates Federal "A" size miniature Dial Indicator

Bezel Diameter: 1-7/32"

CHR-Custom Miniature Gages recommended for use when space or weight considerations preclude use of CHR-1 or 2.

UNMATCHED FOR RELIABILITY AND ACCURACY

Feature-for-feature, the Davis CHR-Custom Sweep Gage is unmatched by any other concentricity and hole relation gage available today. These rugged, production gages are built directly to individual customer specifications and are so accurate that air probes or electronic heads can be substituted for the indicator when additional amplification is required.

This catalog includes typical applications and contact point variations that are available. Space does not permit a complete listing of the capabilities of this versatile unit. If your particular application is not shown, please contact A. G. Davis for assistance.

WIDE RANGE OF APPLICATIONS

Through the use of four standardized contact point configurations, it is possible to accommodate specific part sizes as small as .04" or as large as 7.000" (see page 7). A wide range of additional contact point configurations, often used in combination on a single gage, offer even greater latitude to the design engineer (see page 4 & 5).

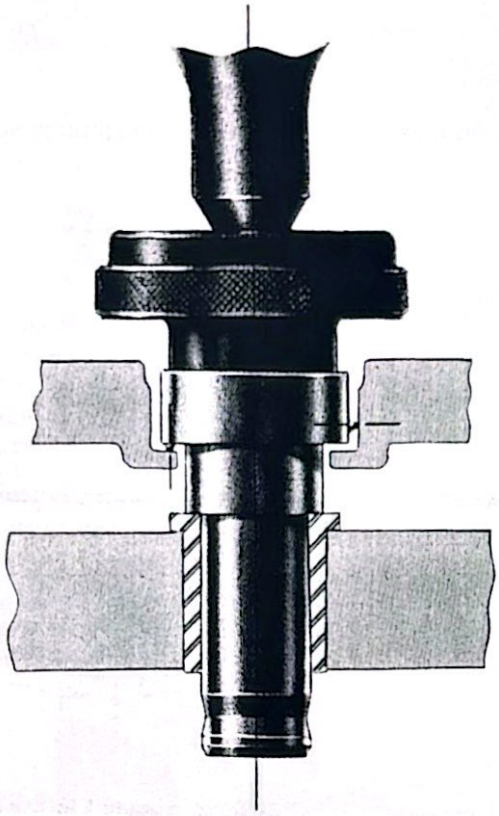
GAGING FIXTURE DESIGN

A. G. Davis also offers a complete design and build service for gaging fixtures. Our design engineering group offers the experience and capability necessary to produce a gaging fixture that is completely integrated with your particular production process. Substantial time and cost savings are realized with this added service. See back cover for additional details.

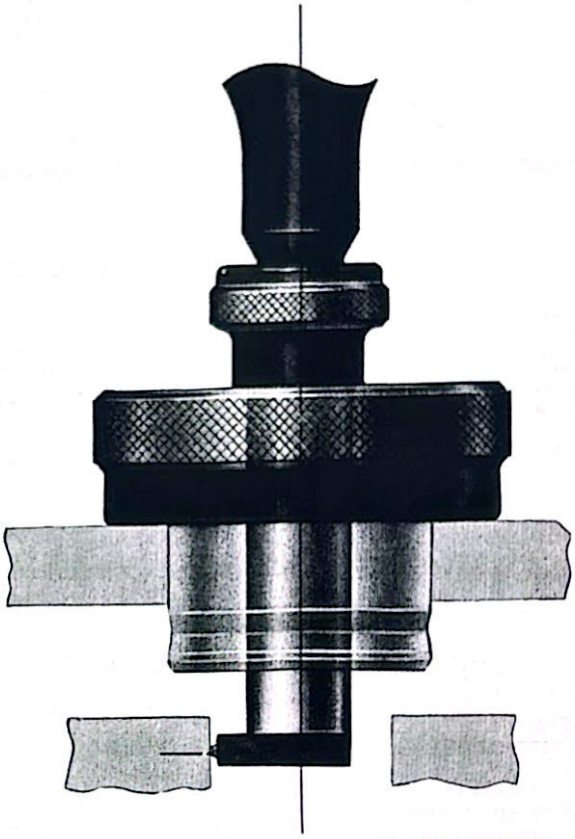
CHR CUSTOM SERIES

Typical Design Variations and Applications

(Examples shown are not to exact scale.)

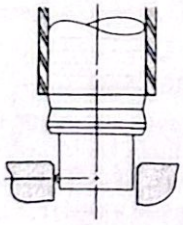


CHR Gage with EZE-Entry Lead and two contact points utlizing a single indicator.
With spacer between head of bushing & Sweep Unit, bore is gaged for location. With spacer removed, face is gaged for squareness.

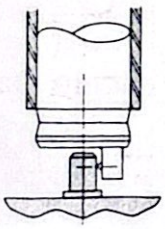


CHR Gage mounted in Davis Hydra-Grip expanding mechanical or ball type arbor.
Utilized to locate in one bore and check relationship to second bore.
For Davis Hydra Grip information see Davis catalog.

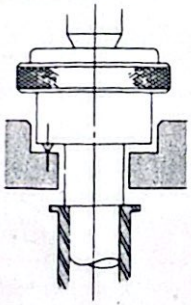
Typical Contact Point Variations



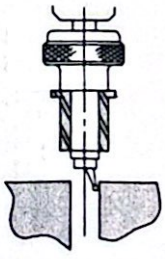
Top piloting unit to check hole location.



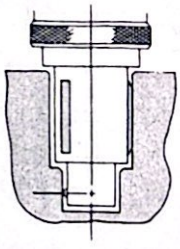
Sweep unit checks pin dowel for location.



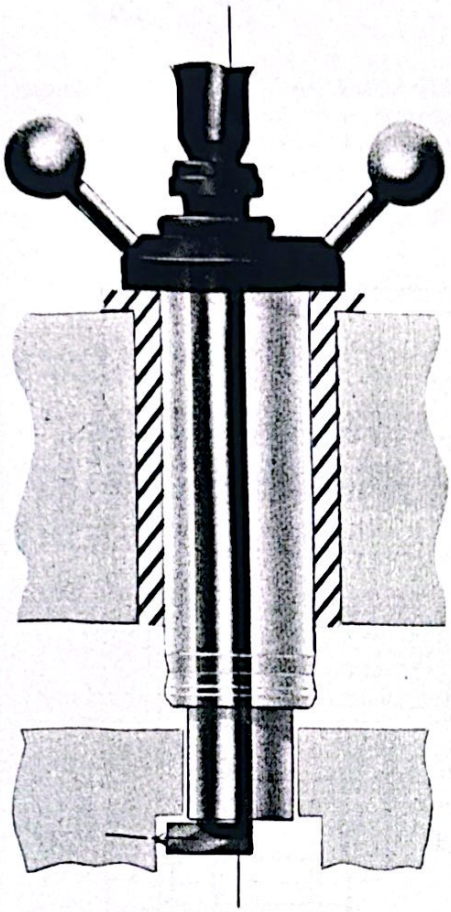
Bottom piloting unit checks squareness of bore face.



Top piloting unit checks hole location of bores less than .188.



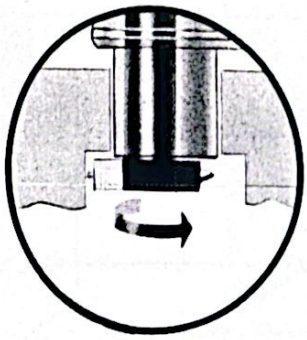
Utilizing inside "vee" spring locators to check concentricity of one bore in relation to second bore.

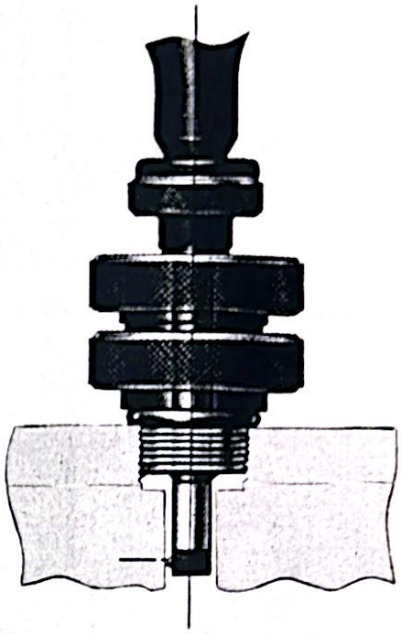


CHR Gage utilizing eccentrically mounted sweep unit.

Checks hole location of larger bore after entering through smaller bore.

Eccentrically located sweep unit rotates 180° to clear smaller bore for entry and exit.

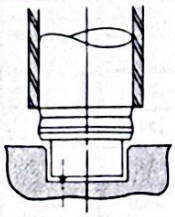




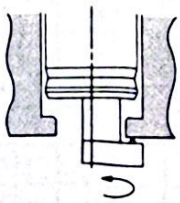
CHR Gage mountad in Davis Con-Ax thread locator.

Con-Ax unit establishes functional thread axis and sweep gage checks bore relationship to thread axis.

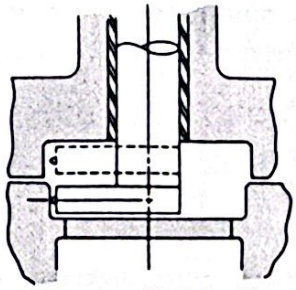
For Con-Ax information see page 52.



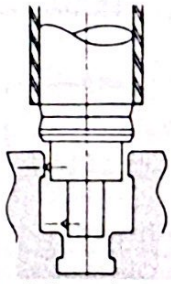
Top piloting unit stops on bushing and checks squareness of bore face.



Eccentrically located contact enters through small bore to check face of larger bore with reverse contact. (See eccentric unit above.)

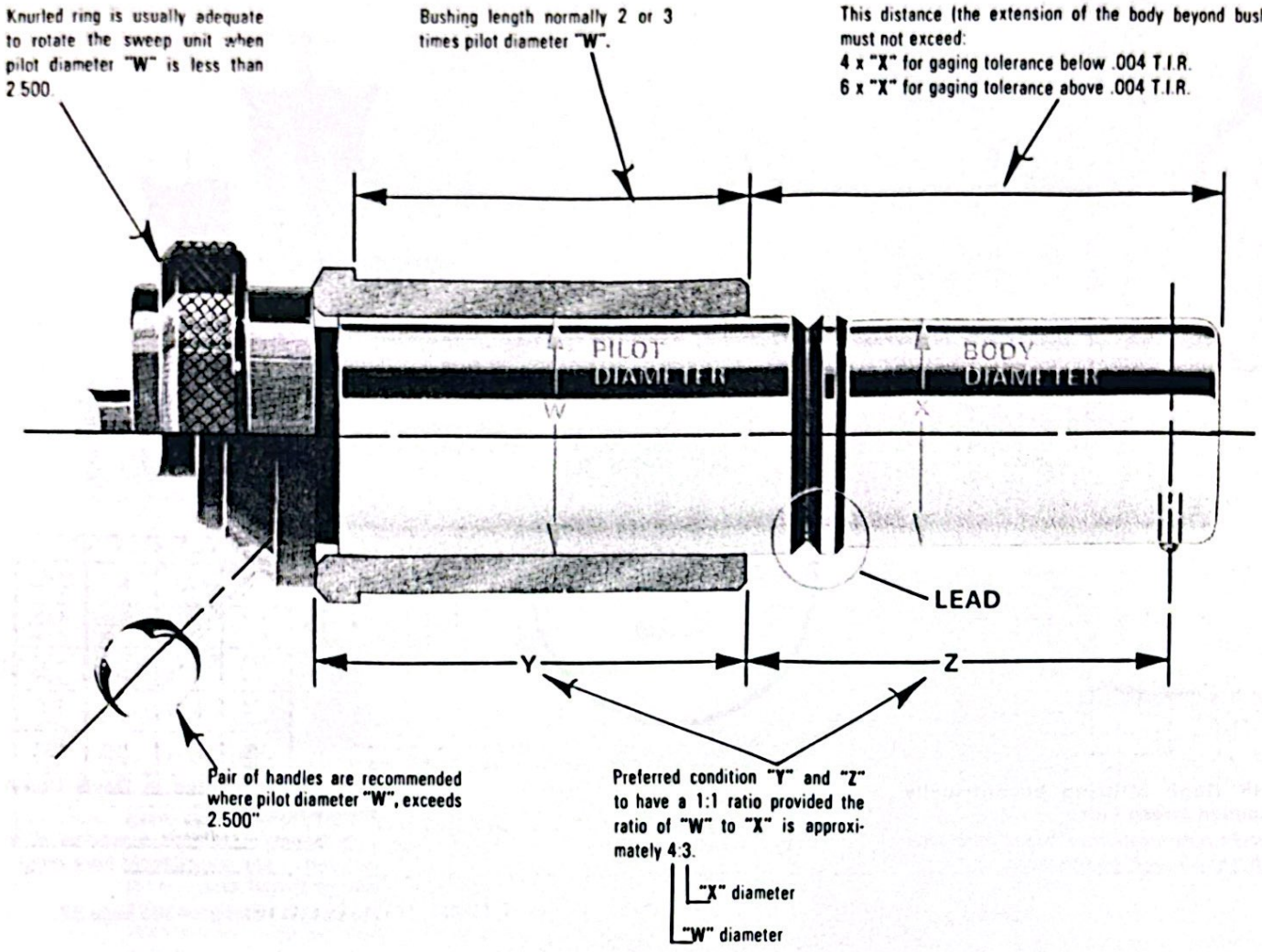


Economy Model with removable head is used to check bores over 1.500 at considerable cost savings because a smaller pilot diameter is utilized.



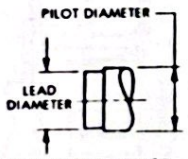
Top piloting unit checks location of two bores, utilizing one indicator. With spacer between head of bushing and gage, top bore is checked. With spacer removed, unit checks bottom bore.

CHR CUSTOM SERIES
OPTIMUM DESIGN SPECIFICATIONS



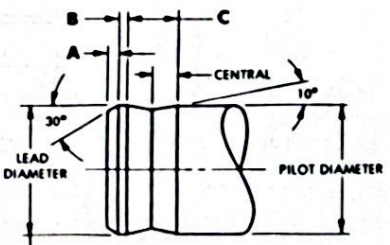
LEAD OPTIONS

ECONOMY LEAD



LEAD DIAMETER = PILOT DIAMETER MINUS .001 WITH MINUS .001 TOLERANCE FOR PILOT DIAMETERS LESS THAN .750

EZE ENTRY LEADS



LEAD DIAMETER = PILOT DIAMETER MINUS **D** WITH MINUS .0005 TOLERANCE FOR PILOT DIAMETERS .750 AND ABOVE

PILOT DIAMETER		A	B	C	D
ABOVE	TO & INCL.				
.750	1.250	.02	.020	.200	.0005
1.250	2.000	.04	.040	.240	.0008
2.000	2.750	.06	.060	.280	.001
2.750	3.500	.08	.080	.360	.001
3.500	4.250	.08	.080	.440	.001
4.250	5.000	.08	.080	.540	.001
5.000	& UP	.08	.080	.660	.001

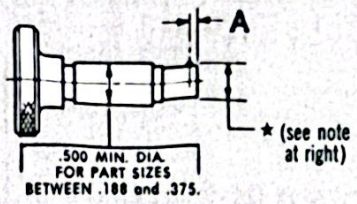
DESIGN PROCEDURE

The following points should be considered when selecting the proper Sweep Gage configuration for your application. These points are considered to be optimum guidelines. Should deviations from these specifications be required, please consult the A. G. Davis Engineering Department.

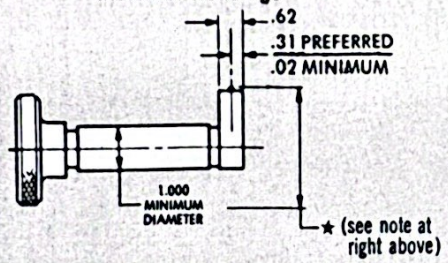
1. Check part configuration to determine style of sweep gage and gage contact range requirement.
2. Size of rotating section (knurl or handles) should be as large or larger than part diameter being gaged (see Davis Templates No. 23B-C-D & E for selection).
3. Indicator selection:
   .0001 graduation when T.I.R. is between .000/.004.
   .0005 graduation when T.I.R. is between .004/.008.
   .001 graduation when T.I.R. is over .008.
4. Review sweep design to be within range chart below and optimum design rations as outlined on opposite page. If deviations are required please consult the A. G. Davis Staff.

Style Options

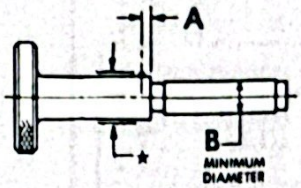
STYLE I
TOP PILOTING MODEL
May be used with all CHR Series indicator housings



STYLE II
REMOVABLE GAGE CONTACT ECONOMY MODEL FOR BORES 1.500 AND UP
Not recommended for use with CHR-M indicator housings



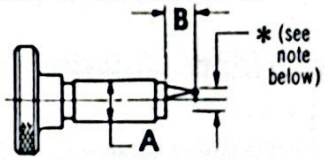
STYLE III
BOTTOM PILOTING MODEL
May be used with all CHR Series indicator housings



★ **IMPORTANT: Manufacturer must have minimum and maximum part size and total indicator reading required for feature being gaged.**

Example: $\frac{1.000}{1.001}$ **Part Size .004 T.I.R.**

STYLE IV
FOR HOLES LESS THAN .188
(Recommended for use with CHR-M housings)



* **IMPORTANT: Manufacturer must have minimum and maximum part size and total indicator reading required for feature being gaged.**

Example: $\frac{.188}{.186}$ **Part Size .004 T.I.R.**

STYLE IV ONLY

PART SIZE	A	B	GAGING RANGE
.080 / .150	.4375	.100 / .150	.010 / .015
.080 / .200	.5000	.100 / .200	.010 / .020
.080 / .200	.5625	.100 / .250	.010 / .025
.080 / .250	.6250	.100 / .350	.010 / .025

Dimension listed here is the TOTAL gaging range on diameter INCLUDING part size and tolerance.

Range Chart & Contact Point Location Guide
FOR STYLES I, II, & III ONLY

When part size is within this range the "A" contact point location and "B" diameter apply. If part size does not fall within this range, consult A. G. Davis Engineering staff for assistance.

PART SIZE	A	GAGING RANGE	B
.188 / .203	.123	.020	–
.203 / .218	.123	.020	–
.218 / .233	.123	.036	–
.233 / .248	.150	.036	–
.248 / .263	.150	.056	–
.263 / .278	.150	.056	–
.278 / .293	.150	.056	–
.293 / .306	.150	.064	–
.308 / .450	.150	.064	–

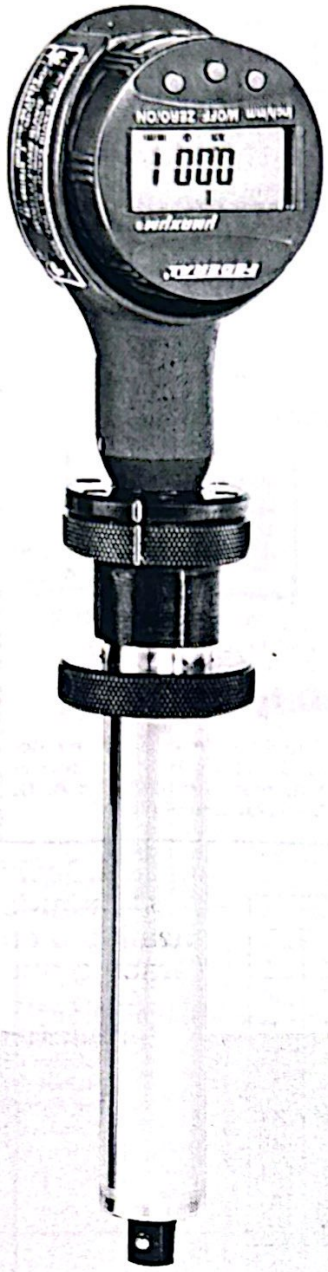
The B dimensions shown on this chart apply only to Style III. The other three conditions: Part Size, A, and Gaging Range – apply to Styles I, II, and III.

PART SIZE	A	GAGING RANGE	B
.450 / .659	.185	.125	.437
.568 / .960	.200	.125	.468
.670 / 1.250	.216	.125	.500
.800 / 1.600	.232	.125	.530
.926 / 1.700	.248	.125	.560
1.000 / 4.125	.187	.125	.406
1.000 / 5.000	.218	.125	.437
1.000 / 5.600	.220	.125	.500
1.000 / 7.000	.264	.125	.560

Dimension listed here is the TOTAL gaging range on diameter INCLUDING part size and tolerance. Additional range greater than .125 can be obtained on bores .500 and up. Please consult A. G. Davis Engineering staff.

Davis... CHR-20 Series—

Custom features in an Economical Stock Unit.



Maximum Compactness and Minimum Weight permits CHR-20 series to be used in "tight" applications with complete protection for the dial indicator.

Interchangeable Indicator Housings Mean Greater Economy. Loosen two screws and remove indicator housing for **reuse** on any CHR - 20 economy series Sweep gage.

Dirt Guard permanently seals unit against solid and fluid contaminates.

Contact Position Indicator; ground vee-notch on knurled body indicates position of contact point.

Tungsten Carbide Gage Contacts for maximum wear life.

No Retracting Levers Required; gage contact is radiused for smooth entry into piece part.

Gage contact is held in fixed radial position so that the same point of contact is always presented to part.

No Deflection from pressure on the contact . . . both ends of the contact ride in lapped bearings.

Precision Motion Transfer. 1:1 ratio throughout entire range.

SERIES CHR-20

Series CHR-20 accommodates any Dial / Electronic Indicator.

Indicator housing is fixed to body and rotates with it.

Dial indicator housing remains in one position, FACING THE OPERATOR, as the body is rotated.

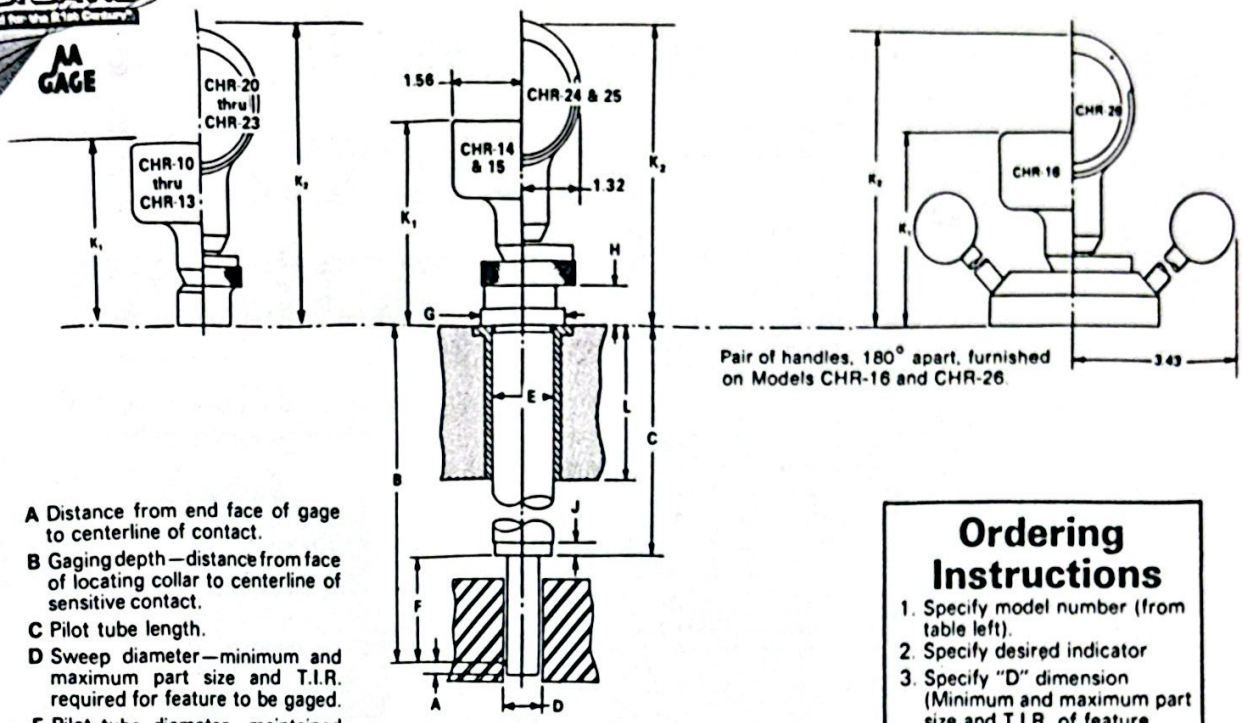
Permanently lubricated and sealed bearing in rotating mechanism.

No Hidden Error in Rotating Mechanism. Preloaded dial indicator permits operator to check for wear in the rotating mechanism by merely turning the housing.

Maximum Wear Life; pilot tube is hardened steel, hard chrome plated and precision lapped.

The CHR 20 Economy Series offers many of the design and construction features found in the CHR Custom Series. These economical gages are available from stock—nine models, in each of the two styles, covering any single specified sweep diameter from .234" to 3.25". Design options (available at additional cost)make this unit one of the most versatile stock gages available today. Many applications, that previously required a custom gage may now be filled with this rugged unit with considerable cost savings and rapid delivery.

DESIGN SPECIFICATIONS



A Distance from end face of gage to centerline of contact.

B Gaging depth—distance from face of locating collar to centerline of sensitive contact.

C Pilot tube length.

D Sweep diameter—minimum and maximum part size and T.I.R. required for feature to be gaged.

E Pilot tube diameter—maintained at a +.0002, −.0000; Oversize allowance permits bushing to be lapped to proper fit.

F Distance from end face of pilot tube to centerline of sensitive contact.

G Diameter of locating collar.

H Clearance from face of locating collar to knurled flange or handle.

J Pilot tube lead—.001 step, .24 long on all stock models.

K Distance from face of locating collar to top of indicator housing; Add to "A" and "B" for overall length of gage.

L **MINIMUM** recommended bushing length is normally 2 or 3 times diameter "E", or 1/2 length "B", whichever is larger.

Ordering Instructions

1. Specify model number (from table left).
2. Specify desired indicator
3. Specify "D" dimension (Minimum and maximum part size and T.I.R. of feature being gaged.

Example:
1.500 p/p Dia., .004 T.I.R.
1.501

4. Specify required design options as shown below.

Should your require any deviations from the table shown at left, please consult the A. G. Davis Engineering Staff.

A.G.Davis standards available on tracing and AutoCAD templates

MODEL	CAPACITY (inches)	Range of Sensitive Contact†	DIMENSIONS (INCHES)										
			A	B	C	D	E	F	G	H	J	K_2	K_1
CHR-20	.234- .300	.013	.150	4.38	3.50	SPECIFY	.5006	.88	.88	.75	.24	5.56	3.43
CHR-21	.280- .500	.025	.160	4.54	3.50		.5006	1.04	.88	.75	.24	5.56	3.43
CHR-22	.470- .680	.040	.180	5.88	4.50		.8757	1.38	1.18	.75	.24	5.56	3.43
CHR-23	.640- .875	.050	.200	6.38	4.50		.8757	1.88	1.18	.75	.24	5.56	3.43
CHR-23A	.640-1.000	.062	.360	6.96	5.00		1.0000	1.96	1.38	.75	.24	5.56	3.43
CHR-23B	.840-1.250	.062	.360	7.54	5.50		1.2500	2.04	1.68	.75	.24	5.56	3.43
CHR-24	.800-1.500	.062	.240	8.10	6.00		1.5008	2.10	1.88	.75	.24	5.81	3.93
CHR-25	1.440-2.250	.062	.240	10.50	7.00		2.2508	3.50	2.62	.75	.24	5.81	3.93
CHR-26	2.180-3.250	.062	.260	15.00	9.00		3.2508	6.00	3.62	1.00	.24	5.84	3.96

†Greater ranges of sensitive contact available on application

In these models the dial indicator and indicator housing remain stationary facing the operator, as the "Sweep" gage is rotated.

Design Options

1. Custom series interchangeable indicator housings, CHR-1, CHR-2, and CHR-FH (shown on Page 2), can be substituted for the CHR-20 series indicator housing at no additional cost.
2. EZE entry leads, (see Page 6) available on models CHR-12 through CHR-16 and CHR-22 through CHR-26, at additional cost.
3. Adjustable stop collars on the pilot tube are available at additional cost ("E" dimension above), making it possible to vary gaging depth dimension, "B" above.
4. For checking diameters below .234 or above 3.250, refer to CHR-Custom series.
5. Chrome plate on pilot diameter "E", for maximum wear life, is automatic on CHR-20 series. Optionally available, at additional cost, on CHR-10 series.