

## HANDLING AND REPLACEMENT TIPS—5BGP\_ & 5BHP\_ SPIRAL ACCELERATOR CRT'S

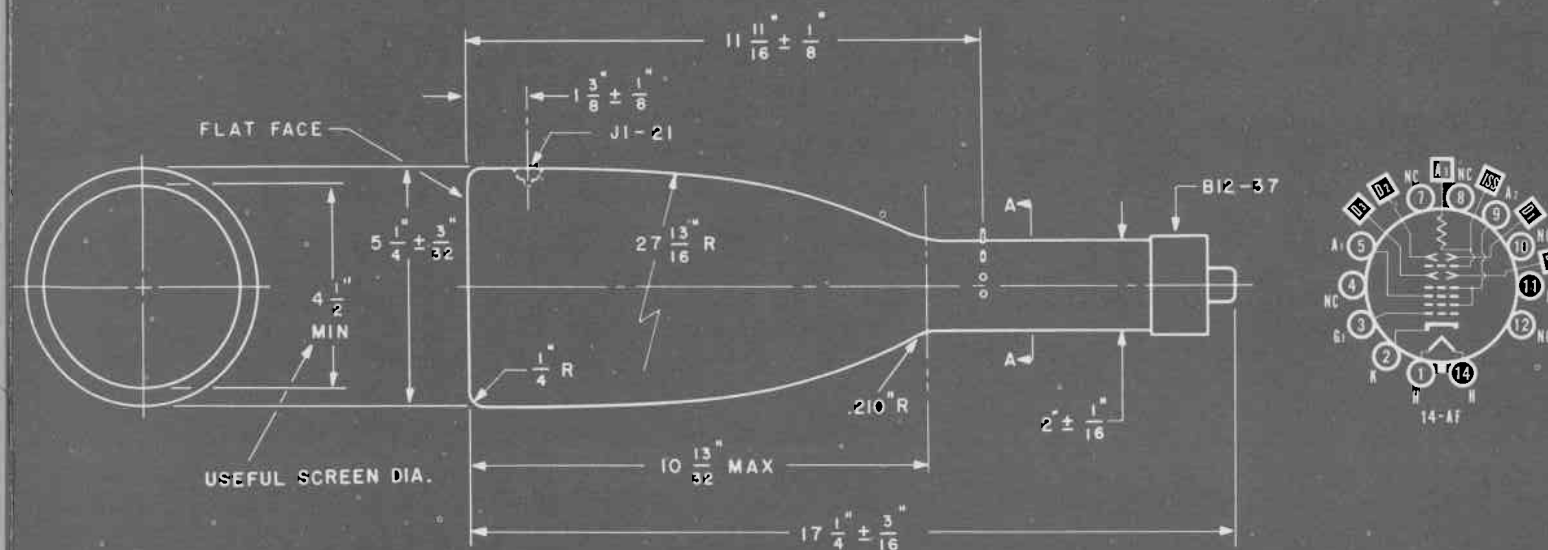
Spiral Accelerator cathode ray tubes are highly precise, carefully made indicators, capable of providing very accurate measurements when properly installed in oscilloscopes designed for their use. When installing a replacement tube, attention to the following installation suggestions and hints will assure you of continuing performance equal to the initial capability of your instrument.

1. Handle with care! Avoid sharp blows or scratches to the glass envelope or tube face.
2. Avoid undue pressures on the leads brought out through the neck of the tube. Attempts to bend them or forcing on of a faulty connector may break the glass-to-metal seal around these connectors, causing loss of vacuum.
3. Disconnect the power supply to the scope prior to dismantling or remounting one of the Spiral Accelerator CRT's.
4. When installing the tube, align the neck pins under the opening provided in the shield, make all connections, but clamp the tube only lightly so that it can be rotated to align its trace with the marking on the graticule.
5. Once the tube is aligned, exercise care in tightening the clamp so that excessive tightening will not crack the base.
6. Corrections in astigmatism and/or geometry may be required and should be made in accordance with the instructions of the oscilloscope manufacturer.
7. To retain optimum visual performance, be sure the tube face is cleaned before re-installing graticule and bezel assembly.
8. Following installation, the graticule may require minor adjustment to conform with the scan area of the tube. Some oscilloscopes have an adjustable graticule for this purpose.

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# SYLVANIA SPIRAL ACCELERATOR TUBES

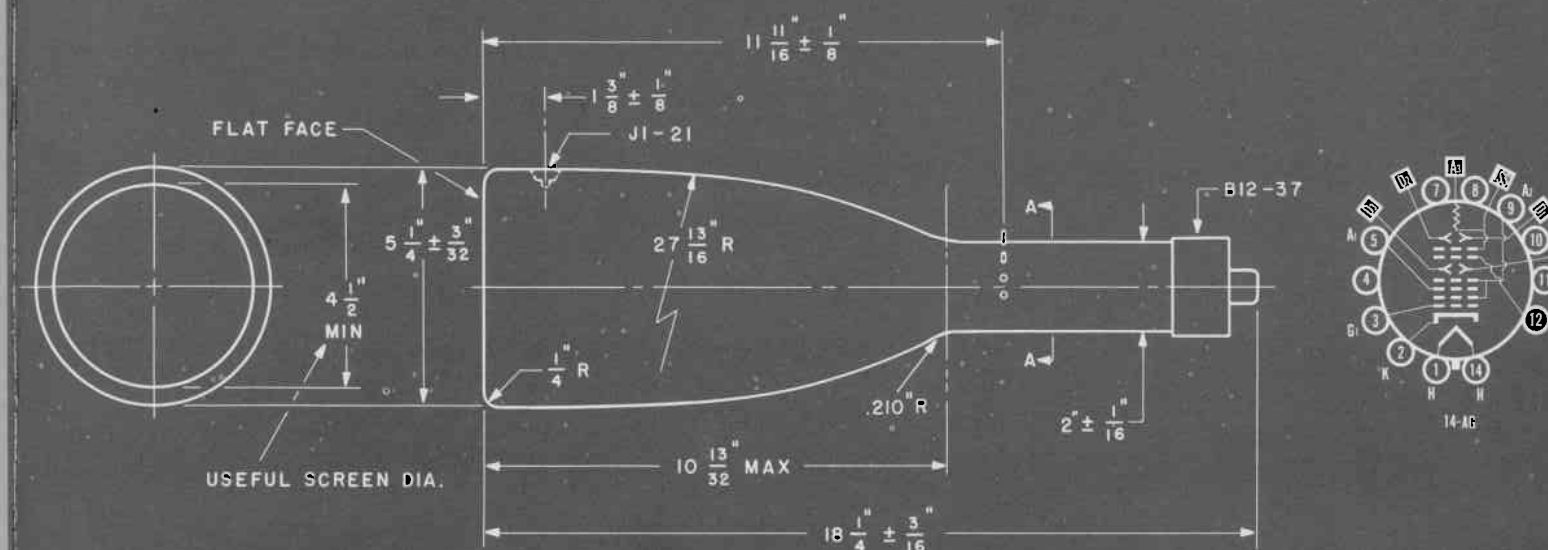


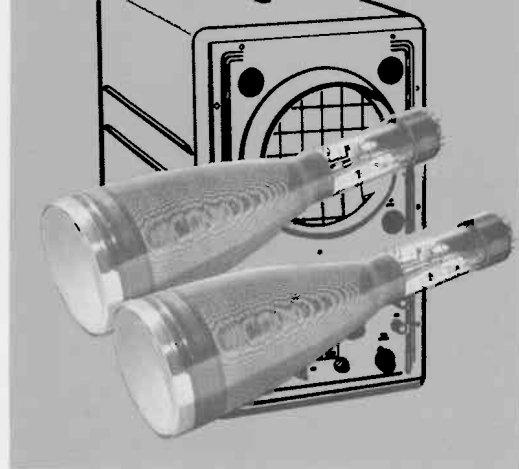
—the optimum in deflection sensitivity,  
linearity, resolution, and brightness.

# 5BGP

■ Replacements in the highest quality precision oscillographic equipment. ■ Equipment now being used by commercial laboratories ■ electronic equipment manufacturers ■ educational institutions ■ government laboratories ■ systems manufacturers.

# 5BHP





## SYLVANIA SPIRAL ACCELERATOR CATHODE RAY TUBES

The Sylvania Spiral Accelerator tubes available are round glass types with a 5" direct viewed flat face plate. Providing the optimum in cathode ray tube performance, they have electrostatic deflection and focus, and give high deflection sensitivity and accuracy. They provide extremely precise displays on their aluminized screens, and offer a wide range of phosphors, some extremely bright. Sylvania Spiral Accelerator tubes are designed to perform exceptionally throughout an unusually long life.

### OPERATION

The Sylvania Spiral Accelerator tube is a helical anode post accelerator cathode ray tube. The post-deflection beam accelerating field is distributed along the length of the tube by a conducting helix on the inner bulb wall. This helical resistance coating allows the accelerating voltage to be uniformly increased along the length of the bulb, between the deflection plates and the screen. The result is a higher ratio of final anode voltage to second anode voltage without excessive pattern distortion. Thus, displays are brighter, clearer, with greater resolution.

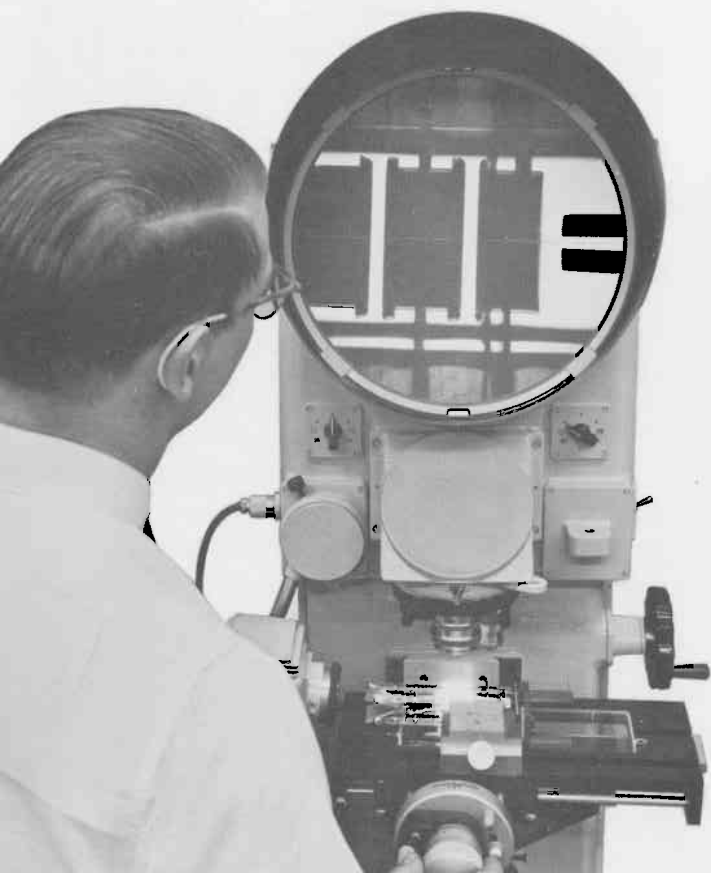
### PHOSPHORS AND SCREENS

Sylvania produces high quality fluorescent powders and phosphors and uses their own carefully controlled processes for applying screens to insure optimum performance and screen quality. Such carefully prepared screens play an important part in providing the superior performance of Sylvania's Spiral Accelerator CRT's. Types 5BGP2 and 5BHP2 are stock items, while P1, P5, P7, P11 and P15 screens are optional and are available on a made-to-order basis. Also, a new substantially brighter phosphor, P31, can be supplied to order. P31 is similar to P2, but is approximately 70% brighter under corresponding operating conditions.

### SYLVANIA SUPERIORITY THROUGH TESTING AND QUALITY CONTROL

Thorough testing and manufacturing techniques build in and then check Sylvania quality and operating superiority. The helical resistance coating is rigidly controlled for thickness, distribution, and ink purity to insure the exact, uniform increase of the accelerating voltage, so important to the final display. Guns used in Sylvania Spiral Accelerator tubes are assembled on mounting jigs developed by Sylvania that are accurate to .001". All guns are checked for accuracy of aperture alignment, and spacing between deflection plates. All spacings are held to very fine tolerances. Perpendicularity of horizontal and vertical scan lines must not exceed 1.0 degrees. A microscope is used to measure spot size to insure satisfactory resolution at all points of the useful scan. Each tube is fully inspected for emission, spot size, filament current, spot cutoff, focus, voltage, pattern distortion, brightness, alignment of traces, internal reflections and deflection sensitivity. Samples are life tested under maximum operating conditions and are tested periodically for optimum electrical performance.

*Every Spiral Accelerator gun is inspected on a high-magnification optical comparator for spacing and dimensions.*



## SPIRAL ACCELERATOR CRT REPLACEMENT GUIDE

TEKTRONIX OSCILLOSCOPE MODEL NUMBERS	CRT DESIGNATION	SYLVANIA TYPE NUMBER
531; 535; 513; RM31; RM35	T51P	5BGP2
541; 545; RM41; RM45	T54P	5BHP2
543; 541A; 545A; RM41A; RM45A; RM43	T65P T543P_	SC3116 (See Note 1)

**NOTE 1:** Type SC3116 is similar to the 5BHP2 but it is not a retrofit. SC3116 is available on a made-to-order basis. It will be supplied with the P2 phosphor unless an optional phosphor is specified.

**NOTE 2:** Models designated "RM" are rack mounted.

**NOTE 3:** 5BGP2 and 5BHP2 are stock items. P1, P5, P7, P11, P15 screens are optional . . . will be provided on a made-to-order basis.

**NOTE 4:** Tubes are available on a made-to-order basis with a new phosphor P31. This is similar to P2, but approximately 70% brighter under similar operating conditions.

**NOTE 5:** Sylvania Spiral Accelerator Tubes listed above are the types in widest usage.

## KEY CHARACTERISTICS AND OPERATING CONDITIONS

	5BGP__	5BHP__
Anode No. 3 Voltage	10,000 Volts dc	10,000 Volts dc
Isolation Shield Voltage	1575 to 1700 Volts dc	1575 to 1700 Volts dc
Anode No. 2 Voltage	1670 Volts dc	1670 Volts dc
Anode No. 1 Voltage For Focus	180 to 590 Volts dc	180 to 590 Volts dc
Grid No. 1 Voltage Required For Cutoff	-50 to -80 Volts dc	-50 to -80 Volts dc
Deflection Factor: Deflection Plates 1-2	70 to 86 Volts dc/inch	70 to 85 Volts dc/inch
Deflection Plates 3-4	28.4 to 34.8 Volts dc/inch	15 to 18.3 Volts dc/inch
Pattern Distortion At 100% Useful Scan	1% Maximum	1.5% Maximum
Undelected Spot Position (Deviation From Center)	5MM Maximum	5MM Maximum
Useful Scan D1-D2	10 cm	10 cm
D3-D4	6 cm	4 cm
Angle Between Traces	90 ± 0.8°	90 ± 0.8°