

MD 6922 REFERENCE CRYOVALVE ELECTRON TUBES

AN OVERVIEW OF THE "CRYOVALVE" TREATMENT AND GRADING PROCEDURES

The series of operations through which an electronic tube must pass before it can be called an MD 6922 Reference Cryovalve is lengthy and in some ways, arduous.

As received, a typical electron tube exhibits several problems that deleteriously impact its sonic performance. Most serious are the many internal stresses in the construction materials that accumulate during most of the stages of manufacture, and a very hard, heavy oxide-coating on through-glass pins to which direct connections is made. In the case of the MD Reference 6922 Cryovalve tubes, all through-glass pins are cleaned back to base metal and polished; the result is contact quality being much improved. The degree of sonic improvement is substantial.

The next stage involves an initial 100hr. burn-in, which allows the tubes' characteristics to stabilize while providing an opportunity to cull any 'infant mortals'. During cryogenic tempering, the tube is slowly cooled to the -196°C/-350°F temperature of liquid nitrogen, 'soaked' for many hours, then slowly returned to ambient. By means of this unique and vital process, the stresses interior to the materials of the tube are substantially and permanently relaxed. During a subsequent anneal, the tube is heated to 175°C/350°F then slowly cooled to ambient. Although not as extensive, the results are similar to those achieved by the cryogenic treatment.

The 'Q' of the (self) resonant (electro)mechanical systems responsible for the output of (electro)microphonic spurious is thereby drastically reduced. By this important reduction, both the peak amplitude and the 'ring down' time of these systems are reduced with the result that the 'dynamic noise floor' is lowered and, consequently, the 'apparent gain' of the device is increased - even in feedback controlled circuits.

Grading for noise and microphonic performance involved both listening and instrument evaluation. Various instrumentation provides data on the noise, microphonic levels and spectral content while the overall 'sound' of the spurious is critically evaluated. In particular, the evaluation of microphonic output is very much an experienced-judgement call.

Dual triodes are rated for overall noise performance by the noise-output level of the noisier triode or section. Thereby, it's possible for a tube given a SILVER rating to contain an Ultra Low-Noise section. ULN and BLACK rated tubes always contain two ULN sections, hence the higher cost.

The last few steps in our process are the standard yet essential procedures for the evaluation of many important electrical characteristics such as amplification factor, μ , plate current, I_b and transconductance, g_m . Additional data is generated indicative of the μ and DC balance of the tube's sections.

Put simply, the MD 6922 Reference Cryovalve Tube is the tube of choice for virtually all high performance audio applications, and our assertion that your Magnum Dynalab product includes only the finest materials.



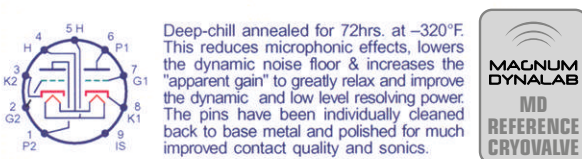
6922/ECC88
BUILD DATE: 2006
TEST DATE: 04/06
SERIAL NO. 2712

NOISE GRADE					GAINS & MATCH	
0dB relative to an equivalent input noise of 2.0µV. Weight: -3dB @ 10Hz & 30kHz	-12	-9	-6	-3	0dB	+8
	GOLD GR +PLUS=	GOLD GRADE	ULTRA LOW	LOW NOISE	STD. GRADE	
Section 1: Pins 6, 7 & 8	-9.7					
Section 2: Pins 1, 2 & 3		-8.3				

0dB is relative to the bogie** value of the amp. fctr. expressed below as Gain in dB	Amp Fctr Match ± X.X dB
-27	±.26
+26	

Noise Grade & Microphonic Test Conditions: B+ = 241V; R_L = 10k Ω ; R_K = 80 Ω ; C_{bypass} = 470 µF; E_b = 90V

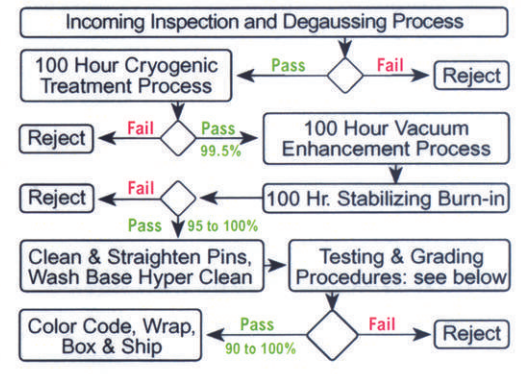
Microphonic Test		Plate Current (I_b): mA	Transconductance (g_m): milli Siemens	Sec. 1-Sec. 2 Match: DYNATRAN Operation	
Output Level	Ring Down			I_b - mA	g_m - mS
Low	High	15.7	13.0	± X.X %	± X.X %
Fast	Slow	15.2	13.35		
← Better				±1.6	±1.3



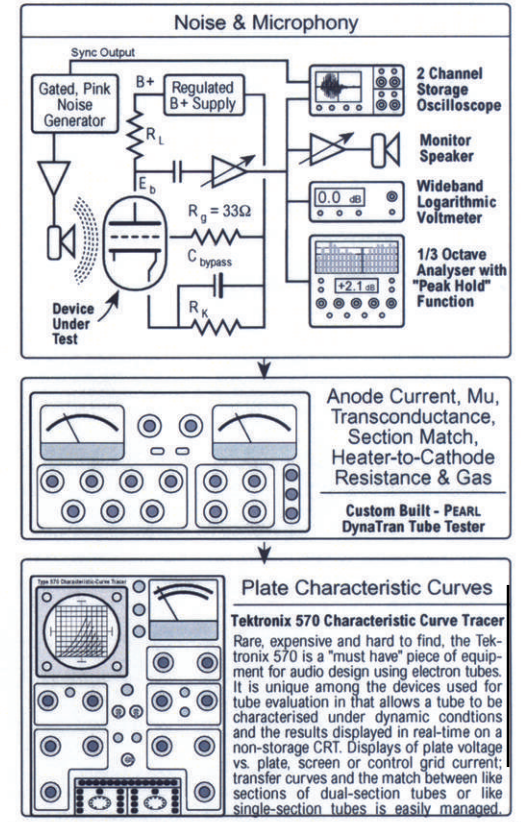
RETMA Basing: 9AJ

Fig. 1. Shown above is an artwork typical of those applied to the sides of the boxes in which all 7/9-pin CryValve tubes are packed. All test data is written in by hand as the tube is passed through the various stages of our procedure. Every tube is subjected to assessment by instrumentation and actual listening tests.

Miniature Tube Treatment Procedure



Testing & Grading Procedures



Magnum Dynalab Ltd.
Ontario, Canada
info@magnumdynalab.com
www.magnumdynalab.com

Fig. 2. The complete production flow for MD Reference CryoValve electron tubes is schematically rendered above. Unique in the audio industry, our methodology effectively addresses many issues relevant to the performance of electron tubes in high-quality audio and musical instrument applications. CryoValves will remarkably improve the sound of any tube-type audio equipment.