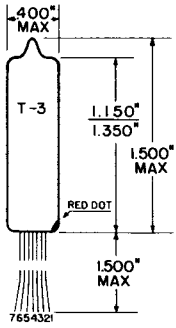
TUNG-SOL

PENTODE

SUBMINIATURE TYPE

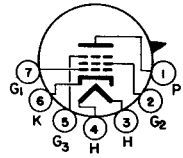


GLASS BULB

OUTLINE DRAWING
→ JEDEC 3-6

HEATER
6.3 VOLTS 0.20 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

0.016" TINNED FLEXIBLE LEADS
LENGTH: 1.5" MIN.
SPACING: 0.048"
CENTER-TO-CENTER
IN LINE

THE 5702 WA IS A HEATER-CATHODE TYPE SHARP-CUTOFF PENTODE DESIGNED FOR SERVICE WHERE SEVERE CONDITIONS OF HIGH TEMPERATURE AND MECHANICAL SHOCK OR VIBRATION ARE ENCOUNTERED, CAPABLE OF OPERATION IN THE VHF REGION. A SEPARATE TERMINAL CONNECTION IS PROVIDED FOR GRID #3, WHICH UNDER SELF-BIAS CONDITIONS CAN BE CONNECTED DIRECTLY TO GROUND, PERMITTING THE CATHODE BY-PASS CAPACITOR TO BE OMITTED FOR LOWER GRID LOADING. THE FLEXIBLE TERMINAL LEADS MAY BE SOLDERED OR WELDED DIRECTLY TO CIRCUIT COMPONENTS WITHOUT THE USE OF SOCKETS. STANDARD INLINE SUBMINATURE SOCKETS MAY BE USED BY CUTTING THE LEADS TO A SUITABLE LENGTH.

RATINGS

MECHANICAL

MAXIMUM IMPACT ACCELERATION (SHOCK TEST #3)	450	G
MAXIMUM UNIFORM ACCELERATION (CENTRIFUGE TEST #4)	1000	G
MAXIMUM VIBRATIONAL ACCELERATION (96 HR. FATIGUE TEST #5)	2.5	G
MAXIMUM BULB TEMPERATURE	265	°C

RATINGS

AND NORMAL OPERATION

	MIL-E-1 SYMBOL	ABS. MIN.	NORMAL TEST COND. (NOTE 7)	NORMAL OPER. (NOTE 6)	ABS. MAX.	DES. MAX.	MIL-E-1 UNITS
HEATER VOLTAGE[8]	Ef:	5.7	6.3	6.3	6.9	---	V
PLATE VOLTAGE	Eb:	---	120	120	165	---	Vdc
GRID #1 VOLTAGE	Ec1:	-55	0	0	---	---	Vdc
GRID #2 VOLTAGE	Ec2:	---	120	120	155	---	Vdc
GRID #3 VOLTAGE	Ec3:	---	0	0	0	---	Vdc
PLATE DISSIPATION	Pp:	---	---	0.9	---	1.10	W
GRID #2 DISSIPATION	Pg2:	---	---	0.3	---	0.40	W
GRID #1 CIRCUIT RES.	Rg1	---	---	1.0	1.2	---	Meg
HEATER-CATHODE VOLT.	Ehk:	-200	---	100	+200	---	V
CATHODE CURRENT	Ik:	---	---	---	16.5	---	mAdc
CATHODE RESISTANCE	Rk:	---	200	200	---	---	OHMS
PLATE CURRENT (1)	Ib:	---	---	7.5	---	---	mAdc
GRID #2 CURRENT	Ic2:	---	---	2.6	---	---	mAdc
TRANSCONDUCTANCE (1):	Sm(1):	---	---	5000	---	---	μMHOS
PLATE RESISTANCE	rp:	---	---	0.34	---	---	Meg.

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CHARACTERISTICS AND QUALITY CONTROL TESTS[1]

TEST	AQL %	MIL-E-1 SYMBOL	MIN.	LAL	BOGIE	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TESTS PART 1	COMBINED AQL=1.0% EXCLUDING MECH. & INOPERATIVES					
HEATER CURRENT:	0.65	If:	183	192	200	mA
HEATER-CATHODE LEAKAGE: Ehk=+100 VDC, Ehk=-100VDC	0.65	Ihk:	---	---	---	μAdc
GRID CURRENT (1): Rg1=1.0 MEG.	0.65	Ic1(1):	---	---	---	μAdc
PLATE CURRENT (1):	0.65	Ib(1):	5.5	6.7	7.5	mAdc
PLATE CURRENT (2): Ec1=-9.0 VDC , Rk=0	0.65	Ib(2):	---	---	---	μAdc
SCREEN CURRENT:	0.65	Ic2:	1.7	---	2.6	mAdc
TRANSCONDUCTANCE (1):	0.65	Sm(1):	4200	4700	5000	μMHOS
CONTINUITY AND SHORTS (INOPERATIVES):	0.4	---	---	---	---	---

(CONT'D FROM ABOVE)	AQL %	MIL-E-1 SYMBOL	UAL	MAX.	ALD	MIL-E-1 UNITS
HEATER CURRENT:	0.65	If:	208	217	16	mA
HEATER-CATHODE LEAKAGE: Ehk=+100 VDC, Ehk=-100VDC	0.65	Ihk:	---	5	---	μAdc
GRID CURRENT (1): Rg1=1.0 MEG.	0.65	Ic1(1):	---	-0.1	---	μAdc
PLATE CURRENT (1):	0.65	Ib(1):	8.3	9.5	2.3	mAdc
PLATE CURRENT (2): Ec1=-9.0 VDC, Rk=0	0.65	Ib(2):	---	50	---	μAdc
SCREEN CURRENT:	0.65	Ic2:	---	3.5	---	mAdc
TRANSCONDUCTANCE (1):	0.65	Sm(1):	5300	5800	900	μMHOS
CONTINUITY AND SHORTS (INOPERATIVES):	0.4	---	---	---	---	---
MECHANICAL: ENVELOPE (8-7)						

	AQL %	MIL-E-1 SYMBOL	MIN.	LAL	BOGIE	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TEST PART 2	COMBINED AQL=1.0% EXCLUDING MECH. & INOPERATIVES					
INSULATION OF ELECTRODES: (Ef=6.3V, Eg-all=-100 Vdc	2.5	Rg1-all	100	---	---	MEG.
(Ep-all=-300 Vdc		Rp-all	100	---	---	MEG.
TRANSCONDUCTANCE (2): Ef=5.5 V (NOTE 9)	2.5	ΔEfSm(2):	---	---	---	PERCENT
GRID EMISSION: Ef=7.5 V; Rg1=1.0 MEG.; PREHEAT 5 MIN. AT Ec1=0; TEST AT Ec1=-10Vdc	6.5	Ic(2):	---	---	---	μAdc
AF NOISE: Esig= 70mVac; Ec2=25 Vdc; Rg1=0.1 MEG. ;Rg2=1000 OHMS; Rp=0.2 MEG. ; Ck=1000 μf; Rk=4000 OHMS	2.5	EB:	---	---	---	VU

→INDICATES A CHANGE.

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CHARACTERISTICS AND QUALITY CONTROL TESTS -cont'd.[1]

TEST	AQL %	MIL-E-1 SYMBOL	MIN.	LAL	BOGIE	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TEST PART 2 (CONT'D)	COMBINED AQL= 1.0% EXCLUDING MECH. & INOPERATIVES					
PLATE RESISTANCE:	6.5	rp:	0.15	---	---	MEG.
CAPACITANCE:	6.5	Cgp:	---	---	---	μμf
CAPACITANCE: (NOTE 2)		Cin:	4.1	4.4	4.8	μμf
CAPACITANCE:		Cout:	2.9	3.1	3.5	μμf
LOW PRESSURE VOLT. BREAKDOWN PRESSURE =55±5mmHg; VOLTAGE = 300 Vac	6.5	----	---	---	---	----
VIBRATION (2): F=40cps; G=15; Rp=10,000 OHMS	2.5	Ep:	--	---	---	mVac

(CONT'D FROM ABOVE)	AQL %	MIL-E-1 SYMBOL	UAL	MAX.	ALD	MIL-E-1 UNITS
INSULATION OF ELECTRODES: Ef=6.3V; Eg-all=-100 Vdc;	2.5	Rg1-all:	---	---	---	MEG.
Ep-all=-300 Vdc		Rp-all	---	---	---	MEG.
TRANSCONDUCTANCE (2): Ef=5.5 V (NOTE 9)	2.5	ΔEfSm(2):	---	10	---	PERCENT
GRID EMISSION: Ef=7.5V; Rg1=1.0 MEG.; PREHEAT 5 MIN. AT Ec1=0; TEST AT Ec1=-10Vdc	6.5	ic(2):	---	-0.5	---	μAdc
AF NOISE: Esig=70mVac: Ec2=25Vdc; Rg1=0.1 MEG;Rg2=1000 OHMS; Rp=0.2 MEG; Ck=1000 μf; Rk=4000 OHMS	2.5	EB:	---	17	---	VU
PLATE RESISTANCE:	6.5	rp:	---	---	---	MEG.
CAPACITANCE:	6.5	Cgp:	---	0.03	---	μμf
CAPACITANCE: (NOTE 2)		Cin:	5.2	5.5	0.83	μμf
CAPACITANCE:		Cout:	3.9	4.1	0.71	μμf
LOW PRESSURE VOLT. BREAKDOWN: PRESSURE=55±5mmHg: VOLTAGE=300 Vac	6.5	---	---	---	---	----
VIBRATION (2): F=40 cps; G=15; Rp=10,000 OHMS	2.5	Ep:	---	50	---	mVac

	AQL %	MIL-E-1 SYMBOL	MIN	LAL	BOG.	UAL	MAX	MIL-E-1 UNITS
DEGRADATION RATE ACCEPTANCE TESTS								
SUBMINIATURE LEAD FATIGUE: SHOCK (1): Ehk=+100 Vdc; Rg=0.1 MEG.; HAMMER ANGLE =30° (NOTE 3)	2.5	---	4.0	---	---	---	---	arcs
	20	---	---	---	---	---	---	----
FATIGUE (1): 96 HOURS; G=2.5; FIXED FREQUENCY; F=25 MIN. 60 MAX. (NOTE 5)	6.5	---	---	---	---	---	---	----

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CHARACTERISTICS AND QUALITY CONTROL TESTS - cont'd. [1]

TEST	AQL %	MIL-E-1 SYMBOL	MIN	MAX	MIL-E-1 UNITS
DEGRADATION RATE ACCEPTANCE TESTS (CONT'D.)					
POST SHOCK (1) AND FATIGUE TESTES (1)					
END POINTS:					
VIBRATION (2):					
F=40cps; G=15; Rp=10,000 OHMS	----	Ep:	---	100	mVac
HEATER-CATHODE LEAKAGE:					
Ehk=+100 Vdc , Ehk=-100 Vdc	---	Ihk:	---	20	μAdc
CHANGE IN TRANSCONDUCTANCE (1)					
OF INDIVIDUAL TUBES: Ef=6.3 V.	---	Δ_tSm(1):	---	20	PERCENT
GLASS STRAIN (THERMAL SHOCK):	6.5	---	---	---	----
ACCEPTANCE LIFE TESTS					
HEATER CYCLE:					
Ef=7.0 V; Eb=Ec1=Ec2=Ec3=0V;					
Ehk=140 Vac; 1MIN. ON, 1MIN. OFF	1.0	---	2000	---	CYCLES
HEATER CYCLING LIFE TEST END POINTS:					
HEATER-CATHODE LEAKAGE:					
Ehk=±100 Vdc Ehk=-100 Vdc	---	Ihk:	---	20	μAdc
1HOUR STABILITY LIFE TEST:					
TA=ROOM; Ehk=+200;Vdc; Rg1=1.0 MEG.	---	---	---	---	----
1 HOUR STABILITY LIFE TEST END POINTS:					
CHANGE IN TRANSCONDUCTANCE					
(1) OF INDIVIDUAL TUBES:					
(TYPICAL SAMPLE SIZE=50 TUBES)	1.0	Δ_tSm(1):	---	10	PERCENT
100 HOUR SURVIVAL RATE LIFE TEST:					
TA=ROOM; Ehk=+200 Vdc; Rg1=1.0 MEG.	---	---	---	---	----
100 HOUR SURVIVAL RATE LIFE TEST					
END POINTS:					
(TYPICAL SAMPLE SIZE 200 TUBES)	---	---	---	---	----
INOPERATIVES:	0.65	---	---	---	----
TRANSCONDUCTANCE (1):	1.0	Sm(1):	3800	---	μMHOS
INTERMITTENT HIGH TEMPERATURE					
LIFE TESTS:					
T BULB =265°C MIN; Ehk=+ 200 Vdc;					
Rg1=1.0 MEG.	---	---	---	---	----
500 HOUR INTERMITTENT HIGH					
TEMPERATURE LIFE TEST END POINTS:					
(TYPICAL SAMPLE SIZE=20 TUBES 1st SAMPLE;					
40 TUBES 2nd SAMPLE)	---	---	---	---	----
INOPERATIVES: [A]	---	---	---	---	----
GRID CURRENT (1): [B]	---	Ic(1):	---	-0.5	μAdc
HEATER CURRENT: [C]	---	If:	180	220	mA
CHANGE IN TRANSCONDUCTANCE [D]					
(1) OF INDIVIDUAL TUBES:	---	Δ_tSm(1):	---	20	PERCENT
TRANSCONDUCTANCE (2): (NOTE 9) [F]	---	Δ_{Ef}Sm(2):	---	15	PERCENT
HEATER-CATHODE LEAKAGE: [E]					
Ehk=+ 100 Vdc Ehk=-100 Vdc	---	Ihk:	---	10	μAdc
INSULATION OF ELECTRODES: G					
g1-all	---	Rg1-all:	50	---	MEG.
p-all		Rp-all:	50	---	MEG.

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TUNG-SOL

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CHARACTERISTICS AND QUALITY CONTROL TESTS - cont'd. [1]

TEST	AQL %	MIL-E-1 SYMBOL	MIN.	MAX.	MIL-E-1 UNITS
ACCEPTANCE LIFE TESTS (cont'd.)					
TRANSCONDUCTANCE (1) AVG. CHANGE [H]	---	$Avg\Delta_t Sm(1)$:	---	15	PERCENT
TOTAL DEFECTIVES: [J]	---	---	---	---	----
1000 HOUR INTERMITTENT HIGH TEMPERATURE LIFE TEST END POINTS: [K] (TYPICAL SAMPLE SIZE=20 TUBES 1st SAMPLE; 40 TUBES 2nd SAMPLE)	---	---	---	---	----
INOPERATIVES: [L]	---	---	---	---	----
GRID CURRENT (1): [M]	---	Ic(1):	0	-1.0	μAdc
HEATER CURRENT: [N]	---	If:	177	223	mA
CHANGE IN TRANSCONDUCTANCE (1) OF INDIVIDUAL TUBES: [P]	---	$\Delta_t Sm(1)$:	---	30	PERCENT
HEATER - CATHODE LEAKAGE: [Q] Ehk=+ 100 Vdc Ehk=-100 Vdc	---	Ihk:	---	15	μAdc
TOTAL DEFECTIVES [R]	---	---	---	---	----

ALLOWABLE DEFECTS PER CHARACTERISTIC

NOTE:	1st SAMPLE	COMBINED SAMPLES
A	1	3
B	1	3
C	1	3
D	1	3
E	2	5
F	2	5
G	2	5
H	---	---
J	4	8
K	---	---
L	2	5
M	2	5
N	2	5
P	2	5
Q	2	5
R	5	10

TUNG-SOL

NOTES

NOTE 1 CHARACTERISTICS, QUALITY CONTROL TEST PROCEDURES, AND INSPECTION LEVELS ARE MADE ACCORDING TO THE APPROPRIATE PARAGRAPHS OF MIL-E-1 "INSPECTION INSTRUCTIONS FOR ELECTRON TUBES" AND MIL-STD-105A.

NOTE 2 WITH A CYLINDRICAL SHIELD (0.405" I.D.–17/8" LONG) CONNECTED TO LEAD 6.

NOTE 3 TEST CONDITIONS AND ACCEPTANCE CRITERIA PER SHOCK TEST PROCEDURES OF MIL-E-1 BASIC SPECIFICATION.

NOTE 4 CENTRIFUGE TEST WITH FORCES APPLIED IN ANY DIRECTION.

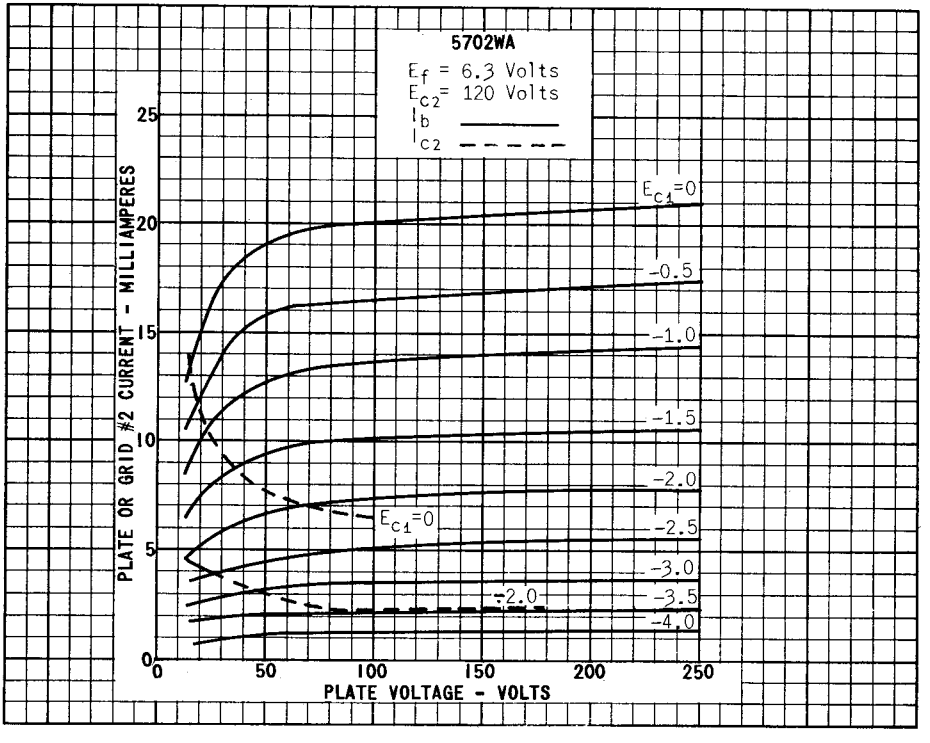
NOTE 5 TEST CONDITIONS AND ACCEPTANCE CRITERIA PER FATIGUE TEST PROCEDURES OF MIL-E-1 BASIC SPECIFICATIONS.

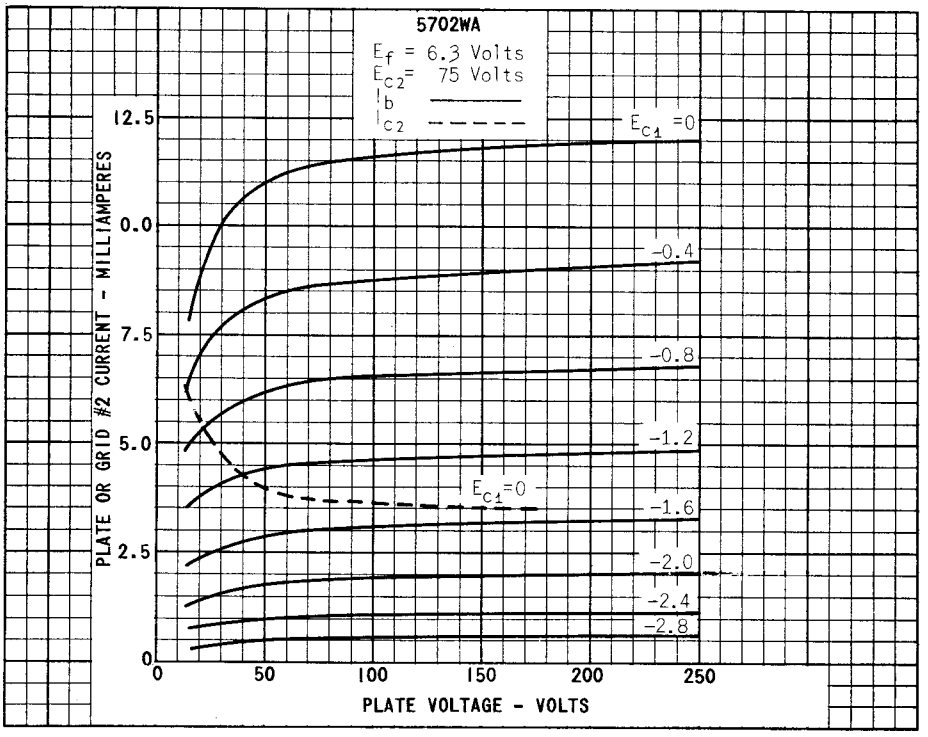
NOTE 6 THESE NORMAL VALUES REPRESENT CONDITIONS AT WHICH CONTROL OF RELIABILITY MAY BE EXPECTED.

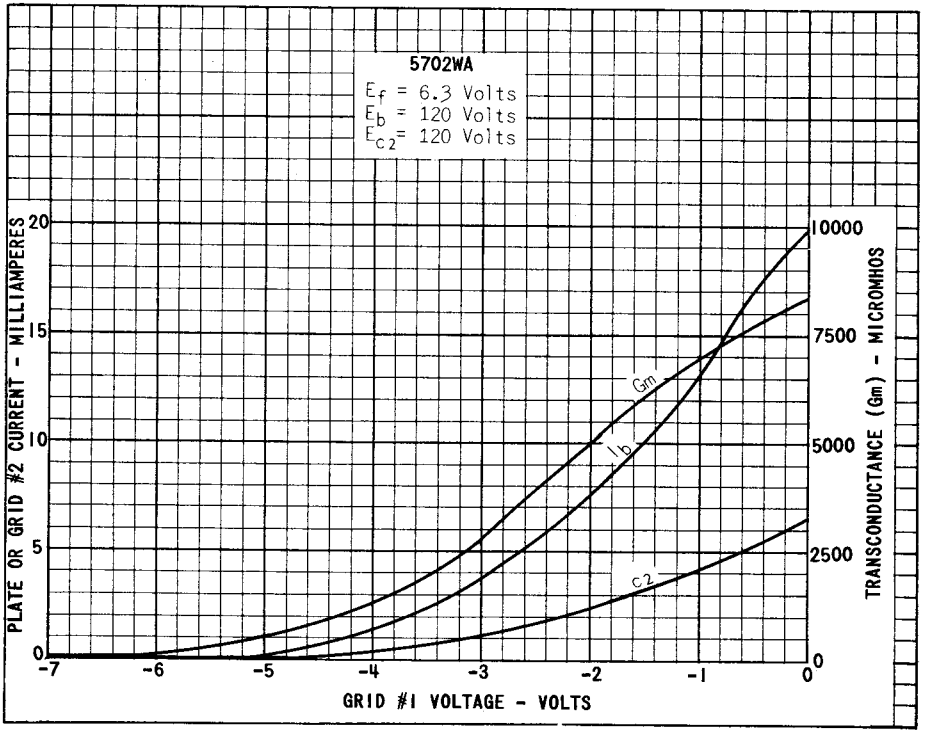
NOTE 7 THESE NORMAL TEST CONDITIONS ARE USED FOR ALL CHARACTERISTIC TESTS UNLESS OTHERWISE STATED UNDER THE INDIVIDUAL TEST ITEM.

NOTE 8 FOR MOST APPLICATIONS THE PERFORMANCE WILL NOT BE ADVERSELY AFFECTED BY ±10% HEATER VOLTAGE VARIATION, BUT WHEN THE APPLICATION CAN PROVIDE A CLOSER CONTROL OF HEATER VOLTAGE, AN IMPROVEMENT IN RELIABILITY WILL BE REALIZED.

NOTE 9 CHANGE OF TRANSCONDUCTANCE FOR INDIVIDUAL TUBES FROM THAT VALUE MEASURED AT Ef= 6.3V TO THAT VALUE MEASURED AT Ef=5.5V.







TENTATIVE DATA