



# Twin Triode Type DET 19

(POWER AMPLIFIER, OSCILLATOR AND MULTIPLIER)

**General.** The DET 19 is a low-power transmitting valve, consisting of two triodes in one envelope, suitable for use as a power amplifier, oscillator or frequency multiplier, at frequencies up to 250 Mc/s. It is necessary to neutralise the valve under all conditions of amplifier service; two capacitors which may each have a maximum value of 5 pF, are required for each valve.

**Cooling.** The valve must be adequately ventilated as it becomes very hot under normal operating conditions. No visible heating of the anodes should occur under any condition of operation.

**APPROXIMATE DATA**

$V_h$	6.3	V
$I_h$	0.8	A
$V_{a(max)}$	300	V
$I_{a(max)}$ per anode	40	mA
$p_{a(max)}$ per anode	5	W
$g_m$	taken at	2.1 mA/V
$\mu$		
$r_a$	$I_a$ 25 mA	3,340 $\Omega$
$V_{h-k(max)}$	100	V
$C_{a'-a''}$	1	pF
$C_{a-gl}$ (other electrodes earthed)	2.3	pF
$C_{a-k}$	0.6	pF
$C_{gl-k}$	4.2	pF

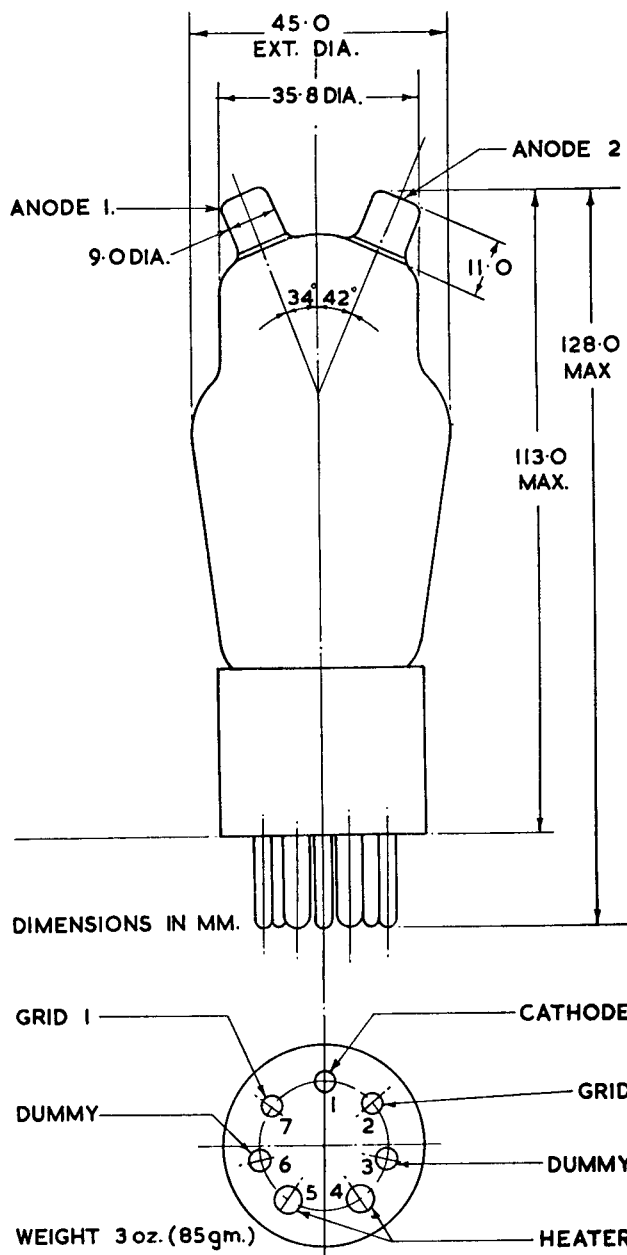
**(1) PUSH-PULL RF AMPLIFIER.  
CLASS C TELEGRAPHY**

(Key down conditions, per valve, without modulation)  
Maximum permissible ratings

$V_a$	300	V
$V_{gl}$	-150	V
$I_a$	80	mA
$I_{gl}$		
$P_a$	24	W
$P_a$		

both triodes

	25	mA
	10	W



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Typical Operation					
f	7	7	7	7	Mc/s
V <sub>a</sub>	300	250	200	150	V
I <sub>a</sub>	80	80	70	65	mA
V <sub>g1</sub> (i) from a fixed supply of	-50	-50	-50	-50	V
(ii) via R <sub>k</sub>	625	625	715	770	Ω
(iii) via R <sub>g1-k</sub>	3,300	2,800	2,800	2,500	Ω
I <sub>g1</sub> (a)	15	18	18	20	mA
V <sub>g1'-g1''</sub> (pk)	210	220	220	230	V
P <sub>dr</sub> (a)	2	2.5	2.5	3	W
P <sub>out</sub>	15.9	12.5	8.5	5.4	W
η	66.5	62.5	60.5	55.5	%

### (2) PUSH-PULL ANODE MODULATED RF AMPLIFIER. CLASS C TELEPHONY

(Carrier conditions, per valve, permissible modulation 100%)

Maximum permissible ratings

V <sub>a</sub>	250	V
V <sub>g1</sub>	-150	V
I <sub>a</sub>	55	mA
I <sub>g1</sub>	25	mA
P <sub>a</sub>	13.5	W
P <sub>a</sub>	6.5	W

#### Typical Operation

f	7	7	Mc/s
V <sub>a</sub>	250	200	V
I <sub>a</sub>	50	50	mA
V <sub>g</sub> (i) from a fixed supply of	-45	-40	V
(ii) via R <sub>k</sub>	900	800	Ω
(iii) via R <sub>g1-k</sub>	6,500	5,000	Ω
I <sub>g1</sub>	7	8	mA
V <sub>g1'-g1''</sub> (pk)	180	170	V
P <sub>dr</sub> (a)	1	1	W
P <sub>out</sub>	8.5	6.5	W
η	68	65	%

### (3) PUSH-PULL RF AMPLIFIER. CLASS B TELEPHONY

(Carrier conditions, per valve, permissible modulation 100%)

Maximum permissible ratings

V <sub>a</sub>	300	V
I <sub>a</sub>	45	mA
I <sub>g1</sub>	25	mA
P <sub>a</sub>	13.5	W
P <sub>a</sub>	10	W

#### Typical Operation

f	7	7	Mc/s
V <sub>a</sub>	300	200	V
I <sub>a</sub>	40	40	mA
V <sub>g</sub> (i) from a fixed supply of (c)	-21	-13	V
(ii) via R <sub>k</sub> (c)	525	325	Ω
I <sub>g1</sub> (a)	1.8	3	mA
V <sub>g1'-g1''</sub> (pk)	70	70	V
P <sub>dr</sub> (a) (b)	1.5	2.2	W
P <sub>out</sub>	3.5	2.3	W
η	29.3	28.3	%

### (4) PUSH-PULL FREQUENCY DOUBLER

Maximum permissible ratings

V <sub>a</sub>	300	V
V <sub>g1</sub>	-150	V
I <sub>a</sub>	80	mA
I <sub>g1</sub>	25	mA
P <sub>a</sub>	24	W
P <sub>a</sub>	10	W

both triodes

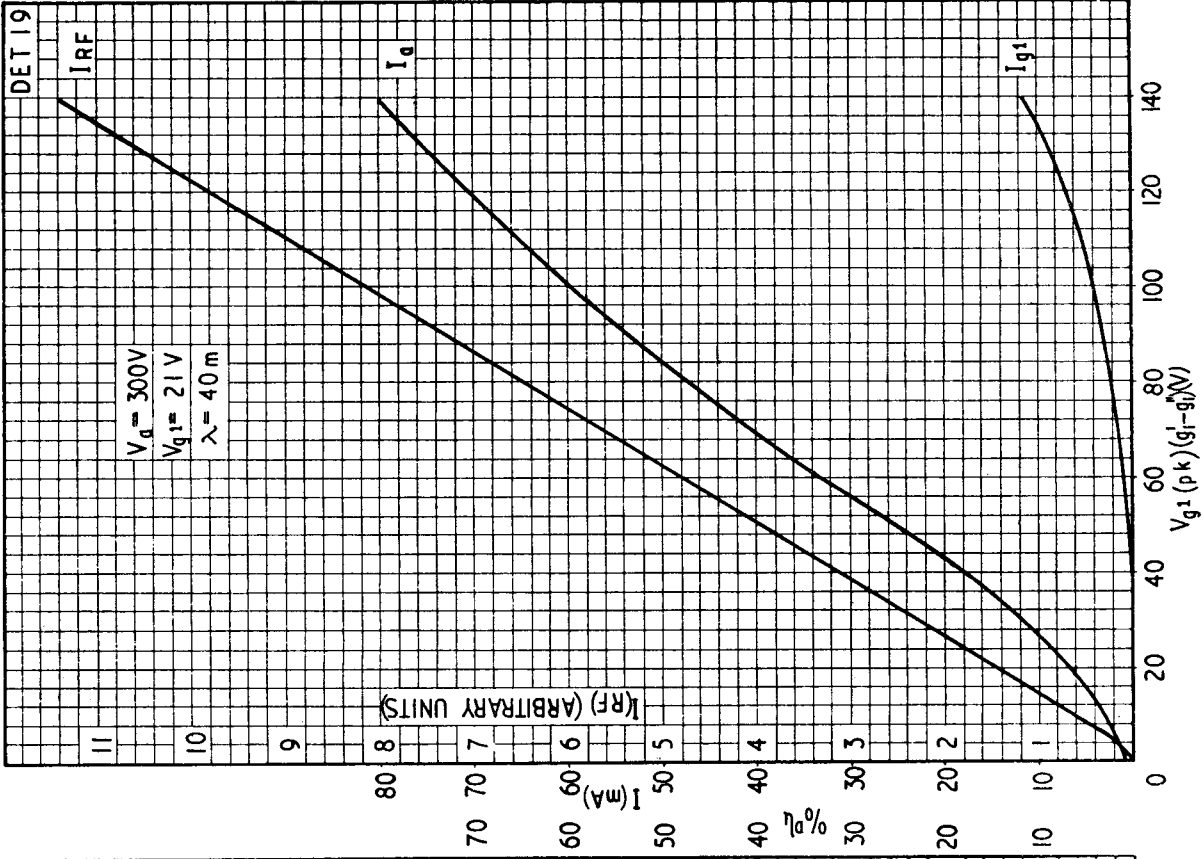
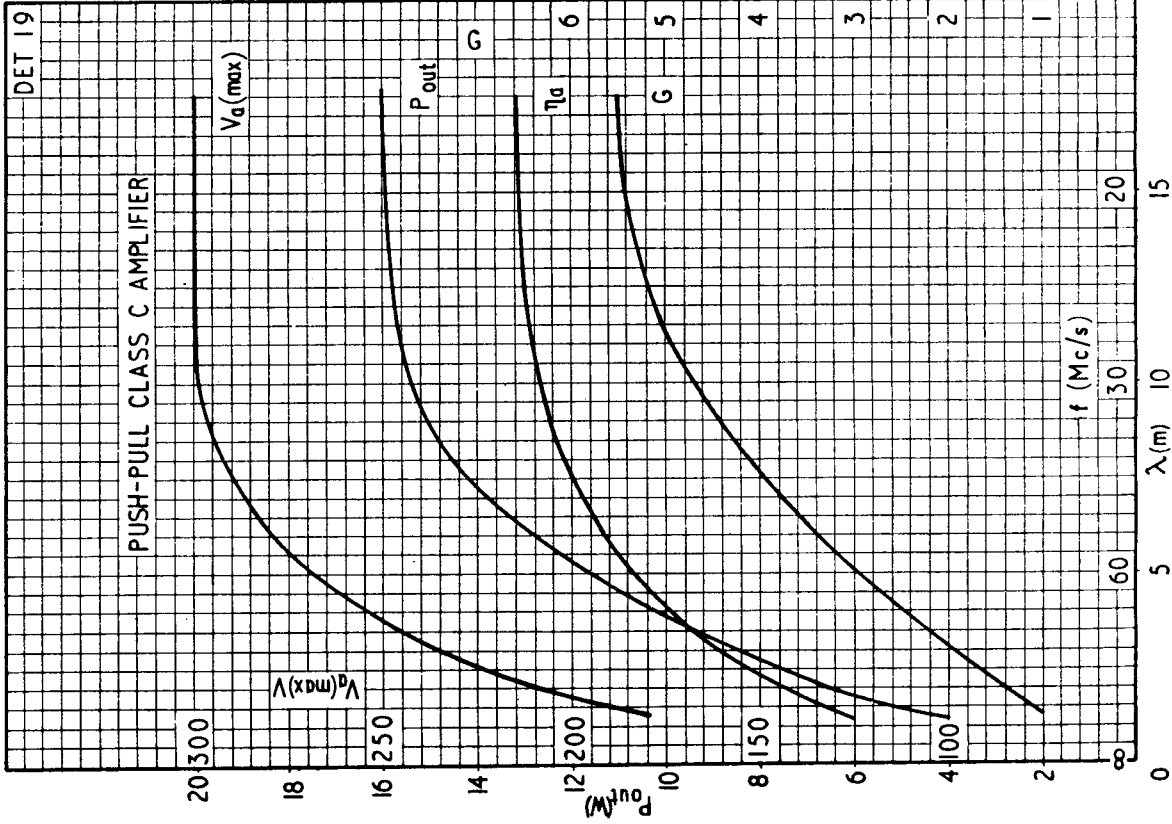
#### Typical Operation

f <sub>(e&amp;c)</sub>	7	7	7	40	Mc/s
f <sub>(out)</sub>	14	14	14	80	Mc/s
V <sub>a</sub>	300	250	200	250	V
I <sub>a</sub>	70	70	70	60	mA

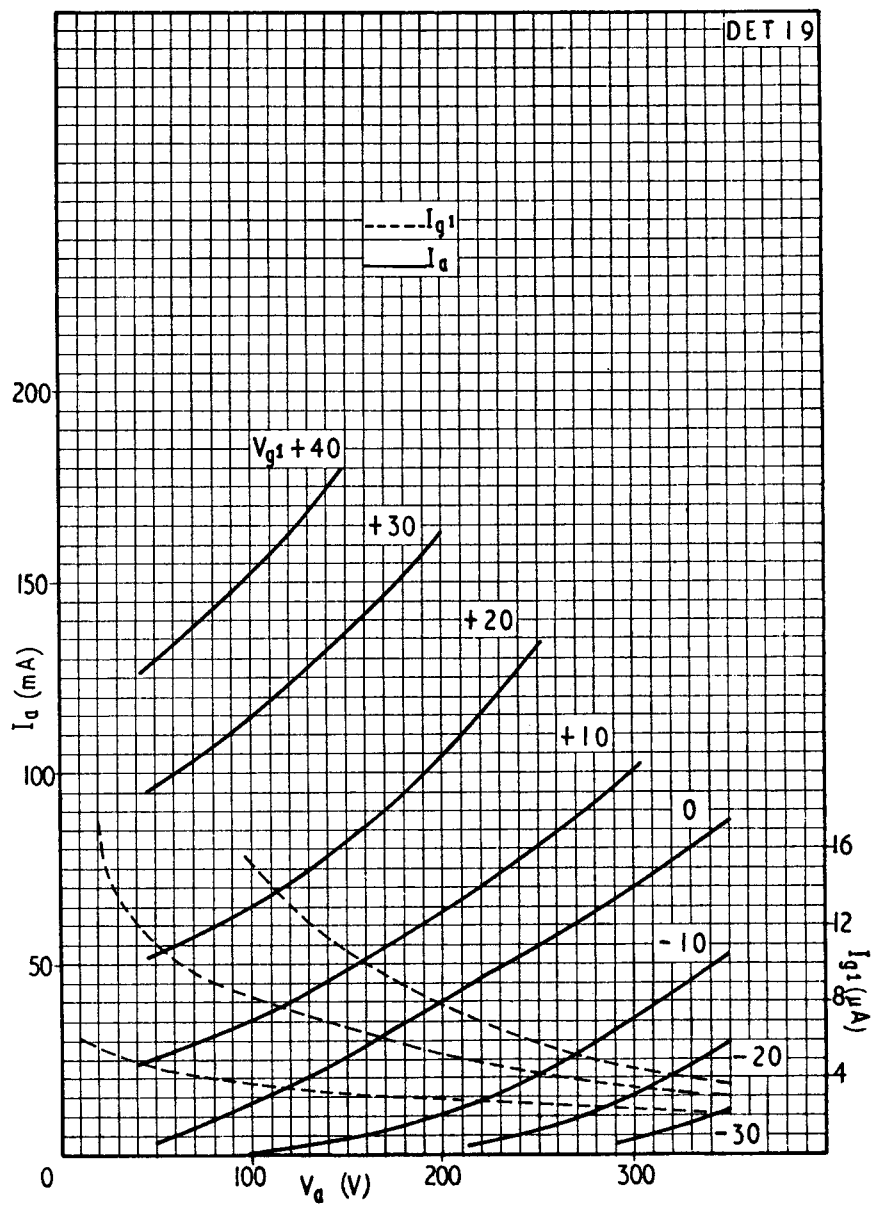
$V_{g1}$ (i) from a fixed supply of	-70	-70	-70	-150	V	<b>Typical Operation</b>			
(ii) via $R_k$	1,000	1,000	1,000	—	$\Omega$	$f_{(xtal)}$	7	Mc/s	
(iii) via $R_{g1-k}$	5,800	4,400	3,900	30,000	$\Omega$	$f_{out}$	14	Mc/s	
$I_{g1}$ (a)	12	16	18	5	mA	<b>Triode (1) Crystal Oscillator</b>			
$V_{g1'-g1''}$ (pk)	240	250	250	—	V	$V_a$ (d)	250	V	
$P_{dr}$	2.5	3	3	—	W	$I_a$	15	mA	
$P_{out}$	10.5	8	6.3	5.1	W	$V_{g1}$ via $R_{g1-k}$	30,000	$\Omega$	
$\eta$	50	45.5	45	33	%	$I_{g1}$	0.8	mA	
<b>(5) CRYSTAL OSCILLATOR AND DOUBLER</b>						<b>Triode (2) Frequency Doubler</b>			
<i>Maximum permissible ratings</i>						$V_a$	300	V	
$V_a$					300	V	$I_a$	26	mA
$V_{g1}$					-150	V	$V_{g1}$ (i) from a fixed supply of	-90	V
$I_a$					40	mA	(ii) via $R_{g1-k}$	45,000	$\Omega$
$P_a$					5	W	$I_{g1}$	2	mA
						$P_{out}$	2.8	W	

#### NOTES

- (a) Subject to wide variations depending on the impedance of the load circuit.
- (b) At crest of modulation cycle.
- (c) Grid leak operation is not permissible.
- (d) The anode voltage applied to the first triode should be kept as low as is consistent with adequate output.



DET 19









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