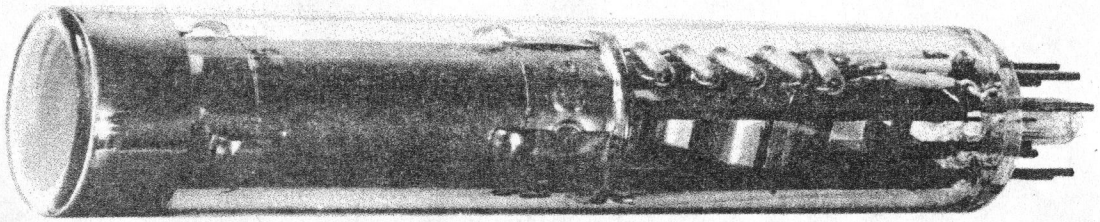
F. Capelupo

TENTATIVE DATA

VIDISSECTOR - IMAGE DISSECTOR

Type F4012



DESCRIPTION

The F4012 Vidissector is a 1 inch diameter magnetically focused and deflected image dissector camera tube. Photocathodes of the S-1, S-11, and S-20 type can be provided along with various scanning aperture shapes and sizes ranging from 0.0005 inch to 0.150 inch (Notes 1 and 3).

APPLICATION

The image dissector has several properties which make it well suited to such applications as slide-projector readers, hard-copy readers, electronically scanned spectrometers, flaw detectors for industrial process controls, and electronic star trackers. A few of these image dissector properties which should be considered when selecting an appropriate camera tube for a specific application are: (a) high resolution-determined primarily by the size of the defining aperture (b) nonstorage - allowing the scan rate to be varied without changing the signal current amplitude (c) reliable operation over a long period of time - simple rugged construction and lack of thermionic cathode and (d) linear dynamic range of several orders of magnitude.

GENERAL CHARACTERISTICS

Photocathode spectral response (Note 1)	S-1, S-11, or S-20 (See Figure 1)
Focusing method (Note 2)	Magnetic
Deflection method (Note 2)	Magnetic
Aperture size limits (Notes 1 and 3)	0.0005 to 0.150 inch
Number of dynodes (Note 4)	12
Internal dynode voltage divider (Note 7)	2.5 megohm per stage

MECHANICAL CHARACTERISTICS

Window material	Corning 7056 or equivalent
Window index of refraction	1.5
Window thickness	0.080 ± 0.005 inch
Maximum useful photocathode diameter	3/4 inch
Maximum tube diameter	1.0 inch
Maximum over-all tube length	6-3/4 inches
Weight (approximate)	2.6 ounces
Base	JEDEC No. 8-11 (9 Pin Vidicon)
Mounting position	Any
Socket Connections	(See Figure 2)

RECOMMENDED OPERATING CONDITIONS

Photocathode	-2000 volts
Drift tube	-1700 volts (Note 5)
Dynode 1	-1700 volts (Note 6)
Dynodes 2-11	(Note 7)
Dynode 12	-140 volts (Note 8)
Guard ring	Ground (Note 9)
Required focus field	40 gauss
Ambient temperature	25° C

NOTES

1. When ordering an F4012, two specifications in addition to the series designation "F4012" are required, namely: (1) the type of spectral response desired, and (2) the dimension of the defining aperture in mils. These two numerical specifications should follow the series designation in brackets as follows:

EXAMPLE 1: An F4012 (S1, 2R). This calls for an F4012 image dissector with an S-1 type photocathode and a 0.002 inch diameter round defining aperture.

EXAMPLE 2: An F4012 (S-11, 1S). This calls for an F4012 image dissector with an S-11 type photocathode and a 0.001 inch x 0.001 inch square aperture.

EXAMPLE 3: An F4012 (S-20, 4 x 100). This calls for an F4012 image dissector with an S-20 photocathode and a 0.004 inch x 0.100 inch slit shaped rectangular aperture.

2. The F4012 is designed to utilize the standard deflection and focus coil assembly available commercially for 1 inch diameter vidicons. Custom built coils for improved resolution and reduced distortion are also available from ITTIL.

3. The F4012 is available with aperture sizes and shapes varying within the dimensional limits of 0.0005 inch and 0.15 inch. Added tooling costs may be involved if specialized sizes or shapes are required.

4. Additional dynodes can be supplied on special order.

5. Drift tube must be positive relative to photocathode. Drift tube to cathode potential should satisfy the electron optical focus condition;

$$E = 0.18\,B^2$$

where E = accelerating potential for single node focus and B = focus field in Gauss.

The appropriate potential for multiple node focus is

$$E_n = 0.18\,B^2/n^2$$

where n = number of focus nodes.

To allow for manufacturing variations in tube and focus coil, some adjustment should be allowed in either cathode to drift tube potential or focus coil current.

NOTES (Continued)

6. Dynode 1 at cathode potential should provide good secondary emission yield. This reduces electron multiplier noise approximately as the square root of gain. Gain at dynode 1 typically varies from 2 at 50 volts to 7 at 300 volts. Dynode 1 may be operated positive or negative relative to the drift tube. At more positive potentials it provides the higher first stage gain discussed above without loss in deflection sensitivity, but at the cost of increased spurious "background" signal.

If slightly more negative than the drift tube, dynode 1 rejects the spurious signal contributed by secondary, thermionic and photoemission from the drift tube, hence gives a better black rendition. Ten to twenty volts are sufficient to accomplish this.

7. All dynodes are internally connected by 2.5 megohm 1/8-watt resistors built into the electron tube. These resistors are adequate for signal current levels usually encountered. Under typical operating characteristics, bleeder current is 60 μa.

For applications requiring more than 6 μa output current, modified multipliers are available. These applications may be identified as those where the product

$$J_o \, aG \geq 10^7$$

where J_o = cathode current density in $\mu a/cm^2$

a = defining aperture area in square mils

G = multiplier gain.

A border line case, for example, has

J_o = $10 \ \mu a/cm^2$

a = $1 \ mil^2$

G = 10^6

$J_o \, a \, G$ = $10 \times 1 \times 10^6$

= 10^7

NOTES (Continued)

8 At -140 volts on dynode 12 (ignoring the voltage divider limits discussed in Note 7), output current is linear to 40 μa even with a 1 megohm amplifier input impedance. Lower coupling impedance or lower output current permit operation of D12 closer to ground potential.

In general, lower dynode 12 voltages favor measured multiplier gain. The limit in dynode 12 voltage reduction is set by linearity requirements at high signal currents.

9. Because of short leakage paths and high voltages in the stem, and because of the possibility of thin film deposition on the stem during cathode formation, a conductive ring is deposited about the anode lead, and brought out on pin 3. By grounding this lead, leakage which would otherwise appear as a spurious signal, is shunted to ground.

10. Registered JEDEC response curve. All spectral responses are normalized to 100 percent following registered JEDEC recommendations. Permissible tolerances on these various registered S-response curves have been or are being established by JEDEC.

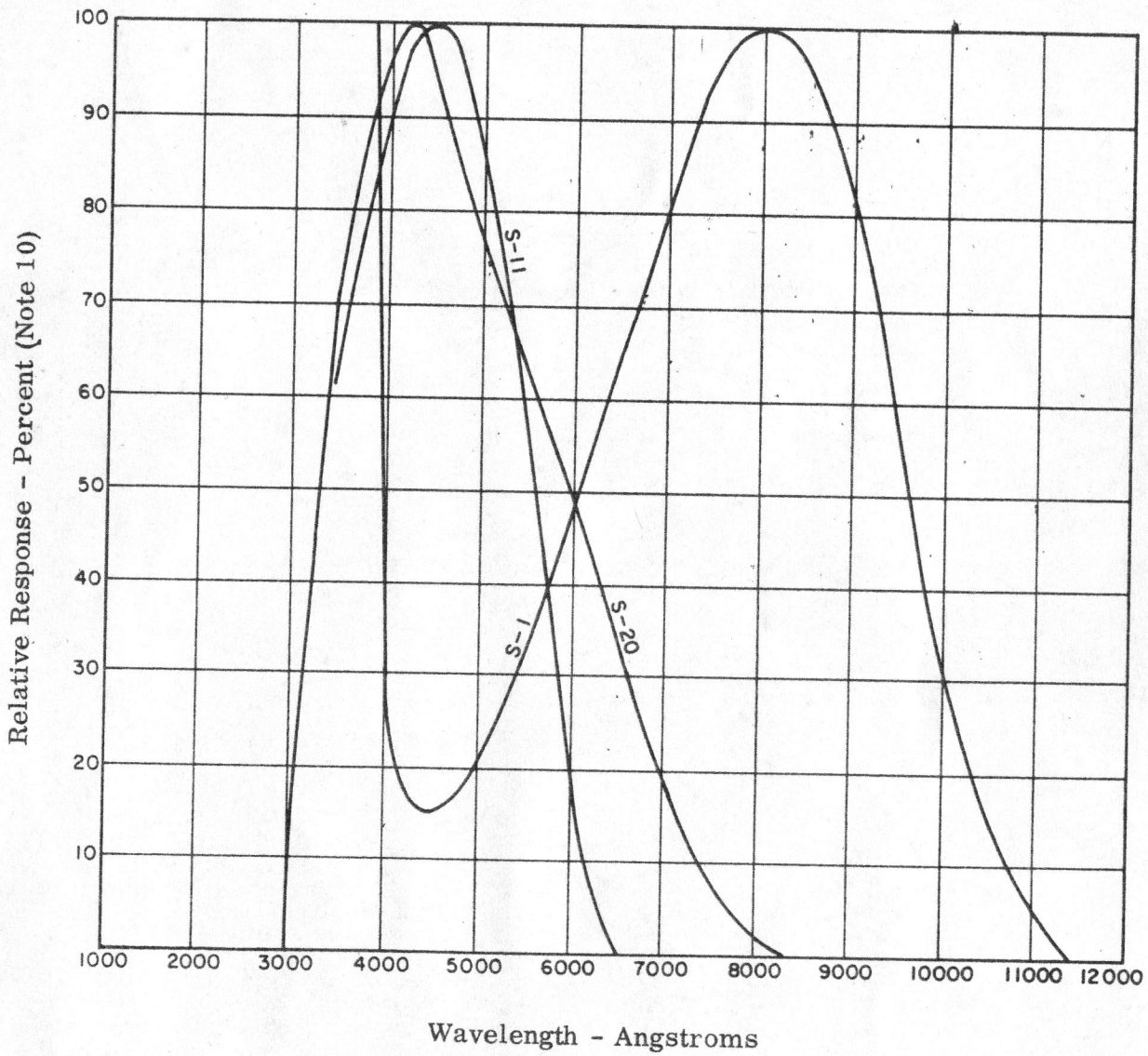
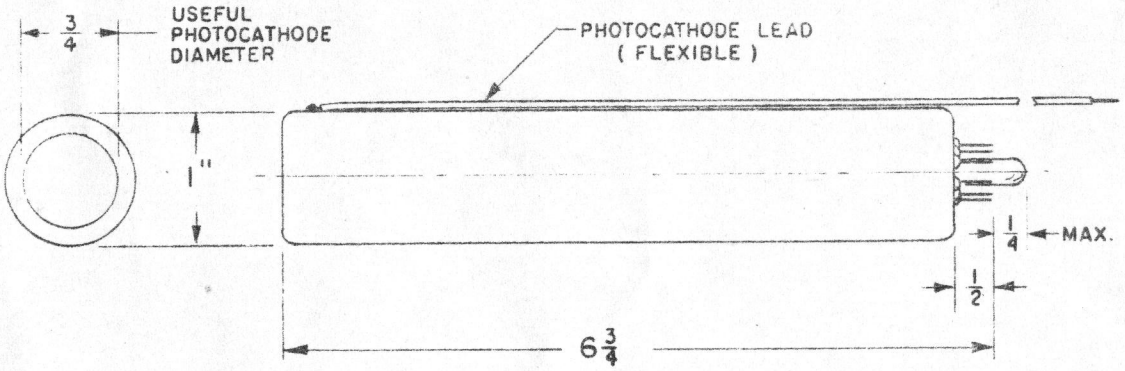
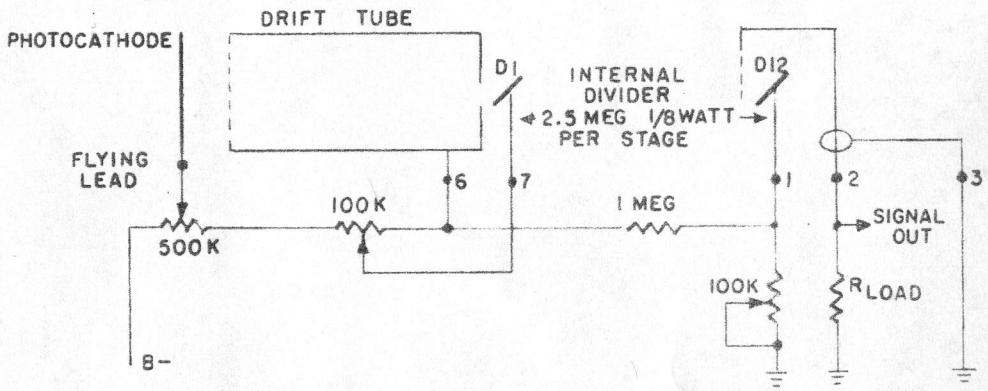


Figure 1 Spectral-Sensitivity Curves

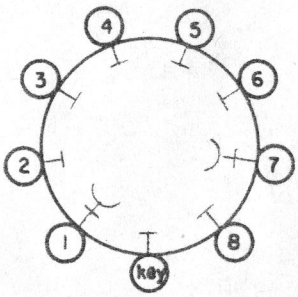
Outline Drawings



Electrical Schematic



Pin Connections



JEDEC NO 8-11
BASE

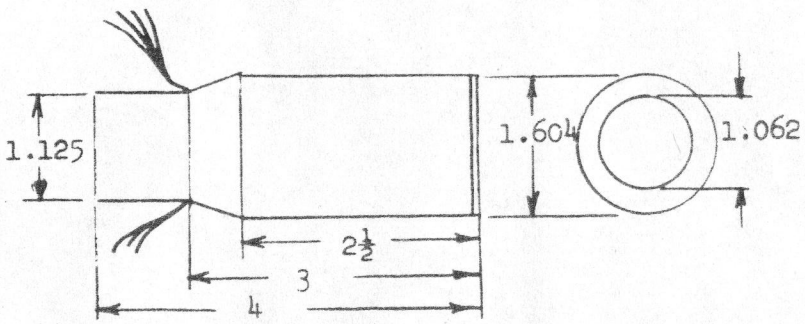
Pin	Connection
1	Dynode 12
2	Anode
3	Guard Ring
4	Internal Connection
5	Internal Connection
6	Drift Tube
7	Dynode 1
8	Internal Connection
Key Pin	Internal Connection (Short Pin)
Flying Lead	Photocathode

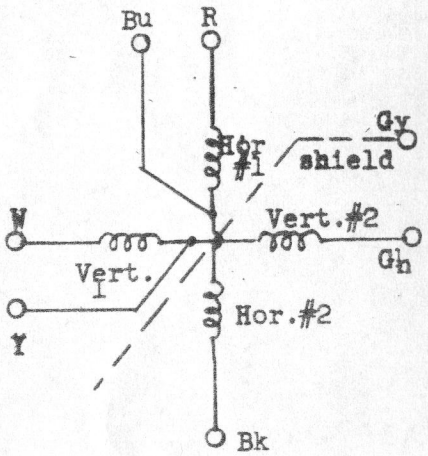
ITT INDUSTRIAL LABORATORIES
FORT WAYNE, INDIANA

1 INCH
DEFLECTION AND FOCUS COIL ASSEMBLIES
FOR F4012 VIDISSECTOR

DEFLECTION YOKE

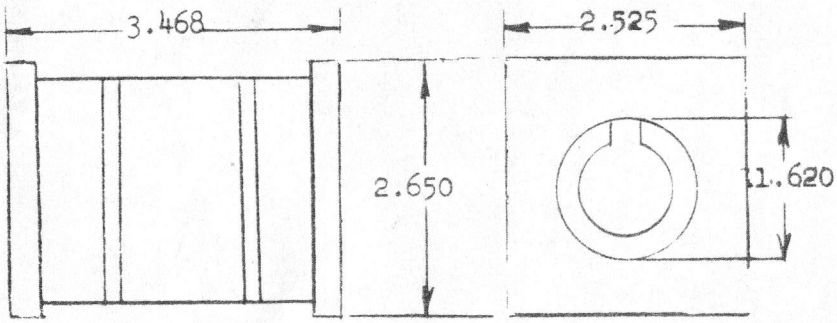
ITTIL PART NO.	HORIZONTAL COIL			VERTICAL COIL		
	Inductance mh	Resistance ohms	Typ. Defl. Sens. ma/in.	Inductance mh	Resistance ohms	Typ. Defl. Sens. ma/in.
F4509	42	180	55	50	200	55

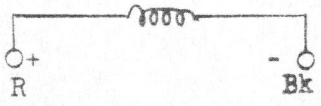




FOCUS COIL

ITTIL PART NO.	RESISTANCE ohms	TYPICAL CURRENT ma
F4510	670	30





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