



ELECTRON TUBE DEPARTMENT ■ COMPONENTS DIVISION
INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION, CLIFTON, NEW JERSEY

**X-394*
BACKWARD WAVE
CONVERTER
TUBE**

T E N T A T I V E

GENERAL CHARACTERISTICS

The X-394 is a single tube designed to convert SHF signals in the band from 2540-4050 megacycles to a 180 megacycle intermediate frequency output signal.

The tube consists of a backward-wave amplifier and a backward wave oscillator in the same vacuum envelope. The r-f input signal is fed to the amplifier section where its level is increased. It is then mixed with the oscillator signal in the common electron beam that interacts with both r-f structures, to yield an i-f output signal which can be adjusted over a fairly large frequency range. This tube uses a 180 megacycle i-f.

The X-394 is a glass tube, mounted in an aluminum capsule. Solenoid focusing is required. A type TNC r-f input connector and a "TSM" i-f output connector are included as an integral part of the capsule. A type "TNC" l-o output connector can be supplied if required.

ELECTRICAL DATA

Operating Frequency	2540-4050 megacycles
Bandwidth of Input Section	10-40 megacycles
Noise Figure	20 db
I-F Output	180 megacycles
Conversion Gain	Unity
Image Rejection	35 db

NOTE: The image rejection is dependent upon the intermediate frequency selected. This tube utilizes a 180 megacycle i-f, an increase in the i-f would result in a higher level of image rejection.

MECHANICAL DATA

Mounting Position	Any
Capsule Length	31 inches
Capsule Outside Diameter	1-3/8 inches
R-F Input Connector	Type "TNC" coaxial, female
I-F Output Connector	Type "TSM" coaxial, male
L-O Output connector (if required)	Type "TNC" coaxial, female
D.C. Connections	Color coded flying leads.

*This number identifies a particular experimental tube design, such number and identification data being subject to change without notice. This tube is for experimental purposes only, carries no obligation for future manufacture, and should not be used for design purposes without prior arrangement.

X-394
BACKWARD WAVE
CONVERTER TUBE

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MAXIMUM RATINGS

Heater Voltage	6.5 Volts dc maximum
Heater Current	4.0 Amperes maximum
Cathode Voltage	-250 to -1500 Volts maximum
Cathode Current	8 ma maximum
Focus Voltage	0 to -10 Volts maximum)
Anode No. 1 Voltage	+15 to +75 Volts maximum)
Anode No. 2 Voltage	+15 to +150 Volts maximum) with respect
Anode No. 3 Voltage	+30 to +350 Volts maximum) to cathode
Anode No. 4 Voltage	+100 to +900 Volts maximum)
Anode No. 5 Voltage)	
Amplifier Helix No. 1 Voltage)	
Amplifier Helix No. 2 Voltage)	Zero Volts (Ground)
Capsule Voltage)	
Oscillator Helix Voltage	-50 to +100 Volts maximum
Collector Voltage	250 Volts maximum
Focus Current	.3 ma maximum'
Anode No. 1 Current	.3 ma maximum
Anode No. 2 Current	.3 ma maximum
Anode No. 3 Current	.3 ma maximum
Anode No. 4 Current	.3 ma maximum
Anode No. 5 Current	.3 ma maximum
Amplifier Helix No. 1 Current)	
Amplifier Helix No. 2 Current)	.5 ma maximum
Capsule Current)	
Oscillator Helix Current	.3 ma maximum
Collector Current	8 ma maximum
Solenoid Magnetic Field	750 Gauss maximum

TYPICAL OPERATION

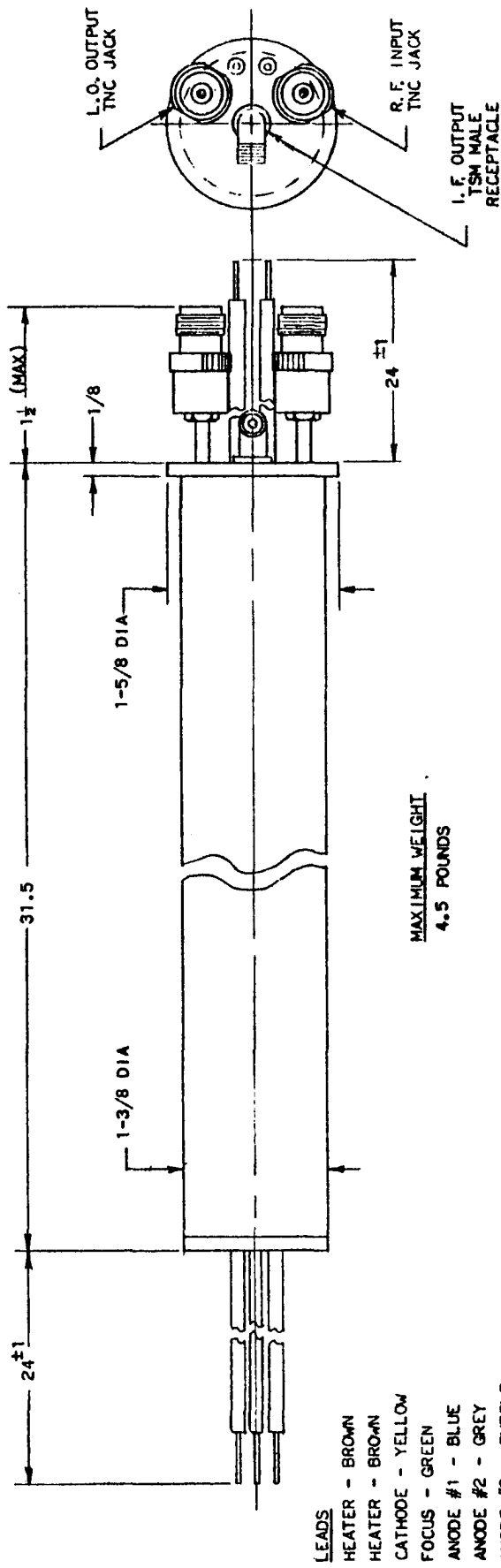
R-F Frequency	3500 megacycles
L-O Frequency	3320 megacycles
I-F Frequency	180 megacycles
Conversion Gain	0 db
Heater Voltage	6.3 Volts dc
Heater Current	3.5 Amperes
Cathode Voltage	-820 Volts with respect to ground
Cathode Current	4.5 ma
Focus Voltage	0 Volts)
Anode No. 1 Voltage	54 Volts)
Anode No. 2 Voltage	60 Volts) With respect to cathode
Anode No. 3 Voltage	210 Volts)
Anode No. 4 Voltage	320 Volts)
Anode No. 5 Voltage)	
Amplifier Helix No. 1 Voltage)	
Amplifier Helix No. 2 Voltage)	0 Volts (Ground)
Capsule Voltage)	

Oscillator Helix Voltage	-20 Volts)
Collector Voltage	200 Volts) with respect to ground
Focus Current	0 ma
Anode No. 1 Current	.08 ma
Anode No. 2 Current	.06 ma
Anode No. 3 Current	.05 ma
Anode No. 4 Current	.05 ma
Anode No. 5 Current	.06 ma
Amplifier Helix No. 1 Current)	
Amplifier Helix No. 2 Current)	.08 ma
Capsule Current)	
Oscillator Helix Current	.02 ma
Collector Current	4.1 ma
Solenoid Magnetic Field	650 Gauss

Additional information for specific application can be obtained from the

Electron Tube Application Section
ITT Components Division
P.O. Box 412
Clifton, New Jersey





BACKWARD WAVE CONVERTER

TYPE X-394