



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

**X-398*
BACKWARD WAVE
CONVERTER
TUBE**

T E N T A T I V E

GENERAL CHARACTERISTICS

The X-398 is a single tube designed to convert SHF signals in the band from 5700-8400 megacycles to a 320 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 and it mixes with the oscillator signal. Mixing is accomplished 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 320 megacycle i-f.

The X-398 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- output connector can be supplied if required.

ELECTRICAL DATA

Operating Frequency	5700-8400 megacycles
Bandwidth of Input Section	17-84 megacycles
Noise Figure	20 db
I-F Output	320 megacycles
Conversion Gain	Unity
Image Rejection	35 db

Note: The image rejection is dependent upon the intermediate frequency selected. This tube utilizes a 320 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	19 inches
Capsule Outside Diameter	7/8 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-398
 BACKWARD WAVE
 CONVERTER TUBE

-2-

MAXIMUM RATINGS

Heater Voltage	6.5	Volts dc maximum	
Heater Current	2	Amperes maximum	
Cathode Voltage	-250 to -1300	Volts maximum	
Cathode Current	8	ma maximum	
Focus Voltage	0 to -10	Volts Maximum)	
Anode No. 1 Voltage	15 to 80	Volts Maximum)	
Anode No. 2 Voltage	15 to 150	Volts Maximum)	with respect to cathode
Anode No. 3 Voltage	30 to 300	Volts Maximum)	
Anode No. 4 Voltage	100 to 900	Volts Maximum)	
Anode No. 5 Voltage			
Amplifier Helix No. 1 Voltage)			
Amplifier Helix No. 2 Voltage)			
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	900	ma maximum	

Zero Volts (Ground)

X-398
BACKWARD WAVE
CONVERTER TUBE

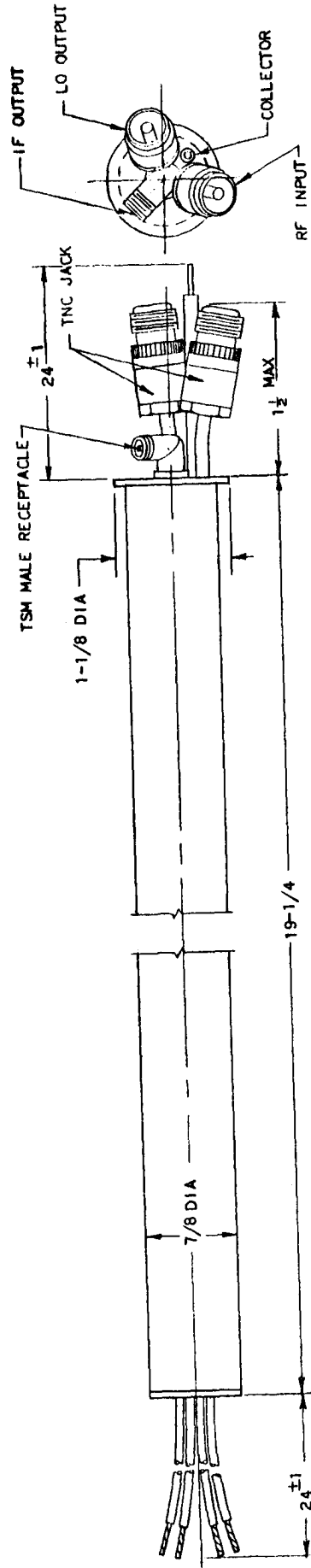
TYPICAL OPERATION

R-F Frequency	7000 megacycles
L-O Frequency	6680 megacycles
I-F Frequency	320 megacycles
Conversion Gain	+2 db
Heater Voltage	6.3 Volts dc
Heater Current	1.9 Amperes
Cathode Voltage	-640 Volts with respect to ground
Cathode Current	4.0 ma
Focus Voltage	0 Volts)
Anode No. 1 Voltage	49 Volts)
Anode No. 2 Voltage	62 Volts)with respect to cathode
Anode No. 3 Voltage	220 Volts)
Anode No. 4 Voltage	380 Volts)
Anode No. 5 Voltage	0 Volts (Ground)
Amplifier Helix No. 1 Voltage)	
Amplifier Helix No. 2 Voltage)	
Capsule Voltage	
Oscillator Helix Voltage	-25 Volts)
Collector Voltage	200 Volts)with respect to ground
Focus Current	0 ma
Anode No. 1 Current	.10 ma
Anode No. 2 Current	.08 ma
Anode No. 3 Current	.06 ma
Anode No. 4 Current	.06 ma
Anode No. 5 Current	.04 ma
Amplifier Helix No. 1 Current)	.08 ma
Amplifier Helix No. 2 Current)	
Capsule Current	
Oscillator Helix Current	.02 ma
Collector Current	3.6 ma
Solenoid Magnetic Field	800 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





MAXIMUM WEIGHT
1-1/4 POUNDS

LEADS

HEATERS	BROWN
CATHODE	YELLOW
FOCUS	GREEN
ANODE NO. 1	BLUE
ANODE NO. 2	GREY
ANODE NO. 3	PURPLE
ANODE NO. 4	WHITE
ANODE NO. 5	GROUND-BLACK
AMPL. HELIX NO. 1	RED
AMPL. HELIX NO. 2	RED
COLLECTOR	RED
OSCILLATOR HELIX - INNER CONDUCTOR OF L O OUTPUT JACK	

BACKWARD WAVE CONVERTER

TYPE X-398