



WJ **WATKINS-JOHNSON**
FALD W. CALIFORNIA, U.S.A.

BACKWARD-WAVE OSCILLATOR

TYPE	SERIAL NO.	DATE
WJ2039-51	13592	8039
HEATER	APPROX. ANODE	CATHODE
6.5V	135V	8.3mA

U.S. PATENT NUMBER 2938133 LICENSE PATENT NUMBERS 2880355, 2932760



BACKWARD-WAVE OSCILLATOR

TYPE	SERIAL NO.	DATE
WJ2039-51	13592	8039
HEATER	APPROX. ANODE	CATHODE
6.5V	135V	8.3mA

U.S. PATENT NUMBER 2938133 LICENSE PATENT NUMBERS 2880355, 2932760





WATKINS - JOHNSON COMPANY

440 Mount Hermon Road • Scotts Valley, California 95066 • (408) 436-2100

TWX 910-998-4403 • Tele 34-6327

GENERAL OPERATING INSTRUCTIONS

for

Watkins-Johnson Permanent-Magnet Backward-Wave Oscillators

GENERAL

The backward-wave oscillator is an electron beam device. A permanent magnet is used to focus the oscillator. The oscillator is packaged in either a magnetically shielded or unshielded housing. Certain precautions must be observed when installing, handling, and operating the oscillator to avoid severe or permanent degradations in performance.

INSTALLATION and HANDLING

Mount the oscillator package (oscillator) rigidly in equipment. The oscillator may be mounted in any position. Cooling is achieved by conduction through the housing to the equipment chassis. For safety, the housing should be grounded through non-ferrous or non-magnetic stainless steel mounting screws. Screws should not penetrate housing more than 0.20 inches (5 mm).

When handling the RF power output connectors, caution must be observed. Do not bend flying coaxial cables in less than 0.75 inch radius (19 mm) along the general length. Do not crimp the cable anywhere along the length. In the case of housing-mounted waveguides, use a short section of flexible waveguide or coax-to-waveguide transition at the output flange. Do not exert strain on housing-mounted waveguides. Waveguide flange screws must not penetrate flange more than 0.25 inch (6.25 mm) depth. In all cases, care must be taken to not nick, bend or dent connector interfaces or threads.

Keep an unshielded oscillator separated from any magnetic material. An unshielded oscillator should also be separated from active magnetic and high intensity ac fields. In the case of magnetically shielded oscillators, no separation from passive magnetic material or other shielded oscillators is required. A magnetically shielded oscillator should be separated from active magnetic and high intensity ac fields. In all cases, refer to the applicable Technical Data Sheet or Developmental Specification.

Do not subject the oscillator to hard or localized shocks.

The oscillators are constructed to withstand certain environmental conditions. The specification limits and absolute maximum conditions, as described in the Technical Data Sheet or Developmental Specification, should be observed. If oscillator is to be stored for extended periods of time, it should be placed into normal operation for a period of approximately one hour every 18 months.

OPERATION and ADJUSTMENT

In all cases, observe the color code supplied with the oscillator.

TYPICAL COLOR CODE

Heater	Black
Heater	Brown
Cathode	Yellow
Grid	Green
Anode	Blue
Helix	Red
Collector	Orange

The test data supplied is taken with the grid to cathode voltage zero volts. A 50-150 volt positive collector to helix bias is recommended. The tube will operate with collector at helix potential with somewhat reduced performance. If the cathode is to be tied to one side of the heater, tie the positive side of the heater supply and cathode supply together.

CAUTION:

THE FOLLOWING PROCEDURE MUST BE PERFORMED IN SEQUENCE TO AVOID PERMANENT DAMAGE TO OSCILLATOR.

A. TO TURN OSCILLATOR ON

The heater is the first element to be turned on. Set heater voltage to value supplied with test data sheet. Allow at least one minute for heater-warm up.

Apply high voltage to helix or delay line and collector. Set helix voltage at, or above, indicated operating voltage for F_1 , while not exceeding operating voltage for F_2 . Observe values on test data sheet.

Apply anode voltage and adjust cathode current to value indicated on test data sheet and label. Do not exceed the specified cathode current at any time during oscillator life.

Helix voltage and anode voltage may be applied to the oscillator simultaneously, but care must be taken to insure that maximum voltages and currents are not exceeded.

B. TO TURN OSCILLATOR OFF

The anode is the first element to be turned off and must be near zero voltage, with reference to cathode, before any other element is turned off.

Remove voltage from helix or delay line and collector. Turn off heater. Heater voltage may remain applied during brief non-operating periods as in stand-by operation, (less than one hour).

High voltage and anode voltages may be turned off simultaneously.

Further information regarding the operation or application of these devices may be obtained from our Watkins-Johnson Field Sales Office in your area, or by contacting Watkins-Johnson Applications Engineering at our Santa Cruz facility.

TUBE TYPE 6J2018-50 SERIAL NO. 191928 DATE 1-1-81



480 Mount Vernon Road
Sunnyvale, California

FINAL TEST DATA

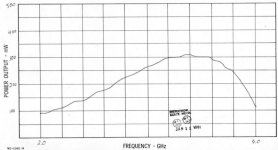
HEATER I_H 54 A E_H 6.3 V

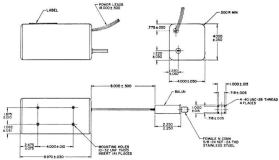
APPROX. ANODE E_a 120 V (Set to obtain I_a 10.1 mA at F_1) ANODE I_a 10.1 mA

FREQ. 2.0 GHz HELIX E_H 371 V HELIX I_H .9 mA COLL I_C 9.2 mA

FREQ. 9.0 GHz HELIX E_H 1737 V HELIX I_H 1.1 mA COLL I_C 9.6 mA

COLLECTOR VOLTAGE ABOVE HELIX 110 V FIELD PM





MATERIAL SPECIFICATIONS	
MATERIAL	
BEAM	304 SS
SOLENOID	304 SS
SOLENOID	304 SS
SOLENOID	304 SS
SOLENOID	304 SS
SOLENOID	304 SS
SOLENOID	304 SS
SOLENOID	304 SS

APPLIES TO WJ2018-50 ONLY

1. CHECK BEAM TUBE BY MEASUREMENT STANDARD TOOL.
2. DO NOT TOUCH BEAM TUBE TO THE END OF LEADS. ALWAYS USE OF INSULATED GLOVES. CONTACT GROUND TO THE END OF LEADS TO AVOID SHOCK. ALWAYS WEAR INSULATED WORK SHOES TO AVOID SHOCK.
3. BEAM TUBE IS MOUNTED TO THE END OF LEADS. ALWAYS WEAR INSULATED WORK SHOES TO AVOID SHOCK. ALWAYS WEAR INSULATED WORK SHOES TO AVOID SHOCK.

REV	DESCRIPTION	BY	DATE	ISSUED
1	REVISIONS BY: (NAME)			

WJ	WATKINS-JOHNSON COMPANY			
CORPORATE HEADQUARTERS				
14482 302498				
BACKWARD WAVE OSCILLATOR				
REV	DESCRIPTION	BY	DATE	ISSUED
1	REVISIONS BY: (NAME)			

REV	DESCRIPTION	BY	DATE	ISSUED
1	REVISIONS BY: (NAME)			