

TRANSISTOR PULSE GENERATOR

TEK-21

MC6826



1. DESCRIPTION

The TEK-21 Transistor Pulse Generator is a battery operated instrument for use in servicing the "Extender" circuit in Motorola two-way radio equipment. It eliminates the need for checking noise circuits while a radio set is installed in a vehicle, by enabling the serviceman to simulate noise conditions at the service bench. The pulse generator also can be used with the Motorola TEK-1A Tone Generator for noise balancing any receiver. The unit provides a source of pulses with a peak-to-peak amplitude exceeding 5 volts into an open circuit at a repetition rate of 40 kc or 100 kc. It has provisions for modulating the pulse output from an external source.

2. APPLICATIONS

a. "Extender" Operational Check

Noise pulses must be coupled into the receiver along with the r-f carrier frequency to test the effectiveness of the "Extender" circuit. These pulses will degrade the sensitivity of the receiver when the switch on the control head is in the STD position. However, they should have very little effect when the switch is in the EXTEND position.

(1) Connect a UHF "T" connector to the antenna connector on the radio set.

(2) Connect a signal generator (Motorola T1034B or equivalent) to one end of the "T" connector.

(3) Connect the output of the pulse generator to the remaining end of the "T" connector.

(4) Place the EXTEND-STD-REJECT switch on the radio set control head in the STD position.

(5) With the pulse generator OFF, adjust the signal generator to produce 20 db quieting as described in the radio set instruction manual. Note the reading on the signal generator dial in dbm.

(6) Set the pulse generator to 100 KC and adjust the LEVEL control until the 20 db quieting reading is degraded by 50 dbm.

Example:

Normal 20 db quieting	-118 dbm (.27 microvolt)
20 db quieting degraded 50 dbm	-68 dbm (85 microvolts)

(7) Place the EXTEND-STD-REJECT switch in the EXTEND position and readjust the signal generator output to again produce 20 db quieting. This 20 db quieting reading should be within 10 dbm of the normal 20 db quieting reading.

Example:

Normal 20 db quieting	-118 dbm
"Extender" 20 db quieting	-108 to -118 dbm

(8) If the degradation is greater than 10 dbm in the EXTEND position, readjust the "Extender" sensitivity control located on the bottom side of the receiver r-f deck. Refer to the radio set

instruction manual for this adjustment. If this fails to bring the degradation to 10 dbm or less, proceed with the following "Extender" Servicing procedure.

b. "Extender" Servicing

The recommended procedure for servicing the "Extender" circuit consists of injecting the output of the pulse generator into the "Extender" channel and viewing the waveforms at various points in the circuit on an oscilloscope (Motorola Model T1014A or equivalent). Once the defective stage has been located, voltage and resistance measurements can be compared to those given on the schematic diagram to locate the defective component.

(1) Connect the output of the signal generator and the pulse generator to the antenna input of the radio set.

(2) Set the pulse generator for 100 KC and adjust the LEVEL control for maximum output.

(3) Place the EXTEND-STD-REJECT switch on the radio set control head in the EXTEND position.

(4) Adjust the signal generator output to produce 20 db quieting.

(5) Connect the oscilloscope to the components indicated in the following TABLE and compare the waveform display with those shown.

c. Noise Balancing in Receivers

Noise balancing a receiver may result in an appreciable amount of noise reduction. However, this method alone may not reduce all the apparent ignition noise.

It is characteristic of an FM receiver, that, at one point in the alignment, a null point in impulse noise response will be reached. This null may vary from installation to installation. As the unit leaves the factory, the receiver is tuned to the exact operating frequency and is properly adjusted for proper noise balance. However, if it is found necessary to noise balance the receiver at some future date (as the set ages) or in some specific installation, the following procedures should be used.

NOTE

When balancing "Extender" model radio sets, place the EXTEND-STD-REJECT switch in the STD position.

(1) Using a UHF "T" connector, connect the signal generator and pulse generator to the antenna input.

(2) Adjust the signal generator to produce 20 to 30 db quieting.

(3) Adjust the radio set volume control to normal listening level.

(4) Plug the metering cable of a test set (Motorola Model TU546, TU546P or equivalent) into the meter receptacle on the receiver.

(5) Place the test set selector switch in position 1 or 2 and note the meter reading.

(6) Connect the output of a tone generator (Motorola Model TEK-1A or equivalent) to the external modulation jack (EXT MOD) of the pulse generator.

(7) Set the tone generator for 1 kc and adjust the level from one half to full open.

(8) Set the pulse generator to 100 kc and adjust the level control until a definite noise is heard in the speaker.

(9) Change the receiver i-f coil adjustment, one at a time, and note the amount of audible noise reduction. Return each coil to its normal peaked adjustment.

(10) Readjust the i-f coil which had the largest noise reducing effect. The adjustment should not reduce the test meter reading (in position 2) by more than one-half microampere.

3. MAINTENANCE

a. Battery Replacement

To replace batteries in the unit, simply remove two screws holding the bottom plate. Remove the plate and insert two 6.5 v mercury batteries. (See battery note in Parts List)

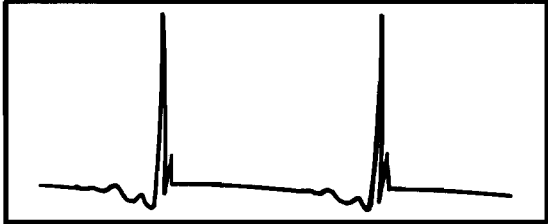
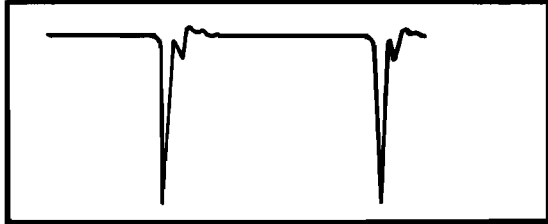
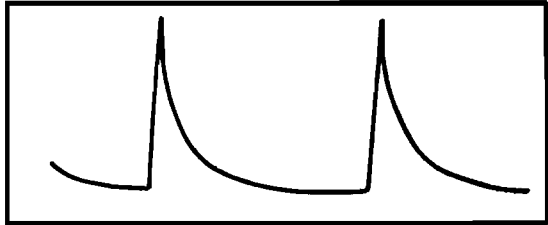
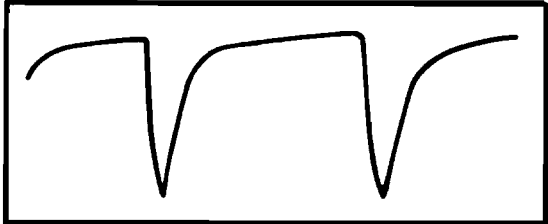
WARNING

Do not discard mercury batteries in fire as they may explode.

b. Calibration

The frequency of the pulse generator can be checked by using an oscilloscope with a calibrated time base (Motorola T1014 or equivalent). The recommended procedure is as shown on page 4.

TABLE

EXTENDER CHANNEL COMPONENT	NORMAL WAVEFORM
DETECTOR TRANSISTOR COLLECTOR	
FIRST PULSE AMPLIFIER COLLECTOR	
SECOND PULSE AMPLIFIER COLLECTOR	
THIRD PULSE AMPLIFIER COLLECTOR	

AEPD-6611-O

AEPD-6612-O

AEPD-6613-O

AEPD-6614-O

(1) Adjust the oscilloscope for 10 centimeter sweep rate.

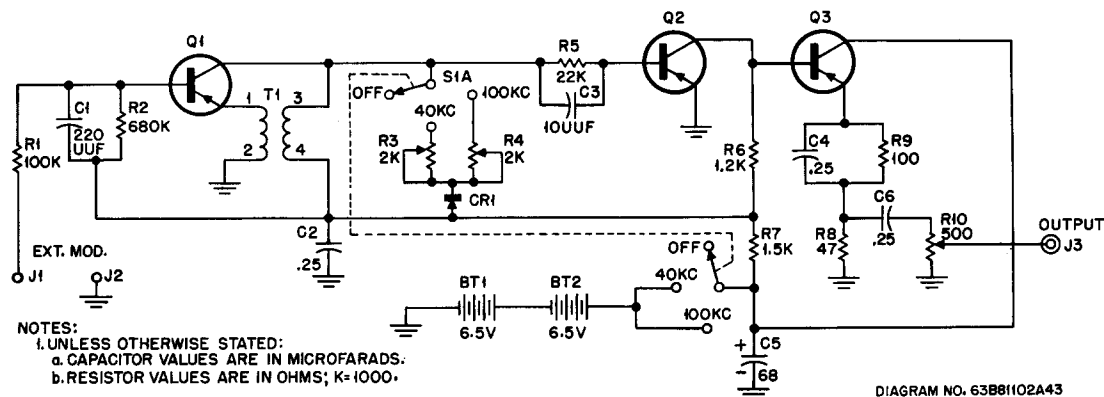
(2) Connect the output of the pulse generator to the oscilloscope and place the pulse generator selector switch in the 100 kc position.

(3) Adjust the internal potentiometer, R4, of the pulse generator for one pulse per centimeter on the oscilloscope.

(4) Adjust the oscilloscope for 50 centimeter sweep rate.

(5) Place the pulse generator selector switch in the 40 kc position.

(6) Adjust the internal potentiometer, R3, of the pulse generator for two pulses per centimeter on the oscilloscope.



PARTS LIST for Schematic Diagram 63B81102A43-O

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1	21C82187B08	CAPACITOR, fixed: uf; unless stated
C2, 4, 6	8K834384	220 uuf ±10%; 500 v
C3	21C868206	0.25 ±20%; 200 v
C5	23K865594	10 uuf ±10%; 200 v
		68 ±10%; 15 v
CR1	48B811119	SEMICONDUCTOR DEVICE, diode: (SEE NOTE) germanium
J1	9A833982	CONNECTOR, receptacle: single contact; black
J2	9K833983	single contact; red
J3	9B855268	BNC; fem
Q1	48A124363	TRANSISTOR; (SEE NOTE) P-N-P
Q2, 3	48R134579	P-N-P
R1	6R6031	RESISTOR, fixed: ±10%; 1/2 w; unless stated
R2	6R6475	100K
R3, 4	18K847061	680K
R5	6R6397	variable; 2K ±20%; .2 w
R6	6R6393	22K
R7	6R6038	1.2K
R8	6R5550	1.5K
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REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R9	6R6326	100
R10	18C801878	variable; 500 ±20%; 1/4 w
S1	40A82835C01	SWITCH: rotary; 2 pole, 3 pos.
T1	25B82805C01	TRANSFORMER: pri: coded 1 & 2; d-c res. .4 Ω sec: coded 3 & 4; d-c res. .6 Ω
BT1, 2	60B863919	BATTERY, mercury: See note 6.5 v
NON-REFERENCED ITEMS		
	31B82804C01	Eyelet Circuit Bd.
	42B82836C01	Battery Holder

NOTE:

Replacement transistors or crystal units (diodes) must be ordered by Motorola part number for optimum performance.

Note: The battery may be one of the following brands and types:

Eveready E-135N, Burgess H135R, Mallory TR-135R, or Ray-O-Vac T-135N

This is a 6.75 volt, 1000 mAh mercury battery that is 0.662" diameter and 3.245" long.