2-WAY MOBILE RADIO

MAINTENANCE MANUAL
for
TPL CHANNEL GUARD UNITS

Encoder-Decoder Models 4EK12A10 and 11
Encoder Model 4EH13A10
Decoder Models 4EJ14A10 and 11

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SPECIFICATIONS

Channel-Guard Tone Squelch Encoder

Output: 3 volts rms into 17,000 ohms (low band).
1.1 volts rms into 4,000 ohms (high band).

Input: 12 VDC at 8 ma.

Channel-Guard Tone Squelch Decoder

Output: Filtered audio into TPL audio amplifier.
DC control voltage to TPL audio amplifier.

Input: 12 VDC at 25 ma.
30 millivolts of tone (nominal).

Tone Frequencies:

Low Range: 71.9 cps to 156.7 cps.

High Range: 131.8 cps to 203.5 cps.

GENERAL ELECTRIC TRANSISTORIZED PROGRESS LINE CHANNEL GUARD

INTRODUCTION

General Electric Transistorized Progress Line CHANNEL GUARD options are designed to prevent the reception of undesired signals in TPL mobile communications. All signals on a channel are locked out except those which are continuously tone coded for positive identification by a TPL receiver.

The CHANNEL GUARD unit consists of a tone squelch encoder and tone squelch decoder. The encoder provides the properly coded tone for modulating the carrier during transmission and the decoder unsquelches the TPL receiver when the proper tone code is received. Stations and mobiles equipped with CHANNEL GUARD may thus communicate without receiving signals from other users of the same channel.

TPL CHANNEL GUARD permits automatic channel monitoring by reverting to the standard squelch circuit in the TPL receiver when the microphone is removed from the hang-up bracket.

Five models of the TPL CHANNEL GUARD are available. Model 4EK12A10 is an encoder/decoder used in the low tone range of 71.9 to 156.7 cps. Model 4EK12A11 is an encoder/decoder used in the high tone range of 131.8 to 203.5 cps. Model 4EH13A10 is used in encoder only applications. Model 4EJ14A10 is used in low-range decoder only applications, while Model 4EJ14A11 is used in high-range decoder only applications. These models are compatible with TPL Oscillator Board Models 4EG11C10 (Revision D or later) and 4EG11E10.

INSTALLATION

The Tone Squelch Unit is housed in Option Case 5498341-P1 which mounts on the rear panel of the TPL receiver. The transmitter portion of the TPL unit may be attached to the Option Case for single-unit mounting. Option Cable PL-19B204657-G1 connects between the tone squelch unit and option jack J707 on the TPL control unit. Modification Kit PL-4033533-G2 must be installed in the TPL unit. This kit contains a Tone Option Harness (PL-5492146-G2) and option jack J707. Installation Diagram RC-1080 outlines the complete installation procedure.

OPERATION

When the microphone of the TPL combination is on the hang-up bracket, the tone squelch circuit keeps the TPL audio circuits squelched until a signal modulated by the proper tone coding is received. When such a signal is received, the cut-off bias on the TPL audio circuits is removed to permit the receiver to operate.

When a call is initiated, the operator lifts the microphone from the hang-up bracket. The TPL receiver reverts to the standard squelch circuit. The channel may then be monitored. If the operator finds the channel clear, the call is made in the usual manner. The proper tone for unsquelching the receiver of the called radio will be transmitted automatically.

ADJUSTMENT

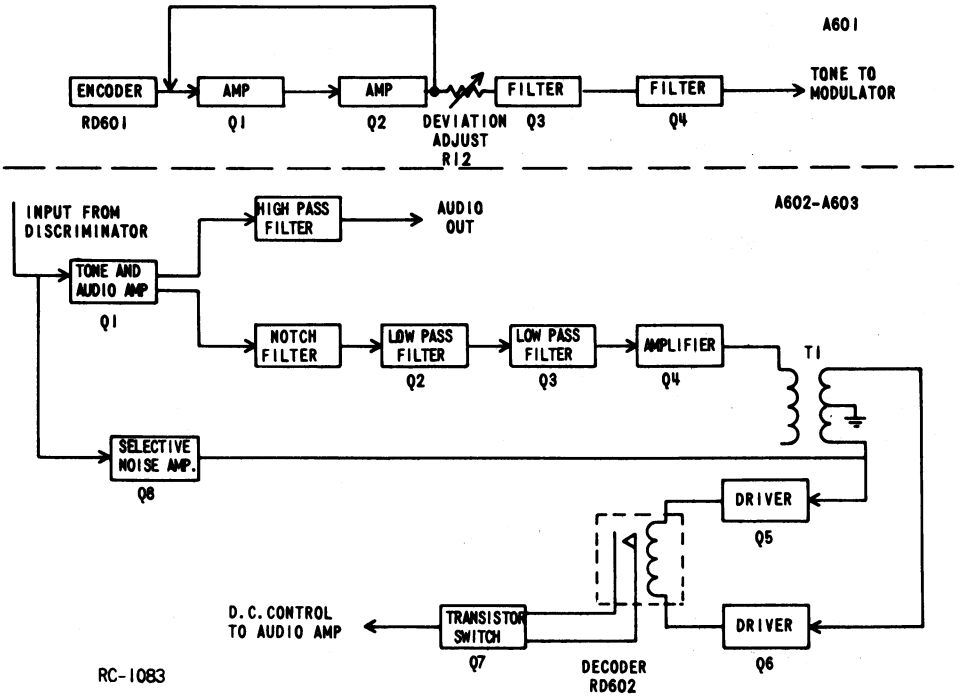
Only one adjustment is required on the tone squelch unit. Normally this adjustment is made at the factory and should require no further adjustment. If operating conditions or system applications are such that adjustment of this control is necessary, the procedure outlined below should be followed.

Low-Band TPL

1. Monitor the TPL transmitter with a deviation monitor.
2. Connect AC-VTVM between J104 (HI) and J114 (shield) on the TPL audio/exciter board.
3. Adjust R12 on the tone squelch encoder board (A601) for 0.75 KC deviation or 3 volts rms as read on the VTVM whichever occurs first. (At least 0.5 KC deviation must be obtained without exceeding 3 volts rms between J104 and J114).

High-Band TPL

1. Monitor the TPL transmitter with a deviation monitor.
2. Adjust R12 on the tone squelch encoder board (A601) for 0.75 KC deviation.



CIRCUIT DESCRIPTION

ENCODER BOARD A601

Q1 and Q2, together with the reed encoder RD601, serve as the tone oscillator portion of the transmitter. RD601 is an electro-mechanical device resonant to the desired tone frequency. The output of Q2 is coupled to RD601 which, in turn, is connected to the base of Q1. The resultant output of the oscillator circuit is essentially a square wave. The tone signal is passed through the deviation control R12, through a band-pass filter composed of Q3-Q4 to the output terminal P601-4. The tone signal is then passed to the oscillator stage of the TPL transmitter.

DECODER BOARDS A602 and A603

Audio from the TPL discriminator is connected to the tone squelch unit through P601-3; the audio signal is amplified by Q1. The collector output of Q1 is divided into two paths: a high-pass filter removes the tone from the audio signal, returning the speech frequencies to the TPL audio circuits through P601-6; the other path passes the tone signal through a low-pass filter Q2-Q3. Component selection in this circuit determines the tone range of the Channel Guard decoder.

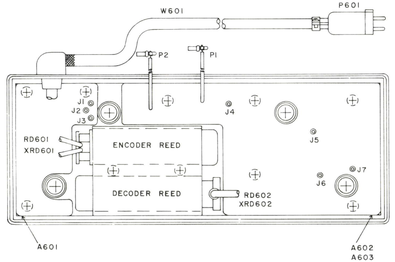
The tone is amplified by Q4 and passed to a push-pull driver circuit composed of T1 and Q5-Q6. This stage drives the reed decoder RD602.

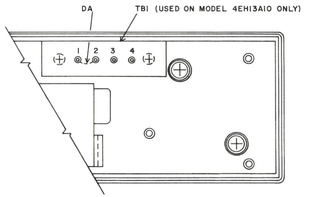
The reed is resonant to the desired tone frequency and its contacts will close only when the correct tone frequency is present. Noise frequencies above 5 KC which are present in the audio signal are amplified by Q8 and applied to the driver stage to decrease the sensitivity of the reed decoder and thus reduce noise falsing in the decoder.

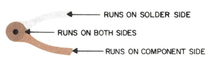
Transistor switch Q7 controls the squelch function in the TPL audio circuits. As long as the hookswitch is operated (mike on hook), Q7 is conducting. Conduction of Q7 supplies a control voltage through P601-2 to the audio stages of the TPL receiver to keep the latter squelched. When the microphone is removed from the hookswitch (or a tone of the proper frequency is received to close the contacts of RD602) Q7 is turned off unsquelching the TPL receiver.

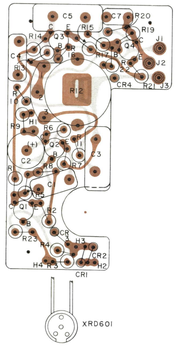
MAINTENANCE

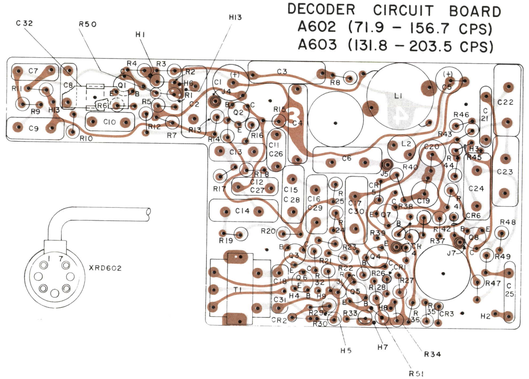
Refer to the Service Sheet (RC-1082) for component location and voltage readings of the Channel Guard units.





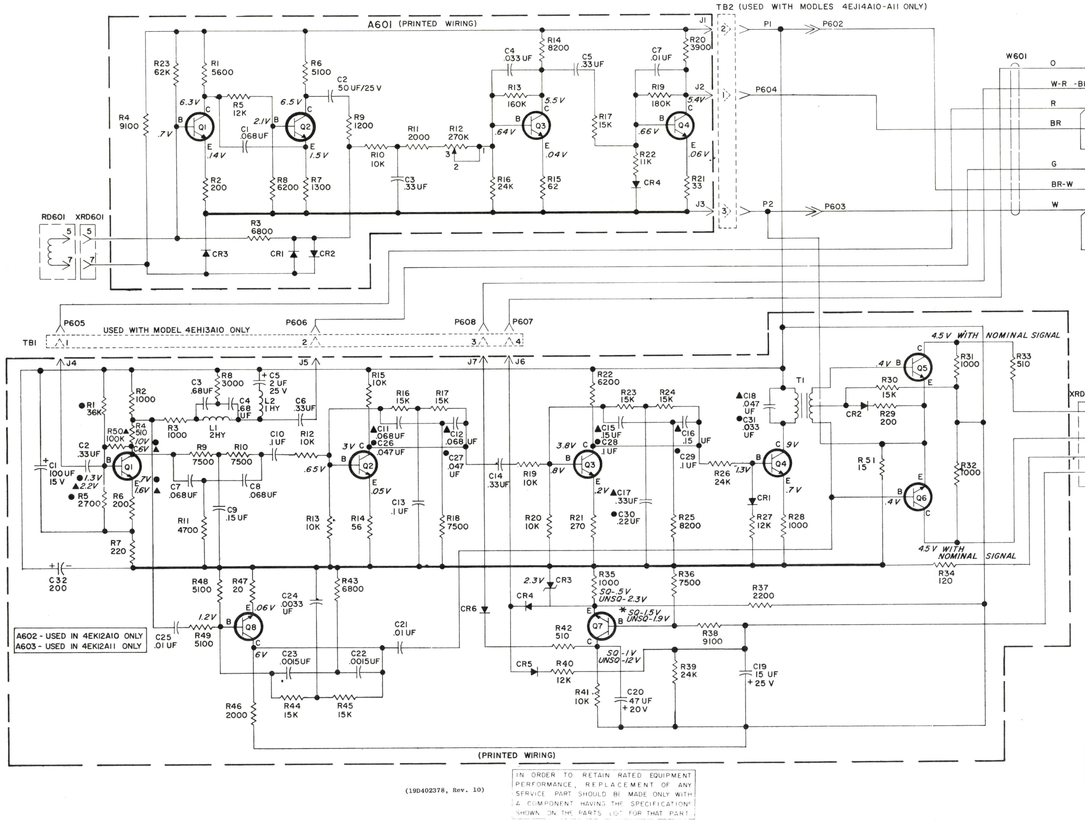






(19D402496, Rev. 4)
(19B204647, Sh. 1, Rev. 1)
(19B204647, Sh. 2, Rev. 1)

(19D402496, Rev. 4)
(19C303331, Sh. 1, Rev. 3)
(19C303331, Sh. 2, Rev. 4)



Service Sheet

TPL CHANNEL GUARD UNITS
MODELS 4EK12A10 & 11, REV. E
MODEL 4EH13A10
MODELS 4EJ14A10 & 11, REV. E

(RC-1082D, Sheet 1)
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PARTS LIST

TPL CHANNEL GUARD UNITS

ENCODER/DECODER	MODEL 4EX12A10 (PL-19D402376-G1) REV E
ENCODER/DECODER	MODEL 4EJ12A11 (PL-19D402376-G2) REV E
ENCODER	MODEL 4HU13A10 (PL-19D402376-G3)
DECODER	MODEL 4EJ14A10 (PL-19D402376-G4) REV E
DECODER	MODEL 4EJ14A11 (PL-19D402376-G5) REV E

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - SUBASSEMBLIES - - - - - - - - -
A601		ENCODER CIRCUIT BOARD PL-19C203525-G1 (Used in Models 4EX12A10, 11, 4EH13A10)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	5491189-P105	Mylars, epoxy-dipped: .068 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C2	5495670-P18	Electrolytic tubular: 50 µF +100% -10%, 25 VDCW; sim to Sprague 30D186A1.
C3	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C4	5491189-P103	Mylars, epoxy-dipped: .033 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C5	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C7	5491189-P101	Mylars, epoxy-dipped: .01 µF ±20%, 50 VDCW; sim to Good-All 601PE.
		- - - - - - - - - RECTIFIERS - - - - - - - - -
CR1 thru CR4	4036936-P1	Silicon; sim to HD-4418.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J3	4033513-P4	Pin, contact: sim to Bead Chain L93-3.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q4	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77-P562K	Fixed composition: 5600 ohms ±10%, 1/2 w.
R2	3R77-P201K	Fixed composition: 200 ohms ±10%, 1/2 w.
R3	3R77-P682J	Fixed composition: 6800 ohms ±5%, 1/2 w.
R4	3R77-P912K	Fixed composition: 9100 ohms ±10%, 1/2 w.
R5	3R77-P123K	Fixed composition: 12,000 ohms ±10%, 1/2 w.
R6	3R77-P512K	Fixed composition: 5100 ohms ±10%, 1/2 w.
R7	3R77-P132K	Fixed composition: 1300 ohms ±10%, 1/2 w.
R8	3R77-P622K	Fixed composition: 6200 ohms ±10%, 1/2 w.
R9	3R77-P122K	Fixed composition: 1200 ohms ±10%, 1/2 w.
R10	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R11	3R77-P202K	Fixed composition: 2000 ohms ±10%, 1/2 w.
R12	7491365-P9	Variable, carbon film: 0.25 megohm ±20%, 0.1 w, linear taper; sim to CTS Type UPS-70.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - RESISTORS(Cont'd) - - - - - - - - -
R13	3R77-P164K	Fixed composition: 0.16 megohm ±10%, 1/2 w.
R14	3R77-P822K	Fixed composition: 8200 ohms ±10%, 1/2 w.
R15	3R77-P620K	Fixed composition: 62 ohms ±10%, 1/2 w.
R16	3R152-P243K	Fixed composition: 24,000 ohms ±10%, 1/4 w.
R17	3R77-P153K	Fixed composition: 15,000 ohms ±10%, 1/2 w.
R19	3R77-P184K	Fixed composition: 0.18 megohm ±10%, 1/2 w.
R20	3R153-P392K	Fixed composition: 3900 ohms ±10%, 1/4 w.
R21	3R77-P330K	Fixed composition: 33 ohms ±10%, 1/2 w.
R22	3R77-P113K	Fixed composition: 11,000 ohms ±10%, 1/2 w.
R23	3R77-P623K	Fixed composition: 62,000 ohms ±10%, 1/2 w.
		- - - - - - - - - SOCKETS - - - - - - - - -
XRD601	19A115068-P1	Tube: 7-pin miniature.
A602		71.9-156.7 CPS DECODER CIRCUIT BOARD PL-19D402370-G1 (Used in Models 4EX12A10, 4EJ14A10)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	5495670-P10	Electrolytic tubular: 100 µF +100% -10%, 15 VDCW; sim to Sprague 30D172A1.
C2	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C3 and C4	19C307083-P20	Mylars dielectric: 0.68 µF ±20%, 50 VDCW; sim to G-E 65F18AB584.
C5	5495670-P13	Electrolytic tubular: 2 µF +100% -10%, 25 VDCW; sim to Sprague 30D176A1.
C6	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C7 and C8	5491189-P105	Mylars, epoxy-dipped: .068 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C9	5491189-P107	Mylars, epoxy-dipped: 0.15 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C10	5491189-P106	Mylars, epoxy-dipped: 0.1 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C11 and C12	5491189-P105	Mylars, epoxy-dipped: .068 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C13	5491189-P106	Mylars, epoxy-dipped: 0.1 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C14	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C15 and C16	5491189-P107	Mylars, epoxy-dipped: 0.15 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C17	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C18*	5491189-P104	Mylars, epoxy-dipped: .047 µF ±20%, 50 VDCW; sim to Good-All 601PE. In Models of Rev A or earlier: Mylars, epoxy-dipped: .068 µF ±20%, 50 VDCW; sim to Good-All 601PE.
	5491189-P105	
C19*	7489483-P8	Electrolytic, tubular: 15 µF +75% -10%, 25 VDCW; sim to Sprague 30D183A1. In Models of Rev D: Electrolytic, tubular: 20 µF +75% -10%, 50 VDCW; sim to Sprague 30D198A1.
	7489483-P11	
	5496267-P12	Tantalum, dry solid: 150 µF ±20%, 15 VDCW; sim to Sprague Type 150D. In Models of Rev B or earlier: Electrolytic, tubular: 20 µF +75% -10%, 50 VDCW; sim to Sprague 30D198A1.
	7489483-P11	

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - CAPACITORS(Cont'd) - - - - - - - - -
C20	5496267-P15	Tantalum, dry solid: 47 µF ±20%, 20 VDCW; sim to Sprague Type 150D.
C21	7774750-P13	Fixed ceramic disc: single unit, .01 µF +100% -0%, 500 VDCW.
C22 and C23	19A115028-P201	Mylars-dielectric: .0015 µF ±10%, 200 VDCW.
C24	19A115028-P203	Mylars-dielectric: .0033 µF ±10%, 200 VDCW.
C25	7774750-P13	Fixed ceramic disc: single unit, .01 µF +100% -0%, 500 VDCW.
C32*	7489483-P20	Electrolytic, tubular: 200 µF +75% -10%, 15 VDCW; sim to Sprague 30D174A1. (Added by Rev A).
		- - - - - - - - - RECTIFIERS - - - - - - - - -
CR1 and CR2	7777146-P3	Germanium; sim to 1N90.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J4 thru J7	4033513-P4	Pin, contact: sim to Bead Chain L93-3.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	PL-19B204667-G1	Coil, 2 hy.
L2	5491736-P5	Choke: 1000 mh ±20%, 580 ohms; sim to Aladdin 33-328.
		- - - - - - - - - PLUGS - - - - - - - - -
P1 and P2	4033348-P1	Contact, female friction: sim to Bead Chain M 125-34.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q8	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1*	3R77-P363K	Fixed composition: 36,000 ohms ±10%, 1/2 w. (Deleted by Rev A).
R2 and R3	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R4	3R77-P511K	Fixed composition: 510 ohms ±10%, 1/2 w.
R5*	3R77-P272K	Fixed composition: 2700 ohms ±10%, 1/2 w. In Models of Rev A or earlier: Fixed composition: 270 ohms ±10%, 1/2 w.
R6	3R77-P201K	Fixed composition: 200 ohms ±10%, 1/2 w.
R7	3R77-P221K	Fixed composition: 220 ohms ±10%, 1/2 w.
R8	3R77-P302K	Fixed composition: 3000 ohms ±10%, 1/2 w.
R9 and R10	3R77-P753J	Fixed composition: 75000 ohms ±5%, 1/2 w. (Added by Rev A).
R11	3R77-P472J	Fixed composition: 4700 ohms ±5%, 1/2 w.
R12 and R13	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - RESISTORS(Cont'd) - - - - - - - - -
R14	3R77-P560K	Fixed composition: 56 ohms ±10%, 1/2 w.
R15	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R16 and R17	3R77-P153J	Fixed composition: 15,000 ohms ±5%, 1/2 w.
R18	3R77-P753J	Fixed composition: 75000 ohms ±5%, 1/2 w.
R19 and R20	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R21*	3R77-P201J 3R77-P271K	Fixed composition: 200 ohms ±5%, 1/2 w. In Models of Rev A or earlier: Fixed composition: 270 ohms ±10%, 1/2 w.
R22	3R77-P622K	Fixed composition: 6200 ohms ±10%, 1/2 w.
R23 and R24	3R77-P153J	Fixed composition: 15,000 ohms ±5%, 1/2 w.
R25	3R77-P822J	Fixed composition: 8200 ohms ±5%, 1/2 w.
R26	3R77-P243K	Fixed composition: 24,000 ohms ±10%, 1/2 w.
R27	3R77-P123K	Fixed composition: 12,000 ohms ±10%, 1/2 w.
R28	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R29	3R77-P201K	Fixed composition: 200 ohms ±10%, 1/2 w.
R30	3R77-P153K	Fixed composition: 15,000 ohms ±10%, 1/2 w.
R31 and R32	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R33	3R77-P511K	Fixed composition: 510 ohms ±10%, 1/2 w.
R34*	3R77-P121K 3R77-P100K	Fixed composition: 120 ohms ±10%, 1/2 w. In Models of Rev D: Fixed composition: 10 ohms ±10%, 1/2 w. In Models of Rev C or earlier:
	3R77-P121K	Fixed composition: 120 ohms ±10%, 1/2 w.
R35	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R36*	3R77-P752J 3R77-P512K	Fixed composition: 7500 ohms ±5%, 1/2 w. In Models of Rev D or earlier: Fixed composition: 5100 ohms ±10%, 1/2 w.
R37	3R77-P222K	Fixed composition: 2200 ohms ±10%, 1/2 w.
R38*	3R77-P912J 3R77-P511K	Fixed composition: 9100 ohms ±5%, 1/2 w. In Models of Rev D or earlier: Fixed composition: 510 ohms ±10%, 1/2 w.
R39	3R77-P243K	Fixed composition: 24,000 ohms ±10%, 1/2 w.
R40*	3R77-P123K 3R77-P912K	Fixed composition: 12,000 ohms ±10%, 1/2 w. In Models of Rev D or earlier: Fixed composition: 9100 ohms ±10%, 1/2 w.
R41	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R42	3R77-P511K	Fixed composition: 510 ohms ±10%, 1/2 w.
R43	3R77-P682K	Fixed composition: 6800 ohms ±10%, 1/2 w.
R44 and R45	3R77-P153K	Fixed composition: 15,000 ohms ±10%, 1/2 w.
R46	3R77-P202K	Fixed composition: 2000 ohms ±10%, 1/2 w.
R47	3R77-P200K	Fixed composition: 20 ohms ±10%, 1/2 w.
R48 and R49	3R77-P512K	Fixed composition: 5100 ohms ±10%, 1/2 w.
R50*	3R77-P104K	Fixed composition: 0.1 megohm ±10%, 1/2 w. (Added by Rev A).
R51*	3R77-P150K	Fixed composition: 15 ohms ±10%, 1/2 w. (Added by Rev A).

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19C307118-P1	Audio frequency: freq range 50 to 200 cps, Pri: 23,000 ohms ±10% imp, 2880 ohms ±10% DC res, Sec: 8000 ohms imp, 682 ohms ±10% DC res.
		- - - - - - - - - SOCKETS - - - - - - - - -
XRD602	19A115068-P2	Tube: 7-pin miniature.
A603		131.8-203.5 CPS DECODER CIRCUIT BOARD PL-19D402370-G2 (Used in Models 4EX12A11, 4EJ14A11)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	5495670-P10	Electrolytic tubular: 100 µF +100% -10%, 15 VDCW; sim to Sprague 30D172A1.
C2	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C3 and C4	19C307083-P20	Mylars dielectric: 0.68 µF ±20%, 50 VDCW; sim to G-E 65F18AB584.
C5	5495670-P13	Electrolytic tubular: 2 µF +100% -10%, 25 VDCW; sim to Sprague 30D176A1.
C6	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C7 and C8	5491189-P105	Mylars, epoxy-dipped: .068 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C9	5491189-P107	Mylars, epoxy-dipped: 0.15 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C10	5491189-P106	Mylars, epoxy-dipped: 0.1 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C13	5491189-P106	Mylars, epoxy-dipped: 0.1 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C14	5491189-P109	Mylars, epoxy-dipped: 0.33 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C19*	7489483-P8	Electrolytic, tubular: 15 µF +75% -10%, 25 VDCW; sim to Sprague 30D183A1. In Models of Rev D: Electrolytic, tubular: 20 µF +75% -10%, 50 VDCW; sim to Sprague 30D198A1.
	7489483-P11	
C20	5496267-P12	Tantalum, dry solid: 150 µF ±20%, 15 VDCW; sim to Sprague Type 150D. In Models of Rev B or earlier: Electrolytic, tubular: 20 µF +75% -10%, 50 VDCW; sim to Sprague 30D198A1.
	7489483-P11	
C21	7774750-P13	Fixed ceramic disc: single unit, .01 µF +100% -0%, 500 VDCW.
C22 and C23	19A115028-P201	Mylars-dielectric: .0015 µF ±10%, 200 VDCW.
C24	19A115028-P203	Mylars-dielectric: .0033 µF ±10%, 200 VDCW.
C25	7774750-P13	Fixed ceramic disc: single unit, .01 µF +100% -0%, 500 VDCW.
C26 and C27	5491189-P104	Mylars, epoxy-dipped: .047 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C28 and C29	5491189-P106	Mylars, epoxy-dipped: 0.1 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C30	5491189-P108	Mylars, epoxy-dipped: 0.22 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C31	5491189-P103	Mylars, epoxy-dipped: .033 µF ±20%, 50 VDCW; sim to Good-All 601PE.
C32*	7489483-P20	Electrolytic, tubular: 200 µF +75% -10%, 15 VDCW; sim to Sprague 30D174A1. (Added by Rev A).

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - RECTIFIERS - - - - - - - - -
CR1 and CR2	7777146-P3	Germanium; sim to 1N90.
CR3	4036887-P1	Silicon, Zeners; sim to HZ2.3.
CR4 thru CR6	5491705-P2	Silicon; sim to HD6225.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J4 thru J7	4033513-P4	Pin, contact: sim to Bead Chain L93-3.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	PL-19B204667-G1	Coil, 2 hy.
L2	5491736-P5	Choke: 1000 mh ±20%, 580 ohms; sim to Aladdin 33-328.
		- - - - - - - - - PLUGS - - - - - - - - -
P1 and P2	4033348-P1	Contact: sim to Bead Chain M 125-34.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q8	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77-P363K	Fixed composition: 36,000 ohms ±10%, 1/2 w.
R2 and R3	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R4	3R77-P511K	Fixed composition: 510 ohms ±10%, 1/2 w.
R5*	3R77-P272K	Fixed composition: 2700 ohms ±10%, 1/2 w.
R6	3R77-P201K	Fixed composition: 200 ohms ±10%, 1/2 w.
R7	3R77-P221K	Fixed composition: 220 ohms ±10%, 1/2 w.
R8	3R77-P302K	Fixed composition: 3000 ohms ±10%, 1/2 w.
R9 and R10	3R77-P753J	Fixed composition: 7500 ohms ±5%, 1/2 w.
R11	3R77-P472J	Fixed composition: 4700 ohms ±5%, 1/2 w.
R12 and R13	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R14	3R77-P560K	Fixed composition: 56 ohms ±10%, 1/2 w.
R15	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R16 and R17	3R77-P153J	Fixed composition: 15,000 ohms ±5%, 1/2 w.
R18	3R77-P752J	Fixed composition: 7500 ohms ±5%, 1/2 w.
R19 and R20	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R21*	3R77-P201J 3R77-P271K	Fixed composition: 200 ohms ±5%, 1/2 w. In Models of Rev A or earlier: Fixed composition: 270 ohms ±10%, 1/2 w.
R22	3R77-P622K	Fixed composition: 6200 ohms ±10%, 1/2 w.
R23 and R24	3R77-P153J	Fixed composition: 15,000 ohms ±5%, 1/2 w.
R25	3R77-P822J	Fixed composition: 8200 ohms ±5%, 1/2 w.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - RESISTORS(Cont'd) - - - - - - - - -
R26	3R77-P243K	Fixed composition: 24,000 ohms ±10%, 1/2 w.
R27	3R77-P123K	Fixed composition: 12,000 ohms ±10%, 1/2 w.
R28	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R29	3R77-P201K	Fixed composition: 200 ohms ±10%, 1/2 w.
R30	3R77-P153K	Fixed composition: 15,000 ohms ±10%, 1/2 w.
R31 and R32	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R33	3R77-P511K	Fixed composition: 510 ohms ±10%, 1/2 w.
R34*	3R77-P121K 3R77-P100K	Fixed composition: 120 ohms ±10%, 1/2 w. In Models of Rev D: Fixed composition: 10 ohms ±10%, 1/2 w.
	3R77-P121K	In Models of Rev C or earlier: Fixed composition: 120 ohms ±10%, 1/2 w.
R35	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R36*	3R77-P752J 3R77-P512K	Fixed composition: 7500 ohms ±5%, 1/2 w. In Models of Rev D or earlier: Fixed composition: 5100 ohms ±10%, 1/2 w.
R37	3R77-P222K	Fixed composition: 2200 ohms ±10%, 1/2 w.
R38*	3R77-P912J 3R77-P511K	Fixed composition: 9100 ohms ±5%, 1/2 w. In Models of Rev D or earlier: Fixed composition: 510 ohms ±10%, 1/2 w.
R39	3R77-P243K	Fixed composition: 24,000 ohms ±10%, 1/2 w.
R40*	3R77-P123K 3R77-P912K	Fixed composition: 12,000 ohms ±10%, 1/2 w. In Models of Rev D or earlier: Fixed composition: 9100 ohms ±10%, 1/2 w.
R41	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R42	3R77-P511K	Fixed composition: 510 ohms ±10%, 1/2 w.
R43	3R77-P682K	Fixed composition: 6800 ohms ±10%, 1/2 w.
R44 and R45	3R77-P153K	Fixed composition: 15,000 ohms ±10%, 1/2 w.
R46	3R77-P202K	Fixed composition: 2000 ohms ±10%, 1/2 w.
R47	3R77-P200K	Fixed composition: 20 ohms ±10%, 1/2 w.
R48 and R49	3R77-P512K	Fixed composition: 5100 ohms ±10%, 1/2 w.
R50*	3R77-P104K	Fixed composition: 0.1 megohm ±10%, 1/2 w. (Added by Rev A).
R51*	3R77-P150K	Fixed composition: 15 ohms ±10%, 1/2 w. (Added by Rev A).
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19C307118-P1	Audio frequency: freq range 50 to 200 cps, Pri: 23,000 ohms ±10% imp, 2880 ohms ±10% DC res, Sec: 8000 ohms imp, 682 ohms ±10% DC res.
		- - - - - - - - - SOCKETS - - - - - - - - -
XRD602	19A115068-P2	Tube: 7-pin miniature.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	PL-19A121353-G1	Terminal Board. Includes (4) pin contacts. (Used in Model 4HU13A10).
TB2	PL-19A121843-G1	Terminal Board. Includes (3) pin contacts. (Used in Models 4EJ14A10, 11).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W601		CABLE ASSEMBLY PL-19B204657-G1
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P601	5495345-P11	Connector: 10 male contacts, black phenolic; sim to Component Mfg Service 6601-M10.
P602 thru P608	4029840-P1	Contact, electrical: sim to Amp 41854.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5498341-P1	Housing: 8.64 x 3.4 x .062 inches, gray semigloss phosphate aluminum alloy. (Used with A601, 602, 603).
	PL-19B204653-G1	Support: 8.27 x 3 x .064 inches, chromate coated aluminum alloy. (Used with RD601, 602).
	PL-19A121348-G1	Upper Support: 2.5 x 2.04 x 0.5 inches, chromate coated aluminum alloy. (Used with RD601, 602).
	7491987-P7	Bushing, strain relief: 2.011 x 0.63 x 0.562 inches, wire; sim to Heyman Mfg SR-16-1. (Used with W701).
	4032591-P27	Insulator: 2 x 0.75 x 0.188 inches, sponge rubber. (Used with RD601, 602).
	19A121370-P1	Support: 2.5 x 0.89 x 0.8 inches, chromate coated aluminum alloy. (Replaces RD602). (Used in Model 4EH13A10, 4EJ14A10, 11).
	5492309-P1	Clip, mounting: nylon. (Used with C32 in A602, 603). (Added by Rev A).
		- - - - - - - - RESONANT REED ENCODER - - - - - - - -
RD601		Reed, governor: Coil - 600 ohms ±10%, standard 7-pin tube socket mounting.
		LO RANGE
	3R161-P719	71.9 cps
	3R161-P770	77.0 cps
	3R161-P825	82.5 cps
	3R161-P885	88.5 cps
	3R161-P948	94.8 cps
	3R161-P1000	100.0 cps
	3R161-P1035	103.5 cps
	3R161-P1072	107.2 cps
	3R161-P1109	110.9 cps
	3R161-P1148	114.8 cps
	3R161-P1188	118.8 cps
	3R161-P1230	123.0 cps
	3R161-P1273	127.3 cps
	3R161-P1318	131.8 cps
	3R161-P1365	136.5 cps
	3R161-P1413	141.3 cps
	3R161-P1462	146.2 cps
	3R161-P1514	151.4 cps
	3R161-P1567	156.7 cps
		HIGH RANGE
	3R161-P1318	131.8 cps
	3R161-P1365	136.5 cps
	3R161-P1413	141.3 cps
	3R161-P1462	146.2 cps
	3R161-P1514	151.4 cps
	3R161-P1567	156.7 cps
	3R161-P1622	162.2 cps
	3R161-P1679	167.9 cps
	3R161-P1738	173.8 cps
	3R161-P1799	179.9 cps
	3R161-P1862	186.2 cps
	3R161-P1928	192.8 cps
	3R161-P2035	203.5 cps

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - RESONANT REED DECODER - - - - - - - -
RD602		Reed, detector: Coil - 600 ohms ±10%, standard 7-pin tube socket mounting. (Used in Models 4EK12A10, 11, 4EJ14A10, 11).
		LO RANGE
	19C307140-P719	71.9 cps
	19C307140-P770	77.0 cps
	19C307140-P825	82.5 cps
	19C307140-P885	88.5 cps
	19C307140-P948	94.8 cps
	19C307140-P1000	100.0 cps
	19C307140-P1035	103.5 cps
	19C307140-P1072	107.2 cps
	19C307140-P1109	110.9 cps
	19C307140-P1148	114.8 cps
	19C307140-P1188	118.8 cps
	19C307140-P1230	123.0 cps
	19C307140-P1273	127.3 cps
	19C307140-P1318	131.8 cps
	19C307140-P1365	136.5 cps
	19C307140-P1413	141.3 cps
	19C307140-P1462	146.2 cps
	19C307140-P1514	151.4 cps
	19C307140-P1567	156.7 cps
		HIGH RANGE
	19C307140-P1318	131.8 cps
	19C307140-P1365	136.5 cps
	19C307140-P1413	141.3 cps
	19C307140-P1462	146.2 cps
	19C307140-P1514	151.4 cps
	19C307140-P1567	156.7 cps
	19C307140-P1622	162.2 cps
	19C307140-P1679	167.9 cps
	19C307140-P1738	173.8 cps
	19C307140-P1799	179.9 cps
	19C307140-P1862	186.2 cps
	19C307140-P1928	192.8 cps
	19C307140-P2035	203.5 cps

PRODUCTION CHANGES

Refer to the PARTS LIST for descriptions of parts affected by the following revisions.

REV. A - Models 4EJ14A10 and 4EK12A10 Only

To eliminate alternator noise and increase bandwidth, following changes were made on decoder board A602.
Added R50, R51 and C32. Deleted R1 and R5.

REV. A - Models 4EJ14A11 and 4EK12A11 Only

To eliminate alternator noise and increase bandwidth, following changes were made on decoder board A603.
Added R51 and C32.

REV. B - Models 4EJ14A10 and 11 Only
REV. B - Models 4EK12A10 and 11 Only

To improve system operating margin, following changes were made on decoder boards A602 and A603.
Reversed leads of R28 and R29.
Connected R51 across top of R28 and R29.
Connected jumper from junction R29-R51 to P2.
Connected negative lead of C32 to H5.
Changed value of C18 (on A602 only).
Changed value of R21.

REV. C - Models 4EJ14A10 and 11 Only
REV. C - Models 4EK12A10 and 11 Only

To prevent intermittent squelch operation at beginning of call, using decoder reed 3R160 only.
C19 was changed. (Returned to original value by Rev. D.)

REV. D - Models 4EJ14A10 and 11 Only
REV. D - Models 4EK12A10 and 11 Only

To improve system reliability by use of improved decoder reed 19C307140, following changes were made on decoder boards A602 and A603.
R34 was changed and C19 was returned to its original value.

REV. E - Models 4EJ14A10 and 11 Only
REV. E - Models 4EK12A10 and 11 Only

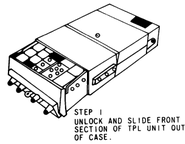
To improve reliability of decoder reed, input impedance of switching circuit was raised so that effects of contact resistance would be negligible. This was accomplished by making following changes on decoder boards A602 and A603.
R34, R36, R38, R40 and C19 were changed.
Lead of R39 was moved from base of Q7 to top of R38 (junction of R38 and C19).
Lead of R40 was moved from base of Q7 to H10.
Red lead was moved from H10 to top of R38.

TABLE 2

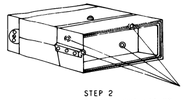
	CONNECTIONS FOR W601		
	WIRE COLOR	TERMINALS	TO JACK
		P1	J1
		P2	J3
	BR	P602	P1
	W	P603	P2
	BR	P604	J2
	R	P605	J4
	G	P606	J5
	O	P607	J6
	BK-R-W	P608	J7
■	R	P605	TB1-1
■	G	P606	TB1-2
■	O	P607	TB1-3
■	BK-R-W	P608	TB1-4
■	DA	TB1-1	TB1-2
▲		P1	TB2-2
▲		P2	TB2-3
▲	BR	P604	TB2-1
▲	BR	P602	P1
▲	W	P603	P2
▲	R	P605	J4
▲	G	P606	J5
▲	O	P607	J6
▲	BK-R-W	P608	J7

■ CONNECTIONS FOR MODEL 4EH13A10 ONLY

▲ CONNECTIONS FOR MODELS 4EJ14A10 & A11

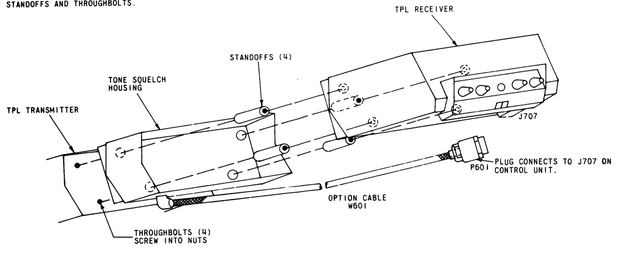


STEP 1
UNLOCK AND SLIDE FRONT SECTION OF TPL UNIT OUT OF CASE.



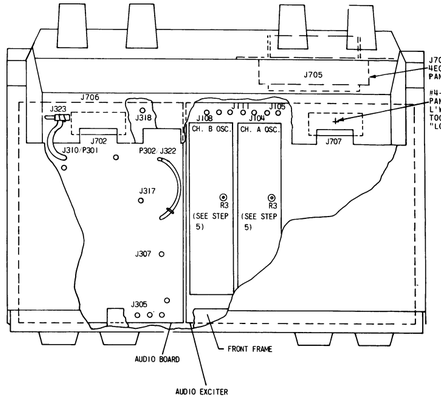
STEP 2
REMOVE FOUR #10-32 SCREWS HOLDING FRONT AND REAR UNITS OF CASE TOGETHER.

STEP 3
ASSEMBLE TONE SQUELCH HOUSING BETWEEN FRONT AND REAR UNITS OF TPL CASE USING THE 4 STANDOFFS AND THROUGHBOLTS.



STEP 4
INSTALL TONE MODIFICATION KIT PL-4033533-G2 PER TABLE I. OPTION JACK J707 IS PART OF THIS KIT AND IS INSTALLED AS SHOWN AT RIGHT.

STEP 5
ON LOW BAND UNITS, CLIP OUT R3 (2.7K) ON OSCILLATOR BOARD 4EG11C10, REV.D OR LATER. IF 2-FREQUENCY UNIT IS USED, REMOVE THIS RESISTOR FROM BOTH OSCILLATORS



NOTE:

FOR FIELD INSTALLATION ONLY:

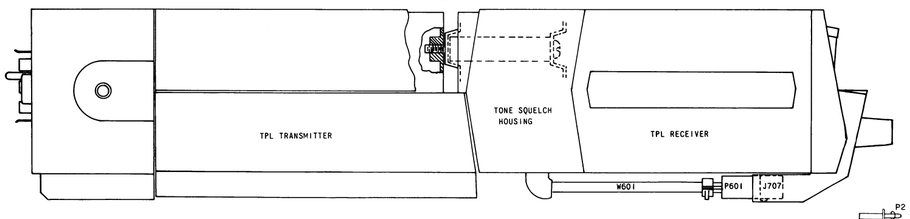
ON OSCILLATOR BOARD 4EG11C10, REV. C OR EARLIER, REMOVE COUPLING CAPACITOR C1 (10 ufd ELECTROLYTIC) AND REPLACE WITH 2 TANTALUM CAPACITORS (5496267-P14, 15 ufd TANTALUM) PROVIDED. CONNECT POSITIVE LEAD OF 1 TANTALUM IN HOLE VACATED BY POSITIVE LEAD OF C1, WITH BODY OF CAPACITOR MOUNTED VERTICALLY. LET NEGATIVE LEAD HANG. PLACE POSITIVE LEAD OF OTHER TANTALUM CAPACITOR IN HOLE VACATED BY NEGATIVE LEAD OF C1. THIS CAPACITOR IS ALSO MOUNTED VERTICALLY. CONNECT THE NEGATIVE LEADS OF THE 2 CAPACITORS TOGETHER.

TABLE I

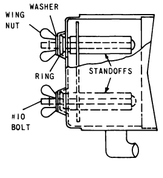
OPERATION	WIRED FROM	WIRE COLOR		PLUG OR JACK	ON TPL UNIT
CONNECT P714*	J707-1	O-R	TO	J706	CONTROL
CONNECT P715	J707-2	BK-BL	TO	J318	AUDIO BOARD
CONNECT P717 & P718	J707-4	BR-G	TO	J104 & J108	AUDIO /EXC.
DISCONNECT P707		BL	FROM	J305	AUDIO BOARD
CONNECT P719	J707-3 & 5	BR-BL	TO	J305	AUDIO BOARD
CONNECT P720	J707-6	R-G	TO	P707	CONTROL
DISCONNECT P705		O-BK	FROM	J307	AUDIO BOARD
CONNECT P721	J707-7	BR-W	TO	J307	AUDIO BOARD
CONNECT 705		O-BK	TO	P721	CONTROL
CONNECT P722*	J707-8 & 10	O	TO	J708	CONTROL
DISCONNECT P702		RG174/U	FROM	J105	AUDIO/EXC.
CONNECT P723	J707-4	BK	TO	J105	AUDIO/EXC.
CONNECT P702		RG174/U	TO	P723	CONTROL

* WHEN USING CONTROL UNIT 4EC45A10, CLIP P722 AND SOLDER WIRE TO J705-11. CLIP P714 AND SOLDER WIRE TO J705-14.

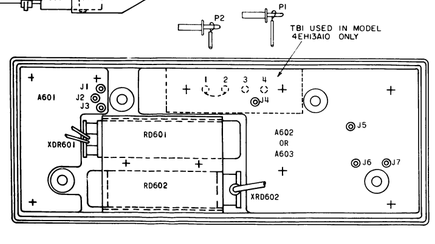
COMPLETED SINGLE-MOUNT ASSEMBLY



TONE SQUELCH HOUSING



IN SPLIT-MOUNT APPLICATIONS SECURE THROUGHBOLTS TO HOUSING WITH WINGNUTS AS SHOWN.



TPL CHANNEL GUARD 4EK12A10, A11, 4EH13A10

RC-1080

Installation Diagram

TPL CHANNEL GUARD
MODELS 4EH13A10 & 4EK12A10, -A11
MODELS 4EJ14A10 & -A11

(RC-1080A)
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