FEDERAL ELECTRIC CORPORATION
BIG RALLY II COMMUNICATION SYSTEM
TEST PROCEDURES
VOLUME II

ESD-TDR 64-451

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BIG RALLY II COMMUNICATION SYSTEM
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VOLUME II

ESD-TDR 64-451

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VOLUME II
TEST PROCEDURES
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG.	
14842	A SIZE	6272924
SCALE	FEC NO.	SHEET 1 OF 2

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

LIST OF MATERIALS

DRAWING NUMBER 6272924 — 2

ITEM NO.	QTY REQD	U OF M	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	
1			MC-50 MULTIPLEX TEST PROC	6272895	
2			AN/TCC-3 MULTIPLEX TEST PROC	6272896	
3			MAIN LINE ORDER WIRE TEST PROC	6272897	
4			TRIBUTARY ORDER WIRE TEST PROC	6272898	
5			TECH. CONTROL CKT TEST PROC	6272899	
6			20 KW PWR GEN TEST PROC	6272900	
7			60 KW PWR GEN TEST PROC	6272901	
8			150 KW PWR GEN TEST PROC	6272902	
			Errata sheets applicable to original editions have		
			been incorporated herein.		

VOLUME II
TEST PROCEDURES

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PREPARED BY H. Jones DATE 3/29/6[illegible]
CHECKED BY [illegible] DATE

CODE IDENT. NO. 14842

DWG SIZE A — LM 6272924 — A

FEC NO.

SHEET 2

DWG NO. 289 ERM57

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TEST PROCEDURES
MC-50 MULTIPLEX
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG.	
14842	A SIZE	6272895
SCALE	FEC NO.	SHEET 1 OF 10

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

1. SCOPE

1.1 This test plan outlines the testing procedures for the MC-50 Multiplex.

2. TEST EQUIPMENT

2.1 Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The Multiplex Equipment must be properly installed and have been placed into operation prior to the performance of the test procedure in accordance with manufacturer's manual.

3.2 Testing procedures will be performed on equipment properly installed with all signal power connections complete.

4. PROCEDURE

4.1 The procedure for performing each test is included within this section. Complete only those tests applicable to the station multiplex configuration.

4.2 The tests shall be completed in the order presented. The procedures herein and the attached data sheets apply to one multiplex group. Repeat these procedures and complete the data sheets for all remaining groups. For group equipment without associated channelizing equipment, patch in an available channel bank and complete those tests applicable to the group equipment.

5. REQUIREMENTS

5.1 MC-50 Station Tests

5.1.1 Master Oscillator Levels (ID only)
5.1.2 Slave Master Oscillator Synchronization and Output Level (All except ID)
5.1.3 Harmonic Generator Level
5.1.4 Channel Carrier Supply Levels
5.1.5 Group Carrier Supply Level
5.1.6 Channel Carrier Leak Level
5.1.7 Group Carrier Leak Level
5.1.8 Signalling Supply Level
5.1.9 Channel Transmit Levels

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Test Procedures MC-50 Multiplex	CODE IDENT. NO. 14842	DWG. SIZE A	6272895 A
PREPARED BY [signature] DATE 3/2 9/64			
CHECKED BY [signature] DATE 4/2/64		FEC NO.	SHEET 2

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5.1.10 Group Transmit Level
5.1.11 Group Receive Levels
5.1.12 Channel Receive Levels

5.2 MC-50 Link Tests

5.2.1 Channel Transmit Levels
5.2.2 Group Transmit Levels
5.2.3 Group Receive Levels
5.2.4 Channel Receive Levels
5.2.5 Channel Frequency Response
5.2.6 Gain Change

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on forms attached.

7. MC-50 STATION MULTIPLEX TESTS (FORM BR11/41)

7.1 Test Equipment

A. Frequency Selective Voltmeter, Sierra 125A

B. VTVM, HP400H or 400D

C. Oscilloscope, Tektronix 317 or OS-8

D. Test Accessory Kit, Motorola MA 289

E. Audio Oscillator, HP200CD or 650A

F. Matching Transformer, HP AC-60B

7.2 Master Oscillator Levels (ID only)

NOTE: All station tests utilizing the selective voltmeter are to be performed in the 600 ohm bridging position with the selector switch in the 250 cps position unless otherwise specified.

A. Connect the selective voltmeter tuned to 64 kc to TP1 on the master oscillator drawer. Record the reading.

B. Connect the selective voltmeter, tuned to 64 kc to PILOT TRANS. TP3 on the Master Oscillator. Record the reading.

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Test Procedures MC-50 Multiplex	CODE IDENT. NO. 14842	DWG. SIZE A	6272895	A
PREPARED BY [illegible] DATE 3/29/64				
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7.3 Slave Master Oscillator Synchronization and Output Level (All except ID)

A. Connect the horizontal plates of an oscilloscope to TP1 on the master oscillator and the vertical plates on pin 21 on the service shelf or to the 64 IN test point on the Alarm Sensor. Adjust the scope for a Lissajous pattern. Pull Q3 on the MU377L and adjust C3 on the MU483 as close as possible to sync as indicated by a stationary pattern. Replace Q3 and note that the Lissajous pattern is locked. Record the results.

B. Connect the selective voltmeter tuned to 64 KC to TP1 on the master oscillator. Record the reading.

7.4 Harmonic Generator Level

Connect the oscilloscope to TP1 (4kc) on the Harmonic Generator. Measure the peak to peak voltage of the 4kc pulse. Record the peak to peak voltage.

7.5 Channel Carrier Supply Levels

A. Connect the frequency selective voltmeter tuned to the correct frequency to CH CARR (TP3) on Channel 1 Demodulator. Record the reading.

B. Perform Step A for the remaining channels in the group.

7.6 Group Carrier Supply Level

Connect the HP ACVTVM to TP3 (GRP CARR) on Group Demodulator. Record the reading. Note: This measurement not required for the base group (60-108 KC) or on any MC-50 operating totally within the 60-108 KC range e.g. the 4 channel tributary systems.

7.7 Channel Carrier Leak Levels

A. Turn CH TRANS control (R5416) on each Channel Modulator to extreme clockwise position.

B. Connect selective voltmeter to GRP IN (TP7) on Group Modulator and tune to the channel carrier frequency. Record the reading. Note: The VF channel transmit side must be terminated in 600 ohms (if remote signalling is being transmitted) and the local signalling supply must be disabled.

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C. Perform Steps A & B for all channels.

D. Patch test tone (1000 cps) at -16 dbm to CH. 1 MOD IN on MC-50 jackfield. Note: On 4 channel tributary systems the first channel will be channel 1, 5 or 9 depending on the particular station under test.

E. Connect selective voltmeter to TP7 of Channel Modulator and adjust CH. TRANS control (R5416) for 7.8 mv. Note: The selective voltmeter is tuned to 1 kc below the channel carrier supply frequency for the channel under test.

F. Perform steps D & E for all channels.

7.8 Group Modulator Carrier Leak Level

Connect selective voltmeter, tuned to group carrier frequency to GRP AMP IN (TP6). Record the reading. Note: This measurement not required for the base group (60-108 kc) or any MC-50 Mux operating totally within the 60-108 kc range, e.g., the 4 channel tributary systems.

7.9 Signalling Supply Level

Connect the HP ACVTVM to TP3 (SIG) on Group Carrier and Signalling Supply drawer. Record the reading.

7.10 Channel Transmit Levels

A. Voice frequency levels to be used at channel inputs - outputs are: -16 dbm transmitting; + 7 dbm receiving.

B. Patch test tone (1000 cps) at proper level to channel 1 MOD IN on MC-50 jackfield.

C. Connect selective voltmeter tuned to the correct frequency to GRP IN (TP7) test point on Group Modulator. Record the reading.

D. Repeat Steps A, B & C for remainder of channels in this group.

E. Extend Channel Modulator 1 drawer on the test shelf. Note: First channel on Tributary Systems may be 1, 5 or 9 depending on the particular station under test.

Test Procedures MC-50 Multiplex	CODE IDENT. NO. 14842	DWG. SIZE A	6272895
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F. Apply -48 V dc to M Lead of the T signalling cord. The -48 volt dc supply can be obtained from pin 199 of VF block.

G. Tune the Selective Voltmeter to 3.825 kc below the channel carrier supply frequency. Record the reading or GRP IN (TP7) test point on Group Modulator.

H. Repeat Steps E through G for all channels in the group.

7.11 Group Transmit Level

A. Patch test tone (1000 cps) at -16 dbm to channels 3 MOD IN at jackfield. Note: On tributary stations equipped with channels 5 through 8 or 9 through 12, use Channel 5 or 9 respectively.

B. Connect selective voltmeter to TP4 (Group Out) of Group Modulator. Tune the selective voltmeter to correct frequency. Record the reading.

C. Verify correct gain of amplifiers between Group Modulator and the radio set as follows:

AN/MRC-85 - With a test tone input to Channel 3 MOD IN in accordance with A above, bridge the Selective Voltmeter across the appropriate modulator input (LF/or HF). Tune the voltmeter to the correct frequency and record the reading.

AN/MRC-80 - With a test tone input to Channel 3 MOD IN in accordance with A above, bridge the Selective Voltmeter (with the input switch in the 135 ohm bridging position) across the 135 ohm input to radio. Tune the voltmeter to the correct frequency and record the reading.

MW 503A - With a test tone input to the appropriate channel in accordance with A above, bridge the Selective Voltmeter across J5 of the 499 J-3 RF Patch panel or between terminal C and ground on the 20D1-MW isolation Amplifier. Tune the Selective Voltmeter to the correct frequency and record the reading.

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DRAWING NUMBER 6272895

7.12 Group Receive Level

A. To test the receive levels, a test tone of proper level (-16 dbm) is patched into the appropriate channel (See step 7.11A above) and multiplex transmit side looped back into the receive side. Looping is accomplished as follows:

AN/MRC-85-Remove one Exciter Modulator from service by transfer and connect a 20 db pad between J-17 on the HF Modulator and J-1 on the Demodulator.

AN/MRC-80-Accomplish an RF Loopback in accordance with 10.2.2 of the AN/MRC-80 Acceptance Test procedures.

MW 503A- Disconnect Jumper cables from J5 and J7 and connect a cable between J5 and J7 on the 499J-3 RF Patch Panel.

B. Connect selective voltmeter tuned to the correct frequency to GRP IN test point TP7 of Group Demodulator. Record the reading.

C. Connect selective voltmeter tuned to the correct frequency to GRP OUT test point TP4 of Group Demodulator. Record the reading.

7.13 Channel Receive Levels

A. Patch a test tone of proper level, -16 dbm, to MOD IN Channel 1 (Ch 5 or 9 on tributary stations equipped with 5 through 8 or 9 through 12 respectively). Disable signalling supply so that the following broadband measurement will not be affected by the signalling tone.

B. Place the HP ACVTVM at VF REC (TP7) test point of the Channel Demodulator under test. Record the reading.

C. Measure the VF out on the channel under test on the HPACVTM. The VTVM should be connected to the channel VF out via an AC-60B Matching Transformer. Place the AC-60B in the "terminate" position. Add 0.5 db to the meter reading to compensate for transformer loss. Record the adjusted reading.

D. Repeat steps A through C for the remaining channels in the Group.

E. Remove looping connections and restore equipment to normal.

8. MC-50 MULTIPLEX LINK TESTS (FORM BR11/42)

(In Italy conducted only between ID and 1C)

8.1 Test Equipment

A. Frequency Selective Voltmeter - Sierra 125A

B. VTVM - HP400H or 400D.

C. Audio oscillator - HP 200CD or HP650A.

D. Test Accessory Kit - Motorola MA 289

E. Matching Transformer - HP AC60B

8.2 Channel Transmit Level

Note: All measurements with the selective voltmeter are to be made in accordance with the note proceeding 7.2A.

A. Voice frequency levels to be used at channel inputs - outputs are: -16 dbm transmitting; 7 dbm receiving.

B. Patch 1000 cps test tone at -16 dbm level to Channel 1 EQUIP IN jack on the MC-50 jackfield. Note: Channels 5 or 9 on Tributary Stations equipped with Channels 5 through 8 or 9 through 12 respectively.)

C. Connect selective voltmeter tuned to proper frequency to GRP-IN test point (TP7) on Group Modulator.

D. Record the reading.

E. Repeat Steps A through D for remainder of channels in this group.

F. Extend Channel 1 Modulator drawer on the test shelf. Note: Channel 1 on Tributary Stations equipped with Channels 5 through 8 or 9 through 12 is 5 or 9 respectively.

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G. Apply -48 V dc to M lead on the T signalling card. The -48 dc supply can be obtained from pin 199 of VF block.

H. Tune the selective voltmeter to 3.825 kc below the channel carrier supply frequency. Record the reading at GRP IN (TP7) test point on Group Modulator.

I. Repeat Steps F through H for all remaining channels in group.

8.3 Group Transmit Level

A. Patch test tone at -16 dbm level to Channel 3 EQUIP IN jack in the voice frequency jackfield. Note: On tributary stations equipped with Channels 5 through 8 or 9 through 12, use Channels 5 or 9 respectively.

B. Connect selective voltmeter to baseband HF line transmit connection on HF termination block terminal A1. Tune the selective voltmeter to correct frequency. Record the reading.

8.4 Group Receive Level

A. To test the receive levels, a test tone of proper level (-16 dbm) has to be fed to the transmit Channel 3 Modulator at the transmitting terminal station. Note: On tributary stations equipped with Channels 5 through 8 or 9 through 12, use Channels 5 or 9 respectively.

B. At the receiving station, measure the voltage at the GRP IN test point (TP7) of the appropriate Group Demodulator with the selective voltmeter tuned to the correct frequency. Record the reading.

C. Connect selective voltmeter tuned to the correct frequency to GRP OUT (TP4) test point. Record the reading.

8.5 Channel Receive Levels

A. Feed test tone of proper level (-16 dbm) to EQUIP IN Jack Channel 1 Modulator at the transmitting terminal. Note: Channel 1 at tributary stations may be 5 or 9 depending on assignment.

B. Place the HP400H or 400D VTVM (through the AC-60B Matching Transformer in the terminate position) across the channel output jack at the receiving station.

C. Subtract 0.5 db from the meter reading to compensate for transformer loss. Record the adjusted reading.

D. Repeat Steps A through C for all remaining channels in the group.

8.6 Channel Frequency Response.

A. Patch a test tone into channel 1 in accordance with 8.5A above.

B. Connect the HP ACVTVM (through the HP AC-60B Matching Transformer in the terminate position) to the Channel Demodulator output at the receiving station.

C. Using the above procedure measure frequencies from 300 cps to 3400 cps in 100 cps increments. Add 0.5 db from the meter reading to compensate for transformer loss. Record the adjusted reading.

D. Repeat steps A through C for the remaining channels in the group.

8.7 Gain Change

A. Patch test tone into channel 1 in accordance with 8.5A above at the transmitting terminal.

B. Connect the HP ACVTVM (through the HP AC-60B Matching transformer in the terminate position) to the Channel Demodulator output at the receiving station.

C. Add 0.5 db from the meter reading to compensate for transformer loss. Record the adjusted reading.

D. Increase the input at the transmitting station to a -14 dbm.

E. Record the reading at the receiving station in accordance with C above.

F. Increase the input at the transmitting station to a -2 dbm.

G. Record the reading at the receiving station in accordance with C above.

H. Repeat steps A through G for the remaining channels in the group.

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PREPARED BY P. Jones DATE 3/29/64			
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TEST PROCEDURES
MULTIPLEX AN/TCC-3
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG. SIZE	
14842	A	6272896
SCALE	FEC NO.	SHEET 1 OF 5

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

6272696

DRAWING NUMBER 6272896

1. SCOPE

1.1 This test plan outlines the testing procedures for the AN/TCC-3 Multiplex.

2. TEST EQUIPMENT

2.1 Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The Multiplex Equipment must be properly installed and have been placed into operation prior to the performance of the test procedure in accordance with manufacturer's manual.

3.2 Testing procedures will be performed on equipment properly installed with all signal power connections complete.

3.3 These procedures apply to the modified and unmodified equipments. The input and output channel levels of the modified units are -16 dbm and + 7 dbm as adjusted by installation of TM1-004-FEC. The input and output channel levels of the unmodified units are -4 dbm and + 4 dbm respectively. Use check mark on data sheet BR 11/61 to indicate if modification has been installed on equipment being tested.

4. PROCEDURE

4.1 The procedure for performing each test is included within this section.

4.2 The testing procedures shall be completed in the order presented.

5. REQUIREMENTS

5.1 Multiplex AN/TCC-3 Station Tests

5.1.1 Carrier Supply Output Levels

5.1.2 Channel Levels

5.1.3 Channel Noise Levels

5.2 Multiplex AN/TCC-3 Link Tests

5.2.1 Channel Gain and Frequency Response

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on forms attached.

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Test Procedures Multiplex AN/TCC-3	CODE IDENT. NO. 14842	DWG. SIZE A	6272896	A
PREPARED BY [signature] DATE 3/29/64				
CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 2	

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7. MULTIPLEX AN/TCC-3 TESTS (FORM BR 11/61)

7.1 Test Equipment

A. AF Oscillator, HP200CD

B. VTVM, HP400D

C. Two Isolation Transformers, HP AC-60B

D. Transmission Measuring Set, TS-559 or equivalent

E. Terminations, 600 Ohm Resistors

7.2 Preliminary Set-Up

A. Place all the lever switches in the normal (non-operate) position unless otherwise stated. Operate the 2W-4W Switches on all the CHANNELS of the TA 219 MODEM to the 4W position. Connect ground binding post on the JUNCTION PANEL to a suitable ground.

B. Connect the send pair of the Spiral-Four connector to the receive pair using test leads to obtain a loop back configuration.

7.3 Carrier Supply Output Level

A. Check to see that the CARRIER SUPPLY POWER cable is connected to the TA 219 MODEM.

B. Connect the VTVM, HP 400D, successively to each of the following terminal pairs on the AMPLIFIER - POWER SUPPLY AM-682 terminal board TB 901, 1 & 2, 4 & 5, 6 & 7 and 9 & 10. Record the voltages which appear across each of the pairs.

7.4 Channel Level Test

A. Connect the 600 OHM BALANCED side of the Isolation Transformer, HP AC-60B, to the 4 WT terminals of CHAN 1 of the TA 219 CHAN MODEM. Connect the AF Oscillator, HP 200 CD, with the VTVM, HP 400 D, across the 600 OHM UNBALANCED side of the Transformer. Set the Transformer switch to BRIDGING. Set the Oscillator to 1 KC with an output of -15.5 dbm as measured on the VTVM, or -3.5 dbm for unmodified units. (The AC-60B Transformer insertion loss is approximately 0.5 db; therefore the actual channel input is -16.0 dbm or -4 dbm.)

Test Procedures Multiplex AN/TCC-3	CODE IDENT. NO. 14842	DWG. SIZE A	6272896	A
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B. Connect the 600 OHM BALANCED side of another Isolation Transformer, HP AC-60B, to the 4 WR of CHAN 1 of the TA 219 CHAN MODEM. Connect the VTVM, HP 400 D to the UNBALANCED side of the Transformer. Set the Transformer switch to TERMINATING (600 OHM). Record the measured output level.

C Repeat Steps A and B for the remaining three channels of the MODEM.

7.5 Channel Noise Levels

A. Connect 600 Ohm resistors across 4WR and 4 WT binding posts of CHAN 1 of the TA 219 CHAN MODEM.

B. Calibrate the Transmission Measuring Set for F1A weighting. Measure the noise appearing at the CHAN 1 output, 4 WR terminals. Record the measured noise on the Data Sheet. Use Bridging input to TS-559.

C. Repeat Steps A and B for each of the remaining three channels.

7.6 The AN/TCC3 Multiplex Station Tests are now complete. Reconnect the multiplex to the radio equipment and prepare for the Link Tests.

8. MULTIPLEX LINK TESTS AN/TCC3 (FORM BR11/62)

8.1 Channel Gain and Frequency Response

8.1.1 Test Equipment

A. AF Oscillator, HP 200 CD

B. VTVM, HP 400D

C. Isolation Transformer, AC-60B

D. Transmission Measuring Set, Daven 12B or equivalent

E. Termination, 600 Ohm Resistors

8.1.2 Procedure

A. Transmit Station - Connect the 600 OHM BALANCED side of the Isolation Transformer, HP AC-60B to the 4 WT binding posts of CHAN 1 of the TA 219 CHAN MODEM. Connect the AF Oscillator, HP 200 CD, with the VTVM, HP 400D, across the 600 OHM UNBALANCED side of the Transformer. Set the Transformer switch to BRIDGING. Vary the Oscillator

Test Procedures Multiplex AN/TCC-3	CODE IDENT. NO. 14842	DWG. SIZE A	6272896	A
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frequency from 300 cps to 3400 cps as shown on the Data Sheet. The Oscillator output is maintained at -15.5 dbm as measured on the VTVM, or -3.5 dbm for unmodified units. (HP AC-60B insertion loss is approximately 0.5 db; therefore, the actual channel input level is -16 dbm or -4 dbm.)

B. Receive Station - Connect the 600 OHM BALANCED side of the Isolation Transformer, HP AC-60B, to the 4 WR binding posts of CHAN 1 of the TA 219 CHAN MODEM. Connect the VTVM, HP 400D, to the UNBALANCED side of the Transformer. Set the Transformer switch to TERMINATING (600 OHMS). Record the measured output level on the Data Sheets. The level at 1,000 cps will be the receive reference level.

C. Repeat Steps A and B for the remaining three channels.

D. The two stations involved in this Link Test should reverse their roles as transmit and receive stations and repeat Steps A, B and C.

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DWG NO. 6272897

FEE-2A (P)

A ORIGINAL ISSUE	REVISIONS		
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SHEET NO.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ISSUE LTR																									
SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ISSUE LTR	A	A	A	A	A	A	A	A	A	A															

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G1		6272924	
	NEXT ASSEMBLY		FIRST USED ON
	APPLICATION		

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TEST PROCEDURES
MAIN LINE ORDER WIRE
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG.	
14842	A SIZE	6272897
SCALE	FEC NO.	SHEET 1 OF 10

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

6272897

1. SCOPE

1.1 This test plan outlines the testing procedures for the Main Line Order Wire, which involves Sites ID, IR, IC, GK, GA, GPA, TID and TKG.

2. TEST CONDITION

2.1 Test procedures will be performed on equipment properly installed with all signal and power connections complete.

3. PROCEDURE

3.1 The procedure for performing each test is included within this document.

3.2 The testing procedures shall be completed in order presented.

4. REQUIREMENTS

4.1 Station Tests

4.1.1 Terminal Control Stations (All Main Line Sites)

4.1.1.1 Circuit Level

4.1.1.2 Tone Oscillator Level

4.1.2 Master Terminal Control Station (GPA Only)

4.1.2.1 Circuit Levels

4.1.2.2 Tone Oscillator Level

4.2 Link Tests

4.2.1 Order Wire Channel Levels

4.2.2 Express Order Wire (EXOW) Channel Levels (ID to GPA on Mux.)

4.2.3 Over-ride Operation

5. TEST EQUIPMENT

5.1 Audio Oscillator, HP 650 A

5.2 VTVM, HP 400 H or D

5.3 Termination Plugs, 600 ohm, WECO 386A

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5.4 Resistors, 600 ohm, 1%, 1/2W

5.5 Test Patch Cords, Jack to Dual Banana

5.6 Daven 12BTMS unit may be used in place of 5.1 and 5.2

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on attached Data Sheets

7. IMPORTANT CONSIDERATIONS BEFORE TESTS

7.1 All legs of the Terminal Control Station 4W/6W Bridge must be terminated in 600 ohms. Therefore, the unused circuits must have 600 ohm terminations on the CDF. This condition must exist before any adjustment or measurement can be attempted.

7.2 While conducting the station tests, the Radio East, West and EXOW TX circuits should be terminated at the equipment side of the 901A Jack Panel with the WECO Termination Plugs, if not by the terminated VTVM. This is done to prevent annoyance to the other Main Line Stations. The local Monitor Amplifiers, KMT 4503, should be turned off to avoid local annoyance.

7.3 In all cases in these procedures the nomenclature "terminated VTVM" refers to the HP 400H VTVM with a 600 ohm, 1%, 1/2 W, resistor affixed to its input terminals. "Unterminated VTVM" refers to the usual VTVM input of high impedance.

7.4 The Terminal Control Station circuit configuration and associated levels for each Main Line Station are presented on Figures 1 and 2.

7.5 The circuit notation used in the procedures refers to the circuit classification of Figures 1 and 2.

8. MAIN LINE ORDER WIRE STATION TEST PROCEDURE

(Data Sheet BR11/131)

8.1 Terminal Control Station (All Main Line Sites)

8.1.1 Connect the Test Oscillator, HP 650A to Circuit CRX, Jack 33. Adjust the oscillator to 1 KC at the level shown on Figure 2, Circuit C RX. Use the unterminated VTVM, HP 400H, to set the level.

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8.1.2 Connect the terminated VTVM, HP400H, to Circuit A TX, Jack 27. Adjust the Drop Amplifier, KMT 4501, in Position 9-9, A for the level shown on Figure 2, Circuit A TX. Record the VTVM reading on the Data Sheet for verification.

8.1.3 Connect the terminated VTVM to Circuit B TX, Jack 29. Measure and record on the Data Sheet the VTVM reading.

8.1.4 Connect the terminated VTVM to Circuit D TX, Jack 36. Adjust the Drop Amplifier in Position 9-10, B for the level shown on Figure 2, Circuit D TX. Record the VTVM reading on the Data Sheet.

8.1.5 Connect the terminated VTVM to Circuit F TX, Jack 40, at a station with the Technical Control Unit (Circuit F). Measure and record on the Data Sheet the VTVM reading.

8.1.6 Connect the Test Oscillator to Circuit A RX, Jack 28. Adjust the oscillator to 1 KC at the level shown on Figure 2, Circuit A RX. Use the unterminated VTVM to set the level.

8.1.7 Connect the terminated VTVM to Circuit B TX, Jack 29. Adjust the Drop Amplifier in Position 9-8, A for the level shown on Figure 2, Circuit B TX. Record the VTVM reading on the Data Sheet.

8.1.8 Connect the terminated VTVM to Circuit C TX, Jack 34. Adjust the Drop Amplifier in Position 9-9, B for the level shown on Figure 2, Circuit C TX. Record the VTVM reading on the Data Sheet.

8.1.9 Connect the Test Oscillator to Circuit B RX, Jack 30. Adjust the oscillator to 1 KC at the level shown on Figure 2, Circuit B RX. Use the unterminated VTVM to set the level.

8.1.10 Connect the terminated VTVM to Circuit C TX, Jack 34. Adjust the Drop Amplifier in Position 9-8, B for the level shown on Figure 2, Circuit C TX. Record the VTVM reading on the Data Sheet.

8.1.11 Connect the Test Oscillator to Circuit D RX, Jack 35. Adjust the oscillator to 1 KC at the level shown on Figure 2, Circuit D RX. Use the unterminated VTVM to set the level.

8.1.12 Connect the terminated VTVM to Circuit C TX, Jack 34. Adjust the Drop Amplifier in Position 9-10, A for the level shown on Figure 2, Circuit C TX. Record the VTVM reading on the Data Sheet.

8.1.13 Remove the Test Oscillator from the Jack Panel.

8.1.14 Connect the terminated VTVM to Circuit A TX, Jack 27. Place WECO Termination Plugs in all used RX legs on the equipment side of the 901A Jack Panel. Push the Over-ride Switch, S6, and measure the 3,400 cps tone on 16 VTVM. This tone level should be 13 db below the test tone at Jack 27 as given on Figure 2, Circuit A TX. Adjust the Tone Oscillator, NUS 3420, gain control accordingly. Record the VTVM reading on the Data Sheet.

8.1.15 All unused Drop Amplifiers, KMT 4501, of the Terminal Control Stations should be adjusted for minimum gain. The unused amplifiers should NOT be removed from their assigned positions. This condition is necessary to keep all bridge legs properly terminated. Figures 1 and 2 show the equipped, but unused, amplifier positions.

8.1.16 Restore the Terminal Control Station to normal operation.

8.2 Master Terminal Control Station (GPA Only)

8.2.1 Place WECO Termination Plugs in the TX and RX channels of the Radio West circuit, Jack 1 and 2, LINE, on the Master Terminal Control Jack Panel. See Figure 3.

8.2.2 Connect the Test Oscillator to the Radio West RX, Jack 1, EQUIP. Adjust the oscillator to 1 KC at the level shown on Figure 3, Radio West RX. Use the unterminated VTVM to set the level.

8.2.3 Connect the terminated VTVM to the OUT Jack of Drop Amplifier, KMT 4501, in Position 6-8, A. Adjust this amplifier for the level shown on Figure 3, OUT Jack of 6-8, A. Record the VTVM reading on the Data Sheet for verification.

8.2.4 Connect the Test Oscillator to the Tech. Control TX, Jack 3, EQUIP. Adjust the oscillator to 1 KC at the level shown on Figure 3. Use the unterminated VTVM to set the level.

8.2.5 Connect the terminated VTVM to OUT Jack of Drop Amplifier in Position 6-8, B. Adjust the amplifier for the level shown on Figure 3, OUT Jack of 6-8, B. Record the VTVM reading on the Data Sheet.

8.2.6 Connect the terminated VTVM to Radio West TX, Jack 2, EQUIP. Push the Over-ride Switch, S-6, and measure the 3,400 cps tone on the VTVM. This tone level should be 13 db below the test tone level at Jack 2 as given on Figure 3, Radio West TX. Adjust the Tone Oscillator, NUS 3420, gain control accordingly. Record the VTVM reading on the Data Sheet.

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8.2.7 Restore the Master Terminal Control Station to normal operation.

9. MAIN LINE ORDER WIRE LINK TEST PROCEDURE (Data Sheet BR11/132)

9.1 General Procedure

9.1.1 This Link Test Procedure is to be performed on all Main Line Radio Order Wire circuits which are terminated on either the Terminal Control Station or the Master Terminal Control Station (GPA).

9.1.2 At Sites ID and GPA the link level test is to be conducted on the Express Order Wire (EXOW) circuit in the same fashion as regular Radio Order Wire test.

9.1.3 The over-ride operation test is to be performed on all Main Line Radio Order Wire circuits which are terminated on either the Terminal Control Station or the Master Terminal Control Station (GPA).

9.2 Test Procedure

9.2.1 Transmit Station - Connect the Test Oscillator, HP 650A, to Radio East or West, or EXOW TX circuit on the LINE side of the Jack Panel. Adjust the oscillator to 1 KC at the level shown on either Figure 2 or 3. Use the unterminated VTVM, HP 400 H, to set the level.

9.2.2 Receive Station - Connect the terminated VTVM, HP400H, to Radio East or West, or EXOW RX circuit on the LINE side of the Jack Panel. Measure and record on the Data Sheet the received level.

9.2.3 Repeat Steps 9.2.1 and 9.2.2 for the remaining link order wire circuits.

9.2.4 The two stations involved in this link test should reverse their roles as transmit and receive stations and repeat Steps 9.2.1, 9.2.2 and 9.2.3.

9.2.5 Instruct on adjacent Main Line Station to lift their handset from the Key Telephone Panel, KMT 4433, and depress on operating circuit key (S1, etc.).

9.2.6 Locally, depress the Over-ride Key, S6, on the Key Telephone Panel, KMT 4433. Obtain verification from the adjacent station that the over-ride circuit is functioning properly. Initial the Data Sheet.

9.2.7 Repeat Steps 9.2.5 and 9.2.6 in the other direction to test the operation of the local over-ride receiving equipment. Initial the Data Sheet..

9.2.8 Restore all order wire equipment to normal operation.

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E-2A 7

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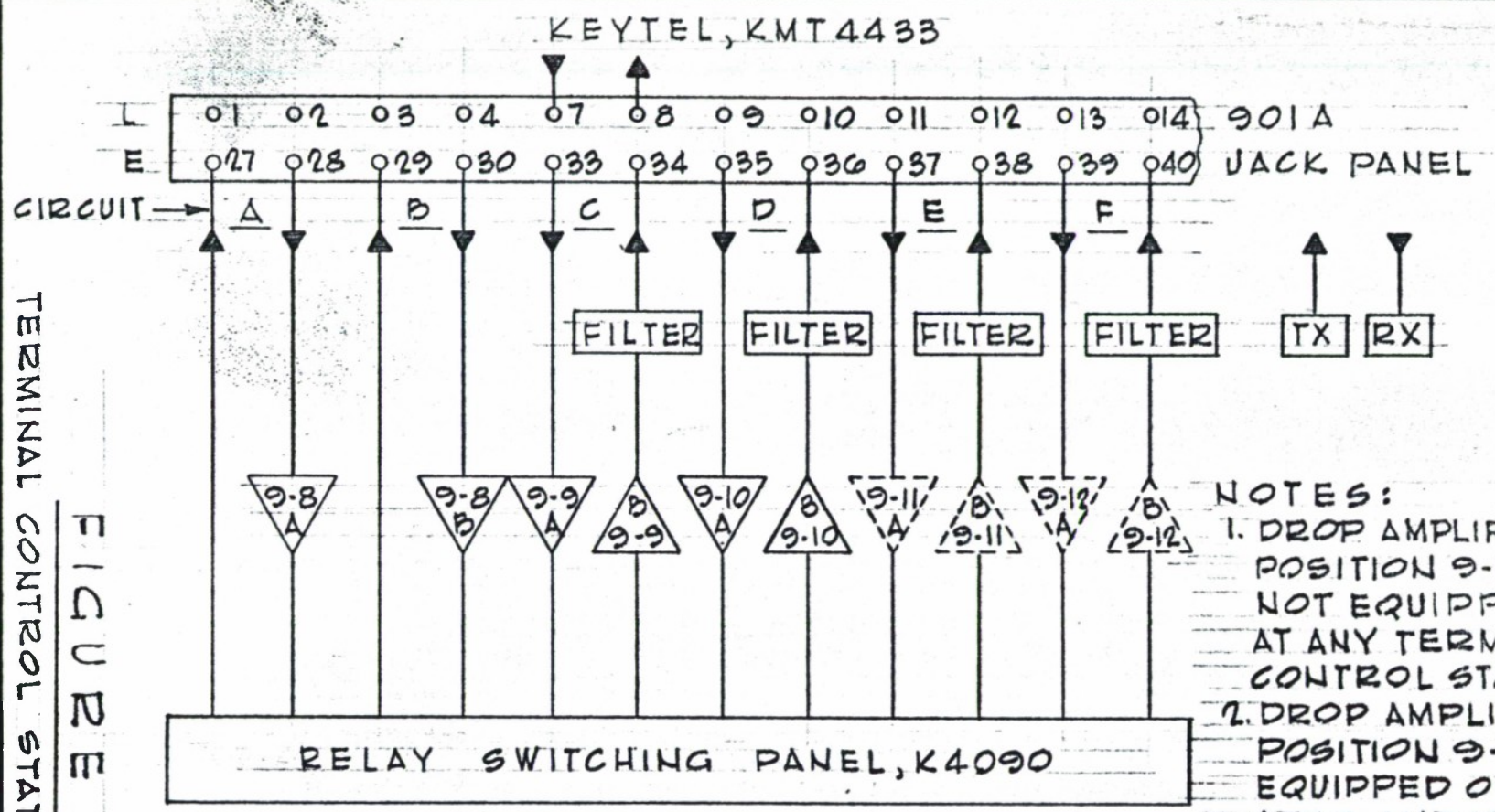
CODE IDENT. NO. 14842 DWG. SIZE A FEC NO. 6272897 A SHEET 8

FIGURE 1 TERMINAL CONTROL STATION (ALL MAINLINE SITES)



NOTES:
1. DROP AMPLIFIER POSITION 9-12 IS NOT EQUIPPED AT ANY TERMINAL CONTROL STATION.
2. DROP AMPLIFIER POSITION 9-11 IS EQUIPPED ONLY AT IR AND IC
3. ALL UNEQUIPPED POSITIONS ARE STRAPPED THROUGH.

9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	9-10	9-11	9-12
KMT 4503 MONITOR AMPLIFIER				KMT 4450 4W/6W BRIDGE		A	A	A	A	A	A
						B	B	B	B	B	B

KMT 4501 DROP AMPLIFIERS

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CODE IDENT. NO. 14842
DWG. SIZE A
FEC NO. 6272897 1A
SHEET 9

TERMINAL CONTROL STATION LEVEL CHART

CIRCUIT:	A (NOTE 1)		B		C		D		E		F	
(NOTE 1)	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX
10	RADIO EAST -13 dbm	-10 dbm	EXOW -13 dbm	+7 dbm	KEY TEL -5 dbm	0 dbm	NOT USED		NOT USED		TECH. CONTROL (NOTE 3) -13.5 dbm	+7dbm
1R	RADIO EAST -13	-10	RADIO WEST -13	-10	KEY TEL -5	0	EXT #1 -5	0	NOT USED		NOT USED	
1C	RADIO EAST -13	-10	RADIO WEST -13	-10	KEY TEL -5	0	EXT #1 -5	0	NOT USED		TECH. CONTROL -13.5	+7
GK	RADIO EAST -13	-10	RADIO WEST -13	-10	KEY TEL -5	0	EXT #1 -5	0	NOT USED		NOT USED	
GA	RADIO EAST -20	-20	RADIO WEST -13	-10	KEY TEL -5	0	EXT #1 -5	0	NOT USED		NOT USED	
GPA	RADIO EAST -13	-10	EXOW -13	+7	KEY TEL -5	0	EXT #1 -5	0	NOT USED		NOT USED	
T1O	RADIO EAST -13	-10	RADIO WEST -13	-10	KEY TEL -5	0	EXT #1 -5	0	NOT USED		NOT USED	
TKG	RADIO EAST -13	-10	RADIO WEST -13	-10	KEY TEL -5	0	NOT USED		NOT USED		NOT USED	

NOTES:
1. The circuit notation on this chart refers to labeling on Figure 1.
2. TX refers to signals leaving the line side of the Terminal Control 901A JAck Field.
3 The Technical Control circuits do not have Drop Amplifiers in the Terminal Control Station.

FIGURE 2

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CODE IDENT. NO. 14842
DWG. SIZE A
FEC NO. 6272897
SHEET 10

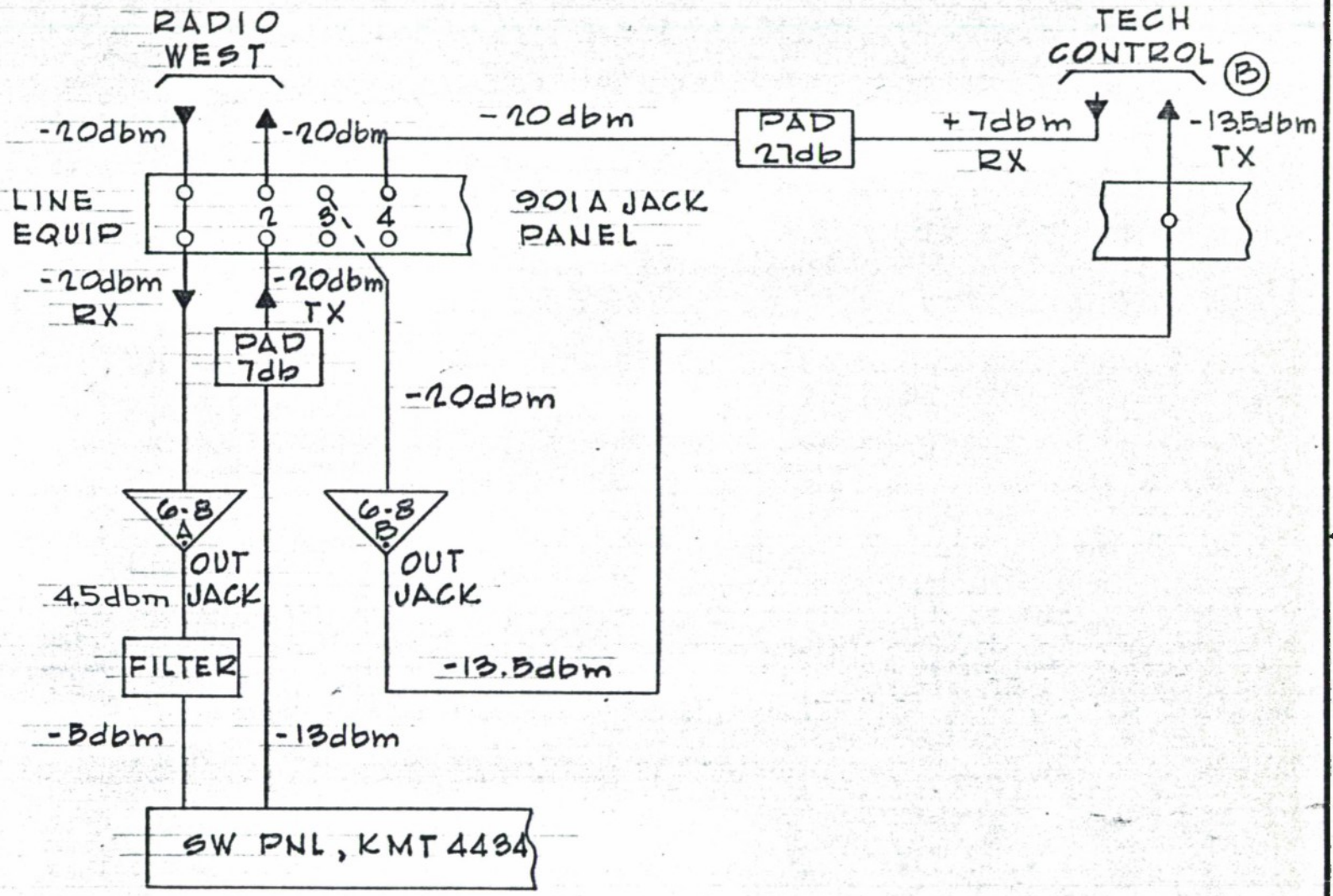

FIGURE 3
MASTER TERMINAL CONTROL STATION (GPA ONLY)

DWG NO. 6272898

SERIES

FEE-2A (P)

A ORIGINAL ISSUE	REVISIONS		
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ISSUE LTR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ISSUE LTR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

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TEST PROCEDURES
TRIBUTARY ORDER WIRE
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG.	
14842	A SIZE	6272898
SCALE	FEC NO.	SHEET 1 of 49

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1. SCOPE

1.1 This test plan outlines the testing procedures for the Tributary Order Wire equipment.

2. TEST EQUIPMENT

2.1 The test equipment required for all of the tests in this procedure:

2.1.1 TMS, Daven 12B

OR

2.1.2 Audio Oscillator, HP 200 CD

2.1.3 VTVM, HP400D or equivalent

2.1.4 Termination, 600 ohm $\pm$ 1% Resistor

2.2 IMPORTANT CONSIDERATION - It is recommended that the Daven 12B TMS be used in the following procedures. If the Daven is not available, the HP200CD Audio Oscillator and the HP400D VTVM may be used with caution. The ground strap on the HP200CD output terminals must be removed. If a VTVM is used to continuously monitor the HP200CD, the receive or terminated VTVM MUST NOT be grounded through the third terminal on the power plug. Use a three to two prong adaptor for this purpose. If these precautions are not taken, a ground loop will be created which will give false indications on the VTVM's. The HP AC-60B Isolation Transformers may be used to avoid this problem, but their use is rather inconvenient. If these transformers are used, their 0.5 db insertion loss must be taken into consideration.

2.3 The expression "terminated VTVM" used in the following procedure refers to a 600 ohm resistor placed across the VTVM INPUT terminals. The Daven 12B TMS has an internal termination; therefore, no external termination is required.

3. TEST CONDITIONS

3.1 The Tributary Order Wire equipment must be properly installed prior to the performance of these test procedures. The acceptance test procedures contained herein include the necessary adjustment procedures initially required to align the equipment.

3.2 The Link test procedures included within each section cannot be conducted until the station tests have been completed at the adjacent stations.

4. PROCEDURE

4.1 The necessary procedures for performing each test is included within the applicable section.

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4.2 The test procedures shall be completed in the order presented within the application section.

5. REQUIREMENTS

5.1 The applicable Tributary Order Wire tests requirements are presented as follows:

LINK	SHEET
IC-GK	4
GEL-GAB, TCO-TKG, TES-TKG	7
GPA-GHO	11
GHO-GPE, GHO-GAG	15
GHO-GPA	20
GAB-GEL, GAB-GPA	24
GPA-GA	28
GTA-GPA, GPE-GHO, TIC-TID, TIZ-TKR, GIM-GPA, GAG-GHO, TAL-TKG	32
TID-TIC	36
TKG-TAL	39
TKR-TKA	43

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on the applicable data sheets. A sample of the applicable data sheet can be found with each section of this procedure.

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TRIBUTARY ORDER WIRE TERMINAL TYPE B - ASSEMBLY IC (GK)

1.0 References

1.1 Schematic KLB-4044, Sheet 12.1

1.2 Interconnection of Assy. KLB-4044, sheet 12.2

1.3 FEC Drawing 6271818

2.0 Test Equipment Required

2.1 Oscillator, Hewlett-Packard Mod. 200 CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400D or 400H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistors, 150 ohm, 1%, three each

2.5 Resistor, 600 ohm, 1%

2.6 Capacitor, 2 uf

2.7 Patch cord with Tip-Ring-Sleeve phone plugs

3.0 General

3.1 The Tributary Order Wire Terminal must be properly installed prior to the performance of the test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the Station Tests have been completed at the adjacent stations.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1	WX-4294 Tone Receiver
Pos. 9-2	WX-4293 Tone Generator
Pos. 9-3 to 9-7	Blank Panel
Pos. 9-8	WX-4297 Ring Unit
Pos. 9-9 to 9-12	KMT-4433 G6 4W Tel. Set

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4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to making a measurement.

4.2 Signal Transmit Level - Terminate VTVM and patch into TEL Jack Pos. 26. Lift handset off-hook. Rotate the LEVEL ADJUST on WX-4293, Pos. 9-3, to obtain level, while push-button 1 on KMT-4433, Pos. 9-9 is depressed. Measure and record.

4.3 1 KC Transmit Level - See Figure 1. Terminate the VTVM and patch into TEL Jack Pos. 26. Measure and record.

4.4 1 KC Transmit Level - See Figure 1. Patch TEL Jack Pos. 26 to TRIB Jack Pos. 2. Connect the unterminated VTVM to T.S. A51, 52. Measure and record.

4.5 1 KC Receive Level - See Figure 3 and 2. Adjust the oscillator for -5 dbm per Figure 3 and connect to T.S. A27, 28. Remove the patch of test 4.4. Patch terminated VTVM to Jack Pos. 1 and readjust oscillator for -5 dbm. Patch TRIB Jack Pos. 1 to TEL Jack Pos. 25. Connect the VTVM per Figure 2. Measure and record.

4.6 Signal Receive Level - See Figure 3. Adjust the oscillator for 1.6 KC $\pm$ 5 cps at -20 dbm. Remove the patch of test 4.5 and apply the oscillator to T.S. A27, 28. Patch terminated VTVM to Jack Pos. 1 and readjust oscillator for -20 dbm. Initial the data sheet.

4.7 Remove all test connections. Reconnect handset.

5.0 Link Level and Signalling

5.1 See Figure 1 and adjust the oscillator level and connect to the KMT-4433 accordingly. Patch TEL Jack Pos. J1 to J25 and TEL Jack Pos. J2 to J26.

5.2 Receive Level (IGC) - Request IGC to measure the receive level by patching a terminated (600 ohm) VTVM to Amplifier A OUT Pos. 9-4. Obtain the level measured and record on the data sheet.

5.3 Signalling - Reconnect handset and lift off-hook. Depress pushbutton 1 on KMT-4433. Initial the data sheet.

5.4 Remove the patch cords.

Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [signature] DATE 3/24/64			
CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 5

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DRAWING NUMBER 6272898 6

PREPARED BY [illegible] DATE 3-17-64
CHECKED BY [illegible] DATE

CODE IDENT. NO. 14842
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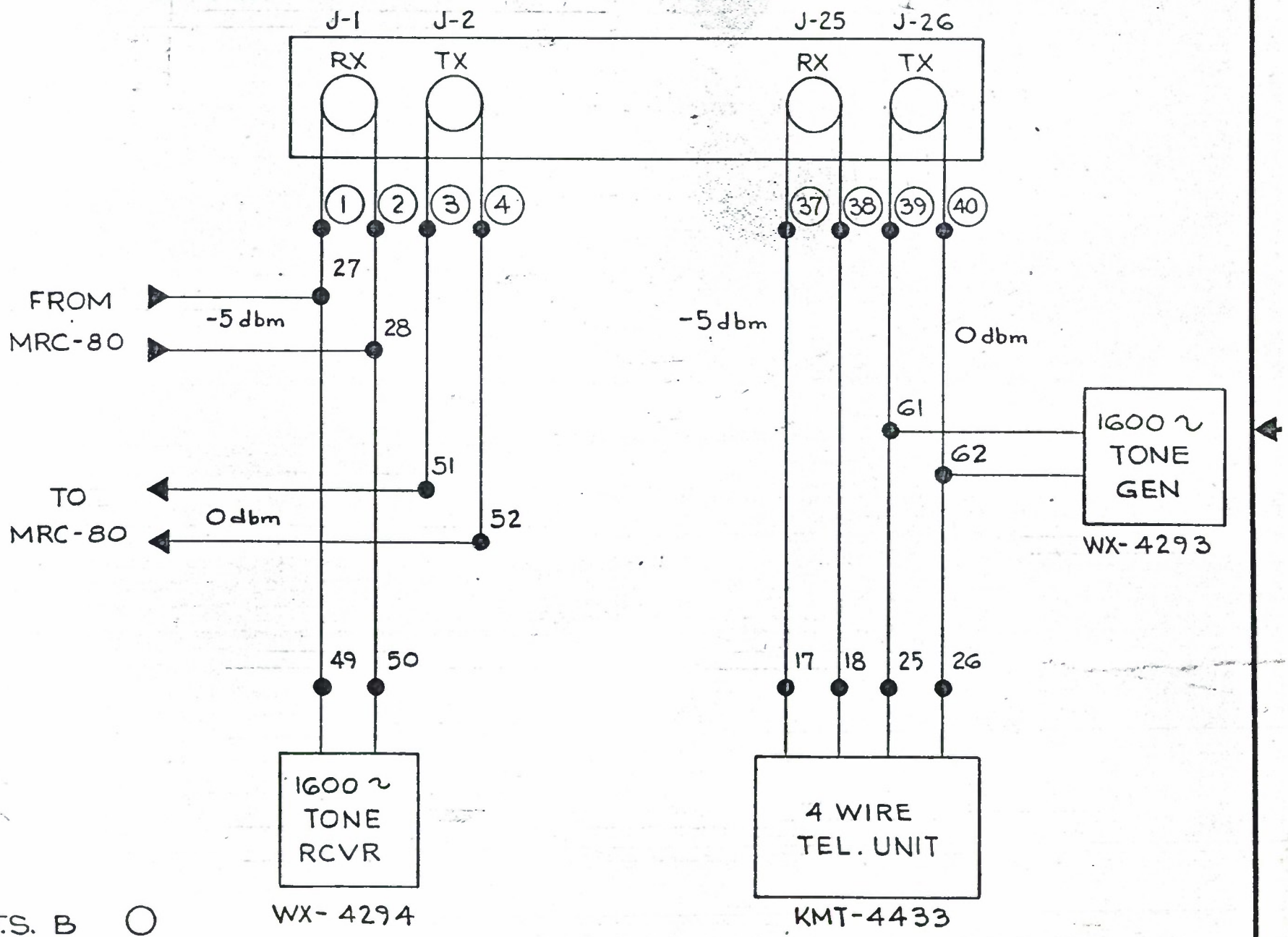
FEC NO. 6272898
SHEET 6

IC (GK)



T.S. B

DRAWING NUMBER 6272898

TRIBUTARY ORDER WIRE TERMINAL TYPE B ASSEMBLY GEL (GAB), TCO (TKG), TES (TKG)

1.0 References

1.1 Schematic KLB-4044, Sheet 12.1

1.2 Interconnection of Assy. KLB-4044, Sheet 12.4

1.3 FEC Drawing 6271815

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard Mod. 200 CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400D or 400H

2.3 Patch cord with Tip-Ring-Sleeve plugs

2.4 VOM, Simpson 260 or 270

2.5 Resistors, 150 ohm, 1%, two each

2.6 Resistors, 600 ohm, 1%

2.7 Capacitor, 2 uf

3.0 General

3.1 The Tributary Order Wire Terminal must be properly installed prior to the performance of these test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the station tests have been completed at the adjacent stations.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1	WX-4294 Tone Receiver
Pos. 9-2	WX-4293 Tone Generator
Pos. 9-3 and 9-4	WX-4292 Dual Amplifier
Pos. 9-5	Blank Panel

Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [illegible] DATE 3/29/61			
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Pos. 9-6 and 9-7	KMT-4440 4W/4W Bridge
Pos. 9-8	WX-4297 Ring Unit
Pos. 9-9 to 9-12	KMT-4433 G6 4-Wire Tel. Set

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to taking a measurement.

4.2 Signal Transmit Level - Terminate VTVM and patch into W Mod. Pos. 9-6 on the KMT-4440. Lift handset off-hook. Set the W Mod pot on KMT-4440 fully clock-wise. Rotate the LEVEL Adjust on WX-4293, Pos. 9-2, to obtain the required level, while pushbutton 1 on KMT-4433 is depressed. Measure and record.

4.3 Bridge Transmit Loss W MOD - Connect the Audio Oscillator to the SPUR DEMOD Jack of the KMT 4440 4w/4w Bridge. Adjust the oscillator for 1 KC at 0 dbm. Connect the terminated VTVM into the W MOD Jack of the Bridge. Adjust the W MOD Pot. for the designated level. Record the meter indication on the Data Sheet.

4.4 Bridge Receive Loss - SPUR MOD - connect the oscillator to the W DEMOD Jack of the Bridge. Adjust the oscillator for 1 KC at 0 dbm. Connect the terminated VTVM to the SPUR MOD Jack of the Bridge. Adjust the SPUR MOD Pot. (located inside) for the designated level. Record the meter indication on the Data Sheet.

4.5 Amplfier A Gain Adjust, Pos. 9-4 - With test condition of 4.4 above, terminate VTVM and patch into Amplifier A OUT, Jack Pos. 9-4 and adjust the amplifier gain. Measure and record.

4.6 Bridge Transmit Loss - Loss, E Mod - With test condition of 4.4 above, terminate VTVM and patch into E Mod. Jack Pos. 9-6. Rotate E Mod. pot on KMT-4440 for the designated level. Measure and record.

4.7 Amplifier B Gain Adjust, Pos. 9-3 - With test condition of 4.4 above, terminate VTVM and patch into Amplifier B OUT Jack Pos. 9-3. Adjust amplifier gain to obtain the designated level. Measure and record.

4.8 Order Wire Receive - Patch E Mod. Jack Pos. 9-6 to Amplifier A IN, Jack Pos. 9-4. Lift handset off-hook. Depress pushbutton 1 on KMT-4433. Check-off result.

4.9 Remove all test connections.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. A SIZE	6272898
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CHECKED BY [illegible] DATE 4/2/64		FEC NO.	SHEET 8

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5.0 Link Level and Signalling Test

5.1 Connect the oscillator to the SPUR DEMOD Jack of the Bridge. Adjust the oscillator for 1 KC at 0 dbm.

5.2 Receive Level (IC, GAB, or TKG) - Request the appropriate adjacent station to measure the receive level by patching a terminated (600 ohms) ACVTVM into the appropriate receive Jack. Obtain the level measured and record in the appropriate place on the data sheet. Measurements at receive station are to be made on the below listed Jack:

a. TCO to TKG - Jack 1 at TKG

b. TES to TKG - Jack 7 at TKG

c. IGC to IC - Amplifier A, Pos. 9-4 Amplifier, OUT Jack on IC(IGC) unit and Jack 1 of IC(GK) unit

d. GEL to GAB - Amplifier A, Pos. 9-4 Amplifier OUT Jack at GAB

5.3 Signalling Test - Remove all test connections and reconnect the handset. Remove handset from hook. Depress pushbutton 1 on the KMT-4433. Initial the data sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO.	DWG.	
PREPARED BY [illegible] DATE 3/24/64	14842	A SIZE	6272898
CHECKED BY [illegible] DATE 4/2/64		FEC NO.	SHEET 9

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CHECKED BY [illegible] DATE 3/19/69

CODE IDENT. NO. 14842 | DWG. SIZE A | 6272898 A

FEC NO.

SHEET 10

GEL (GAB | TCO (TKG), TES (TKG)

15 16 71 72

FROM MUX EQUIP. CHAN 1
27 28
+1 dbm
1 db PAD
69 70
0 dbm

W DEMOD E MOD
4W/4W BRIDGE KMT-4440
W MOD E DEMOD
DEMOD-SPUR-MOD

9 3
10 4
-16 dbm
B 9-3
59 53
600Ω
60 54
TO FUTURE TEL SET

65
29
600Ω
66
30
FROM FUTURE TEL SET

TO MUX EQUIP. CHAN 1
52 51
-4 dbm
A 9-3
13 14
-16dbm

66 67
0 dbm
11 12
-16 dbm
5 6
25 26
A9-4

1600 ~ TONE GEN
WX-4293
0 dbm

50 62 49 61
1600 ~ TONE RCVR
WX-4294
-5 dbm

17 18
4 WIRE TEL UNIT
KMT-4433

DRAWING NUMBER 6272898

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TRIBUTARY ORDER WIRE TERMINAL TYPE B - ASSEMBLY GPA (GHO)

INDEX

1.0 References

1.1 Schematic KLB-4044, Sheet 12.1

1.2 Interconnection of Assy. KLB-4044, Sheet 12.3, 12.5

1.3 FEC Drawing 6271818, 6271796

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard Mod. 200CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400D or 400H

2.3 Frequency Counter, Hewlett-Packard Mod. 524D

2.4 VOM, Simpson Mod. 260 or 270

2.5 Resistors, 150 ohm, 1%, two each

2.6 Resistor, 600 ohm, 1%

2.7 Capacitor, 2 uf.

2.8 Patch cord with Tip-Ring-Sleeve phone plugs

3.0 General

3.1 The Tributary Order Wire Terminal must be properly installed prior to the performance of the test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the station tests have been completed at the adjacent station.

Test Procedures Tributary Order Wire	CODE IDENT. NO.	DWG.	
PREPARED BY [illegible] DATE 3/27/64	14842	A SIZE	6272898
CHECKED BY [illegible] DATE 4/2/64		FEC NO.	SHEET 11

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3.2 The terminal is to be equipped as follows:

Pos. 1, 2, and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1	WX-4294 Tone Receiver
Pos. 9-2	WX-4293 Tone Generator
Pos. 9-3, 9-4	WX-4292 Dual Amplifier
Pos. 9-5	Blank Panel
Pos. 9-6, 9-7	KMT-4440 4W/4W Bridge
Pos. 9-8	Blank Panel
Pos 9-9, 9-12	KMT-4433 G6 4W Tel. Set

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to taking a measurement.

4.2 Signal Transmit Level - Patch terminated VTVM into W Mod. Jack Pos. 9-6. Depress pushbutton 1 on KMT-4433. Set W Mod. Pot fully clockwise and rotate LEVEL ADJUST on WX-4293, Position 9-2 to obtain designated level. Measure and record.

4.3 Bridge Transmit Loss W Mod - See Figure 1. Terminate VTVM. Plug VTVM into W Mod Jack Pos. 9-6. Adjust the W Mod pot for the designated level. Measure and record.

4.4 Amplifier A Gain Adjust, Pos. 9-3 - With the Oscillator connected and adjusted to the same level as 4.3 above, patch the terminated VTVM into Amplifier A OUT, Pos. 9-3 and adjust the gain to the designated level. Measure and record.

4.5 Bridge Receive Loss Spur Mod - See Figure 3. Reconnect handset and place on-hook. Adjust the oscillator for 0 dbm at 1 KC and connect to W Demod. Patch terminated VTVM into Spur Mod. Jack Pos. 9-6. Rotate Spur Mod pot on KMT-4440 for designated level. Measure and record.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [signature] DATE 3/29/64			
CHECKED BY [signature] DATE 4/2/64		FEC NO.	SHEET 12

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4.6 Amplifier A Gain Adjust Pos. 9-4 - With oscillator connected and adjusted to the same level as 4.5 above, patch the terminated VTVM into Amplifier A OUT, Pos. 9-4 and adjust the gain to the designated level. Measure and record.

4.7 Bridge Transmit Loss, E Mod - With test condition at 4.5 above, patch terminated VTVM into E Mod. Jack Pos. 9-6. Rotate E Mod pot on KMT-4440 for designated level. Measure and record.

4.8 Amplfier B Gain Adjust, Pos. 9-3 - With the test conditions of 4.5 above, patch terminated VTVM into Amplifier B OUT, Pos. 9-3 and adjust gain to designated level. Measure and record.

4.9 Order Wire Receive - Patch E Mod. Pos. 9-6 to Amplifier A IN Jack Pos. 9-4. Lift handset off-hook. Depress pushbutton 1 on KMT-4433. Initial record sheet.

4.10 Remove all test connections.

5.0 Link Level and Signalling Test

5.1 See Figure 1 and adjust oscillator level and connect to KMT-4433 accordingly.

5.2 Receive Level (GHO) - Request appropriate station to measure the receive level by patching a terminated VTVM into Amplifier B OUT, Pos. 9-4 (GHO Shelter) and Jack 23 (GHO LOS Bldg). Obtain the level measured and record on the data sheet.

5.3 Signalling - Remove all test connections. Reconnect handset and lift off-hook. Depress pushbutton 1 on KMT-4433. Initial data sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [illegible] DATE 3/29/64			
CHECKED BY [illegible] DATE 4/2/64		FEC NO.	SHEET 13

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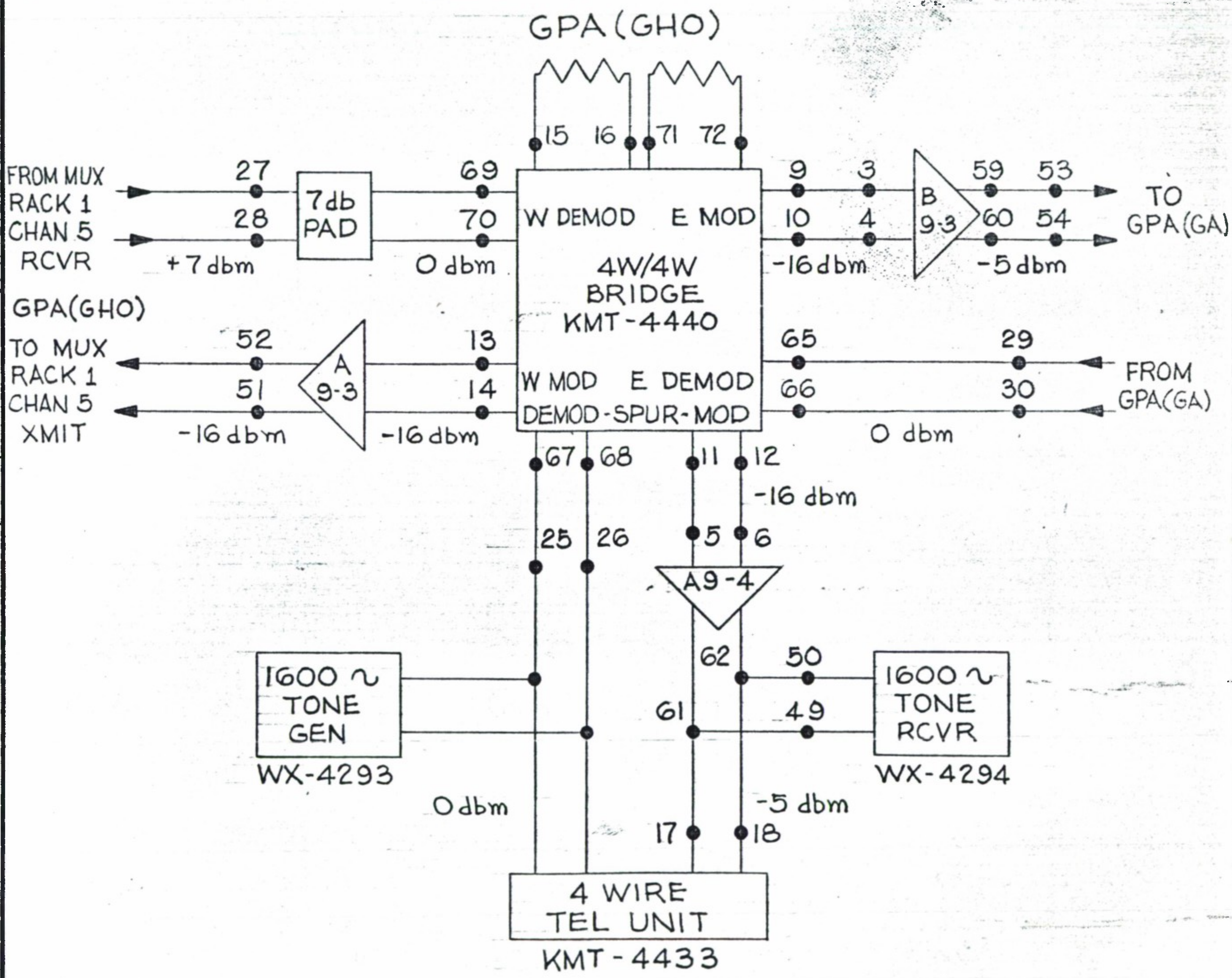
DRAWING NUMBER 6272898 14



PREPARED BY V Raeobles	DATE 3-18-64	CODE IDENT. NO. 14842	DWG. SIZE A 6272898
CHECKED BY [signature]	DATE 3/18/64	FEC NO.	SHEET 14

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FEE-2A (E)

4-16

DRAWING NUMBER 6272898

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TRIBUTARY ORDER WIRE TERMINAL TYPE A - ASSEMBLY GHO(GPE), GHO(GAG)

1.0 References

1.1 Schematic KLB-4043, Sheet 12.1

1.2 Interconnection of Assy. GHO(GPE) KLB-4043, Sheet 12.3

1.3 System Diagram FEC 6271814

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard 200 CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400D or 400H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistors, 150 ohm, 1%

2.5 Resistors, 600 ohm, 1%, three each

2.6 Capacitor, 2 uf.

2.7 Patch cord with Tip-Ring-Sleeve phone plugs

3.0 General

3.1 The Tributary Order Wire Terminal must be properly installed prior to the performance of the test procedures. The link tests cannot be conducted until the station tests have been completed at the adjacent stations.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-6	KMT-4440 4W/4W Bridge
Pos. 9-8	WX-4297 Ring Unit
Pos. 9-9	KMT-4433 G6 4W Tel. Set
Pos. 12-1	WX-4294 Tone Receiver
Pos. 12-2	WX-4294 Tone Receiver

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. A SIZE	6272898
PREPARED BY [signature] DATE 3/27/64			
CHECKED BY [signature] DATE 4/17/64		FEC NO.	SHEET 15

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Pos. 12-3	WX-4294 Tone Receiver
Pos. 12-6	WX-4292 Dual Amplifier
Pos. 12-7	WX-4292 Dual Amplifier
Pos. 12-8	WX-4292 Dual Amplifier
Pos. 12-10	WX-4293 Tone Generator

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to taking a measurement.

4.2 Signal Transmit Level - Patch the terminated VTVM into TEL Jack Pos. 26, lift handset off-hook, depress pushbutton 1 on the KMT-4433 and rotate the LEVEL ADJUST on the WX-4293 to obtain the designated level. Measure and record.

4.3 Pad Loss - Connect the Audio Oscillator to TEL Jack 4. Adjust the oscillator for 1KC at 0 dbm. Bridge an unterminated VTVM across terminals 35 and 36 of T.S.A. Record the meter indication on the Data Sheet.

4.4. Amplifier B Gain Adjust, Pos. 12-6 - Connect the oscillator to the IN Jack of Amp B, Pos. 12-6. Adjust the oscillator for 1 KC at -25 dbm. Connect the terminated VTVM to TEL Jack 3. Adjust the amplifier for the designated level. Record the meter indication.

4.5 Pad Loss - Connect the oscillator to TEL Jack 2. Adjust the oscillator for 1 KC at 0 dbm. Bridge an unterminated VTVM across terminals 33 and 34 of T.S.A. Record the meter indication.

4.6 Amplifier A Gain Adjust, Pos. 12-6 - Connect the oscillator to the IN Jack of Amplifier A in Pos. 12-6. Adjust the oscillator for 1 KC at -25 dbm. Connect the terminated VTVM to TEL Jack 1. Adjust Amp A gain for the designated level. Record the meter indication.

4.7 Test Oscillator Level Adjust - Connect the oscillator to the SPUR DEMOD Jack of the 4w/4w Bridge. Adjust the oscillator for 1KC at 0 dbm.

4.8 Bridge Transmit Loss, W Mod. With the conditions of test 4.7, patch the terminated VTVM into the KMT-4440 W Mod. Jack. Rotate the W Mod. pot for the designated level. Measure and record.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG.	6272898	A
PREPARED BY [illegible] DATE 3/27/64		SIZE A		
CHECKED BY [illegible] DATE 4/1/64		FEC NO.	SHEET 16	

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4.9 Amplifier A Gain Adjust, Pos. 12-7 - With the conditions of Test 4.7, patch the terminated VTVM into TEL Jack Pos. 23. Adjust the gain of the Amplifier A. Measure and record.

4.10 Bridge Receive Loss - SPUR MOD - Connect the oscillator to the W DEMOD Jack of the Bridge. Adjust the oscillator for 1 KC at 0 dbm. Connect the terminated VTVM to the SPUR MOD Jack of the Bridge. Adjust the SPUR MOD Pot. for the designated level. Record the meter indication on the Data Sheet.

4.11 Amplifier B Gain Adjust, Pos. 12-7 - With the conditions of test 4.10, patch the terminated VTVM into the Amplfier B OUT, Pos. 12-7, and adjust the amplifier gain. Measure and record.

4.12 Bridge Transmit Loss, E Mod. - With the conditions of test 4.10, patch the terminated VTVM into the East Mod. Jack. Rotate the East Mod. pot for the designated level. Measure and record.

4.13 Order Wire Receive - With the TEL Jack Pos. 26 patched to TEL Jack 24, depress pushbutton 1 on the KMT-4433 with handset off-hook. Check-off the result.

4.14 Order Wire Receive - Remove the patches of Test 4.13. Patch TEL Jack Pos. 23 to TEL Jack Pos. 3. Insert 600 ohm terminating plug into the Amplifier B, IN, Pos. 12-6. Depress pushbutton 1 on the KMT-4433 with the handset off-hook. Check-off the result.

4.15 Order Wire Receive - Remove the patch and terminating plug of Test 4.14. Patch TEL Jack Pos. 23 to TEL Jack Pos. 1. Insert a 600 dbm terminating plug into Amplifier A IN, Pos. 12-6. Depress pushbutton 1 on KMT-4433 with the handset off-hook. Check-off the result. Remove all Test connections.

5.0 Link Level and Signalling Test

5.1 In the following steps, connect the oscillator to the designated Jack. Adjust the oscillator for 1 KC at 0 dbm.

5.2 Receive Level, GAG - Connect the oscillator to TEL Jack 4 as per Paragraph 5.1. Request GAG to measure the receive level by patching a terminated VTVM into Amplifier A OUT, Pos. 9-4. Obtain the level measured and record on the data sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898	A
PREPARED BY P. Zimmerman DATE 3/25/64				
CHECKED BY AR DATE 4/7/64		FEC NO.	SHEET 17	

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5.3 Receive Level, GPE - Connect the oscillator to TEL Jack 2 as per Paragraph 5.1. Request GPE to measure the receive level by patching the terminated VTVM into Amplifier A OUT, Pos. 9-4. Obtain the level measured and record on the data sheet.

5.4 Receive Level, GPA(GHO) - Connect the oscillator to the SPUR DEMOD Jack of the 4w/4w Bridge as per Paragraph 5.1. Request GPA to measure the received level on the MRC-80 shelter by patching the terminated VTVM into Amplifier A OUT, Pos. 9-4. Obtain the level measured and record on the data sheet.

5.5 Receive Level, GPA (GA) - With the test conditions of 5.4 above, request GPA to patch a terminated VTVM to TEL Jack Pos. 7 in the LOS building. Obtain the measured level and record on the data sheet.

5.6 Signalling GPA - Remove all test connections. Lift the handset off-hook and depress pushbutton 1 on KMT-4433. Initial the data sheet.

5.7 Signalling, GAG - Patch Jack Pos. 26 to Jack Pos. 4. Patch Jack Pos. 25 to Jack Pos. 3. Lift the handset off-hook and depress pushbutton 1 on KMT-4433. Initial the data sheet.

5.8 Signalling, GPE - Patch Jack Pos. 26 to Jack Pos. 2. Patch Jack Pos. 25 to Jack Pos. 1. Lift the handset off-hook and depress pushbutton 1 on KMT-4433. Initial the data sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO.	DWG.	
PREPARED BY [signature] DATE 3/29/64	14842	A SIZE	6272898
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CODE IDENT. NO. 14842 DWG. SIZE A

FEC NO. 6272898

SHEET 19

OGILVIE PRESS, INC., BROOKLYN 17, N.Y. REPROVEL NO. 400M

LOS RADIO FROM GAG TO

-25 dbm -20dbm

1600~ TONE REC WX-4294

B12-6

20db PAD

J-1B J-2B J-3B J-4B

J-24B J-23B J-26B J-25B

0dbm -5dbm 0dbm -5dbm

1600~ TONE GEN WX-4293

4WIRE TEL KMT-4433

1600~ TONE REC WX-4294

TO MRC-80 SHELTER

A12-7 B12-7

DEMOD-SPUR-MOD W MOD E DEMOD

4W/4W BRIDGE KMT-4440

W DEMOD E MOD

A12-6

20db PAD

-16dbm

FROM -25dbm TO -20dbm

1600~ TONE REC WX-4294

GPE LOS RADIO

TS B

GHO (GAG)
GHO (GPE)

DRAWING NUMBER 6272898

TRIBUTARY ORDER-WIRE TERMINAL TYPE B - ASSEMBLY GHO(GPA)

1.0 References

1.1 Schematic KLB-4044, Sheet 12.1

1.2 Interconnection of Assembly KLB-4044, Sheet 12.8

1.3 FEC Drawing 6271814

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard Mod. 200 CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400 D or 400 H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistors, 150 ohm, 1%

2.5 Resistors, 600 ohm, 1%, two each

2.6 Capacitor, 2 uf

2.7 Patch cord with Tip-Ring-Sleeve plugs

3.0 General

3.1 The Tributary Order-Wire Terminal must be properly installed prior to the performance of the test procedures. The tests are to be performed in the order presented. The link test procedure cannot be conducted until the station tests have been completed at the adjacent station

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1	WX-4294 Tone Receiver
Pos. 9-2	WX-4293 Tone Generator
Pos. 9-3	WX-4292 Dual Amplifier
Pos. 9-4	WX-4292 Dual Amplifier

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Test Procedures
Tributary Order Wire

PREPARED BY [illegible] DATE 2/29/64

CHECKED BY [illegible] DATE 1/7/64

CODE IDENT. NO. 14842

DWG. SIZE A

6272898

FEC NO.

SHEET 20

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

Pos. 9-5 and 9-8	Blank Panel
Pos. 9-6	KMT-4400 4W/4W Bridge
Pos. 9-9	KMT-4433 G6 4W Tel. Set

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistance prior to taking a measurement.

4.2 Signal Transmit Level - Patch the terminated VTVM into the W Mod. Jack Pos. 9-6. Lift handset off-hook. Depress pushbutton 1 on KMT-4433, set W Mod. pot fully clockwise on the KMT-4440 and rotate the LEVEL ADJUST on WX-4293, Pos. 9-2, to obtain the designated level. Measure and record.

4.3 Bridge Transmit Loss, W MOD - Connect the Audio oscillator to the SPUR DEMOD Jack of the 4w/4w Bridge. Adjust the oscillator for 1 KC at 0 dbm. Connect the terminated VTVM to the W MOD Jack of the Bridge. Adjust the W MOD Pot. for the designated level. Record the meter indication on the Data Sheet.

4.4 Amplifier B Gain Adjust, Pos. 9-3 - Patch the terminated VTVM into Amplfier B OUT, Jack Pos. 9-3, and adjust the amplifier gain for the designated level. Measure and record.

4.5 Amplifier A Gain Adjust, Pos. 9-3 - Connect the oscillator to the IN Jack of Amp A, Pos. 9-3. Adjust the oscillator for 1 KC at -16 dbm. Connect the terminated VTVM to the OUT Jack of Amp A, Pos. 9-3 and adjust the amplifier gain for the designated level. Record the meter indication on the Data Sheet. Remove the VTVM.

4.6 Bridge Receive Loss, Spur Mod. - With the conditions of test 4.5, patch the terminated VTVM into Spur Mod. Jack. Rotate the Spur Mod. pot for the designated level. Measure and record.

4.7 Amplifier B Gain Adjust, Pos. 9-4 - With the conditions of Test 4.5, patch the terminated VTVM into Amplifier B OUT, Pos. 9-4 and adjust the amplifier gain for the designated level. Measure and record.

4.8 Bridge Transmit Loss, E Mod. - With the conditions of test 4.5, patch the terminated VTVM into E Mod. Jack. Rotate the E Mod. pot for the designated level. Measure and record.

4.9 Amplifier A Gain Adjust, Pos. 9-4. - With the conditions of test 4.5, patch the terminated VTVM into Amplifier A OUT, Pos. 9-4 and adjust the amplifier gain for the designated level. Measure and record.

4.10 Order Wire Receive - Patch the W Mod. Jack Pos. 9-6 on the KMT-4433 to Amplifier B IN, Jack Pos. 9-4. Lift the handset off-hook and depress pushbutton 1. Initial the data sheet.

5.0 Link Level and Signalling Test

5.1 Connect the oscillator to the SPUR DEMOD Jack of the 4w/4w Bridge. Adjust the oscillator for 1 KC at 0 dbm.

5.2 Receive Level (GPA) - Request GPA to measure the receive level by patching a terminated (600 ohms) VTVM into Jack Pos. 24 in the MRC-80 shelter. Obtain the level measured and record on the data sheet.

5.3 Signalling - Remove all test connections and reconnect the handset. Lift handset off-hook. Depress pushbutton 1 on the KMT-4433. Initial the data sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. A SIZE	6272898 A
PREPARED BY [illegible] DATE 3/29/64			
CHECKED BY [illegible] DATE 4/1/64		FEC NO.	SHEET 22

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

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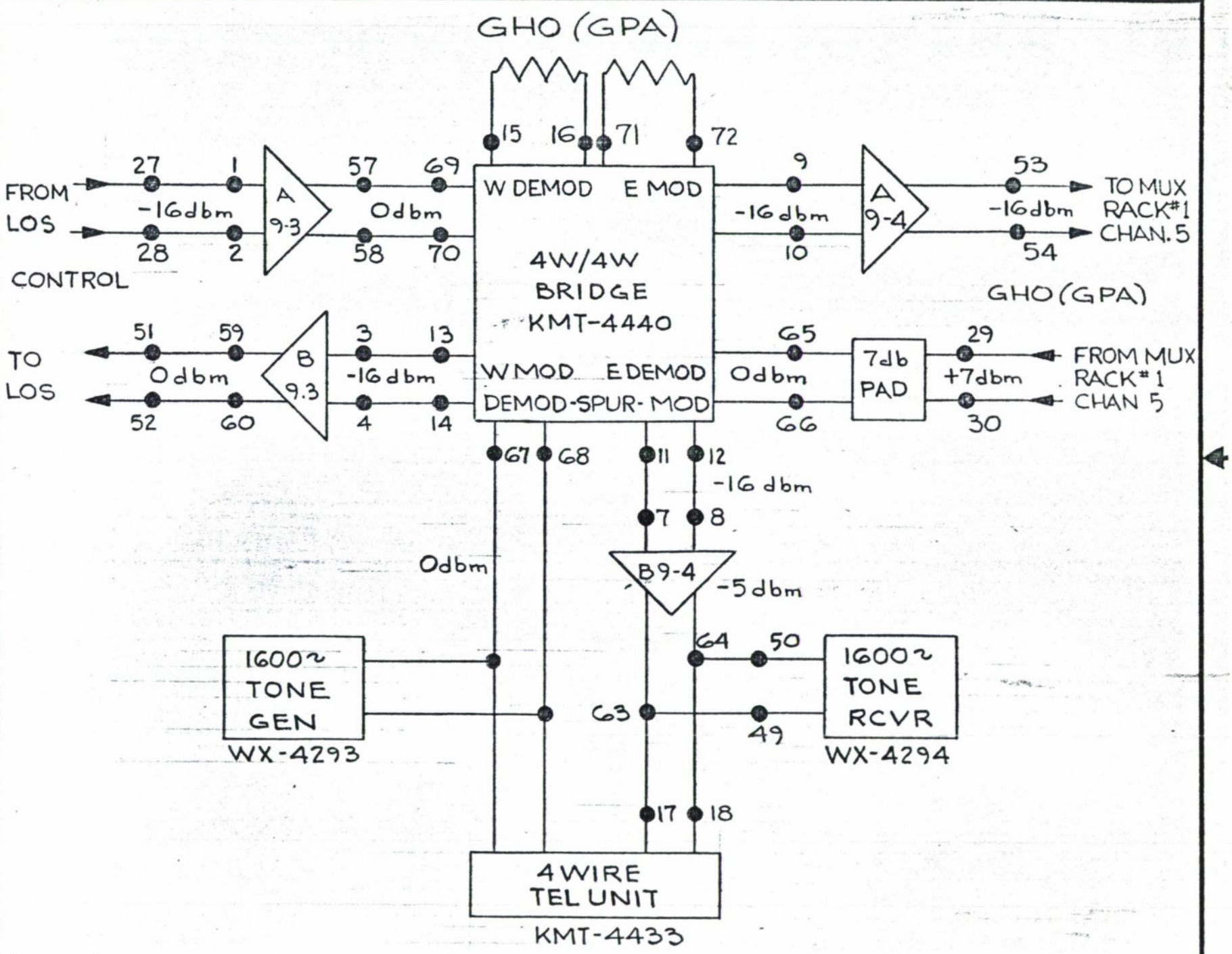
DRAWING NUMBER G272898 23

PREPARED BY [illegible] DATE 3-18-64
CHECKED BY [illegible] DATE 3/18/64

CODE IDENT. NO. 14842
DWG. SIZE A
FEC NO. G272898
SHEET 23



DRAWING NUMBER 6272898

TRIBUTARY ORDER WIRE TERMINAL TYPE B - ASSEMBLY GAB(GEL) DAB(GPA)

1.0 References

1.1 Schematic KLB-4044, Sheet 12.1

1.2 Interconnection of Assembly GAB, KLB-4044, Sheet 12.6

1.3 FEC Drawing 6271822

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard 200 CD or 650A

2.2 VTVM, Hewlett-Packard, 400D or 400H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistors, 150 ohm, 1%, two each

2.5 Resistors, 600 ohm, 1%, three each

2.6 Capacitor, 2 uf.

3.0 General

3.1 The Tributary Order Wire Terminal must be properly installed prior to the performance of these test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the station tests have been completed at the adjacent stations.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1	WX-4294 Tone Receiver
Pos. 9-2	WX-4293 Tone Generator
Pos. 9-3	WX-4292 Dual Amplifier
Pos. 9-4	WX-4292 Dual Amplifier

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898	A
PREPARED BY [illegible] DATE 3/27/64				
CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 24	

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

Pos. 9-5 and 9-8	Blank Panel
Pos. 9-6	KMT-4440 4W/4W Bridge
Pos. 9-9 to 9-12	KMT-4433 G6 4-Wire Tel Set

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to taking a measurement.

4.2 Signal Transmit Level - Patch the terminated VTVM into the W Mod. Jack Pos. 9-6. Lift handset off-hook. Rotate the W Mod. pot fully clock-wise. Depress the pushbutton 1 on KMT-4433 and adjust the gain on WX-4293, Pos. 9-2. Measure and record.

4.3 Bridge Transmit Loss, W Mod. - See Figure 1. Patch the terminated VTVM into the W Mod. Jack Pos. 9-6 and adjust the W Mod. for the designated level. Measure and record.

4.4 Amplifier A Gain Adjust, Pos. 9-3 - With the oscillator connected and adjusted to the same level as 4.3 above, patch the terminated VTVM into Amplifier A OUT Pos. 9-3 and adjust the gain. Measure and record.

4.5 Pad Loss - See Figure 3. Reconnect the handset and place on hook. Adjust the oscillator level for 7 dbm at 1 KC. Disconnect the wires from the TCC-3, Chan 1 Demod. Place the oscillator across the leads that were removed from the TCC-3 and bridge with the unterminated VTVM across T.S. A69, 70. Measure and record.

4.6 Bridge Receive Loss, Spur Mod. - See Figure 3. Adjust the oscillator for 0 dbm at 1 KC and patch the oscillator into the W Demod. Patch the terminated VTVM into the Spur Mod. Rotate the Spur Mod. pot for the designated level. Measure and record.

4.7 Amplifier A Gain Adjust, Pos. 9-4 - With the conditions of Test 4.6, patch the terminated VTVM into Amplifier A OUT, Pos. 9-4 and adjust the gain. Measure and record.

4.8 Bridge Transmit Loss, E Mod. - With the conditions of Test 4.6, patch the terminated VTVM into the E Mod, Jack Pos. 9-6. Rotate the E Mod. pot for the designated level. Measure and record.

4.9 Amplifier B Gain Adjust, Pos. 9-3 - See Figure 3. Adjust the oscillator output for -20 dbm at 1 KC. Patch the oscillator output into the Amplifier B IN, Pos. 9-3 and patch the terminated VTVM into the Amplifier B OUT. Adjust the amplifier gain. Measure and record.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [illegible] DATE 3/29/64			
CHECKED BY [illegible] DATE 4/2/64		FEC NO.	SHEET 25

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4.10 Order Wire Receive - Patch the E Mod. into the Amplifier A IN, Pos. 9-4. Lift the handset, off-hook. Depress pushbutton 1 on the KMT-4433. Initial the dat sheet.

4.11 Remove all test connections.

5.0 Link Level and Signalling Test

5.1 See Figure 1 and adjust the oscillator level and connect to the KMT-4433 accordingly.

5.2 Receive Level, GEL - Request Station GEL to measure the receive level by patching a terminated (600 ohms) ACVTVM into the Amplifier A OUT, Pos. 9-4. Obtain the level measured at GEL and record on the data sheet.

5.3 Receive Level, GPA - Request Station GPA to measure the receive level by patching a terminated (600 ohms) ACVTVM into the Jack 1 (GAB Receive). Obtain the level measured at GPA and record on the data sheet.

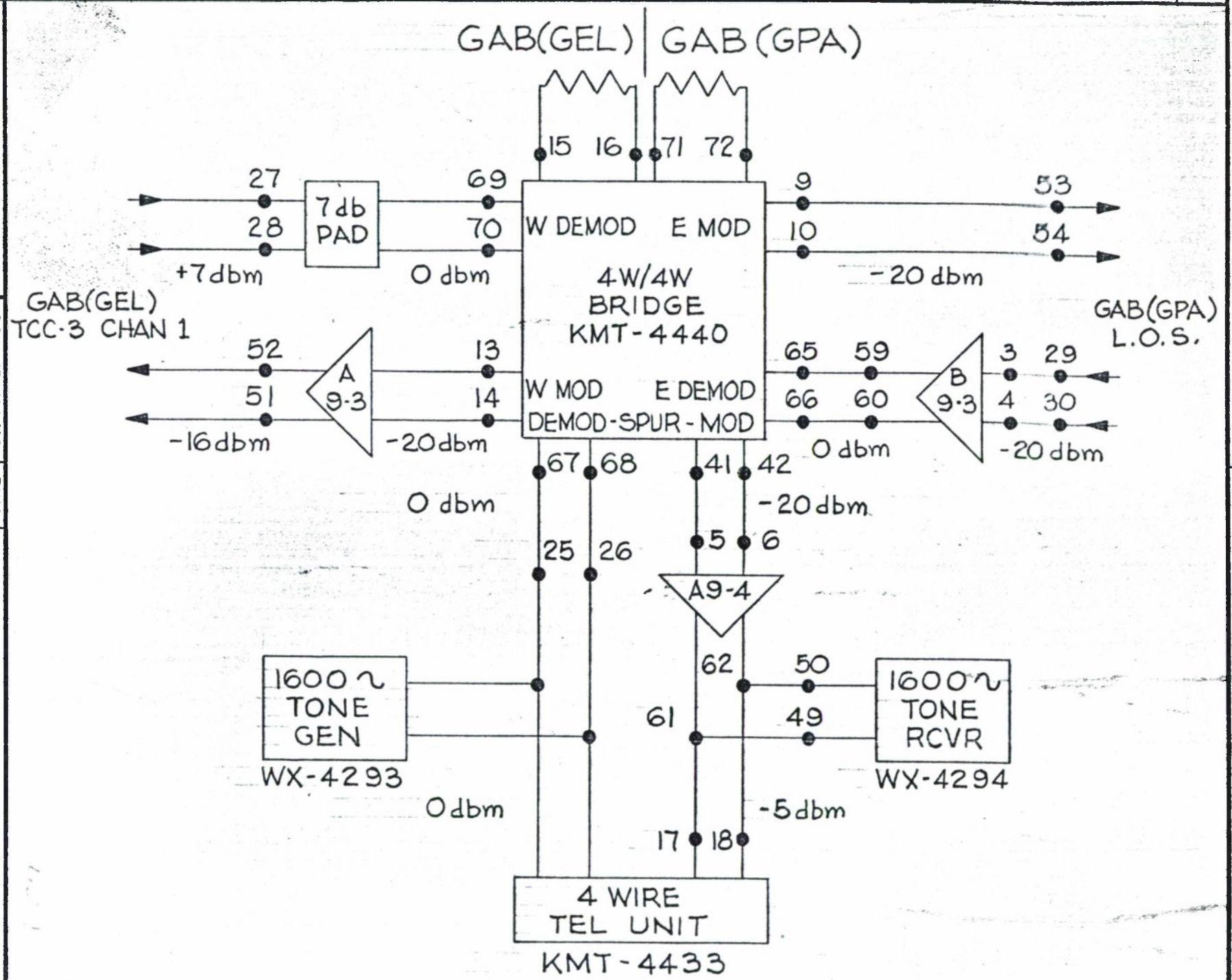
5.4 Signalling Test - Remove all test connections. Reconnect handset and lift off hook. Depress pushbutton 1 on the KMT-4433. The buzzer should sound at GEL and GPA. Initial the data sheet.

Test Procedures Tributary Order Wire	CODE IDENT. NO.	DWG. SIZE	
PREPARED BY [signature] DATE 3/27/64	14842	A	6272898
CHECKED BY [signature] DATE 4/2/64		FEC NO.	SHEET 26

DRAWING NUMBER 6272898 27

PREPARED BY: [illegible] DATE: 3-19-64
CHECKED BY: [illegible] DATE: 3/19/64

CODE IDENT. NO. 14842
DWG. SIZE A
6272898 A
FEC NO.
SHEET 27



TRIBUTARY ORDER WIRE TERMINAL TYPE A - ASSEMBLY GPA(GA)

1.0 References

1.1 Schematic KLB-4043, Sheet 12.1

1.2 Interconnection of Assembly KLB-4043, Sheet 12.2

1.3 FEC Drawing 6271796

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard Mod. 200CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400D or 400H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistors, 150 ohms, 1%, two each

2.5 Resistor, 600 ohms, 1%

2.6 Capacitor 2 uf.

2.7 Patch cord with Top-Ring-Sleeve phone plugs, two each.

3.0 General

3.1 The Tributary Order Wire Terminal must be properly installed prior to the performance of the test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the station tests have been completed at the adjacent stations.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1 to 9-4	KMT-4433 G6 4W Tel. Set
Pos. 9-5 to 9-7	Blank Panel
Pos. 9-8	WX-4297 Ring Unit
Pos. 9-9 to 9-12	KMT-4433 G6 4W Tel. Set

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Test Procedures
Tributary Order Wire

PREPARED BY [illegible] DATE 3/29/64
CHECKED BY SP DATE 4/7/64

CODE IDENT. NO. 14842
DWG. SIZE A
6272898
FEC NO.
SHEET 28

GILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

Pos. 12-1, 12-2, 12-3, 12-4	WX 4294 Tone Receivers
Pos. 12-5	Blank Panel
Pos. 12-6, 12-7	WX 4292 Dual Amplifier
Pos. 12-8, 12-9, 12-12	Blank Panel
Pos. 12-10, 12-11	WX 4293 Tone Generators

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to taking a measurement.

4.2 Signal Transmit Level, Jack Pos. 24 - Patch terminated VTVM to Jack Pos. 24. Lift handset off-hook of Tel Set Pos. 9-1. Rotate the Level Adjust control of WX 4293, Pos. 12-11, for the designated level with pushbutton 1 depressed. Measure and record.

4.3 Signal Transmit Level, Jack Pos. 26 - Patch terminated VTVM to Jack Pos. 26. Lift handset off-hook of Tel Set Pos. 9-9. Rotate the Level Adjust control of WX 4293, Pos. 12-10, for the designated level with pushbutton 1 depressed. Measure and record.

4.4 Pad Loss, GAB - Connect the oscillator to TEL Jack 2 and adjust the oscillator for 1 KC at 0 dbm. Bridge an unterminated VTVM across terminals 25 and 26 on T.S.A. Record the meter indication.

4.5 Pad Loss, GTA - Connect the oscillator to TEL Jack 4 and adjust the oscillator for 1 KC at 0 dbm. Bridge the unterminated VTVM across terminals 27 and 28 on T.S.A. Record the meter indication.

4.6 Pad Loss, GIM - Connect the oscillator to TEL Jack 6 and adjust the oscillator for 1 KC at 0 dbm. Bridge unterminated VTVM across terminals 29 and 30 on T.S.A. Record the meter indication.

4.7 Amplifier A Gain Adjust, Pos. 12-6 - Connect oscillator to the IN Jack of Amplifier A in Pos. 12-6. Adjust the oscillator for 1 KC at -25 dbm. Connect the terminated VTVM to the OUT Jack of Amp A. in Pos. 12-6. Adjust the amplifier for the designated level. Record the meter indication on the Data Sheet.

4.8 Amplifier A Gain Adjust, Pos. 12-6 - See Figure 3. Adjust the oscillator for -20 dbm at 1 KC. Connect oscillator output to Amplifier A IN, Pos. 12-6. Patch terminated VTVM into Amplifier A OUT, Pos. 12-6 and adjust the gain for the designated level.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [illegible] DATE 3/27/64			
CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 29

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

4.9 Amplifier A Gain Adjust, Pos. 12-7 - With the conditions of test 4.7, connect the oscillator to Amplifier A IN, Pos. 12-7. Patch the terminated VTVM into Amplifier A OUT, Pos. 12-7, and adjust the gain for the designated level. Measure and record.

4.10 Order Wire Receive, GAB - See Figure 3. Adjust oscillator for -20 dbm at 1.6 KC 5 cps. Remove the VTVM from the oscillator and connect oscillator to Jack Pos. 1. Initial the data sheet.

4.11 Remove all test connections and reconnect the handsets.

5.0 Link Level and Signalling

5.1 Connect the oscillator to the TEL Jacks listed in Step 5.2. Adjust the oscillator for 1 KC at 0 dbm.

5.2 Receive Level - Request the appropriate receiving station to measure the receive level by patching a terminated VTVM as follows:

LINK	GPA	RECEIVING STATION
GPA to GAB	Patch OSC to J2	Patch VTVM to Amp A OUT, Pos. 9-4
GPA to GTA	Patch OSC to J4	Patch VTVM to Amp A OUT, Pos. 9-4
GPA to GIM	Patch OSC to J6	Patch VTVM to Amp A OUT, Pos. 9-4
GPA to GHO	Patch OSC to J8	Patch VTVM to J23 in LOS Bldg.

Obtain the levels measured and record on the appropriate section of the data sheets.

5.3 Signalling - Reconnect Tel Set handset and lift off-hook. Patch J24 alternately to the Jacks listed below and depress pushbutton 1 on Tel Set Pos. 9-1.

LINK	PATCH
GPA to GAB	J24 to J2
GPA to GTA	J24 to J4
GPA to GIM	J24 to J6
GPA to GHO	J24 to J8

Initial the data sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO.	DWG.	
PREPARED BY J. Jones DATE 3/29/64	14842	A SIZE	6272898 A
CHECKED BY DATE 4/7/64		FEC NO.	SHEET 30

OGILVIE PRESS, INC., BROOKLYN 17, N.Y. REPROVEL NO. 400M

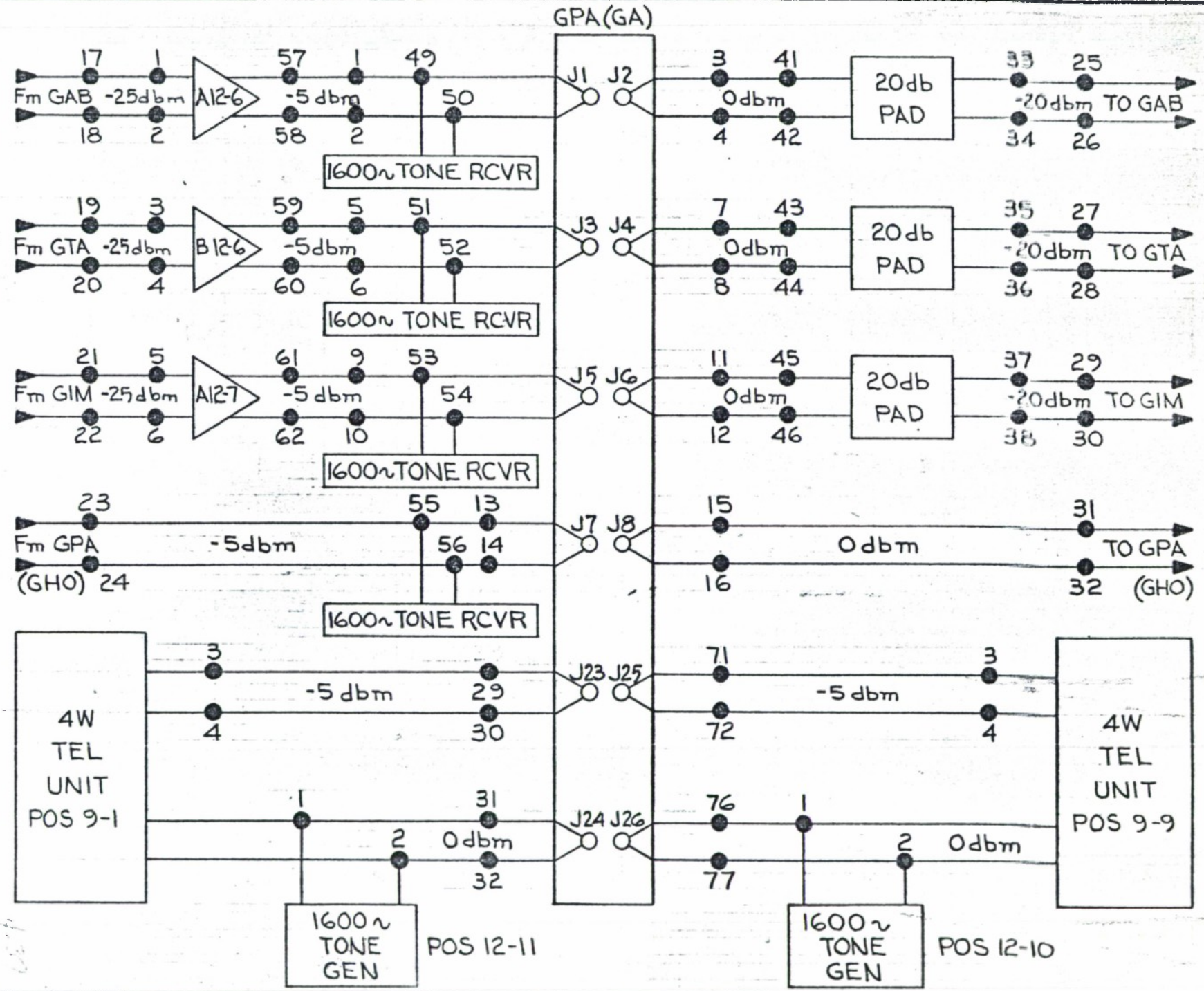
DRAWING NUMBER 6272898 31

PREPARED BY J.A. LIPARI DATE 3-19-64
CHECKED BY DATE 3/23/64

CODE IDENT. NO. 14842 DWG. SIZE A

FEC NO. 6272898 A

SHEET 31



DRAWING NUMBER 6272898

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TRIBUTARY ORDER-WIRE TERMINAL B

ASSEMBLY GTA(GPA) GPE(GHO) TIC(TID) TIZ(TKR) GIM(GPA) GAG(GHO) TAL(TKC

1.0 References

1.1 Schematic KLB-4044, Sheet 12.1

1.2 Interconnection of Assembly KLB-4044, Sheet 12.7

1.3 FEC Drawing 6271817

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard Mod. 200 CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400D or 400H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistors, 150 ohm, 1%, two each

2.5 Resistor, 600 ohm, 1%

2.6 Capacitor, 2 ufd.

2.7 Patch cord with Tip-Ring-Sleeve phone plugs.

3.0 General

3.1 The Tributary Order-Wire Terminal must be properly installed prior to the performance of the test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the station tests have been completed at the adjacent stations.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1	WX-4294 Tone Receiver
Pos. 9-2	WX-4293 Tone Generator
Pos. 9-3, 9-4	WX-4292 Dual Amplifier

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GILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

Pos. 9-5	Blank Panel
Pos. 9-6, 9-7	KMT-4440 4W/4W Bridge
Pos. 9-8	WX-4297 Ring Unit
Pos. 9-9 to 9-12	KMT-4433 G6 4W Tel. Set

4.0 Station Level Tests and Adjustments

4.1 Bridge Loss

A. Connect the Audio Oscillator to the AMP OUT Jack of the KMT 4440 4w/4w Bridge. Adjust the oscillator to 1 KC at 0 dbm as read on an unterminated VTVM temporarily connected to the oscillator output.

B. Connect a terminated VTVM to the SPUR MOD Jack of the Bridge. Adjust the SPUR MOD (located inside) potentiometer for the designated level. Record the meter indication on the Data Sheet.

C. Connect a terminated VTVM to the W MOD Jack of the Bridge. Adjust the W MOD potentiometer for the designated level. Record the meter indication on the Data Sheet.

4.2 Amplifier Gain

A. Connect the Audio Oscillator to the IN Jack of the KMT 4501 AMP A in position 9-3. Adjust the oscillator to 1 KC at -25 dbm as in Step A of 4.1.

B. Connect the terminated VTVM to the OUT Jack of AMP A, position 9-3. Adjust this amplifier to the designated level. Record the meter indication on the Data Sheet.

C. Connect the Audio Oscillator to the IN Jack of AMP B, position 9-3. Adjust the oscillator to 1 KC at -20 dbm as in Step 4.1.

D. Connect the terminated VTVM to the OUT Jack of AMP B, position 9-3. Adjust this amplifier to the designated level. Record the meter indication on the Data Sheet.

E. Connect the oscillator just as in Step C and meter as in Step D to AMP A, position 9-4. Adjust this amplifier to the designated level. Record the meter indication on the Data Sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. A SIZE	6272898
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4.3 Signal Transmit Level

A. Connect the terminated VTVM to the W MOD of the Bridge.

B. Remove the handset from hook. Push call button.

C. Adjust Tone Oscillator, NUS 4293 to the designated level. Record the meter indication on the Data Sheet.

NOTE: If the noise level on the meter is too high to obtain this reading a HP AC-60B Isolation Transformer must be connected to the VTVM before the Tone Oscillator signal can be seen.

4.4. Signal Receiver Test

A. Patch the E MOD Jack of the Bridge to the IN Jack of the AMP. A in position 9-4.

B. Remove handset from hook and push call button. Initial the Data Sheet.

5.0 Link Level and Signalling Test

5.1 Connect the oscillator to the SPUR DEMOD Jack of the 4w/4w Bridge. Adjust the oscillator for 1 KC at 0 dbm.

5.2 Receive Level - Request the appropriate receiving station to measure the receive level by patching a terminated VTVM into the circuit as follows:

a. TIZ to TKR - Amplifier A OUT, Pos. 9-4, at TKR

b. TAL to TKG - Jack 3 at TKG

c. TIC to TID - Jack 1 at TID

d. GAG to GHO - Jack 3 at GHO

e. GPE to GHO - Jack 1 at GHO

f. GIM to GPA - Jack 5 at GPA

g. GTA to GPA - Jack 3 at GPA

Obtain the level measured and record on the appropriate portion of the data sheet.

5.3 Signalling - Remove all test connections and reconnect the handset. Lift the handset off-hook and depress pushbutton 1. Initial the data sheet.

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DRAWING NUMBER 6272898 35

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CODE IDENT. NO. 14842
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SHEET 35

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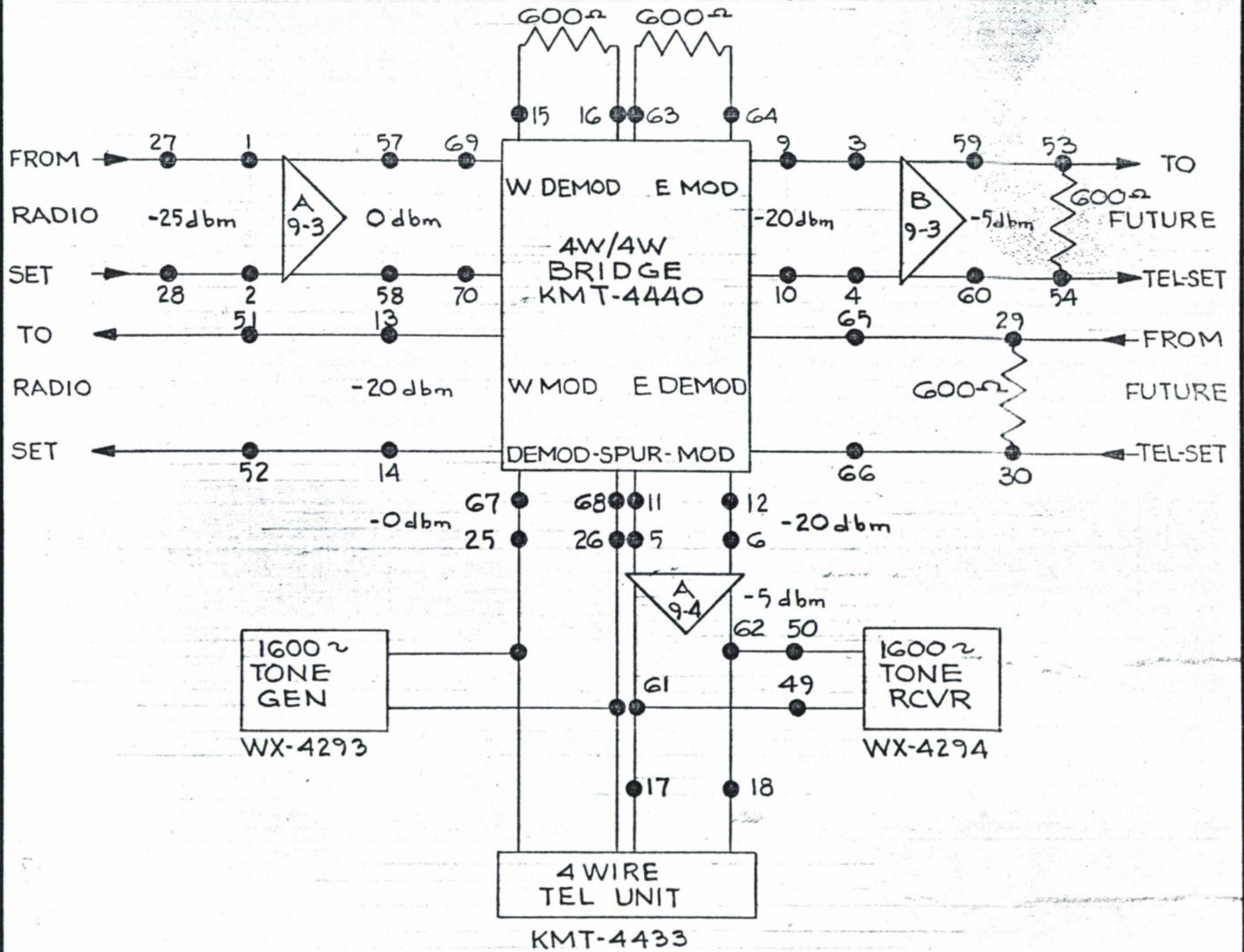
GIM(GPA) GAG(GHO) TAL(TKG)



TRIBUTARY ORDER-WIRE TERMINAL TYPE B - ASSEMBLY TID (TIC)

1.0 References

1.1 Schematic KLB-4044, Sheet 12.1

1.2 Interconnection of Assembly KLB-4044, Sheet 12.9

1.3 FEC Drawing 6271813

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard Mod. 200 CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400D or 400H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistors, 150 ohm, 1%, two each

2.5 Resistor, 600 ohm, 1%

2.6 Capacitor, 2 uf

2.7 Patch cord with Tip-Ring-Sleeve phone plugs

3.0 General

3.1 The Tributary Order-Wire Terminal must be properly installed prior to the performance of the test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the station tests have been completed at the adjacent station.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1	WX-4294 Tone Receiver
Pos. 9-2	WX-4293 Tone Oscillator
Pos. 9-3	WX-4292 Dual Amplifier
Pos. 9-4 to 9-7	Blank Panel

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	262898
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CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 36

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

Pos. 9-8 WX-4297 Ring Unit

Pos. 9-9 to 9-12 KMT-4433 G6 4W Tel. Set

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to taking a measurement.

4.2 Signal Transmit Level - Terminate the VTVM and patch into Jack Pos. 26. Lift the handset off-hook. Depress pushbutton 1 of KMT-4433 and rotate LEVEL ADJUST on WX-4293 tone generator to obtain the designated level. Measure and record.

4.4 Pad Loss - Connect the oscillator to TEL Jack 2 and adjust the oscillator for 1 KC at 0 dbm. Connect an unterminated VTVM across Terminals 51 and 52 of T.S.A. Record the meter indication on the Data Sheet.

4.5 Amplfier A Gain Adjust, Pos. 9-3 - Connect the oscillator to the IN Jack of Amp A in Pos. 9-3. Adjust the oscillator for 1 KC at -25 dbm. Connect the terminated VTVM to the OUT Jack of Amp A in Pos. 9-3. Adjust the amplifier gain for the designated level. Record the meter indication on the Data Sheet.

4.6 Spare Amplifier Gain Adjust - Connect the oscillator to Amplifier B IN maintaining the same input level. Patch the terminated VTVM into the Spare Amplifier B OUT. Adjust the gain of the amplifier for the designated level. Measure and record.

4.7 Order-Wire Receive - Patch Jack Pos. 26 to Jack Pos. 1. Lift handset off-hook and depress pushbutton 1. Initial the data sheet.

4.8 Remove all test connections.

5.0 Link Level and Signalling Test

5.1 Connect the oscillator to TEL Jack 2. Adjust the oscillator for 1 KC at 0 dbm.

5.2 Receive Level, (TIC) - Request station TIC to measure the receive level by patching a terminated VTVM into Amplifier A OUT, Pos. 9-4. Obtain the level measured and record on the data sheet.

5.3 Signalling - Reconnect the handset and lift off-hook. Depress pushbutton 1. Initial the data sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [illegible] DATE 3/29/64			
CHECKED BY [illegible] DATE 4/1/64		FEC NO.	SHEET 37

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DRAWING NUMBER 6212898 38

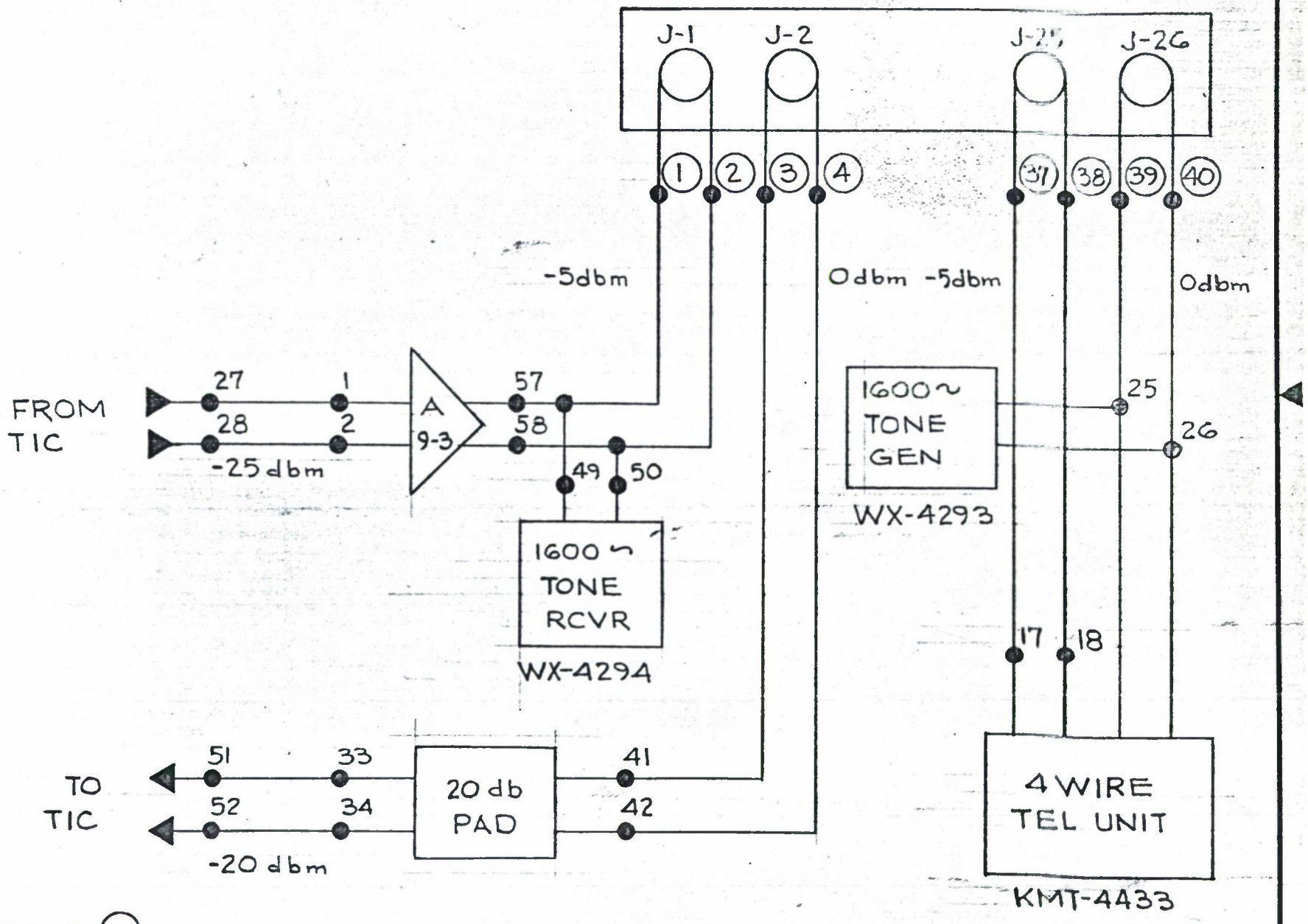
E-2A

PREPARED BY [illegible] DATE 3-17-64
CHECKED BY [illegible] DATE 3/17/64

CODE IDENT. NO. 14842
DWG. SIZE A
FEC NO. 6272898
SHEET 38

GILVIE PRESS, INC., BROOKLYN 17, N.Y. REORDER NO. 400M

TID (TIC)



TRIBUTARY ORDER-WIRE TERMINAL TYPE A ASSEMBLY TKG (TAL)

1.0 References

1.1 Schematic KLB 4043, Sheet 12.1

1.2 Interconnection of Assembly KLB 4043, Sheet 12.4

1.3 FEC Drawing 6271821

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard Mod. 200 CD or 650A

2.2 VTVM, Hewlett-Packard Mod. 400D or 400H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistors, 150 ohm, 1%, two each

2.5 Resistor, 600 ohm, 1%

2.6 Capacitor, 2 ufd

2.7 Patch cord with Tip-Ring-Sleeve phone plugs.

3.0 General

3.1 The Tributary Order-Wire Terminal must be properly installed prior to the performance of the test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the station tests have been completed at the adjacent stations.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1 to 9-4	KMT 4433 G6 4W Tel Set
Pos. 9-5 to 9-8	Blank Panel
Pos. 9-9 to 9-12	KMT 4433 G6 4W Tel Set

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [signature] DATE 3/29/64			
CHECKED BY [signature] DATE 4/2/64		FEC NO.	SHEET 39

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Pos. 12-1, 12-2, 12-3, 12-4	WX-4294 Tone Receivers
Pos. 12-5	Blank Panel
Pos. 12-6, 12-7	WX-4292 Dual Amplifiers
Pos. 12-8, 12-9, 12-12	Blank Panels
Pos. 12-10, 12-11	WX-4293 Tone Generators

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to taking a reading.

4.2 Signal Transmit Level, Jack Pos. 24 - Patch terminated VTVM to Jack Pos. 24. Lift the handset of Tel. Set Pos. 9-1 off-hook. Rotate the Level Adjust Control of WX-4293, Pos. 12-11, for the designated level with pushbutton 1 depressed. Measure and record.

4.3 Signal Transmit Level, Jack Pos. 26 - Patch terminated VTVM to Jack Pos. 26. Lift the handset of Tel. Set Pos. 9-9 off-hook. Rotate the Level Adjust control of WX-4293, Pos. 12-10, for the designated level with pushbutton 1 depressed. Measure and record.

4.4 Pad Loss, TCO - Connect the oscillator to TEL Jack 2 and adjust the oscillator for 1 KC at 0 dbm. Bridge an unterminated VTVM across terminals 25 and 26 of T.S.A. Record the meter indications.

4.5 Pad Loss, TAL - Connect the oscillator to TEL Jack 4 and adjust for 1 KC at 0 dbm. Bridge the unterminated VTVM across terminals 27 and 28 of T.S.A. Record the meter indication.

4.6 Pad Loss, TKA - Connect the oscillator to TEL Jack 6 and adjust for 1 KC at 0 dbm. Bridge the unterminated VTVM across the terminals 29 and 30 of T.S.A. Record the meter indication.

4.7 Pad Loss, TES - Connect the oscillator to TEL Jack 8 and adjust for 1 KC at 0 dbm. Bridge the unterminated VTVM across terminals 31 and 32 of T.S.A. Record the meter indication.

4.8 Amplifier A Gain Adjust, Pos. 12-6 - Connect the oscillator to the IN Jack of Amplifier A in Pos. 12-6. Adjust the oscillator for 1 KC at -25 dbm. Connect the terminated VTVM to the OUT Jack of Amp A in Pos. 12-6. Adjust the amplifier for the designated level. Record the meter indication on the Data Sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898
PREPARED BY [illegible] DATE 3/29/64			
CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 40

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4.0 Amplifier B Gain Adjust, Pos. 12-6 - With the condition of test 4.8, connect oscillator output to Amplifier B IN, Pos. 12-6. Patch terminated VTVM into Amplifier B OUT, Pos. 12-6 and adjust the gain for the designated level. Measure and record.

4.14 Remove all the test connections and reconnect the handsets.

5.0 Link Level and Signalling Test

5.1 Connect the oscillator to the TEL Jack specified in Step 5.2. Adjust the oscillator for 1 KC at 0 dbm.

5.2 Receive Level - Request the appropriate receiving station to measure the receive level by patching a terminated VTVM as follows:

LINK	TKG	RECEIVING STATION
TKG to TCO	Patch OSC to J2	Amp A OUT, Pos. 9-4
TKG to TAL	Patch OSC to J4	Amp A OUT, Pos. 9-4
TKG to TKA	Patch OSC to J6	Amp A OUT, Pos. 9-4
TKG to TES	Patch OSC to J8	Amp A OUT, Pos. 9-4

5.3 Signalling - Reconnect handset and lift off-hook. Alternately patch Jack Pos. 24 to the Jack indicated below while depressing pushbutton 1 on Tel Set Pos. 9-1.

LINK	PATCH
TKG to TCO	J24 to J2
TKG to TAL	J24 to J4
TKG to TKA	J24 to J6
TKG to TES	J24 to J8

Initial the data sheet.

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Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. A SIZE	6272898	A
PREPARED BY [signature] DATE 3/29/67				
CHECKED BY [signature] DATE 4/3/67		FEC NO.	SHEET 41	

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DRAWING NUMBER 6272898 42

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CODE IDENT. NO. 14842
DWG. SIZE A
FEC NO. 6272898
SHEET 42

TKG (TAL)

FROM TCO +7dbm — 17 / 18 — 12 db PAD — 41 / 42 — 1600~ TONE RCVR — 1B -5dbm / 2B — J1

FROM TAL -25 dbm — 19 / 20 — 1 / 2 — A 12-6 — 57 / 58 — 1600~ TONE RCVR — 5B -5dbm / 6B — J3

FROM TKA -25dbm — 21 / 22 — 3 / 4 — B 12-6 — 59 / 60 — 1600~ TONE RCVR — 9B -5dbm / 10B — J5

FROM TES +7dbm — 23 / 24 — 12db PAD — 47 / 48 — 1600~ TONE RCVR — 13B -5dbm / 14B — J7

J2 — 3B 0 dbm / 4B — 16db PAD — 25 -16dbm TO TCO / 26

J4 — 7B 0dbm / 8B — 43 / 44 — 20db PAD — 35 / 36 -20dbm TO TAL / 27 / 28

J6 — 11B 0dbm / 12B — 45 / 46 — 20db PAD — 37 / 38 -20dbm TO TKA / 29 / 30

J8 — 15B 0dbm / 16B — 16db PAD — 31 -16dbm TO TES / 32

4W TEL UNIT POS 9-1 — 29B -5dbm / 30B — J23

1600~ TONE GEN — 1 / 2 — 31B 0dbm / 32B — J24

POS 12-11

J25 — 71 -5dbm / 72 — 3 / 4 — 4W TEL UNIT POS 9-9

J26 — 76 0dbm / 77 — 1 / 2 — 1600~ TONE GEN

POS 12-10

TRIBUTARY ORDER WIRE TERMINAL TYPE B - TKR & TKA

1.0 References

1.1 Schematic KLB-4044, Sheet 12.1

1.2 Interconnection of Assemblies TKR, TKA, KLB-4044, Sheet 12.10

1.3 FEC Drawing 6271824

2.0 Test Equipment

2.1 Oscillator, Hewlett-Packard 200CD or 650A

2.2 VTVM, Hewlett-Packard, 400D or 400H

2.3 VOM, Simpson Mod. 260 or 270

2.4 Resistor, 150 ohm, 1%

2.5 Resistor, 600 ohm, 1%

2.6 Capacitor, 2 uf

2.7 Patch cord with Tip-Ring-Sleeve plugs

3.0 General

3.1 The Tributary Order Wire Terminal must be properly installed prior to the performance of the test procedures. The tests are to be performed in the order presented. The link tests cannot be conducted until the station tests have been completed at the adjacent stations.

3.2 The terminal is to be equipped as follows:

Pos. 1, 2 and 3	K-4100 Power Supply
Pos. 4, 5 and 6	WX-4295 Alerting Unit
Pos. 9-1	WX-4294 Tone Receiver
Pos. 9-2	WX-4293 Tone Generator
Pos. 9-3	WX-4292 Dual Amplifier
Pos. 9-4	WX-4292 Dual Amplifier

Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. SIZE A	6272898	A
PREPARED BY DATE 3/29/64				
CHECKED BY DATE 4/2/64		FEC NO.		SHEET 43

Pos. 9-5 — Blank Panel

Pos. 9-6 — KMT-4440 4W/4W Bridge

Pos. 9-8 — WX-4297 Ring Unit

Pos. 9-9 to 9-12 — KMT-4433 G6 4-Wire Tel. Set

4.0 Station Level Tests and Adjustments

4.1 Whenever a test specifies that the VTVM be terminated, the VTVM must be terminated in a 600 ohm resistor prior to taking a measurement.

4.2 Signal Transmit Level - Patch the terminated VTVM into W Mod. Jack Pos. 9-6. Rotate the W Mod. pot fully clock-wise and depress the push-button 1 on the KMT-4433. Measure and record.

4.3 Bridge Transmit Loss, W MOD - Connect the oscillator to the SPUR DEMOD Jack of the 4w/4w Bridge. Adjust the oscillator to 1 KC at 0 dbm. Connect the terminated VTVM to the W MOD Jack of the Bridge. Adjust the W MOD Pot. for the designated level. Record the meter indication on the Data Sheet.

4.4 Amplifier A Gain Adjust, Pos. 9-3 - Connect the oscillator to the IN Jack of Amp A in Pos. 9-3. Adjust the oscillator for 1 KC at -25 dbm. Connect the terminated VTVM to the OUT Jack of Amp A and adjust the amplifier for the designated level. Record the meter indication.

4.5 Bridge Receive Loss, Spur Mod. - With the conditions of Test 4.4, patch the terminated VTVM into the Spur Mod. Jack Pos. 9-6 and rotate the Spur Mod. pot for the designated level. Measure and record.

4.6 Amplifier A Gain Adjust, Pos. 9-4 - With the conditions of Test 4.4, patch the terminated VTVM into Amplifier A OUT Jack Pos. 9-4 and adjust the amplifier gain. Measure and record.

4.7 Bridge Transmit Loss, E Mod. - With the conditions of Test 4.4, patch the terminated VTVM into the E Mod. Jack. Rotate the E Mod. pot for the designated level. Measure and record.

4.8 Amplifier B Gain Adjust, Pos. 9-3 - Connect the oscillator to the IN Jack of Amp B in Pos. 9-3. Adjust the oscillator for 1 KC at -25 dbm. Connect the terminated VTVM to the OUT Jack of Amp B. Adjust the amplifier for the designated level. Record the meter indication on the Data Sheet.

4.9 Order Wire Receive - On the KMT-4440 patch the E Mod. to the Amplifier A IN, Pos. 9-4. Lift the handset off-hook and depress the pushbutton 1 on the KMT-4433. Initial the data sheet.

4.10 Remove all test connections.

5.0 Link Level and Signalling Test

5.1 Connect the oscillator to the SPUR DEMOD Jack of the 4w/4w Bridge. Adjust the oscillator for 1 KC at 0 dbm.

5.2 Receive Level, (TKR to TKA) - Request station TKA to measure the receive level by connecting a terminated VTVM into Amplifier A OUT, Pos. 9-4. Obtain the level measured and record on the data sheet.

5.3 Receive Level, (TKR to TIZ) - Request station TIZ to measure the receive level by connecting a terminated VTVM into Amplifier A OUT, Pos. 9-4. Obtain the level measured and record on the data sheet.

5.4 Receive Level, (TKA to TKR) - Request station TKR to measure the receive level by connecting a terminated VTVM into Amplifier A OUT, Pos. 9-4. Obtain the level measured and record on the data sheet.

5.5 Receive Level (TKA to TKG) - Request station TKG to measure the receive level by connecting a terminated VTVM into Jack 5. Obtain the level measured and record on the data sheet.

5.6 Signalling - Reconnect the handset and lift-off-hook. Depress push-button 1. Initial the data sheet.

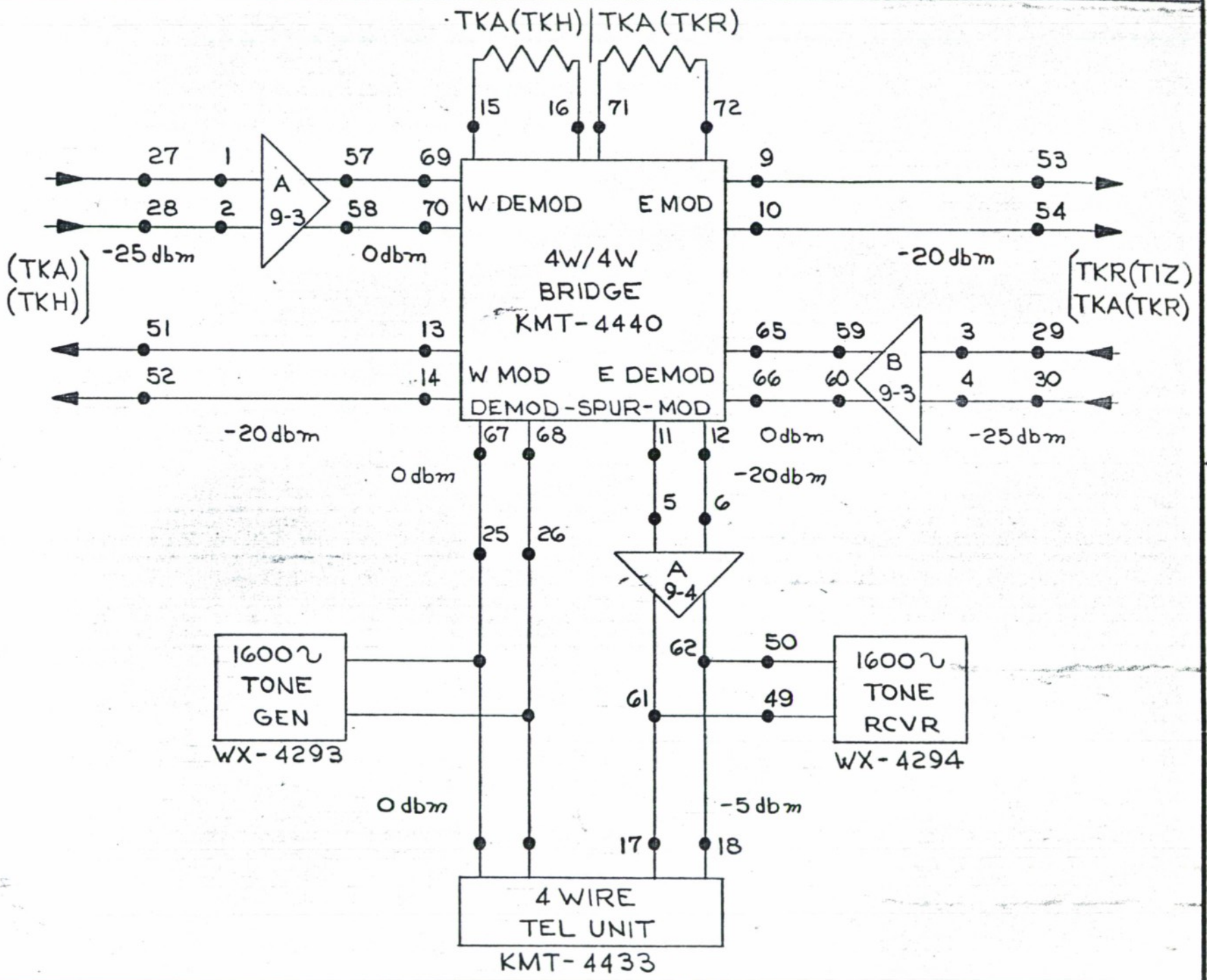
Test Procedures Tributary Order Wire	CODE IDENT. NO. 14842	DWG. A SIZE	6272898
PREPARED BY [illegible] DATE 3/25/64			
CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 45

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

DRAWING NUMBER 6272898 46

PREPARED BY D. MALZON DATE 3-16-64
CHECKED BY DATE

CODE IDENT. NO. 14842
DWG. SIZE A
6272898 A
FEC NO.
SHEET 46



FEE-2A (E)

DRAWING NUMBER 6272898 A7

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NOTE: Whenever reference in the text is made to this figure, adjust the oscillator in Position A for -6 dbm at 1000 cps and then apply the oscillator to D&E of the hand-set connector socket on KMT-4433 and the VTVM per test instruction.

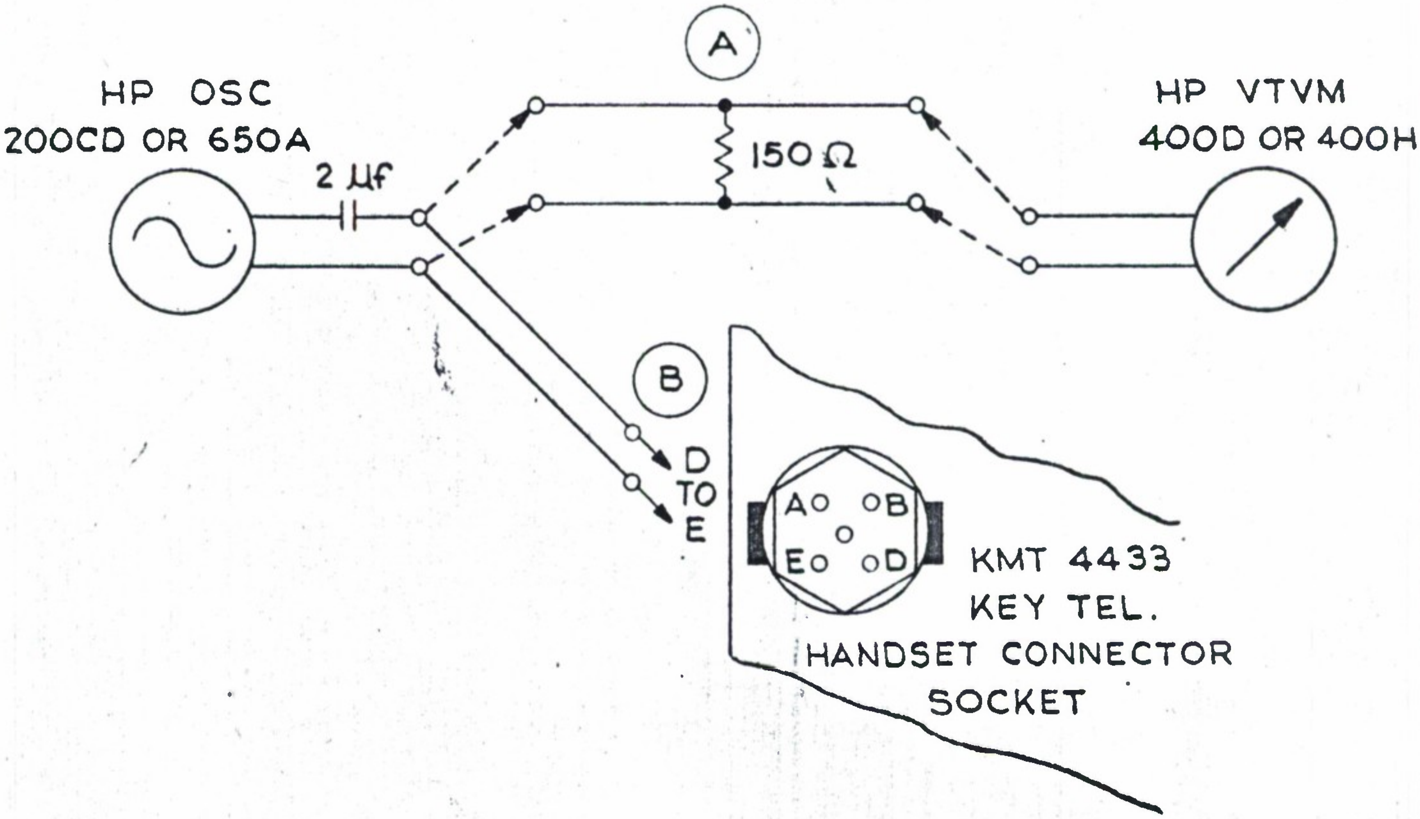

FIGURE 1

PREPARED BY	DATE	CODE IDENT. NO.	DWG. SIZE	
L. Longo	2/25/64	14842	A	6272898 A
CHECKED BY	DATE		FEC NO.	SHEET 47
A. R. [illegible]	3/11/64			

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NOTE: Whenever reference in the text is made to this figure, connect the VTVM as shown, to terminals A and B of the handset connector socket on KMT-4433.

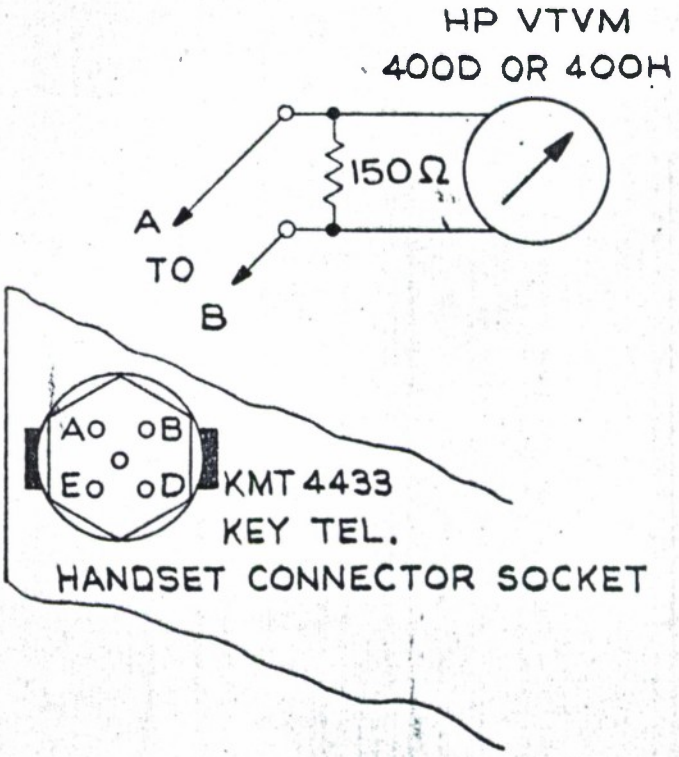

FIGURE 2

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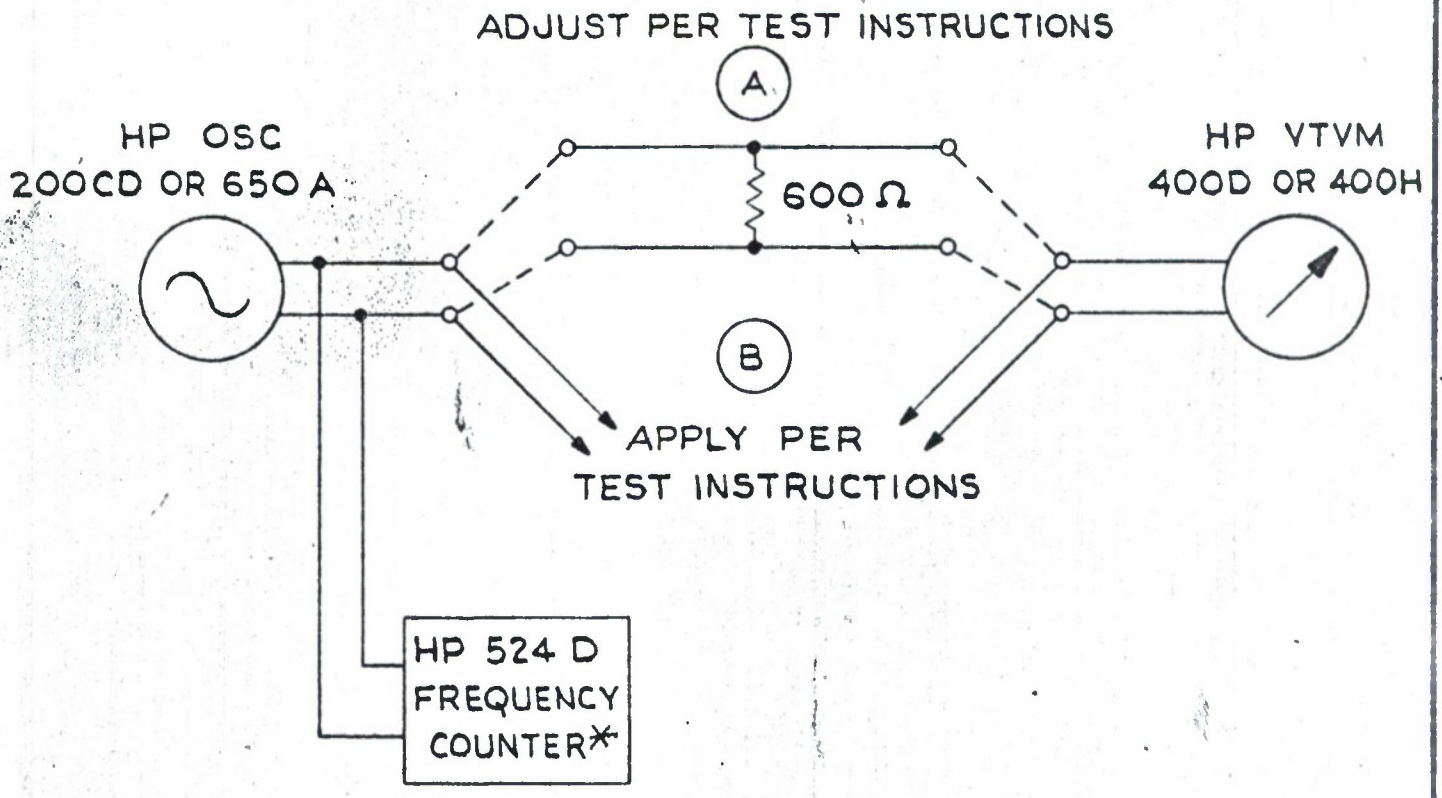
DRAWING NUMBER 6272898 48

PREPARED BY P. LONGO DATE 3/28/64
CHECKED BY DATE

CODE IDENT. NO. 14842
DWG. SIZE A
6272898
FEC NO.
SHEET 48

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

NOTE: Whenever reference in the text is made to this figure, adjust the oscillator in Position A, then apply the oscillator and VTVM per test instructions.



* Frequency counter only to be used when adjusting oscillator for 1600 cps signalling tests for Tributary Order Wire Tests.

FIGURE 3

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DRAWING NUMBER 6272898 49

PREPARED BY P. LONGO DATE 2/28/64
CHECKED BY [illegible] DATE 3/4/64

CODE IDENT. NO. 14842
DWG. SIZE A
6272898 A
FEC NO.
SHEET 49

OGILVIE PRESS, INC., BROOKLYN 17, N.Y. REPROVEL NO. 400M

FEE-2A (P)

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVED
A		ORIGINAL ISSUE		

GROUP		NEXT ASSEMBLY	FIRST USED ON
G			
G			
G			
G			
G1		6272924	

APPLICATION

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

COML. TOL. APPLY TO STOCK SIZES

APPROVALS SIGNATURE & DATE	
DRAWN	
CHECKED	AR 3/23/64
MECH	
ELECT	
STDS	A. Palermo 3/23/64

FEC H. Elliott 4-8-64 — FEC SOURCE

OTHER

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TEST PROCEDURES
TECHNICAL CONTROL
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG.	
14842	A SIZE	6272899
SCALE	FEC NO.	SHEET 1 OF 21

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

6272871

DRAWING NUMBER 6272899

1. SCOPE

1.1 This test plan outlines the testing procedures for the Technical Control Equipment.

2. TEST EQUIPMENT

2.1 The test equipment required for all tests in this section are:

A. Oscillator, HP 200 CD or equivalent.

B. VTVM, HP400H or equivalent

C. Transformer, HP AC60-B

3. TEST CONDITIONS

3.1 The technical control equipment must be properly installed and have been placed into operation prior to the performance of the test procedure.

3.2 Testing procedures will be performed on equipment properly installed with all signal and power connections complete.

4. PROCEDURE

4.1 The procedure for performing each test is included within this section.

4.2 The testing procedures shall be completed in the order presented.

5. REQUIREMENTS

5.1 ID, IC, GPA-1 Configuration

5.1.1 Bridge Loss
5.1.2 Terminating Set Insertion Loss
5.1.3 Pad Loss
5.1.4 Amplifier Gain
5.1.5 Transmit Signal Level
5.1.6 Tone Oscillator
5.1.7 Dialing Test

5.2 GPA-2 Configuration

5.2.1 Bridge Loss
5.2.2 Pad Loss

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Test Procedures Technical Control	CODE IDENT. NO. 14842	DWG. SIZE A	6272899
PREPARED BY [signature] DATE 3/29			
CHECKED BY [signature] DATE		FEC NO.	SHEET 2

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5.3 GHO Configuration

5.3.1 Bridge Loss
5.3.2 Pad Loss
5.3.3 Amplifier Gain
5.3.4 Tone Oscillator Level
5.3.5 Dialing Test

5.4 TIC & GAB-1 Configuration

5.4.1 Bridge Loss
5.4.2 Pad Loss
5.4.3 Amplifier Gain
5.4.4 Tone Oscillator Level
5.4.5 Dialing Test

5.5 IGC, GEL, TID, GTA, GIM, GPE & GAG Configuration

5.5.1 Pad Loss
5.5.2 Receive Level
5.5.3 Transmit Level
5.5.4 Tone Oscillator Level
5.5.5 Dialing Test

5.6 IAV and GAB-2 Configuration

5.6.1 Amplifier Gain
5.6.2 Transmit Level
5.6.3 Receive Level
5.6.4 Tone Oscillator Level

5.7 Link Tests

5.7.1 Dialing Tests

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on forms attached.

7. PROCEDURES

7.1 Sites ID, IC and GPA-1 (Form BRII/141)

7.1.1 Bridge Loss

A. Adjust the output of the oscillator to 1,000 cps at a level of +7dbm using the set up of figure 3.

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Test Procedures Technical Control	CODE IDENT. NO. 14842	DWG. A SIZE	6272899	A
PREPARED BY [illegible] DATE 3/29/64				
CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 3	

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B. Connect the oscillator to terminals 9 and 10 of terminal strip A.

C. Using a matching transformer, connect the VTVM to the SPUR MOD jack on the 4 way/4 wire bridge KMT 4440.

D. Set the SPUR MOD potentiometer on the KMT 4440 bridge to fully clockwise and terminate the AMP IN jack in 600 ohms.

E. Record the level indicated on the VTVM.

F. Remove the 600 ohm termination installed in step D and connect the VTVM to AMP IN jack on 4 way/4wire bridge.

G. Record the level indicated on the VTVM.

H. Connect the VTVM to the E MOD jack on the 4 way/4 wire bridge.

I. Set the E MOD potentiometer fully clockwise.

J. Record the level indicated on the VTVM.

K. With the oscillator frequency set to 1 KC, set the output level for -6 dbm across 150 ohms, using the set up shown in figure 1.

L. Connect the oscillator to terminals D and E of Key Telephone Panel K4433.

M. Terminate the W MOD jack on the 4 way/4 wire bridge with a 600 ohm resistor.

N. Using a matching transformer, connect the VTVM to A MPL IN jack on the 4 way/4 wire bridge.

O. Record the indicated level.

7.1.2 Terminating Set Insertion Loss

A. Set oscillator as described in paragraph 7.1.1A

B. Connect the oscillator to terminals 9 and 10 on terminal strip A.

C. Connect the VTVM, which is terminated in 600 ohms, to the terminal set Rec. Hyd. Jack, Position 6-3.

D. Record the indicated level.

7.1.3 Pad Loss

A. Adjust oscillator as described in paragraph 7.1.1A.

B. Connect the oscillator to terminals 9 and 10 on terminal strip A.

C. Terminate the output of pad B in the "T" pad panel K4401 with 600 ohms.

D. Connect the VTVM to the terminated output.

E. Record the indicated level.

NOTE: The variable pad can be adjusted for a correct reading.

F. Adjust oscillator as described in paragraph 7.1.1K

G. Connect the oscillator to terminals D and E of key telephone panel K4433.

H. Terminate the W MOD jack on KMT 4440 with 600 ohms.

I. Terminate the output of pad A in the "T" pad panel K4401 with 600 ohms.

J. Connect the VTVM to the terminated output.

K. Record the indicated level.

NOTE: The variable pad can be adjusted for a correct reading.

7.1.4 Amplifier Gain

A. Adjust the oscillator as described in paragraph 7.1.1A.

B. Connect the oscillator to terminals 9 and 10 of terminal strip A.

C. Terminate the output of Amplifier B on amplifier card #2, position 6-5, with 600 ohms.

D. Connect the VTVM to the terminated output.

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Test Procedures Technical Control	CODE IDENT. NO.	DWG.	
PREPARED BY DATE	14842	A SIZE	6272899
CHECKED BY DATE		FEC NO.	SHEET 5

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E. Record the indicated level.

NOTE: The gain control can be adjusted for a correct reading.

F. With the oscillator connected as in step B, terminate the output of amplifier A on amplifier card #1, position 9-1, with 600 ohms.

G. Connect the VTVM to the terminated output.

H. Record the indicated level.

NOTE: The gain control can be adjusted for a correct reading.

I. Adjust the oscillator as described in paragraph 7.1.1K

J. Connect the oscillator to terminals D and E on key telephone panel KMT 4433.

K. Terminate the output of amplifier A on amplifier card #2, position 6-5, with 600 ohms.

L. Connect the VTVM to the terminated output.

M. Record the indicated level.

N. Using the set up of figure 3, adjust the output of the oscillator for a level of -13 dbm at 1000 cps.

O. Connect the oscillator to terminals 1 and 2 of terminal strip A.

P. Terminate the output of amplifier B on amplifier card #1, position 9-1, with 600 ohms.

Q. Connect the VTVM to the output of the amplifier.

R. Record the indicated output level.

7.1.5 Transmit Signal Level

A. Adjust the oscillator as described in paragraph 7.1.1K

B. Connect the oscillator to terminals D and E of key telephone panel K4433.

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C. Connect a terminated VTVM to the MOD DROP jack of 4 wire terminating set KMT 4430.

D. Record the indicated level.

7.1.6 Tone Oscillator Level

A. Connect the VTVM, which is terminated in 600 ohms, to the MOD jack on 4 wire terminating set KMT 4430.

B. Rotate the dial of dial unit WX4299 off normal.

C. Record the level indicated on the VTVM.

NOTE: Tone Oscillator NUS 3420 can be adjusted for the proper level.

7.1.7 Dialing Test

A. Switch Power Supply K4100 off.

B. Connect handset to KMT 4433.

C. Connect amplifier A output of amplifier #2, position 6-5, to W DEMOD jack of 4 wire bridge KMT 4440.

D. Strap terminals M to P and L to R at the rear of KMT 4430.

E. Terminate AMPL IN jack of 4 wire bridge KMT 4440 with 600 ohms.

F. Terminate E MOD jack of KMT 4440 with 600 ohms.

G. Turn K4100 power supply on.

H. Dial station code; ID-540, ID-541, GPA 1-557.

I. The bell will now ring; remove handset, bell will silence.

J. Replace handset, dial all station Code 52

K. Bell will ring, remove handset to stop ringing.

L. Remove straps at rear of KMT 4430.

M. Initial data sheet.

7.2 Site GPA-2 (Form BRII/142)

7.2.1 Bridge Loss

A. Adjust oscillator output to 1000 cps at a level of +7 dbm using the set up of figure 3.

B. Connect the oscillator to terminals 17 and 18 of terminal strip A.

C. Connect the VTVM, which is terminated in 600 ohms, to the SPUR MOD jack of KMT 4440, position 3-4.

D. Terminate E MOD jack and W MOD jack in 600 ohms.

E. Set SPUR MOD potentiometer fully clockwise.

F. Record the indicated level.

G. Connect the VTVM to E MOD jack of KMT 4440.

H. Terminate SPUR MOD jack and W MOD jack in 600 ohms.

I. Set SPUR MOD potentiometer fully clockwise.

J. Record the indicated level.

K. Connect the VTVM to the W MOD of KMT 4440.

L. Terminate SPUR MOD jack and E MOD jack in 600 ohms.

M. Set W MOD potentiometer fully clockwise.

N. Record the indicated level.

O. Connect the oscillator to terminals 9 and 10 of terminal strip A.

P. Connect the VTVM to the AMPL IN jack on KMT 4440.

Q. Terminate SPUR MOD jack and E MOD jack in 600 ohms.

R. Record the indicated level.

7.2.2 Pad Loss

A. Adjust oscillator as described in paragraph 7.2.1A

B. Connect the oscillator to terminals 17 and 18 of terminal strip A.

C. Connect the VTVM, which is terminated in 600 ohms, to Pad A OUT jack of KMT 4401, position 3-2.

D. Record the indicated level.

NOTE: Pad can be adjusted for proper level.

E. Connect the VTVM to Pad B OUT jack of KMT 4401, position 3-2.

F. Record the indicated level.

NOTE: Pad can be adjusted for proper level.

G. Connect the VTVM to Pad B OUT jack of KMT 4401, position 3-3.

H. Record the indicated level.

NOTE: Pad can be adjusted for proper level.

I. Connect the oscillator to terminals 9 and 10 of terminal strip A.

J. Connect the VTVM to Pad A OUT jack of KMT 4401, position 3-3.

K. Record the indicated level.

NOTE: Pad can be adjusted for proper level.

7.3 Site GHO (Form BR11/143)

7.3.1 Bridge Loss

A. Adjust the output of the oscillator to 1000 cps at a level of +7 dbm using the set up of figure 3.

B. Connect the oscillator to terminals 9 and 10 of terminal strip A.

C. Connect the VTVM, which is terminated in 600 ohms, to the SPUR MOD jack of the 4 wire bridge KMT 4440.

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D. Terminate AMP IN jack on KMT 4440 in 600 ohms.

E. Turn SPUR MOD potentiometer ON KMT 4440 fully clockwise.

F. Record the indicated level.

G. Connect the VTVM to the AMPL. IN jack of KMT 4440.

H. Terminate the E MOD jack in 600 ohms.

I. Record the indicated level.

J. Connect the VTVM to E MOD jack on KMT 4440.

K. Set E MOD potentiometer fully clockwise.

L. Terminate AMP IN in 600 ohms.

M. Record the indicated level.

N. Connect the oscillator to terminals 17 and 18 on terminal strip A.

O. Connect the VTVM to W MOD jack on KMT 4440.

P. Terminate E MOD jack in 600 ohms.

Q. Set W MOD potentiometer fully clockwise.

R. Record the indicated level.

7.3.2 Pad Loss

A. Set oscillator as described in paragraph 7.3.1A

B. Connect oscillator to terminals 9 and 10 of terminal strip A.

C. Connect VTVM, which is terminated with 600 ohms, to Pad A OUT jack at position 9-3.

D. Record the indicated level.

NOTE: Adjust variable pad for correct output.

E. Connect VTVM to Pad A OUT jack at position 9-2.

F. Record the indicated level.

NOTE: Adjust variable pad for correct output.

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CHECKED BY [illegible] DATE 4/2/64		FEC NO.	SHEET 10	

G. Connect the oscillator to terminals 17 and 18 of terminal strip A.

H. Connect VTVM to Pad B OUT jack at position 9-3.

I. Record the indicated level.

NOTE: Adjust variable pad for correct output.

J. Adjust the output of the oscillator to 1000 cps at a level of -6 dbm using set up of figure 1.

K. Connect the oscillator to terminal D & E of KMT 4433.

L. Connect the VTVM, which is terminated in 600 ohms, to Pad A OUT jack at position 9-3.

M. Record the indicated level.

7.3.3 Amplfier Gain

A. Set oscillator as described in paragraph 7.3.1A.

B. Connect the oscillator to terminals 9 and 10 of terminal strip A.

C. Connect the VTVM, which is terminated in 600 ohms, to the AMPL B OUT jack, position 6-5.

D. Record the indicated level.

NOTE: Amplifier gain can be adjusted for the proper level.

E. Set oscillator as described in paragraph 7.3.2J.

F. Connect the oscillator to D and E of Key Telephone Set KMT 4433.

G. Connect the VTVM, which is terminated in 600 ohms, to AMPL A OUT jack of KMT 4440 position 9-4.

H. Record the indicated level.

NOTE: Amplifier gain can be adjusted for proper level.

7.3.4 Tone Oscillator Level

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PREPARED BY: P. Jones — DATE: 3/29/64	14842	A	6272899
CHECKED BY: A.K. — DATE: 4/2/64		FEC NO.	SHEET 11

A. Connect the VTVM, which is terminated in 600 ohms, to the MOD jack on KMT 4430, position 6-3.

B. Rotate dial of WX 4299, position 6-6, off-normal.

C. Record the level indicated on the VTVM.

NOTE: Tone Oscillator NUS 3420 can be adjusted for proper level.

7.3.5 Dialing Test

A. Switch K4100 power supply off.

B. Patch amplifier A OUT jack of KMT 4501, position 6-5, to W DEMOD jack of KMT 4440 position 9-4.

C. Strap terminals M to P and L to R on the rear of KMT 4430.

D. Terminate AMPL IN jack and E MOD jack of KMT 4440 in 600 ohms.

E. Turn K4100 power supply on.

F. Dial station code 556.

G. The bell will now ring. Remove handset, bell will silence.

H. Replace handset, bell will not ring.

I. Dial all station code 52.

J. Bell will ring, remove handset to stop ringing.

K. Remove straps at rear of KMT 4430.

L. Initial data sheets for proper dialing operation.

7.4 Sites TIC and GAB-1 (Form BRII/144)

7.4.1 Bridge Loss

A. Adjust the output of the oscillator to 1000 cps at a level of +7 dbm using the set up of figure 3.

B. Connect the oscillator to the terminating set KMT 4210 Pos. 16-7.

C. Turn E MOD potentiometer on 4 way/bridge KMT 4440 fully clockwise.

D. Connect the VTVM which is terminated in 600 ohms to the E MOD jack of KMT 4440.

E. Record the indicated level.

F. Connect the VTVM to the SPUR MOD jack of KMT 4440.

G. Turn SPUR MOD potentiometer on KMT 4440 fully clockwise.

H. Record the indicated level.

7.4.2 Pad Loss

A. Adjust the oscillator as described in paragraph 7.4.1A.

B. Connect the oscillator to terminating set KMT 4210.

C. Connect the VTVM, which is terminated in 600 ohms, to the output jack of pad A, KMT 4401.

D. Record the indicated level.

NOTE: The potentiometer on pad A can be adjusted for a correct reading.

7.4.3 Amplifier Gain

A. Adjust the oscillator as described in paragraph 7.4.1A.

B. Connect the oscillator to terminating Set KMT 4210.

C. Terminate terminals A and B of Key Telephone Panel KMT 4433 in 150 ohms.

D. Connect the VTVM, which is terminated with 600 ohms, to the AMP B OUT jack of Drop Amplifier KMT 4501 position 13-2.

E. Record the indicated level.

NOTE: Amplifier gain can be adjusted for proper level.

F. Connect the VTVM, which is terminated with 600 ohms, to the AMP B OUT jack of Drop Amplifier KMT 4501 position 13-3.

G. Record the indicated level.

NOTE: Amplifier gain can be adjusted for proper level.

H. Adjust the output of the oscillator to 1000 cps at a level of -6 dbm using the set up of figure 1.

I. Connect the oscillator to terminals D and E of Key Telephone Panel KMT 4433.

J. Connect the VTVM, which is terminated in 600 ohms, to AMP A OUT jack of Drop Amplifier KMT 4501 position 13-3.

K. Record the indicated level.

NOTE: Amplifier gain can be adjusted for proper level.

L. Connect the VTVM, which is terminated in 600 ohms, to E MOD jack of Junction Network KMT 4440.

M. Record the indicated level.

NOTE: Amplifier A, position 13-2, gain can be adjusted for proper level.

7.4.4 Tone Oscillator Level

A. Connect the VTVM, terminated in 600 ohms, to the E MOD jack of the 4 Way Bridge KMT 4440, position 13-4.

B. Remove Dial Unit WX 4299.

C. Adjust tone oscillator level, position 10-2, with the handset on KMT 4433 off the hook.

D. Record the indicated level.

E. Replace handset and dial unit after adjustment.

F. Strap terminal 21 on terminal strip A to chassis ground.

G. Record indicated level.

NOTE: Adjust tone oscillator, position 16-2 for the proper level.

7.4.5 Dialing Test

A. Dial station Code 550 at GAB-1 and 572 at TIC. Bell WX4300 will ring. Dial all station code 52. Bell WX4300 will ring.

B. Initial data sheet.

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7.5 Sites IGC, GEL, TID GTA, GIM, GPE, GAG (Form BRII/145)

7.5.1 Pad Loss

A. Adjust oscillator output to 1000 cps at a level of +7 dbm using the set up shown in figure 3.

B. Connect the oscillator to terminals 1 and 2 of terminal strip A.

C. Connect VTVM, which is terminated in 600 ohms to Pad A OUT jack of KMT 4401, position 9-3.

D. Record indicated level.

NOTE: Variable pad can be adjusted for correct reading.

7.5.2 Receive Level

A. Adjust oscillator as in paragraph 7.5.1A

B. Connect the oscillator to terminals 1 and 2 of terminal strip A.

C. Connect VTVM to terminals A and B of KMT 4433 position 6-9.

D. Record indicated level.

7.5.3 Transmit Signal Level

A. Adjust oscillator output to 1000 cps at a level of 6 dbm using the set up shown in figure 1.

B. Connect the oscillator to terminals D and E of KMT 4433.

C. Connect VTVM, which is terminated in 600 ohms, to Pad B OUT jack KMT 4401, position 6-9.

NOTE: Variable pad can be adjusted for proper level.

7.5.4 Tone Oscillator Level

A. Connect VTVM, which is terminated in 600 ohms, to HYB. MOD jack on KMT 4430, position 6-3.

B. Rotate the dial of dial unit WX 4299 off normal.

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C. Record the level indicated on the VTVM.

NOTE: The tone oscillator output can be adjusted for the proper level.

7.5.5 Dialing Operation

A. Switch K4100 power supply off.

B. Strap KMT 4501 test amplifier output to terminals 1 and 2 and the input to terminals 5 and 6 of terminal strip A.

C. Block "M" relay on KMT 4430.

D. Turn K4100 power supply on.

E. Dial the station code; IGC-544, GEL-555, TID-570, GTA-560, GIM-557, GPE-559, GAG-554.

F. The bell will now ring.

G. Remove handset, bell will stop.

H. Replace handset.

I. Dial all station code 52.

J. Bell will ring, remove handset to stop ringing.

K. Remove straps at rear of KMT 4430.

L. Remove block from "M" relay.

M. Remove all test connections.

N. Initial data sheet.

7.6 Sites IAV and GAB-2 (Form BRII/146)

7.6.1 Amplifier Gain

A. Adjust oscillator output to 1000 cps at a level of 5.5 dbm using the set up shown in figure 3.

B. Connect the oscillator to terminals 17 and 18 of terminal strip A.

C. Connect the VTVM which is terminated in 600 ohms, to AMP B OUT jack on KMT 4501, position 10-9.

D. Record the level indicated on the VTVM while being certain that AMPL B input pad is wired into the circuit.

NOTE: Amplifier gain can be adjusted to obtain proper level.

7.6.2 Transmit Level

A. Set oscillator as described in paragraph 7.6.1A.

B. Connect oscillator to terminals 17 and 18 of terminal strip A.

C. Connect VTVM, which is terminated in 600 ohms, to MOD jack on KMT 4210, position 10-7.

D. Turn Mod T pad on KMT 4210 fully clockwise.

E. Record the indicated level.

7.6.3 Receive Level

A. Adjust oscillator output to 1000 cps at a level of +7 dbm using the set up shown in figure 3.

B. Connect the oscillator to terminals 1 and 2 on terminal strip A.

C. Turn the demod T pad on KMT 4210 fully clockwise.

D. Connect the VTVM, which is terminated in 600 ohms, to the hybrid jack on KMT 4210 position 10-7.

E. Record the indicated level.

7.6.4 Tone Oscillator Level

A. Connect the VTVM, which is terminated in 600 ohms, to terminals 5 and 6 on terminal strip A.

B. Remove the Secode Unit WX 4298.

C. Record the level indicated on the VTVM.

NOTE: Adjust tone oscillator NUS 3420 for proper level.

D. Replace the Secode Unit.

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8. LINK TESTS (Form BRII/147)

8.1 Preliminary

A. The link tests will determine that each station on the technical control circuit can contact any other station on the same circuit and that the all station option operates properly.

B. Circuit A includes IAV, ID, IC, and IGC.

Circuit B includes GEL, GAB, and GPA

Circuit C includes GAB, GPA, GTA, GIM, GHO, GPE and GAG.

Circuit D includes TIC and TID.

C. Following is a list of station codes.

IAV-543	GHO-556
ID-542	GIM-557
IC-540	GPA-558
IGC-544	GPE-559
GAB-1 -550 or 552	GTA-560
GAB-2 -553	TID-570
GAG-554	TIC-572 or 573
GEL-555	

8.2 Procedure

A. Each station will dial the station code of every other station on their circuit and verify that signalling operates properly and voice communications can be accomplished.

B. Initial the data sheet for each station contacted.

C. Each station will dial the all station code 52 and verify the response of the other stations on the circuit by initialing the data sheet.

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Test Procedures Technical Control	CODE IDENT. NO. 14842	DWG. SIZE A	6272899	A
PREPARED BY [signature] DATE 3/29/64				
CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 18	

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NOTE: Whenever reference in the text is made to this figure, adjust the oscillator in Position A for -6 dbm at 1000 cps and then apply the oscillator to D&E of the hand-set connector socket on KMT-4433 and the VTVM per test instruction.

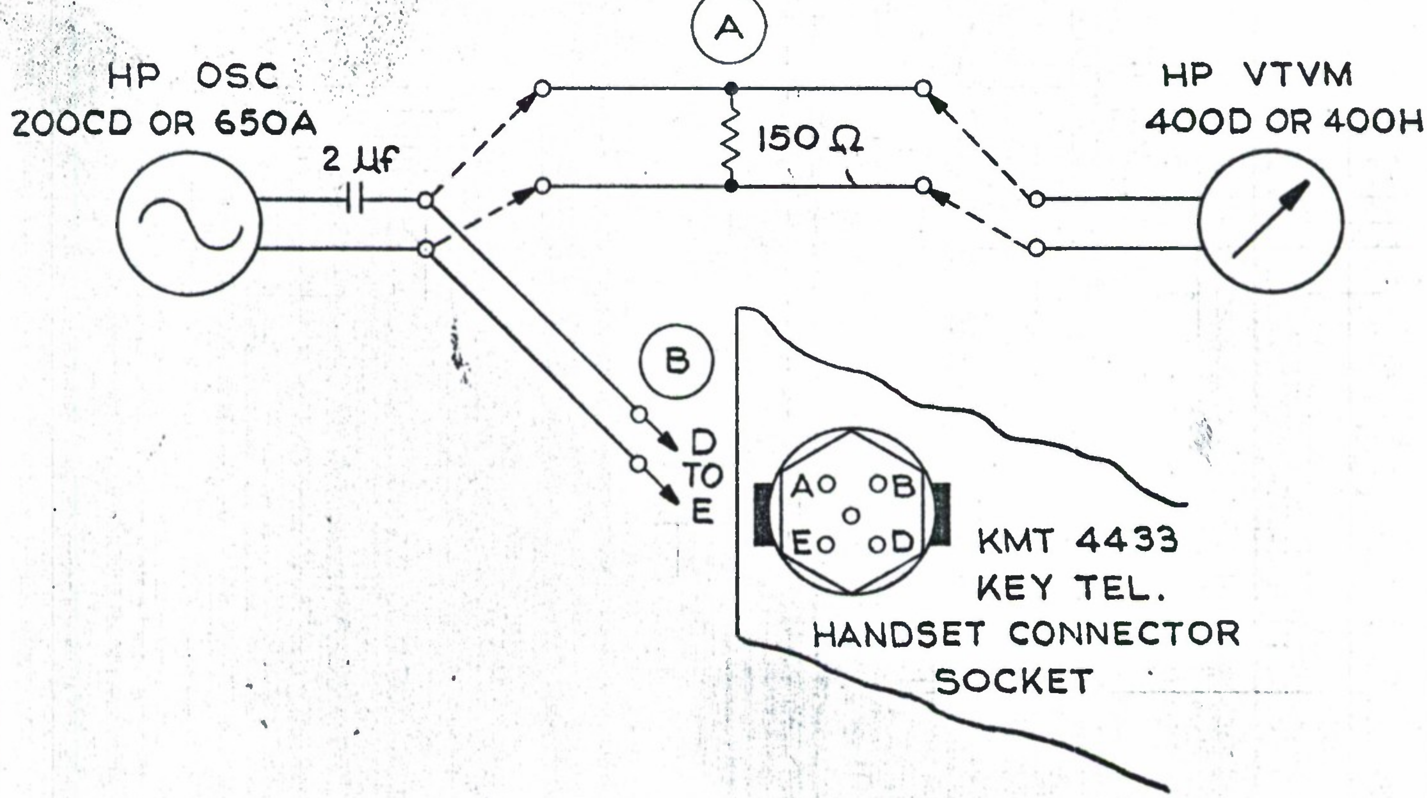

FIGURE 1

PREPARED BY	DATE	CODE IDENT. NO.	DWG. SIZE		
L. Longo	2/28/64	14842	A	6272899	A
CHECKED BY	DATE		FEC NO.		SHEET 19
[illegible]	3/16/64				

NOTE: Whenever reference in the text is made to this figure, connect the VTVM as shown, to terminals A and B of the handset connector socket on KMT-4433.

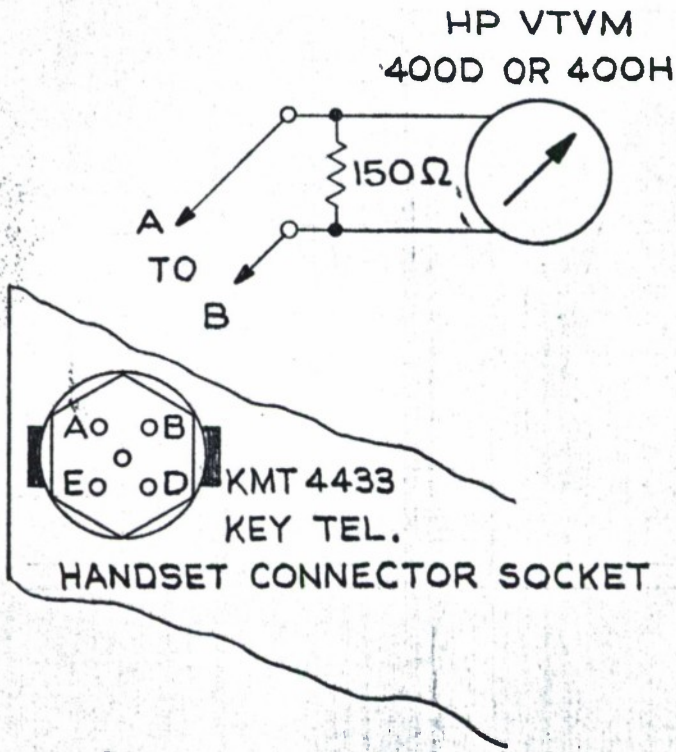

FIGURE 2

CODE IDENT. NO.	DWG. SIZE	
14842	A	6272899 A

PREPARED BY P. Longo DATE 2/28/64

CHECKED BY D. [illegible] DATE 3/16/64

FEC NO.

SHEET 20

[redacted]WING NUMBER 6272899 20

FEE-2A (F)

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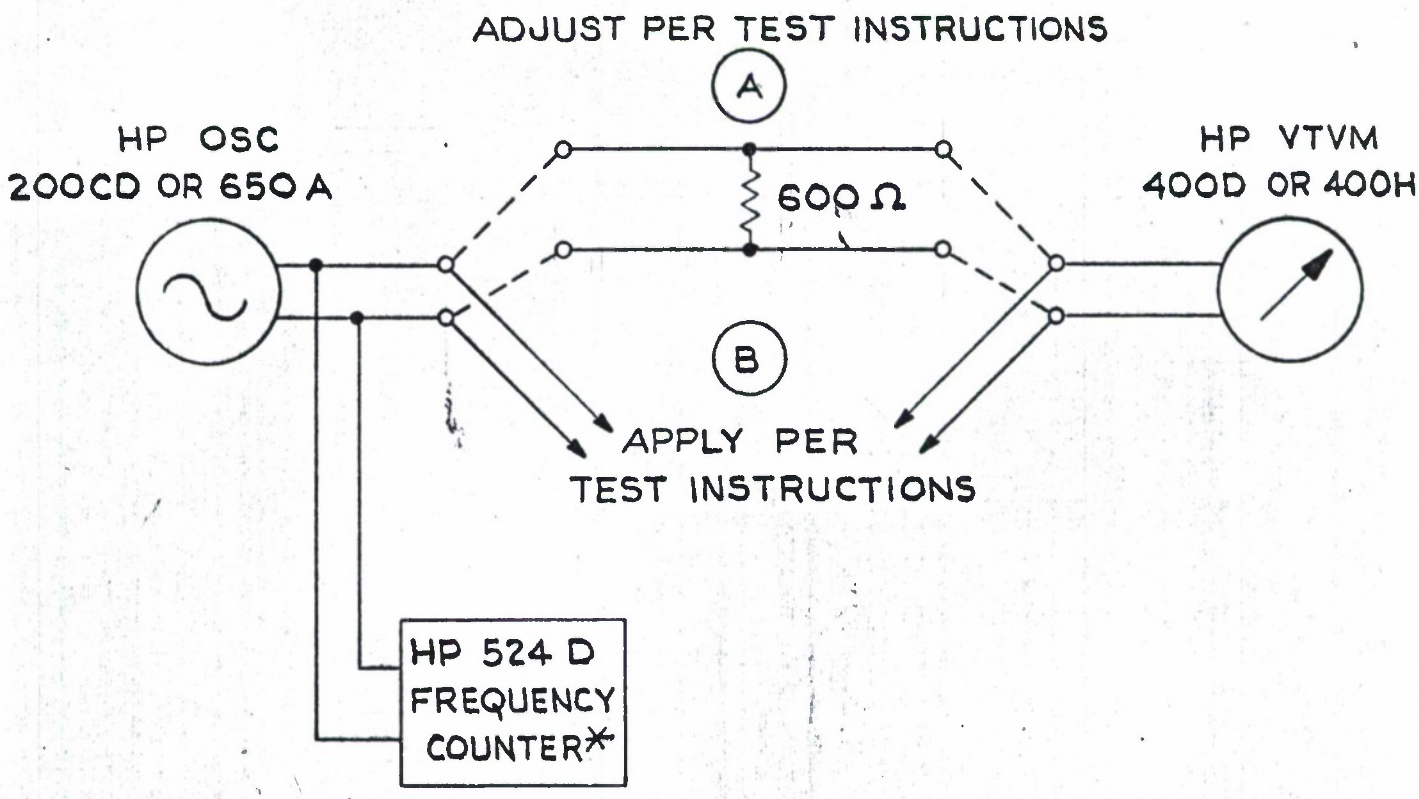
NOTE: Whenever reference in the text is made to this figure, adjust the oscillator in Position A, then apply the oscillator and VTVM per test instructions.



* Frequency counter only to be used when adjusting oscillator for 1600 cps signalling tests for Tributary Order Wire Tests.

FIGURE 3

FEDERAL ELECTRIC CORPORATION
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DRAWING NUMBER 6272899 21

PREPARED BY P. Longo DATE 2/28/64	CODE IDENT. NO. 14842	DWG. SIZE A	6272899 A
CHECKED BY [illegible] DATE 3/14/64		FEC NO.	SHEET 21

...ILVIE PRESS, INC., BROOKLYN 17, N.Y. REPROVEL NO. 400M

DWG NO 6272900

FEE-2A (P)

A ORIGINAL ISSUE

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVED

SHEET NO.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ISSUE LTR																									
SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ISSUE LTR	A	A	A	A	A	A	A																		

G			
G			
G			
G			
G			
G1		6272924	
GROUP	NEXT ASSEMBLY		FIRST USED ON
	APPLICATION		

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

COML. TOL. APPLY TO STOCK SIZES

APPROVALS SIGNATURE & DATE	
DRAWN	
CHECKED	AR 3/23/64
MECH	
ELECT	
STDS	A. Palumbo 3/23/64

FEC H. Elliott 4-8-64 — FEC SOURCE

OTHER

ITT SERVICE

FEDERAL ELECTRIC CORPORATION
PARAMUS INDUSTRIAL PARK — PARAMUS, NEW JERSEY
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TEST PROCEDURES
20 KW POWER GENERATING SYSTEM
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG.	
14842	A SIZE	6272900
SCALE	FEC NO.	SHEET 1 OF 7

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

6272900

1. SCOPE

This test plan outlines the testing procedures and performance criteria for the 20 KW power generating systems of the Big Rally II Communications System.

2. TEST EQUIPMENT

Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The equipment must be properly installed and have been placed into operation prior to the performance of test procedures.

3.2 All equipment and test procedures involved with Engine Alarm Systems, Governors, Starting Systems, Fuel Transfer Systems, etc. shall have been completed prior to the performance of the power generating system test.

4. PROCEDURE

4.1 The procedure for performing each test is included within the individual test procedure.

4.2 The Power Generating System Evaluation tests will be conducted between the Power Generating Units and the Electronic Equipment and at both the Power Generating Unit location and the Electronic Equipment location.

4.3 The testing procedures shall be completed in the order prescribed.

5. REQUIREMENTS

5.1 Frequency

5.2 Phasing

5.3 Neutral Ground

5.4 Terminal Voltage

5.5 Generator Transfer Operation

5.6 Paralleling

6. RECORDING RESULTS

Test results shall be recorded in triplicate on the forms attached.

7. FREQUENCY (Form BR11/121)

7.1 Test Equipment:

A. Frequency Meter (Generator Panelboard)

B. Stop Watch

C. Ammeter (Generator Panelboard)

7.2 Test Condition:

The frequency test shall be performed by utilizing the existing technical and domestic loads.

7.3 Procedure:

A. Connect all loads available at the distribution center.

B. Observe that during a steady state load (constant amperage) frequency fluctuation is within the 2% band, ie.: 0.6 cps. Record the maximum and minimum readings on form provided.

C. Simultaneously trip the main circuit breaker at the distribution center and start the stop watch. Determine that variance in frequency does not vary by more than ±4.8 cps and that recovery time does not exceed 3 seconds to obtain the original figures ±0.6 cps. Record readings and recovery time on form provided.

D. Close main circuit breaker simultaneously with starting the stop watch. Determine that frequency does not vary by more than 4.8 cps and that recovery time does not exceed 3 seconds to obtain the original frequency ±0.6 cps. Record readings and recovery time on form provided.

8. PHASING (Form BRII/122)

8.1 Test Equipment

Panelboard Voltmeter and Selector Switch

8.2 Test Condition

The phasing test shall be performed without station loads connected to the equipment.

8.3 Procedure

A. Open the generator main circuit breaker.

Test Procedures 20 KW Power Gen System	CODE IDENT. NO. 14842	DWG. A SIZE	6272900
PREPARED BY [signature] DATE 3/29/64			
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A

B. While in no-load operating condition, obtain the individual line to neutral voltages by turning the voltage selector switch to positions 1 and 2 respectively. Deviation of individual voltages shall not exceed 1%.

C. Record results on form provided.

9. NEUTRAL GROUNDINGS (Form BRII/122)

9.1 Test Equipment

Simpson Model 270 RT Multimeter with battery and test leads.

9.2 Test Condition

This test shall be performed on both diesel generators with main generator breaker open.

9.3 Procedure

A. Stop both engine and generator

B. Connect one lead of the Simpson Multimeter to the ground rod and the other lead (use extension wire) to the neutral terminal on the generator.

C. Observe and record the resistance readings on the form provided. Readings in excess of 5 ohms indicate that connections are poor and that connections should be tightened.

NOTE: CAUTION

Do not test grounds while there is a thunder storm in the vicinity.

10. TERMINAL VOLTAGE (Form BRII/123)

10.1 Test Equipment

A. Model 270 RT Simpson Multimeter with test leads.

B. Generator Panelboard mounted ammeter and voltmeter.

10.2 Test Condition

This test shall be performed at or in the equipment van with all available station loads connected to the Load Distribution Center in van.

Test Procedures 20 KW Power Gen System	CODE IDENT. NO. 14842	DWG. SIZE A	6272900	A
PREPARED BY [signature] DATE 3/29/64				
CHECKED BY [signature] DATE 4/3/64		FEC NO.	SHEET 4	

10.3 Test Procedure

There are two types of loads for which test results are required:

240 volt loads and 120 volt loads. The maximum voltage drop in all cases shall not exceed three percent of the generated voltage as recorded at the generator panel.

A. Readings shall be recorded on the forms provided, and percentage of voltage drop shall be calculated.

B. Safety features will include the use of rubber gloves, and a dry wood platform under feet.

C. Readings shall be obtained by connecting the test leads of the Simpson Multimeter to the inlet terminals of the 240/120 volt MRC-80 equipment located in the equipment van and selecting the correct meter scale for the voltage being measured.

D. The readings required are listed as follows and shall be taken at terminal locations on equipment:

LINE TO LINE VOLTAGE

LINE TO NEUTRAL VOLTAGE

11. GENERATOR TRANSFER OPERATION: (Form BRII/124)

11.1 Test Equipment

Generator Panelboard mounted voltmeter, ammeter, wattmeter and frequency meter.

11.2 Test Condition

This test shall be performed with all available station loads connected to the duty generator.

11.3 Test Procedure

A. Reduce voltage of duty generator to a value of about 90% by increasing resistance of DC excitation rheostat or reducing the speed of the duty unit at the engine throttle.

B. Observe and record on form provided that within a period of 20 seconds the automatic load transfer occurs from the duty unit to the standby unit and that the voltage frequency, amperage and wattage of the standby unit is equal to normal operating conditions.

C. Determine that the previous duty unit has gone into engine lockout status and that the warning alarms are activated after the transfer is made.

12. PARALLELING TEST (Form BRII/125)

12.1 Test Instruments

Generator Panelboard Mounted Voltmeter, Ammeter, Frequency Meter, Synchronizing lights and Stop Watch.

12.2 Test Condition

This test shall be performed with all available station loads connected to the duty generator.

12.3 Test Procedure

A. Place the circuit breaker of the standby unit in "OFF" position.

B. Place both the Paralleling Bypass Switches in "ON" position.

C. Place the Unit Selector Switch in "1 and 2" position. After predetermined time, the standby unit will start and come up to speed and voltage. Record the time required on form provided.

D. Place the Paralleling Switch of both units on "ON" position.

E. Observe the paralleling lights of the standby unit. Adjust the speed of the unit until the paralleling lights glow bright and dark very slowly. (About once every two or three seconds).

F. At a time when the lights are dark, close the circuit breaker of the standby unit. The units are now in parallel operation.

G. Observe the ammeters and wattmeters of both units. Adjust the speed and/or voltage of the standby unit until the load is equally divided between the units. (Amps and watts are the same on both units).

H. Record the amps, watts, volts, frequency and tachometer readings, of both units now in parallel.

NOTE: Miscellaneous Instructions:

The test outlined in paragraphs 7, 8, 9, 12 and 13 shall be repeated on the standby unit after it has been transferred to the status of the duty unit.

Test Procedures 20 KW Power Gen System	CODE IDENT. NO. 14842	DWG. SIZE A	6272900
PREPARED BY [redacted] DATE 3/29/64			
CHECKED BY [redacted] DATE 4/7/64		FEC NO.	SHEET 6

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13. FORM PARALLEL OPERATION TO DUTY UNIT

Procedure

13.1 Place the unit Selector Switch in the position of the desired duty unit (unit to be tested).

13.2 Push the unit Transfer Switch of the desired duty unit.

13.3 Push both Paralleling Bypass Switches in the "OFF" position.

13.4 Place both the Paralleling Switches in "OFF" position.

13.5 Place the Engine Control Switch of the selected standby unit in "OFF" position.

13.6 Place the Throttle of the selected standby unit in "STOP" position. After the engine has stopped, return the Throttle to "RUN" position.

13.7 Place the Engine Control Switch in "AUTO" position. This unit will now be ready for standby service.

14. Perform all tests as outlined in paragraphs 7, 8, 11 and 12 filling out forms provided for the new duty unit.

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Test Procedures 20 KW Power Gen System	CODE IDENT. NO.	DWG. SIZE	
PREPARED BY [signature] DATE 3/29/64	14842	A	6272900
CHECKED BY [signature] DATE 4/2/64		FEC NO.	SHEET 7

FEF-2A (5) SYLVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

FEE-2A (P)

DWG NO. [illegible]29[illegible]

REVISIONS				
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A		ORIGINAL ISSUE		

SHEET NO.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ISSUE LTR																									
SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ISSUE LTR	A	A	A	A	A	A	A	A																	

GROUP	NEXT ASSEMBLY	FIRST USED ON
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G1	6272924	

APPLICATION

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FEC SOURCE	
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TEST PROCEDURES
60 KW POWER GENERATING SYSTEM
BIG RALLY II COMMUNICATION SYSTEM

CODE IDENT. NO.	DWG. SIZE	
14842	A	6272901
SCALE	FEC NO. CA115000	SHEET 1 OF 8

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

6272901

DRAWING NUMBER 6272901

1. SCOPE

This test plan outlines the testing procedures and performance criteria for the 60 KW power generating systems of the Big Rally II Communications System.

2. TEST EQUIPMENT

Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The equipment must be properly installed and have been placed into operation prior to the performance of test procedures.

3.2 All equipment and test procedures involved with Engine Alarm Systems, Governors, Starting Systems, Fuel Transfer Systems, etc. shall have been completed prior to the performance of the power generating System Test.

4. PROCEDURE

4.1 The procedure for performing each test is included within the individual test procedure.

4.2 The Power Generating System Evaluation tests will be conducted between the Power Generating Units and the Electronic Equipment and at both the Power Generating Unit locations and the electronic equipment location.

4.3 The testing procedures shall be completed in the order prescribed.

5. REQUIREMENTS

5.1 Frequency

5.2 Load Balance

5.3 Phasing

5.4 Neutral Grounding

5.5 Terminal Voltage

5.6 Generator Transfer Operation

5.7 Paralleling

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Test Procedures 60 KW Power Gen System	CODE IDENT. NO. 14842	DWG. SIZE A	6272901	A
PREPARED BY [illegible] DATE 3/29/64				
CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 2	

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6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on the forms attached.

7. FREQUENCY (Form BRII/111)

7.1 Test Equipment

A. Frequency Meter (Generator Panel Board)

B. Stop Watch

C. Ammeter (Generator Panel Board)

7.2 Test Condition

The frequency test shall be performed by utilizing the existing technical and domestic loads.

7.3 Procedure

A. Connect all loads available at the distribution center.

B. Observe that during a steady state load (constant amperage) frequency fluctuation is within the 20 band i. e. 0.6 cps. Record the maximum and minimum readings on form provided.

C. Simultaneously trip the main circuit breaker at the distribution center and start the stop watch. Determine that variance in frequency does not vary by more than 4.8 cps and that recovery time does not exceed 3 seconds to obtain the original figures 0.6 cps. Record readings and recovery time on form provided.

D. Close main circuit breaker simultaneously with starting the stop watch. Determine that frequency does not vary by more than $\pm$ 4.8 cps and that recovery time does not exceed 3 seconds to obtain the original 0.6 cps. Record readings and recovery time on form provided.

8. LOAD BALANCE (Form BRII/112)

8.1 Test Equipment

A. Panel Board Ammeter and Selector Switch

B. Panel Board Voltmeter and Selector Switch

Test Procedures 60 KW Power Gen System	CODE IDENT. NO. 14842	DWG. SIZE A	6272901
PREPARED BY [illegible] DATE 3/29/64			
CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 3

8.2 Test Condition

The phase balance load shall be performed utilizing the existing technical and domestic loads.

8.3 Procedure

A. Connect normal station technical and domestic loads to the load circuit.

B. While in a steady state load condition record the phase amperages and voltages, by turning the selector switches to phase 1, 2 and 3 respectively and recording the individual phase voltages and amperages on forms provided.

C. Multiply the individual phase voltages by the individual phase amperages and record the products on the form provided.

D. If major unbalance is indicated between phases reconnect the single phase loads to obtain the best possible balance. Record readings on form provided.

9. PHASING (Form BRII/113)

9.1 Test Equipment

A. Panel Board Voltmeter and Selector Switch

9.2 Test Condition

The Phasing test shall be performed without station loads connected to the equipment.

9.3 Procedure

A. Open the generator main circuit breaker.

B. While in a no-load operating condition obtain the individual phase voltages by turning the voltage selector switch to phase 1, 2 and 3 respectively. Deviation of individual voltages shall not exceed 1%.

C. Record results on form provided.

10. NEUTRAL GROUNDING (Form BRII/113)

10.1 Test Equipment

Simpson Model 270 RT Multimeter with battery and test leads.

Test Procedures 60 KW Power Gen System	CODE IDENT. NO.	DWG. SIZE		
PREPARED BY P. Jones DATE 3/29/64	14842	A	6272901	A
CHECKED BY DATE 4/7/64		FEC NO.		SHEET 4

10.2 Test Condition

This test shall be performed on both diesel generators manual lock-outs of the diesel engine lock "IN" position.

10.3 Procedure

A. Stop both engine generators.

B. Connect one lead of the Simpson Multimeter to the ground rod and the other lead (use extension wire) to the neutral terminal on the generator.

C. Observe and record the resistance readings on the form provided. Readings in excess of 5 ohms indicate that connections are poor and that connections should be tightened.

NOTE: CAUTION

Do not test grounds while there is a thunder storm in the vicinity.

11. TERMINAL VOLTAGE (Form BRII/114)

11.1 Test Equipment

A. Model 270 RT Simpson Multimeter with test leads.

B. Generator Panelboard mounted ammeter and voltmeter.

11.2 Test Condition

This test shall be performed at or in the equipment van with all available station loads connected to the Load Distribution Center in van.

11.3 Test Procedure

There are two types of loads for which test results are required: 208 volt loads and 120 volt loads. The maximum voltage drop in all cases shall not exceed three percent of the generated voltage as recorded at the generator panel.

A. There are two locations for which test results are required. Each of these locations require a line to line single phase 208 volt test. For Mark 85 Equipment, 208 volt line to line voltage test and 120 volt line to neutral tests are required.

B. Readings shall be recorded on the forms provided and percentage of voltage drop shall be calculated.

C. Safety features will include the use of rubber gloves, and a dry wood platform under feet.

D. Readings shall be obtained by connecting the test leads of the Simpson Multimeter to the inlet terminals of the 208V/237.8 volt transformers located in the equipment van and selecting the correct meter scale for the voltage being measured.

E. The readings required are listed as follows and shall be taken at each transformer location:

LINE TO LINE VOLTAGE

F. For 3 Phase, 4 wire leads (MARK 85 Equipment) readings shall be taken at input terminal points within equipment van as follows:

3 Phase, 208 Volt

Phase 1 to 2
Phase 2 to 3
Phase 3 to 1

Single Phase, 120 Volt

Phase 1 to Neutral
Phase 2 to Neutral
Phase 3 to Neutral

12. GENERATOR TRANSFER OPERATION (Form BRII/115)

12.1 Test Equipment

A. Generator Panelboard mounted voltmeter, ammeter, wattmeter and frequency meter.

B. Stop Watch.

12.2 Test Condition

This test shall be performed with all available station and dummy loads connected to the duty generator.

12.3 Test Procedure

Test Procedures 60 KW Power Gen System	CODE IDENT. NO. 14842	DWG. A SIZE	6272901
PREPARED BY [signature] DATE 3/29/64			
CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 6

A

A. Reduce voltage of duty generator to a value of about 90% by increasing resistance of DC excitation rheostat or reducing the speed of the duty unit at the engine throttle.

B. Observe and record on form provided that within a period of 20 seconds the automatic load transfer occurs from the duty unit to the standby unit and that the voltage, frequency, amperage and wattage of the standby unit is equal to normal operating conditions.

C. Determine that the previous duty unit has gone into engine lock-out status and that the warning alarms are activated after the transfer is made.

13. PARALLELING TEST (Form BRII/116)

13.1 Test Equipment

Generator Panel Board Mounted Voltmeter, Ammeter, Frequency Meter, Synchronizing Lights and Stop Watch.

13.2 Test Condition

This test shall be performed with all available station loads connected to the duty generators.

13.3 Test Procedure

A. Place the circuit breaker of the standby unit in "OFF" position.

B. Place both the Paralleling Bypass Switches in "ON" position.

C. Place the Unit Selector Switch in "1 and 2" position.

After a predetermined time, the standby unit will start and come up to speed and voltage. Record the time required on form provided.

D. Place the Paralleling Switches of both units on "ON" position.

E. Observe the paralleling lights of the standby unit. Adjust the speed of the unit until the paralleling lights glow bright and dark very slowly. (About once every two or three seconds).

F. At a time when the lights are dark, close the circuit breaker of the standby unit. The units are now in parallel operation.

G. Observe the ammeters and wattmeters of both units. Adjust the governor and/or voltage of the standby unit until the load is equally divided between the units. (Amps and watts are the same on both units).

H. Record the amps, watts, volts, frequency and tachometer readings of both units now in parallel.

NOTE: Miscellaneous Instructions:

The test outlined in paragraphs 7, 8, 9, 12 and 13 shall be repeated on the standby unit after it has been transferred to the status of the duty unit.

14. FROM PARALLEL OPERATION TO DUTY UNIT

Procedure

14.1 Place the unit Selector Switch in the position of the desired duty unit (unit to be tested).

14.2 Push the unit Transfer Switch of the desired duty unit.

14.3 Place both Paralleling Bypass Switches in the "OFF" position.

14.4 Place both the paralleling switches in "OFF" position.

14.5 Place the Engine Control Switch of the selected standby unit in "OFF" position.

14.6 Place the Throttle of the selected standby unit in Stop position.

14.7 Place the Engine Control Switch in 'AUTO" position. This unit will now be ready for standby service.

15. Perform all tests as outlined in paragraph 7, 8, 9, 12 and 13 filling out forms provided for the new duty unit.

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Test Procedures 60 KW Power Gen System	CODE IDENT. NO. 14842	DWG. A SIZE	6272901
PREPARED BY L. Jones DATE 3/25/64			
CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 8

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DWG NO. 290

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SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVED
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ISSUE LTR	A	A	A	A	A	A	A	A																	

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TEST PROCEDURES
150 KW POWER GENERATING SYSTEM
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG. SIZE	
14842	A	6272902
SCALE	FEC NO.	SHEET 1 OF 8

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

6272902

DRAWING NUMBER 6272902

1. SCOPE

1.1 This text plan outlines the testing procedures and performance criteria for the 150 KW Power Generating Systems of the Big Rally II communications system.

2. TEST EQUIPMENT

2.1 Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The equipment must be properly installed and have been placed into operation prior to the performance of test procedures.

3.2 All equipment and test procedures involved with Engine Alarm Systems, Governors, Starting Systems, Fuel Transfer Systems, etc. shall have been completed prior to the performance of the Power Generating System Test.

4. PROCEDURE

4.1 The procedure for performing each test is included within this section.

4.2 The Power Generating System Evaluation tests will be conducted between the Power Generating Units and the Electronic Equipment and at both the Power Generating Unit location and the Electronic Equipment Location.

4.3 The testing procedures shall be completed in order prescribed.

5. REQUIREMENTS

5.1 Frequency

5.2 Load Balance

5.3 Phasing

5.4 Neutral Grounding

5.5 Terminal Voltage

5.6 Generator Transfer Operation

5.7 Paralleling

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Test Procedures 150 KW Power Gen System	CODE IDENT. NO. 14842	DWG. SIZE A	6272902 A
PREPARED BY [illegible] DATE 3/29/64			
CHECKED BY [illegible] DATE 4/7/64		FEC NO.	SHEET 2

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6. RECORDING RESULTS

Test results shall be recorded in triplicate on the forms attached.

7. FREQUENCY (Form BRII/101)

7.1 Test Equipment

A. Frequency Meter (Generator Panelboard)

B. Stop Watch

C. Ammeter (Generator Panelboard)

7.2 Test Condition

The frequency test shall be performed by utilizing the existing technical and domestic dummy loads.

7.3 Procedure

A. Connect all loads available at the distribution center.

B. Observe that during a steady state load (constant amperage) frequency fluctuation is within the 2% band, i.e., plus or minus 0.6 cps. Record the maximum or minimum readings on form provided.

C. Simultaneously trip the main circuit breaker at the distribution center and start the stop watch. Determine that variance in frequency does not vary by more than plus or minus 4.8 cps. and that recovery time does not exceed 3 seconds to obtain the original figures plus or minus 0.6 cps. Record readings and recovery time on form provided.

D. Close main circuit breaker simultaneously with starting the stop watch. Determine that frequency does not vary by more than plus or minus 4.8 cps and that recovery time does not exceed 3 seconds to obtain the original frequency plus or minus 0.6 cps. Record readings and recovery time on form provided.

8. LOAD BALANCE (Form BRII/102)

8.1 Test Equipment

A. Panelboard Ammeter and Selector Switch

B. Panelboard Voltmeter and Selector Switch

8.2 Test Condition

The phase balance load shall be performed utilizing the existing technical, domestic loads and dummy loads.

8.3 Procedure

A. Connect normal stations technical, domestic and dummy loads to the load circuit.

B. While in a steady state load condition record the phase amperages and voltages, by turning the selector switches in phase 1, 2 and 3 respectively and recording the individual phase voltage and amperages on forms provided.

C. Multiply the individual phase voltages by the individual phase amperages and record the products on the form provided.

D. If major unbalance is indicated between phases, reconnect the single phase loads to obtain the best possible balance. Record readings on form provided.

9. PHASING (Form BRII/103)

9.1 Test Equipment

Panelboard Voltmeter and Selector Switch.

9.2 Test Condition

The phasing test shall be performed without station loads connected to the equipment

9.3 Procedure

A. Open the generator main circuit breaker.

B. While in a no-load operating condition, obtain the individual phase voltages by turning the voltage selector switch to Phase 1, 2 and 3 respectively. Deviation of individual voltages shall not exceed 1%.

C. Record results on form provided.

10. NEUTRAL GROUNDING (Form BRII/103)

10.1 Test Instruments

Simpson Model 270 TR Multimeter with battery and test leads.

10.2 Test Conditions

This test shall be performed on both diesel generators with the manual lock-outs of the diesel engines locked in "IN" position.

10.3 Procedure

A. Stop both engine generators.

B. Connect one lead of the Simpson Multimeter to the ground rod and the other lead (use extension wire) to the neutral terminal on the generator.

C. Observe and record the resistance readings on the form provided. Readings in excess of 5 ohms indicate that connections are poor and that connections should be tightened.

NOTE: CAUTION

Do not test grounds while there is a thunder storm in the vicinity.

11. TERMINAL VOLTAGE (Form BRII/104)

11.1 Test Instruments

A. Model 270 RT Simpson Multimeter with test leads.

B. Generator Panel Board mounted ammeter and voltmeter.

11.2 Test Conditions

This test shall be performed at or in the equipment van with all available station loads connected to the Load Distribution Center in the van.

11.3 Test Procedure

There are two types of loads for which test results are required: 208 volt loads and 120 volt loads. The maximum voltage drop in all cases shall not exceed three percent of the generated voltage as recorded at the generator panel.

A. All readings shall be recorded on forms provided, and percentage of voltage drop shall be calculated.

B. Safety features will include the use of rubber gloves, and a dry wood platform under feet.

Test Procedures 150 KW Power Gen System	CODE IDENT. NO.	DWG. SIZE		
PREPARED BY [signature] DATE 3/29/64	14842	A	6272902	A
CHECKED BY [signature] DATE 4/7/64		FEC NO.		SHEET 5

C. Readings shall be obtained by connecting the test loads of the Simpson Multimeter to terminal points of the feeder runs at the equipment van and selecting the correct meter scale for the voltage being measured.

D. The readings required are listed as follows and shall be taken at each equipment location.

1. Three-phase 208 volt

Phase 1 to 2
Phase 2 to 3
Phase 3 to 1

2. Single Phase 120 volt

Phase 1 to Neutral
Phase 2 to Neutral
Phase 3 to Neutral

12. GENERATOR TRANSFER OPERATION

12.1 Test Instruments

A. Generator Panel Board mounted voltmeter, ammeter, wattmeter, and frequency meter.

B. Stop Watch.

12.2 Test Condition

This test shall be performed with all available station loads connected to the duty generator.

12.3 Test Procedure

A. Reduce voltage of duty generator to a value of about 90% by increasing resistance of DC excitation rheostat or reducing the speed of the duty unit at the engine throttle.

B. Observe and record on form provided that within a period of 20 seconds the automatic load transfer occurs from the duty unit to the standby unit and that the voltage frequency, amperage and wattage of the standby unit is equal to normal operating conditions.

C. Determine that the previous duty unit has gone into engine lock-out status and that the warning alarms are activated after the transfer is made.

13. PARALLELING TEST (Form BRII/106)

13.1 Test Instruments

Generator Panelboard Mounted Voltmeter, Ammeter, Frequency Meter, Synchronizing Lights and Stop Watch.

13.2 Test Condition

This test shall be performed with all available station loads connected to the duty generator.

13.3 Test Procedure

A. Place the circuit breaker of the standby unit in "OFF" position.

B. Place both the Paralleling Bypass Switches in "ON" position.

C. Place the Unit Selector Switch in "1 and 2" position. After predetermined time, the standby unit will start and come up to speed and voltage. Record the time required on form provided.

D. Place the Paralleling Switches of both units in "ON" position.

E. Observe the paralleling lights of the standby unit. Adjust the the speed of the unit until the paralleling lights glow bright and dark very slowly. (About once every two or three seconds).

F. At a time when the lights are dark, close the circuit breaker of the standby unit. The units are now in parallel operation.

G. Observe the ammeters and wattmeters of both units. Adjust the governor and/or voltage of the standby unit until the load is equally divided between the units. (Amps. and watts are the same on both units).

H. Record the amps, watts, volts, frequency and tachometer readings of both units now in parallel.

NOTE: Miscellaneous Instructions:
The test outlined in paragraphs 7, 8, 9, 12 and 13 shall be repeated on the standby unit after it has been transferred to the status of the duty unit.

Test Procedures 150 KW Power Gen System	CODE IDENT. NO. 14842	DWG. SIZE A	6272902
PREPARED BY [signature] DATE 3/25/64			
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14. FROM PARALLEL OPERATION TO DUTY UNIT

Procedure

14.1 Place the unit Selector Switch in the position of the desired duty unit (unit to be tested).

14.2 Push the unit Transfer Switch of the desired duty unit.

14.3 Place both Paralleling Bypass Switches in the "Off" position.

14.4 Place the Engine Control Switch of the selected standby unit in "OFF" position.

14.5 Place the Throttle of the selected standby unit in "STOP" position. After the engine has stopped, return the throttle to "RUN" position.

14.6 Place the Engine Control Switch in "AUTO" position. This unit will now be ready for standby service.

15. Perform all tests as outlined in paragraph 7, 8, 9, 12 and 13 filling out forms provided for the new duty unit.

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Test Procedures 150 KW Power Gen System	CODE IDENT. NO. 14842	DWG. A SIZE	6272902	A
PREPARED BY [illegible] DATE 3/29/64				
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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
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13. ABSTRACT

Test procedures for MC-50 Multiplex, AN/TCC-3 Multiplex, Main Line Order Wire, Tributary Order Wire, Tech. Control CKT, 20 KW PWR Gen. 60 KW PWR Gen, 150 KW PWR Gen. for Systems 486L

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TEST TEST EQUIPMENT RADIO EQUIPMENT TEST PROCEDURES						

INSTRUCTIONS

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