NOTE: This unit is a variant of the Triplett Model 4 Subscriber Loop Test Set.

MOTOROLA

Control Line Test Set
R-1034B

TABLE OF CONTENTS

R-1034B
Control Line Test Set

SAFETY RULES

Caution

This tester has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous and/or lethal when lack of caution or poor safety practices are used.

Read The Manual

Read this Instruction Manual carefully and completely.

Voltages and currents within the capability of this test equipment can be hazardous. Follow the instructions in this manual for every measurement. Read and understand the general instructions before attempting to use this tester. Do not exceed the limits of the tester.

Safety Check

Double check the switch setting and lead connections before making measurements. Are you following all of the instructions?

Disconnect the tester or turn off the power before changing switch positions.

Do not connect to circuits with voltage present when switch is in any ohms or current position.

When replacing fuses use only specified type fuses and insert in correct fuse holder.

Don't Touch

Don't touch exposed wiring, connections or other "live" parts of an electrical circuit. If in doubt, check the circuit first for voltage before touching it.

Turn off the power to a circuit before connecting test probes to it. Be sure there is no voltage present before you touch the circuit.

Do not use cracked or broken test leads.

Distribution Circuits Pack A Punch

In high energy circuits such as distribution transformers and bus bars, dangerous arcs of explosive nature can occur if the circuit is shorted. If the tester is connected across a high energy circuit when set to a low resistance range, a current range, or any other low impedance range, the circuit is virtually shorted.

Special equipment designed for use with these circuits is available. Contact a qualified person for assistance before attempting to make measurements on any high energy circuit.

SAFETY IS NO ACCIDENT

SPECIFICATIONS

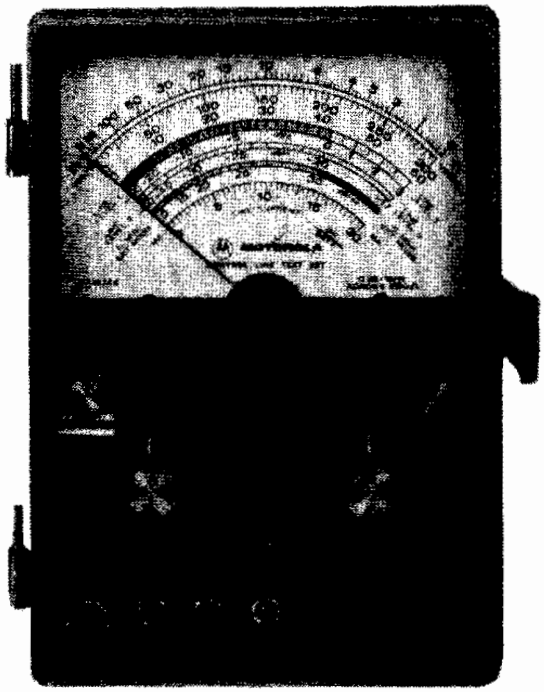
Physical Characteristics	
Size	5½'' W x 7½'' H x 4 ⅞'' D (with cover)
Weight	5 lbs. (approx.)
Operating Temp	0 to +50°C
Storage Temp	-40°C to +60°C
Batteries	2 - 9 volt Alkaline (60-82728J01) 1 - 1.5 Volt C Cell (60-82458B01) 2 - 22.5 Volt (60-80386B43)
Performance Specs.	
Circuit Loss	
Range (Line Level 1)	-40 to +3 dBm (extended by +10 db switch (line level 1 only))
(Line Level 2)	- 60 to -17 dBm
0 dBm Reference	1 mW across 600 Ω
Frequency Range	20 Hz to 15 kHz
Accuracy	20 Hz to 200 Hz ±0.5 dB 200 Hz to 5 kHz ±0.2 dB
Input Impedance	600 Ω ±5% @ 1kHz
Circuit Noise	
Range	0 to 33 dBrnc (extended by +10 dB switch)
Reference Level	0 dBrnc = -90 dBm with ''C'' Message Weighting
Frequency Responce	''C'' Message Curve
Accuracy	Meets Bell Technical Reference 41.009 ''C'' Message Curve Accuracy
Input Impedance	600 Ω ±5%
Modes of Operation	Terminating (600Ω) and Bridging (switch selectable)
Power Influence (Noise-to-Gnd)	
Range	60 to 93 dBrnc (extended by +10 dB switch)
Reference Level	0 dBrnc = -90 dBm with ''C'' Message Weighting
Frequency Responce	''C'' Message Curve
Accuracy	Meets Bell Technical Reference 41.009 ''C'' Message Accuracy
Input Resistance	No DC Path Between Tip-Ring and Gnd.
Input Impedance	Between Tip and /or Ring to Gnd. >50 kΩ
Line Current	
Range	0 to 20 mA DC
Accuracy	±0.6 mA @ 20 mA
Input Resistance	640 Ω ±1%
Tone Generator	
Waveform Sine Wave	
Frequencies	204, 304, 404, 575, 1204, 1754, 2804, 3004, 3204, 4804 Hz
Accuracy	+5% to -0%

SPECIFICATIONS (Continued)

Frequencies	804,1004,1950,2175 Hz
Accuracy	-0 to +0.5%
Frequencies	2713 Hz
Accuracy	± 5 Hz
Output Amplitude	Variable approx. -40 dBm to +10 dBm (output level monitored by meter 0 dB level .775 V ± 0.2 dB)
Output Impedance	600Ω ± 5%

Volt-Ohmmeter

DC Volts	
Ranges	0-20 V, 0-60 V, 0-300 V
Sensitivity	2500 Ω/Volt
Accuracy	± 2%
AC Volts True RMS	
Ranges	0-60 V, 0-300 V
Sensitivity	8.32 K Ω/Volt
Accuracy	± 3%
Ohms	
Ranges	Rx1, Rx100, Rx1K, Rx10K, Rx100K
Open Circuit Voltages	1.5V on ranges Rx1, Rx100, Rx1K 45V on Rx10K and Rx100K
Max. Current (leads shorted)	Rx1 = 150 mA, Rx10 = 15 mA, Rx100 = 1.5 mA, Rx1K = 150μA, Rx10K = 450μA, Rx100K = 45μA



INTRODUCTION

The Control Line Test Set is a general purpose instrument designed for use in special service areas.

Incorporated in one tester are the most desired features for service and maintenance which previously required three pieces of equipment.

The tester consists of the following: A Volt-Ohmmeter with ranges and features specifically selected for telephone service and maintenance. A line measurement section designed to measure line parameters such as circuit loss, noise, and line current. A tone generator that generates 15 specific tones for testing line loss and quality.

The tester utilizes a rugged suspension type meter with colored scales to give qualitative as well as quantitative measurement indications.

The unit is housed in a rugged plastic case with a removable cover compartment used to store test leads and manual. The tester has an adjustable carrying strap so that it can be carried without the use of hands.

This manual was produced to aid the working technician in understanding Level Setting Procedures. Perhaps one of the most difficult and most common complaints to troubleshoot is the gradual system degradation. In addition to optimising the transmitters and receivers, it is often necessary to reset audio levels. Degradation can be caused by many factors including temperature, humidity, and in the case of TELCO Lines, cable plant rearrangements.

FUNCTION OF CONTROLS, JACKS, TERMINALS AND LEADS

FUNCTION SELECTOR SWITCH

I. Selects desired measurement functions-
   A. Line Transmission Measurements
      1. Line Circuit Loss
      2. Circuit Noise
      3. Power Influence
      4. Line Current
   B. Volt- Ohmmeter
      1. AC Voltages
      2. DC Voltages
      3. Ohms

II. Battery Check- Indicates condition of 9 volt batteries.

TONE SELECTOR SWITCH

I. Selects desired tone frequency output.

II. Off position connects a quiet termination across output jacks.

SEND / RECEIVE SWITCH

SEND POSITION-

In this position and with the function switch turned to **CKT LOSS** or **TONE** the output level of the tone generator is indicated on the meter if the tone generator is turned on.

Adjustment of the tone level is made using these switch settings and the tone level adjustment knob.

The tone output termination is also switched to the line jack in the send position. Tones may be sent out to the line jack in this position.

RECEIVE POSITION-

In the receive position the meter measuring circuits monitor incoming signals at the line jack when the function switch is set at **CKT LOSS, CKT NOISE, + - MA,** and **TONE.**

BRIDGE / TERMINATE SWITCH

Selects the bridging or terminating mode. Used to make circuit noise and line level measurements.

FUNCTION OF CONTROLS, JACKS, TERMINALS AND LEADS (Continued)

TONE LEVEL ADJUSTMENT CONTROL

Adjusts the level of all tones generated. The tone level output can be seen and read for adjustment with the **SEND / RECEIVE** switch in the **SEND** position. The level is read on the **LINE LEVEL 1** or **LINE LEVEL 2** scale on the meter.

OHMS ADJUSTMENT

The first step to taking accurate resistance measurements in the **Rx1, Rx100, Rx1k, Rx10k,** and **Rx100k** is to cross or short the test leads and adjust the knob until the meter reads full scale with the needle exactly at zero. This should be done each time a different resistance level is used.

TONE OUTPUT AND VOLT-OHMMETER JACKS

TONES are transmitted through these jacks when the Tone Selector switch is turned to any tone position and the Function Selector switch is turned to any of the five transmission test positions or the tone position.

VOLT-OHMMETER measurements can be taken through these same jacks whenever the Function Selector switch is turned to any range of AC/DC or Ohms resistance measurement regardless of where the Left Hand Rotary Switch is turned. It is suggested that the Left Hand Rotary Switch be turnd off to insure the longest battery life.

LINE TRANSMISSON TEST JACK (TIP, RING, GROUND)- located in the lower left corner of the front face plate.

This jack is used with the three conductor leads plugged into it and properly connected to the pair of wires being tested. The transmission test procedures shall be discussed later in this manual.

TRANSMISSION TEST LEADS

The transmission test leads consist of a two part assembly. The first part is a 4.5 foot section of typical telephone station wire with a standard 310 plug at one end and a male modular plug at the other end. The second part is three 6 inch marked pieces of standard test lead wire all attached to a modular receptacle and with a Western Electric style alligator clip at the other end.

In normal operation the two parts are used plugged together; that is with the modular plug inserted in the modular receptacle. Normal or most common testing would be done through a Subscriber Terminal Block.

FUNCTION OF CONTROLS, JACKS, TERMINALS AND LEADS (Continued)

Occasionally, the operator may have to test through the modular phone jack. If he disconnects the leads at the modular connector, he can directly the modular plug to the modular jack in the wall. This will give him direct proper connection between the tester and the pair being tested. Ring, Tip and Ground of both will be connected.

VOLT-OHMMETER AND TONE OUTPUT LEADS

There are two of these leads. Each is a single conductor test lead wire with a male-female banana plug at one end and a Western Electric style alligator clip at the other end. One is red and the other is black.

If care is taken in coiling the test leads properly and the five alligator clips are laid flat on top of the operator's manual in the cover assembly, the inner door of the cover assembly can be closed easily.

BATTERY DISCONNECT SWITCH

This is a Push-Push type switch. When depressed, either manually or by closing the tester cover, the batteries are disconnected to prevent unnecessary battery drain in case the **TONE** and **FUNCTION** switches are left ON. Pushing and releasing this switch enables the power supply so that tests can be made.

SENSITIVITY SWITCH

This is a momentary double throw, center off type switch used to control the sensitivity of the measurement circuits. Center position, **LEVEL 1,** gives a sensitivity of 775 mV across 600 ohms for **CKT LOSS** and **POWER INFLUENCE** and 775 microvolts for **CKT NOISE.** The + 10 dB position permits reading signals which are greater than the 0 dB range. The **LEVEL 2** position increases the sensitivity of the instrument by 20 dB and permits reading of signals which are too low to be read in the **LEVEL 1** position; readings are made using the **LINE LEVEL 2** scale.

OPERATING INSTRUCTIONS

GENERAL

Preparing to use the R1034B Control Line Tester and checking all batteries.

1. Open the cover assembly and detach it from the tester case.
2. Remove from the cover compartment one or both sets of test leads.
3. Press and release the battery disconnect switch.
4. Turn the Function Selector switch to the **BATTERY CHECK** position. If the pointer moves to the far right hand area of the meter, over some part of the battery check arrow, the two nine volt cells (60-82728J01) that power the transmission test functions and the multi-tone oscillator are O.K. Although these batteries are long-lived, they will fail in normal operation much sooner than the other batteries in the R1034B. This is the reason we have a convenient battery test for them.
5. Plug the red and black leads into the **V - O** jacks. Connect the alligator clips together, shorting the leads. Turn the Function Selector switch to the Rx1 ohms position and observe if the pointer moves to the zero mark on the OHMS scale. If it doesn't, use the **OHMS** Adjustment to bring the pointer to zero. If you can zero the pointer, the 1.5 volt "C" cell (60-82458B01) is O.K.
6. With the leads connected as in Step 5 above, turn the Function Selector switch to the Rx10k position. Follow the same procedure as in Step 5. If you can zero the pointer this time, the two 22.5 volt cells (60-80386B43) are O.K.
7. Check the mechanical zero by allowing the meter pointer to return to zero with both Rotary Selector switches turned to OFF. If the pointer is slightly off, it can be adjusted to zero by rotating the center adjustment screw to the right or left.
8. Care should be taken not to touch the exposed metal parts of the Western Electric style alligator clips as the operator is connecting them to the pair of wires to be tested. The reason to take care is that the voltage present has not been determined yet and it could be at a dangerous level.

OPERATING INSTRUCTIONS (Continued)

LINE MEASUREMENTS

Line mA

1. Plug in **(TIP, RING, GND)** test lead assembly into **LINE** phone jack located in the lower left corner of the front panel. Connect alligator clips **(TIP, RING, GND)** to the telephone terminals observing the configuration tip **(Green)** to tip, ring **(Red)** to ring, ground **(Yellow)** to ground.
2. Set the **FUNCTION** switch to + (plus) **MA** or - (minus) **MA** depending on polarity.
3. The 0-20 mA line current scale of the meter is read.

Line Loss

1. Plug in **(TIP, RING, GND)** test lead assembly into **LINE** phone jack located in the lower left corner of the front panel. Connect alligator clips **(TIP, RING, GND)** to the telephone terminals observing the configuration tip **(Green)** to tip, ring **(Red)** to ring, ground **(Yellow)** to ground. Use the **BRIDGE** position if other equipment is on the line.
2. Set the **SEND / REC** switch to the **REC** position.
3. When a tone from another 600 ohm audio source can be measured the **FUNCTION** switch is switched to the **CKT LOSS** position.
4. The signal loss is read on the **LINE LEVEL 1** scale in dBm. (It is assumed that a 0 dBm signal level is fed into the line by the 600 ohm audio source.) If the reading is lower than -20 dBm, depress the **SENSITIVITY** switch to **LEVEL 2** and observe the reading on the **LINE LEVEL 2** scale.

CIRCUIT Noise

1. Plug in **(TIP, RING, GND)** test lead assembly into the **LINE** phone jack located in the lower left corner of the front panel. Connect alligator clips **(TIP, RING, GND)** to the telephone terminals observing the configuration tip **(Green)** to tip, ring **(Red)** to ring, ground **(Yellow)** to ground. Use the **BRIDGE** position if other equipment is on the line.
2. Set the **SEND / REC** switch to the **REC** position.

OPERATING INSTRUCTIONS (Continued)

3. Set the **FUNCTION** switch to the **CKT NOISE** position.

4. The noise is then read on the **CKT NOISE** scale. If it is below 20 dBrnc (Green area) the noise level is acceptable. If it indicates between 20 to 30 dBrnc (Yellow area), it is marginal. If it is in the Red area, it is unacceptable.

5. If the reading is beyond full scale, the **SENSITIVITY** switch should be depressed to the + 10 dB position. If an on scale reading is then observed, 10 dB should be added to the reading obtained. The reading is still considered to be in the Red area and is unacceptable.

GENERATOR FUNCTION

Tone

1. Plug the Tone Output Leads into the Tone Output Jacks.

2. Connect those leads by any pair of wires desired.

3. Switch the **TONE** switch to the desired tone to be transmitted.

4. Switch the **FUNCTION** switch to the **CKT LOSS** position. The tone is now being transmitted into the pair of wires.

5 Switch the **SEND / REC** switch to the **SEND** position. This allows you to see the dB level of the tone being transmitted and adjust to zero dB output.

6. Several tones, up to 15, can be transmitted by rotating the TONE switch.

7. If you had to adjust the tone output to zero dB level, you can use the **TONE LEVEL** control to adjust the output level. This adjustment can be used to transmit tones at -50 dBm to + 10 dBm. The tone output level is read on the **LINE LEVEL 1** scale on the meter.

8. When the **TONE** switch is turned to the 204 Hz position and the **TONE LEVEL** control is turned completely CCW for zero output, a 600 ohm termination is present at the **V - O** jacks.

OPERATING INSTRUCTIONS (Continued)

AUDIO & TONE MEASUREMENT APPLICATIONS

A. General

In a two-way radio communication system, the audio levels between various radio installations and control points must be adjusted for the specific applications to assure optimum performance.

B. DBM – Decibel referenced to 1 Milliwatt

DBM is a symbol indicating a power level with respect to 1 milliwatt. It shows the number of dB (ratio) above or below 1 milliwatt. Zero dBm is equal to 1 milliwatt. Although this definition does not necessarily imply a 600-ohm impedance, most AC voltmeters are calibrated in terms of dBm across 600 ohms. In this case, using the formula P = E2/R we get: .001 watt = E2/600 OR E = .77 volt across 600 ohms for 1 milliwatt = "0" dBm.

Since "0" dBm is a special definition of the dB equation, any level above or below it has the same dB relationship to zero as the dBm value itself. For example, +6dBm of signal is 6dB above 0dBm. In voltage terms this would be 6dB above .77 volt which is 1.54 volts.

C. VU (Volume Unit)

When adjusting audio levels, it must be remembered that speech is a complex nonperiodic waveform which is difficult to measure.

VU is a measurement of speech, which can be made only with VU meter. This meter has special characteristics to control the rise and fall time overshoot for measurement of speech signal voltages. Thus, an indication of the "loudness" or volume of the signal may be determined.

Adjustment of audio line levels is very difficult using actual speech signals which fluctuate widely. A sinewave signal (1000 hz continuous tone) is much easier to use. A procedure for audio level adjustments using a 1000 hz sinewave signal is included in this manual.

D. REPORTING A TELCO CIRCUIT OUTAGE:

1. Report the outage to the local TELCO repair services.
2. Give the circuit number.

3. Give the location of each termination point for the circuit.
4. Give symptoms of the complaint.
5. Pass on any pertinent data or results of test measurements made.
6. Give your name and telephone number where you can be reached. WHEN REPORTING A TELCO CIRCUIT PROBLEM – REMEMBER HOW DIFFICULT IT IS TO REPAIR A RADIO WHEN YOU ARE ONLY TOLD "IT DOESN'T WORK"!!!

E. LINE LEVEL SETTINGS

1. General (Refer to Diagram No. 1)

   Diagram #1 shows a basic remote control system. It can be divided into three parts. On the left is the remote control console, on the right the base station and in the center, the leased telephone company lines.

   Perhaps the most restricting factor in the system is the leased TELCO lines. The telephone companies place restrictions on the levels that can be applied. This is understandable from the TELCO's point of view, since too high a level can cause crosstalk with other lines in their system. On the other hand, the higher the level that our system can have on the lines, the better the signal-to-noise ratio. For this reason, many of the settings will be predicated on the levels allowed on the leased lines. These vary from one TELCO to another and will have to be determined for your particular system.

2. Transmit and Receive Level Setting

   Let's follow the audio path in Diagram #1 and discuss the adjustments one by one.

   A typical application of the R-1034 would be to measure line losses from REMOTE A to BASE A.

   Losses are checked by transmitting a test tone from REMOTE A at a specific power level and then measuring the level at the distant end (BASE A).

   The carefully selected tones provide the capability to do a frequency sweep of the line to maintain a record of the response. This makes the test

repeatable for future reference of system characteristics. See record keeping chart in back of this text.

LINE LOSS MEASUREMENT
REMOTE A TO BASE A

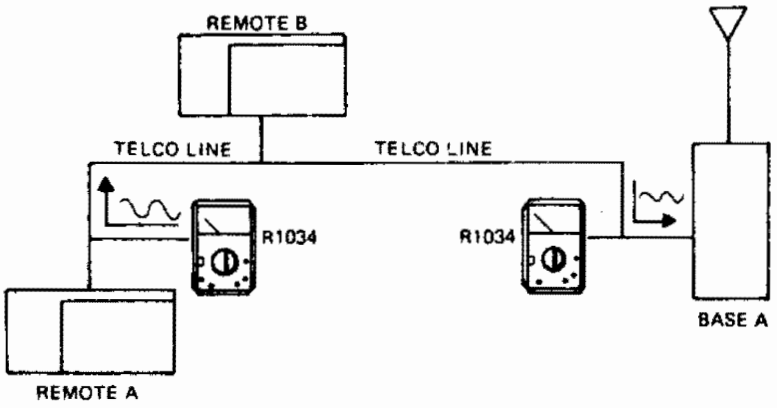


DIAGRAM #1

The recommended practice is to set output levels to the maximum signal amplitude which is allowed on the lines.

Therefore, transmit level pots at REMOTE A should be adjusted for the maximum line level allowed by the local telephone company. We'll call it 0dBm. Other remotes can then be adjusted according to the remaining loss to BASE A in order that all audio reach the base station (BASE A) at the same level.

Our example has a loss REMOTE A to the base of −16dB. Loss from REMOTE B is −13dB. Therefore the output level from REMOTE A is set to the maximum level allowed (0dBm) and REMOTE B output level is set for −3 dBm. DIAGRAM #2.

This allows all console originated audio to reach the base station at the same level no matter from which source.

Base station levels are also set by injecting −16 dBm directly into the base station. This is the level seen by BASE from either source. Adjust the exciter pot for typically a plus or minus 3 kHz deviation. Voice peaks will provide a full 5 kHz deviation.

TRANSMIT LEVEL SETTING

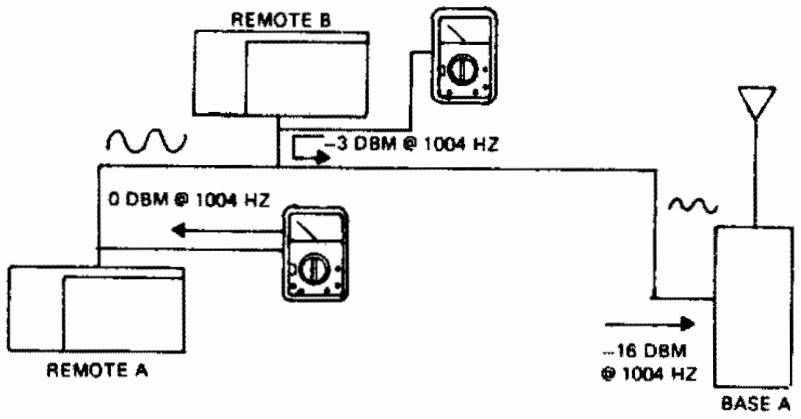


DIAGRAM #2

3. Receive Level Setting

Proper receive level setting requires the same accuracy with the worst case losses generally being at the end point (REMOTE A) and other remotes (REMOTE B) being set for compression at a higher level. DIAGRAM #3.

RECEIVE LEVEL SETTING

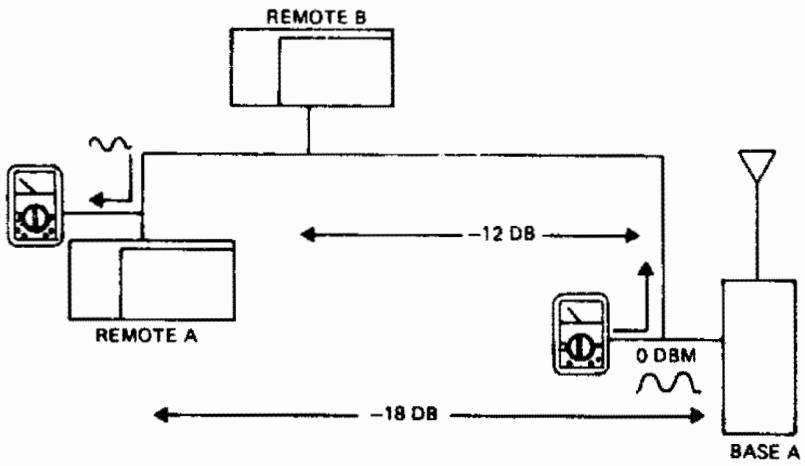


DIAGRAM #3

OPERATING INSTRUCTIONS (Continued)

In our example the loss from the base to REMOTE A is – 18dB.

Loss from REMOTE B is – 12dB. To set the compression level subtract this loss from the maximum output level setting allowed (0dBm).

For REMOTE A inject a – 18dBm signal @ 1004 Hz into the screw terminals and adjust the input line level pot for the knee of compression. DIAGRAM #4.

RECEIVE LEVEL SETTING

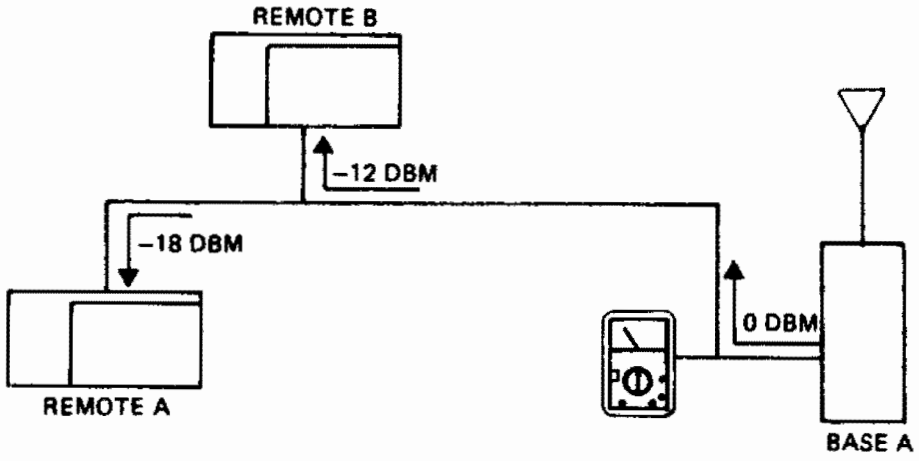


DIAGRAM #4

Repeat the procedure for REMOTE B using a – 12dBm @ 1004 Hz signal.

Base station receive audio level is set by injecting the carrier signal modulated at 1000 hertz and 3KHz deviation using a service monitor tuned to the station receive frequency.

Set the output level pot for again the maximum allowable level (0dBm).

Consult National Service Technicians Guide TT101 SYSTEM AUDIO LEVEL setting for more detailed level setting procedures.

F. Phone Line Noise Measurements

1. General

The C-Message Weighted Filter could be the most valuable feature incorporated into the R-1034 design. The circuit noise meter was designed and built to measure phone line noise as the phone company would. The repairman or installer may make a circuit loss and noise measurement at the time of install of the TELCO circuit. These measurements are through a "C" Message weighting filter, in other words the noise measurement will only see noise in the 300 to 3000 Hz band. The "C" Message filter will attenuate all other frequencies according to its weighting curve. The dabrenco scales (dBrnc) are used to evaulate noise levels and are the decibels above reference noise. Reference noise (0dBrnc) is equivalent to the disturbing effect of a −90dBm, 1000Hz tone.

The 2-way technician needs to be aware of this type noise measurement. Noise above 3000 Hz will cause general system degradation to the 2-way radio system even though this high frequency noise is within TELCO specs as measured through the "C" Message filter. The local TELCOS can be very co-operative with resolving this type of problem. They must however, be informed of the problems as a special services team will be required to make the proper measurements. A normal TELCO repairman may not be aware of how to make unweighted noise measurements but C-Message measurements is data important to him.

If noise problems are apparent in the C-Message range, that information can be given to the telephone company. If flat weighted noise is a problem, the R-1034 also provides a flat frequency response for these measurements. See reporting a TELCO circuit outage.

2. Noise Measurement

The weighting filter averages thermal noise and provides the dBrnc (Dabrenco) meter scales, color coded, to identify the acceptable noise levels.

First, the line must be quiet with no activity. Just connect the test leads across the quiet line in the bridging or terminating mode and measure the C-Message weighted noise just as the phone company would.

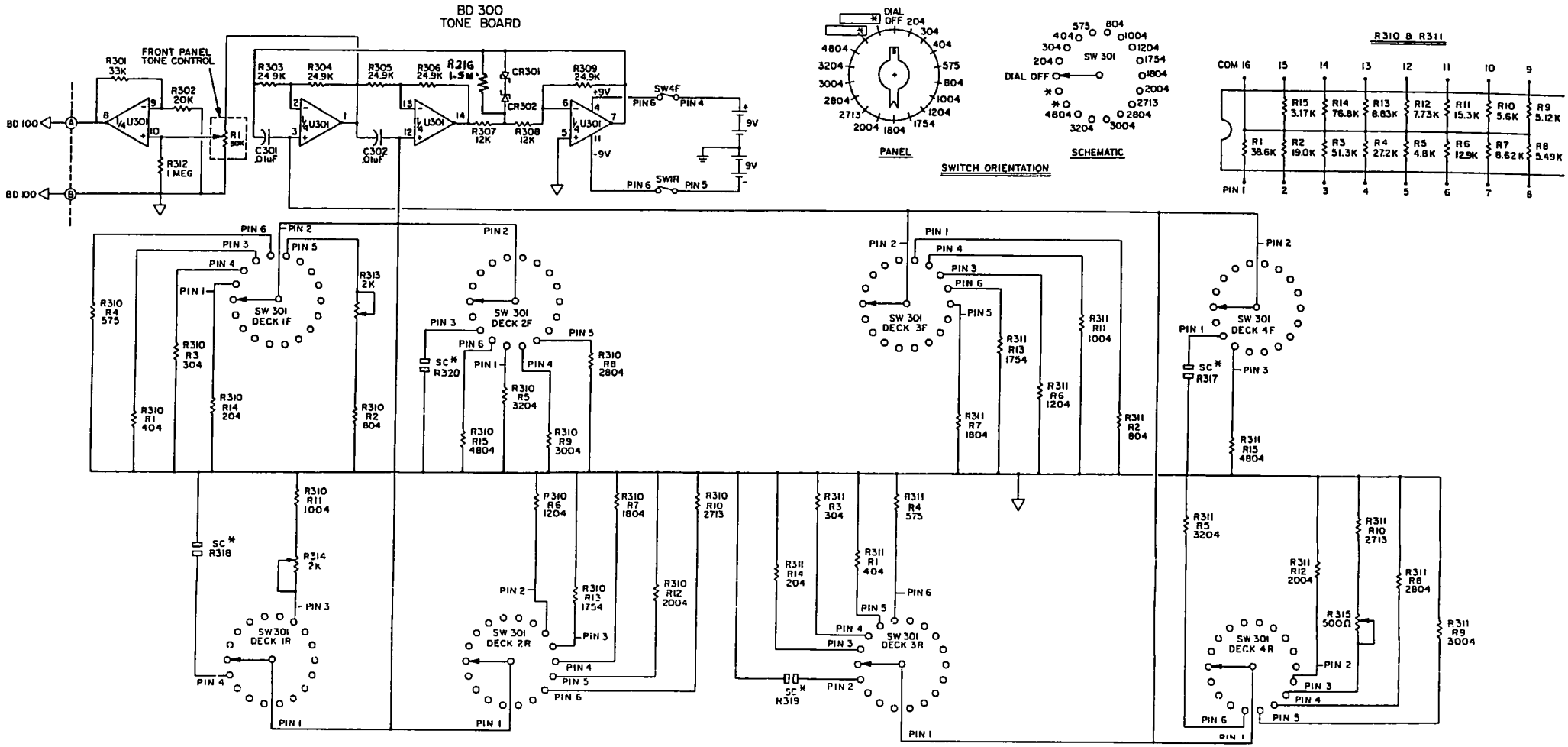
Flat weighted noise measurements are also possible in the LINE LEVEL 1 or 2 positions. Again just connect the test leads across the line in the bridging or terminating mode and measure the flat weighted noise. Repeating the measurements at all available termination points on the line under service will provide even more complete data to the TELCO.

MISCELLANEOUS OPERATING HINTS

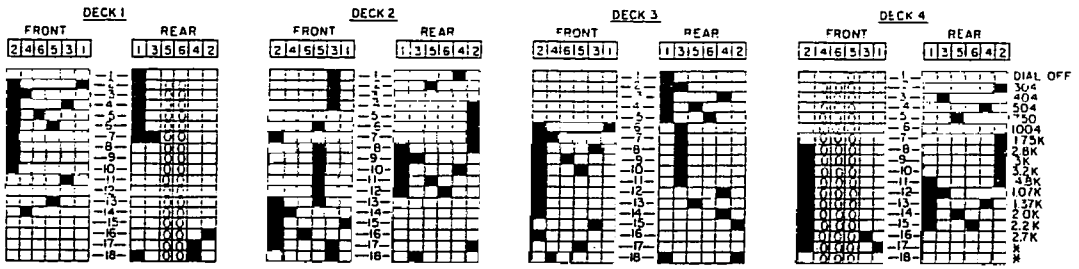
For extended battery life, the tester should be turned off when not in use – maximum current drain occurs when the SELECTOR is in any of the tone positions. No current is drawn on any of the Volt-Ohmmeter or line current positions.

Batteries and fuse are located at the top rear of tester. Access to compartment is achieved by loosening one screw at rear of tester. With screw disengaged lift cover up and out. The cover is replaced in the reverse order.

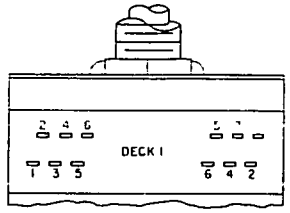
Test cable and test leads are stored in the cover. The test leads should be neatly wound into a small bundle and inserted behind a plastic compartment door.



SW 301 LOGIC TABLE



PIN POSITIONS AS VIEWED FROM TOP OF SWITCH KNOB END



PIN LOCATIONS:
DECKS 2, 3, & 4 SAME AS DECK 1.

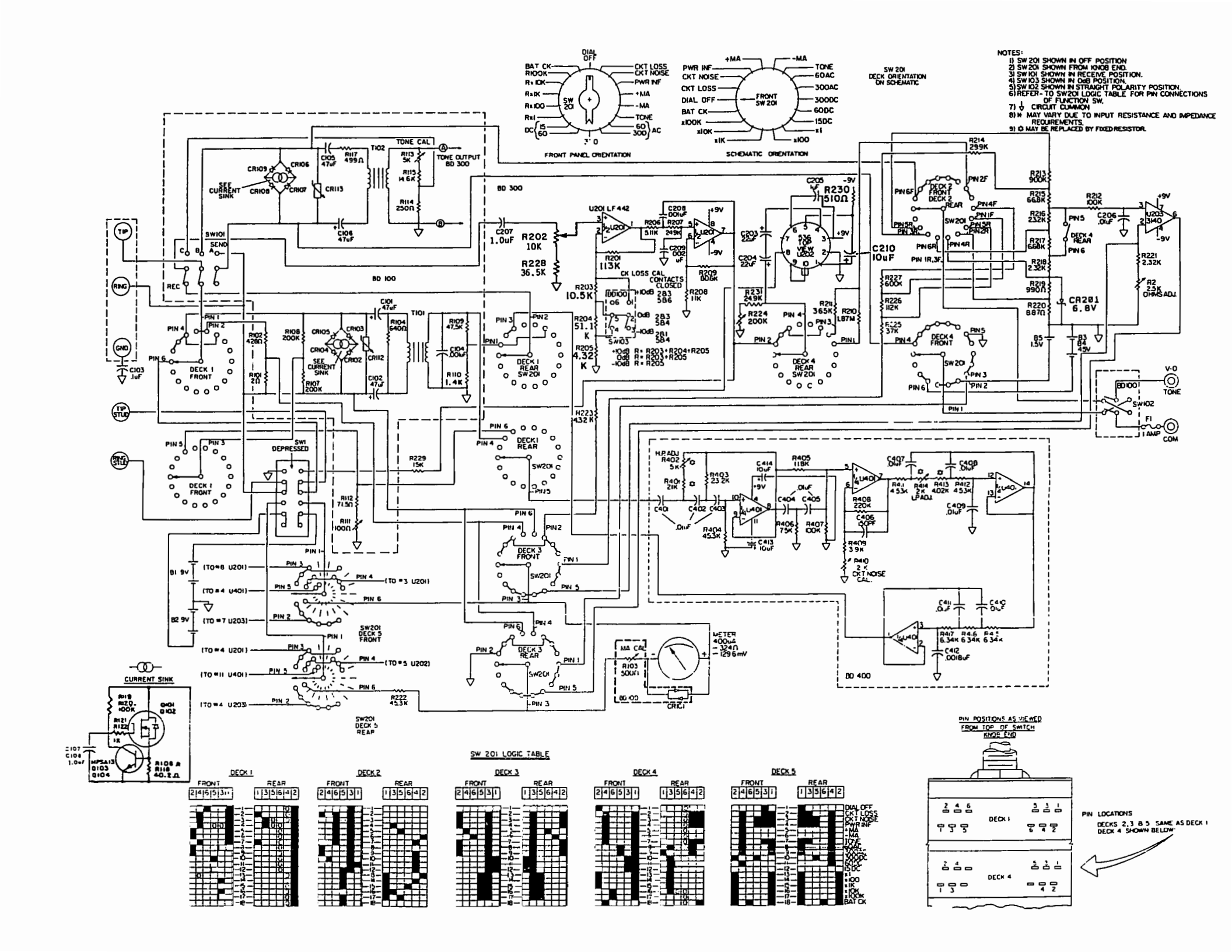
NOTES:

1) SW 301 SHOWN IN OFF POSITION.
2) SW 301 VIEWED FROM KNOB END.
3) POSITIONS 17 & 18:
   * FREQUENCIES SELECTABLE BY PLUG IN RESIS.
4) REFER TO SW 301 LOGIC TABLE FOR PIN CONNECTIONS OF TONE SELECT SW.
5) ALL FREQUENCIES ARE IN Hz.
6) R316, R317, R318 & R319 ARE FOR BLANK POSITIONS 17 & 18 ON SW. (NOT FURNISHED WITH TESTER)

MODEL 4 LOOP TESTER

TRIPLETT CORPORATION

PART NO. 84-618 Rev. B


NOTES:
1) SW 201 SHOWN IN OFF POSITION
2) SW 201 SHOWN FROM KNOB END.
3) SW 101 SHOWN IN RECEIVE POSITION.
4) SW 103 SHOWN IN 0dB POSITION.
5) SW 102 SHOWN IN STRAIGHT POLARITY POSITION.
6) REFER TO SW201 LOGIC TABLE FOR PIN CONNECTIONS OF FUNCTION SW.
7) ⏚ CIRCUIT COMMON
8) * MAY VARY DUE TO INPUT RESISTANCE AND IMPEDANCE REQUIREMENTS.
9) Ω MAY BE REPLACED BY FIXED RESISTOR.
FRONT PANEL ORIENTATION
SCHEMATIC ORIENTATION
SW 201 DECK ORIENTATION ON SCHEMATIC
BD 300
BD 100
BD 400
SW 201 LOGIC TABLE
DECK 1
DECK 2
DECK 3
DECK 4
DECK 5
FRONT
REAR
PIN POSITIONS AS VIEWED FROM TOP OF SWITCH KNOB END
PIN LOCATIONS
DECKS 2,3 & 5 SAME AS DECK 1
DECK 4 SHOWN BELOW
TIP
RING
GND
TIP STUD
RING STUD
TONE OUTPUT BD 300
TONE CAL
SEND
REC
CURRENT SINK
DECK 1 FRONT
DECK 1 REAR SW201
DECK 2 FRONT
DECK 2 REAR
DECK 3 FRONT
DECK 3 REAR
DECK 4 FRONT
DECK 4 REAR SW201
DECK 5 FRONT
DECK 5 REAR
CK LOSS CAL CONTACTS CLOSED
SW1 DEPRESSED
METER 400uA – 324Ω – 1296mV
MA CAL
CR1
CR201 6.8V
B1 9V
B2 9V
B3 B4 45V
B5 1.5V
V-Ω
TONE
COM
1 AMP
SW102
H.P.ADJ
L.P.ADJ
CKT NOISE CAL.
DIAL OFF
CKT LOSS
CKT NOISE
PWR INF
+MA
-MA
TONE
60AC
300AC
300DC
60DC
15DC
x1
x100
x1K
x10K
x100K
BAT CK
RHOOK
DC