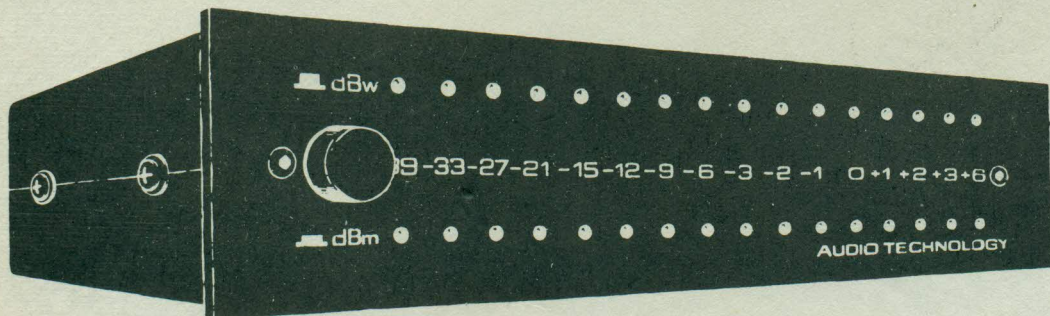


MODEL 510 PEAK RESPONDING L.E.D. DISPLAY
INSTRUCTION MANUAL



AUDIO TECHNOLOGY

CAUTIONARY NOTES

- 1) WHEN CONNECTING THE 510 TO YOUR POWER AMPLIFIER BE SURE TO OBSERVE PROPER PHASING (POLARITY) OF THE WIRES OR INACCURATE READINGS AS WELL AS POSSIBLE DAMAGE TO THE 510 MAY RESULT.

- 2) WHEN USING THE 510 WITH POWER AMPLIFIERS OPERATING IN BRIDGE MODE (STRAPPED) CONFIGURATION CONSULT YOUR DEALER OR THE FACTORY.

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TECHNICAL SPECIFICATIONS

SENSITIVITY: LINE-50mV TO 5V FOR 0dB INDICATION;
 EACH CHANNEL IS INDEPENDENTLY
 AND CONTINUOUSLY VARIABLE
 POWER-ACCURATE DISPLAY FROM .003W
 TO 400W; 25,50,100 WATT 0dB
 REFERENCE SELECT; 4,8,16 OHM
 IMPEDANCE SELECT

FREQUENCY RESPONSE: 20Hz TO GREATER THAN 20kHz

INPUT IMPEDANCE: LINE-GREATER THAN 10,000 OHMS;
 TYPICALLY 100,000 OHMS FOR A
 SENSITIVITY OF 0dB=1VRMS INPUT
 POWER-GREATER THAN 20,000 OHMS

DISPLAY DYNAMIC RANGE: -39dB TO +6dB (45dB)

DISPLAY ACCURACY: ±0.25dB (OVER SPECIFIED FREQUENCY
 RESPONSE)

DISPLAY ATTACK TIME: 750us FOR 45dB RISE TO LESS THAN 50us
 FOR 20dB RISE (VARIES EXPONENTIALLY
 OVER DISPLAY RANGE)

DISPLAY DECAY TIME: 650ms FOR 45dB DECAY TO LESS THAN 300ms
 FOR 20dB DECAY (VARIES EXPONENTIALLY
 OVER DISPLAY RANGE)

CALIBRATION: THE 510 IS A PEAK RESPONDING RMS
 CALIBRATED INSTRUMENT IN THE POWER MODE.
 A +4dBm (OVU) REFERENCE IS PROVIDED FOR
 CALIBRATING THE 510 IN THE LINE LEVEL
 MODE

SIZE: 7½"WIDE X 1-3/4HIGH X 5½" BEHIND FRONT
 PANEL (19 X 4.5 X14cm)

POWER CONSUMPTION: LESS THAN 10 WATTS 110-120VAC, 60Hz

WEIGHT: 2.21bs (1kg)

INTRODUCTION

AUDIO TECHNOLOGY'S MODEL 510 TWO-CHANNEL PEAK RESPONDING L.E.D. DISPLAY HAS A 45dB DYNAMIC RANGE WITH 1dB RESOLUTION EITHER SIDE OF THE 0dB POINT AND A DISPLAY RISE TIME OF 50 μ s. SIXTEEN L.E.D.'S PER CHANNEL, CALIBRATED FROM -39dB TO +6dB, ARE USED TO DISPLAY THE PEAK VALUE OF COMPLEX AUDIO WAVEFORMS TO AN ACCURACY OF ± 0.25 dB. THIS INSTRUMENT IS DESIGNED TO MEASURE PEAK LINE LEVEL SIGNALS (PRE-AMP OUTPUT, TUNER OUTPUT, TAPE RECORDER INPUT) OR PEAK OUTPUT FROM A POWER AMPLIFIER. A FRONT PANEL SWITCH SELECTS EITHER MODE.

IN THE POWER MODE, THE MODEL 510 RESPONDS TO THE PEAK OUTPUT OF A POWER AMPLIFIER. REAR PANEL SWITCHES ARE PROVIDED TO SET THE 0dB REFERENCE TO 25, 50, OR 100 WATTS AND TO SELECT SPEAKER IMPEDANCES OF 4, 8, OR 16 OHMS.

IN THE LINE LEVEL MODE, EACH INPUT IS INDEPENDENTLY AND CONTINUOUSLY VARIABLE OVER A RANGE OF 50mV FOR A 0dB INDICATION. A CALIBRATION FEATURE IS INCLUDED TO BALANCE CHANNELS AND RETURN THE INSTRUMENT TO A "OVU" (+4dBm) REFERENCE. THE MODEL 510 IS INVALUABLE FOR RECORDING PURPOSES WHEN COMPARED TO PRESENT DAY VU METERS DUE TO THE 510'S ABILITY TO TRACK COMPLEX SIGNALS ALONG WITH ITS SUPERIOR ACCURACY, GREATER DYNAMIC RANGE, AND EASE OF READING.

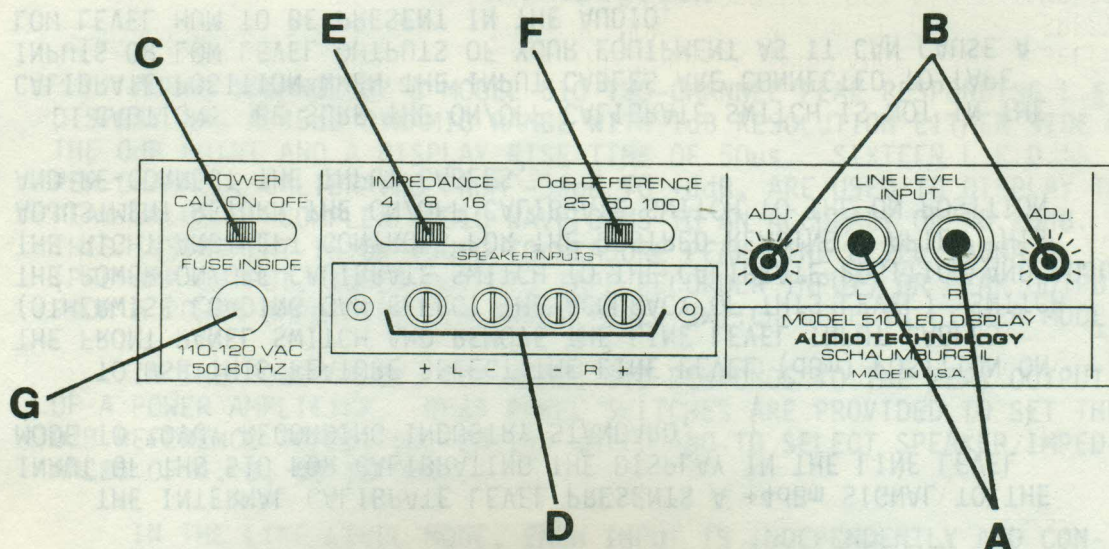
INTERNAL CALIBRATION REFERENCE

THE INTERNAL CALIBRATE LEVEL PRESENTS A +4dBm SIGNAL TO THE INPUT OF THE 510 FOR CALIBRATING THE DISPLAY IN THE LINE LEVEL MODE TO "OVU" RECORDING INDUSTRY STANDARD.

TO USE THIS FEATURE SELECT THE LINE LEVEL (dBm) POSITION ON THE FRONT PANEL SWITCH AND REMOVE THE LINE LEVEL INPUT CABLES (OTHERWISE LOADING CAN EFFECT THE ACCURACY OF THIS LEVEL). SWITCH THE POWER ON/OFF CALIBRATE SWITCH TO THE CALIBRATE POSITION AND ADJUST THE RIGHT AND LEFT CONTROLS FOR THE DESIRED READING. AFTER THIS ADJUSTMENT RETURN THE ON/OFF CALIBRATE SWITCH TO THE ON POSITION AND RE-CONNECT THE INPUT CABLES.

CAUTION: BE SURE THE ON/OFF CALIBRATE SWITCH IS NOT IN THE CALIBRATE POSITION WHEN THE INPUT CABLES ARE CONNECTED TO TAPE INPUTS OR LOW LEVEL OUTPUTS OF YOUR EQUIPMENT AS IT CAN CAUSE A LOW LEVEL HUM TO BE PRESENT IN THE AUDIO.

REAR PANEL CONTROLS

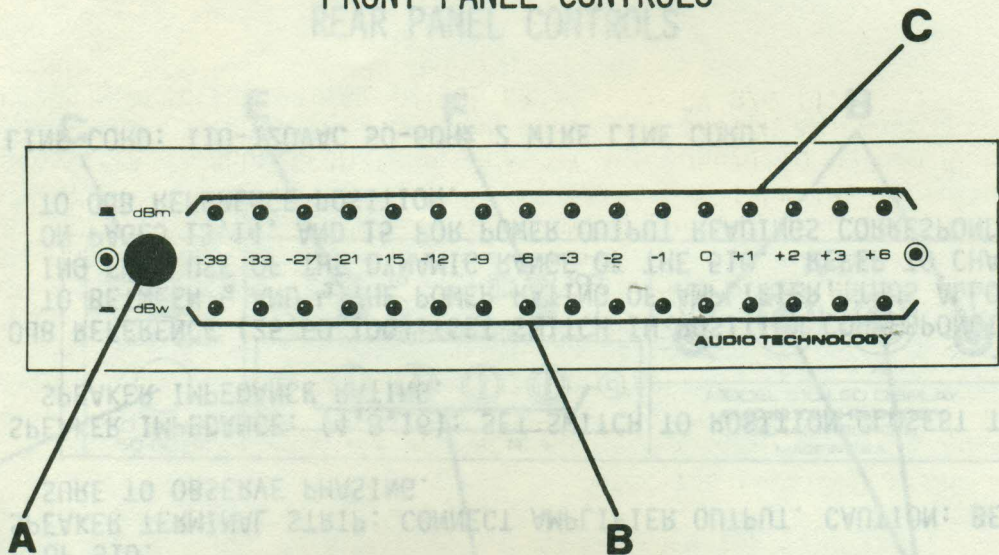


A) LINE LEVEL INPUTS: CONNECT SHIELDED CABLE FROM TAPE DECK, PRE-AMP OUTPUT, ETC.

- B) SENSITIVITY CONTROLS: ADJUSTS LINE LEVEL SENSITIVITY TO USER'S PREFERENCE OVER 0.05V TO 5V RANGE FOR OdB READING.
- C) POWER CALIBRATE SWITCH: ON/OFF POSITIONS FOR NORMAL OPERATION. CALIBRATE POSITION: PRESENTS +4dBm 60Hz SIGNAL TO LINE INPUT OF 510.
- D) SPEAKER TERMINAL STRIP: CONNECT AMPLIFIER OUTPUT. CAUTION: BE SURE TO OBSERVE PHASING.
- E) SPEAKER IMPEDANCE: (4,8,16): SET SWITCH TO POSITION CLOSEST TO SPEAKER IMPEDANCE RATING.
- F) OdB REFERENCE (25,50,100): SET SWITCH IN POSITION CORRESPONDING TO BETWEEN $\frac{1}{4}$ AND $\frac{1}{2}$ THE POWER RATING OF AMPLIFIER, THUS ALLOWING FULL USE OF THE DYNAMIC RANGE OF THE 510. REFER TO CHARTS ON PAGES 13,14, AND 15 FOR POWER OUTPUT READINGS CORRESPONDING TO OdB REFERENCE POSITION.
- G) LINE CORD: 110-120VAC 50-60Hz 2 WIRE LINE CORD.

FRONT PANEL CONTROLS

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- A) FUNCTION SELECTOR SWITCH: dBw: WITH BUTTON "IN" L.E.D.'s WILL INDICATE AMPLIFIER OUTPUT. dBm: WITH BUTTON "OUT" L.E.D.'s WILL INDICATE LINE LEVEL PEAK SIGNALS.
- B) L.E.D.'s: 16 L.E.D.'s INDICATE VALUE OF RIGHT CHANNEL INPUT SIGNAL.
- C) L.E.D.'s: 16 L.E.D.'s INDICATE VALUE OF LEFT CHANNEL INPUT SIGNAL.

CONNECTIONS

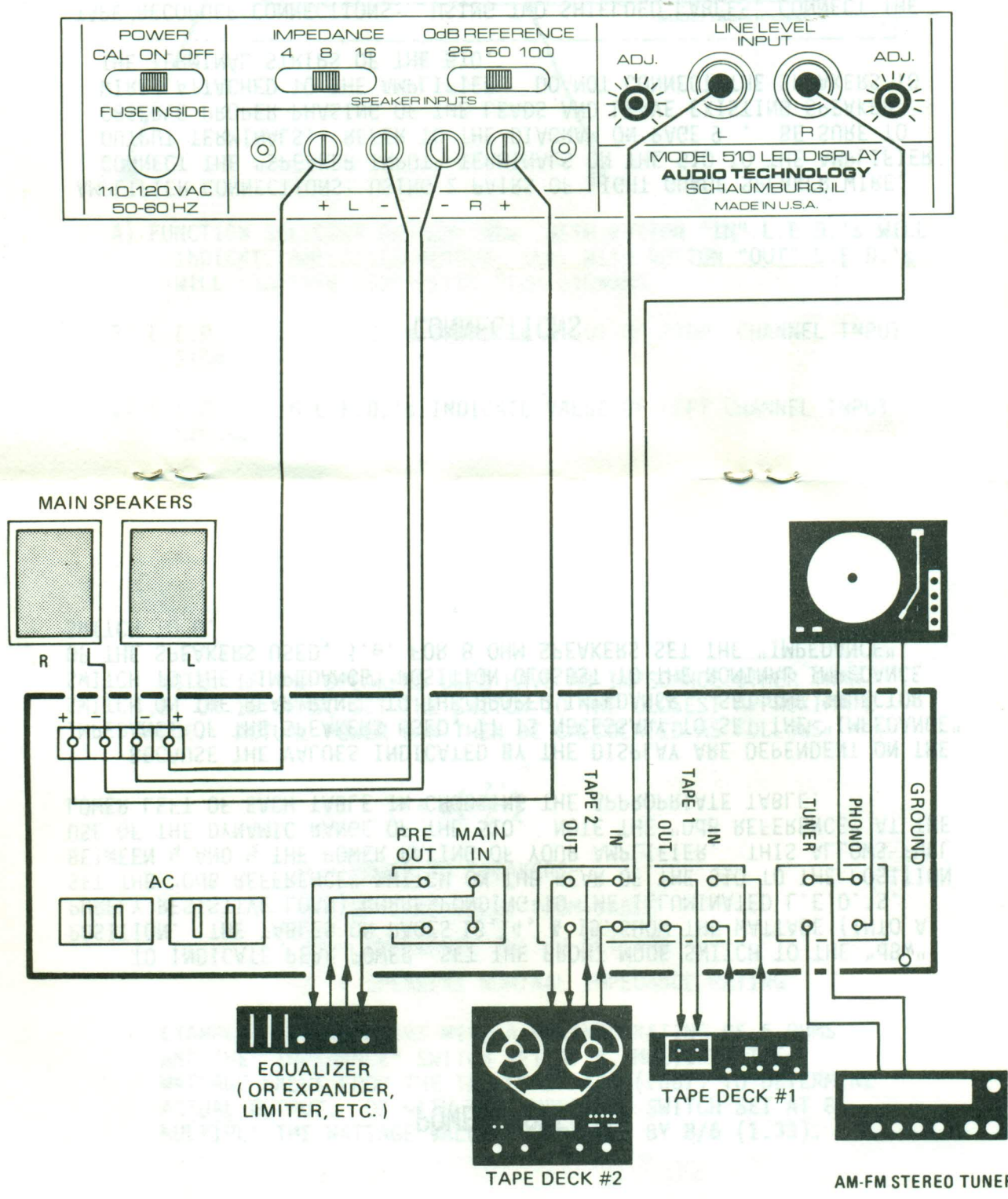
AMPLIFIER CONNECTIONS: USING 2 PAIRS OF LIGHT GAUGE SPEAKER WIRE, CONNECT THE "SPEAKER INPUT" TERMINALS ON THE 510 TO THE AMPLIFIER OUTPUT TERMINALS. REFER TO THE DIAGRAM ON PAGE 9 . BE SURE TO OBSERVE PROPER PHASING OF THE LEADS AND LEAVE EXISTING SPEAKER WIRES ATTACHED TO THE AMPLIFIER. DO NOT CONNECT THE SPEAKERS TO THE TERMINAL STRIPS OF THE 510.

TAPE RECORDER CONNECTIONS: USING TWO SHIELDED CABLES, CONNECT THE RIGHT AND LEFT "LINE LEVEL INPUTS" TO THE OUTPUT OF THE TAPE RECORDER. REFER TO THE DIAGRAM ON PAGE 9 . "Y" CORD ADAPTERS ARE NECESSARY IF THE TAPE RECORDER DOES NOT HAVE A DUAL SET OF OUTPUTS.

OTHER CONNECTIONS: IF THE 510 IS USED TO MONITOR OTHER LINE LEVEL SIGNALS (PRE-AMP, TUNER, ETC.), CONNECT THE "LINE LEVEL INPUTS" TO THOSE POINTS OF INTEREST. HOWEVER, IN NO CASE SHOULD THE SIGNAL BEING MEASURED EXCEED 5VRMS.

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SYSTEM CONNECTION DIAGRAM



POWER MODE

TO INDICATE PEAK POWER, SET THE FRONT MODE SWITCH TO THE "dBw" POSITION. THE TABLES ON PAGES 13, 14, & 15. SHOW THE WATTAGE (INTO A PURELY RESISTIVE LOAD) CORRESPONDING TO THE ILLUMINATED L.E.D.'S. SET THE "0dB REFERENCE" SWITCH ON THE REAR OF THE 510 TO THE POSITION BETWEEN $\frac{1}{4}$ AND $\frac{1}{2}$ THE POWER RATING OF YOUR AMPLIFIER. THIS ALLOWS FULL USE OF THE DYNAMIC RANGE OF THE 510. NOTE THE "0dB REFERENCE" AT THE LOWER LEFT OF EACH TABLE IN CHOOSING THE APPROPRIATE TABLE.

BECAUSE THE VALUES INDICATED BY THE DISPLAY ARE DEPENDENT ON THE IMPEDANCE OF THE SPEAKERS USED, IT IS NECESSARY TO SET THE "IMPEDANCE" SWITCH ON THE REAR PANEL TO THE PROPER IMPEDANCE. SET THE SELECTOR SWITCH TO THE "IMPEDANCE" POSITION CLOSEST TO THE NOMINAL IMPEDANCE OF THE SPEAKERS USED, i.e. FOR 8 OHM SPEAKERS SET THE "IMPEDANCE" SWITCH TO 8.

NOTE: IF THE SPEAKERS USED HAVE AN IMPEDANCE OTHER THAN 4, 8, OR 16 OHMS, SET THE SWITCH TO THE CLOSEST APPROXIMATE VALUE. ACTUAL POWER CAN THEN BE CALCULATED AS FOLLOWS:

$$P = W \left(\frac{Z'}{Z} \right)$$

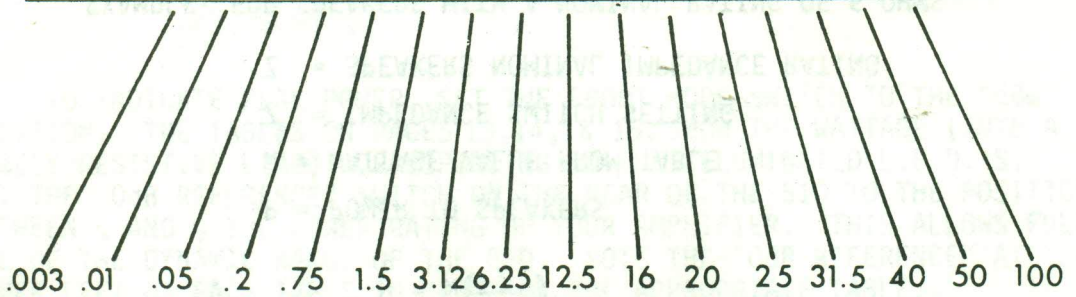
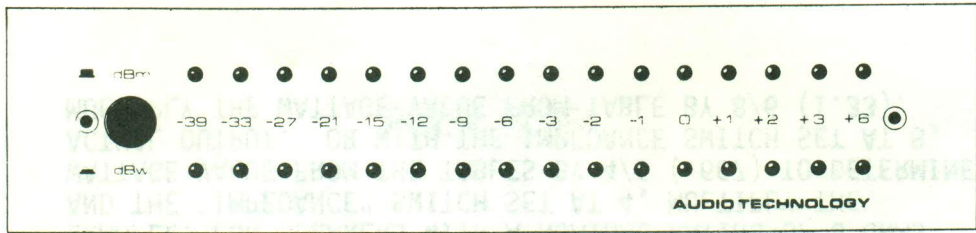
P = POWER TO SPEAKERS

W = WATTAGE VALUE FROM TABLE

Z' = IMPEDANCE SWITCH SETTING

Z = SPEAKERS NOMINAL IMPEDANCE RATING

EXAMPLE: FOR SPEAKERS WITH A NOMINAL RATING OF 6 OHMS AND THE "IMPEDANCE" SWITCH SET AT 4, MULTIPLY THE WATTAGE VALUE FROM THE TABLES BY 4/6 (.667) TO DETERMINE ACTUAL OUTPUT. OR WITH THE IMPEDANCE SWITCH SET AT 8, MULTIPLY THE WATTAGE VALUE FROM TABLE BY 8/6 (1.33).



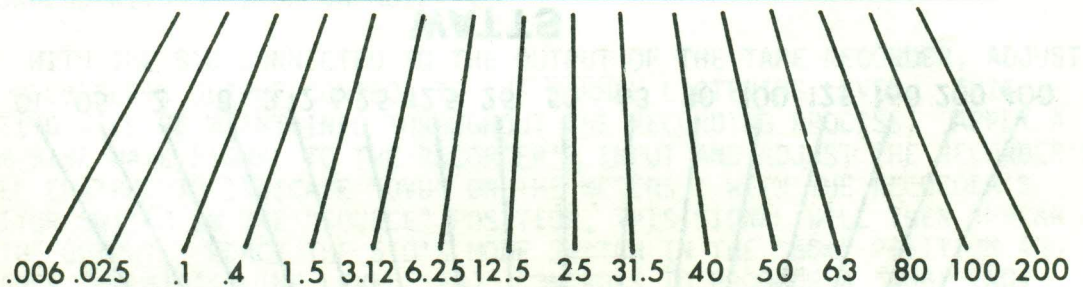
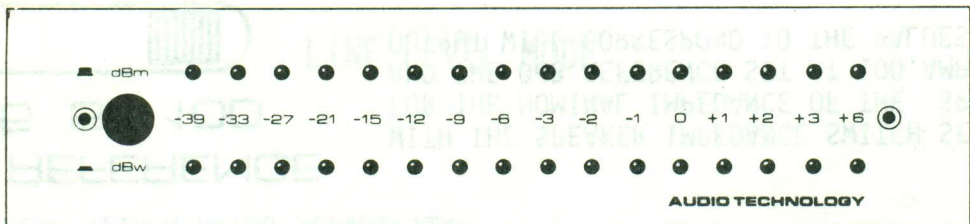
WATTS

0dB REFERENCE

25 50 100



WITH THE SPEAKER IMPEDANCE SWITCH SELECTED FOR THE NOMINAL IMPEDANCE OF THE SPEAKERS AND THE 0dB REFERENCE SET AT 25, AMPLIFIER OUTPUT WILL CORRESPOND TO THE VALUES ABOVE



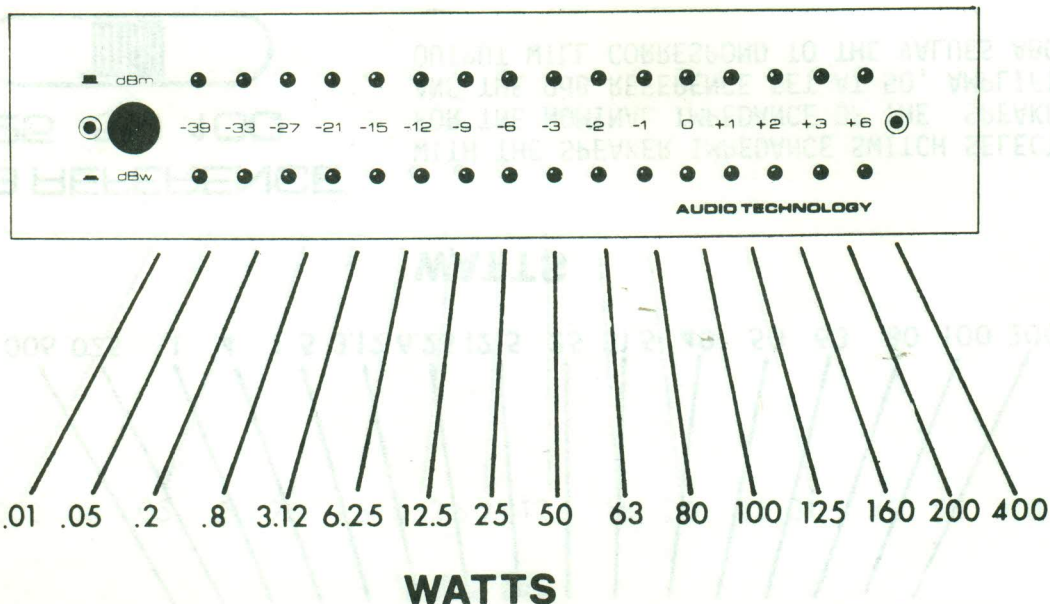
WATTS

0dB REFERENCE

25 50 100

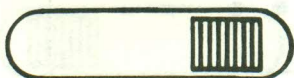


WITH THE SPEAKER IMPEDANCE SWITCH SELECTED FOR THE NOMINAL IMPEDANCE OF THE SPEAKERS AND THE 0dB REFERENCE SET AT 50, AMPLIFIER OUTPUT WILL CORRESPOND TO THE VALUES ABOVE



0dB REFERENCE

25 50 100



WITH THE SPEAKER IMPEDANCE SWITCH SELECTED FOR THE NOMINAL IMPEDANCE OF THE SPEAKERS AND THE 0dB REFERENCE SET AT 100, AMPLIFIER OUTPUT WILL CORRESPOND TO THE VALUES ABOVE

LINE LEVEL MODE

RECORDERS WITH MONITOR CAPABILITY:

WITH THE 510 CONNECTED TO THE OUTPUT OF THE TAPE RECORDER, ADJUST THE RECORDER'S OUTPUT CONTROL TO THE NORMAL LISTENING LEVEL. THIS SETTING WILL BE MAINTAINED THROUGHOUT THE RECORDING PROCESS. APPLY A 0dBm SINE WAVE SIGNAL TO THE RECORDER'S INPUT AND ADJUST THE RECORDER'S LEVEL CONTROL TO INDICATE "OVU" ON THE METERS. WITH THE RECORDER'S MONITOR SWITCH IN THE "SOURCE" POSITION, THIS SIGNAL WILL THEN APPEAR AT THE OUTPUT. PLACE THE 510'S MODE SWITCH IN THE "dBm" POSITION AND ADVANCE THE 510'S LINE LEVEL "ADJ" CONTROLS TO PRODUCE A "0dB" INDICATION ON THE DISPLAY. DURING ACTUAL RECORDING, REFER TO THE 510'S DISPLAY TO SET RECORDING LEVELS. THE RECORDER'S INPUT CONTROL SHOULD BE ADJUSTED TO INDICATE OCCASIONAL +6dB PEAKS ON THE DISPLAY.

THIS PROCEDURE WORKS WELL FOR RECORDING FROM F.M. BROADCASTS AS WELL AS FROM MOST RECORDS AT TAPE SPEEDS OF $7\frac{1}{2}$ I.P.S.. FOR SLOWER TAPE SPEEDS A LEVEL ABOUT 3-4dB LOWER SHOULD BE USED i.e. A SINE WAVE INDICATING "OVU" ON THE RECORDER'S METERS SHOULD BE ADJUSTED TO INDICATE +2dB TO +3dB ON THE 510.

WITH THE 510 CONNECTED TO THE OUTPUT OF THE TAPE RECORDER, ADJUST THE RECORDER'S OUTPUT CONTROL (IF APPLICABLE) TO THE LEVEL NORMALLY USED. THIS SETTING WILL BE MAINTAINED DURING THE ENTIRE RECORDING PROCESS. DEPRESS THE "PAUSE" CONTROL AND PUT THE MACHINE IN THE "RECORD" MODE. APPLY A 0dBm SINE WAVE SIGNAL TO THE RECORDER'S INPUT AND ADJUST THE RECORDER'S INPUT LEVEL CONTROL TO PRODUCE A "OVU" READING ON THE RECORDER'S METERS. THE 0dBm SIGNAL WILL NOW APPEAR AT THE RECORDER'S OUTPUT. PLACE THE 510'S MODE SWITCH IN THE "dBm" POSITION AND ADVANCE THE 510'S LINE LEVEL "ADJ" CONTROLS TO GIVE A +3dB INDICATION ON THE DISPLAY. DURING ACTUAL RECORDING, REFER TO THE 510'S DISPLAY TO SET RECORDING LEVELS. THE RECORDER'S INPUT CONTROL SHOULD BE ADJUSTED TO INDICATE OCCASIONAL +6dB PEAKS ON THE DISPLAY.

NOTE ON LIVE RECORDING:

THE ULTIMATE CALIBRATION OF A PEAK RESPONDING INSTRUMENT FOR RECORDING PURPOSES VARIES WITH PROGRAM MATERIAL, PROGRAM SOURCE, TAPE SPEED, AND TYPE OF RECORDER USED. ALTHOUGH THERE IS SOME DISPUTE AS TO WHAT THE EXACT RELATIONSHIP OF PEAK RESPONDING INSTRUMENTS TO CONVENTIONAL VU METERS SHOULD BE, THE MOST WIDELY ADOPTED "STANDARD" IS THE QUASI-PEAK DIN STANDARD WHICH STATES BASICALLY THAT A +4dBm (OVU) SINE WAVE INPUT SHOULD READ -8dBm ON A PEAK RESPONDING INSTRUMENT FOR TAPE SPEEDS OF 7½IPS OR HIGHER. FOR LIVE PROGRAM SOURCES THIS CALIBRATION WORKS WELL WITH OCCASIONAL +6dB PEAK READINGS ON THE 510. AT LOWER TAPE SPEEDS OR FOR TAPE RECORDERS A LEVEL ABOUT 4dB TO 6dB BELOW THAT SHOULD BE EMPLOYED UNLESS SOME FORM OF COMPRESSION OR PEAK LIMITING IS USED.

OTHER LINE LEVEL SOURCES:

ADJUSTING THE 510 IS SOMEWHAT SIMPLIFIED COMPARED TO THE RECORDING APPLICATION BECAUSE YOU CAN USE BETWEEN CHANNEL NOISE FROM AN F.M. TUNER TO ADJUST THE DISPLAY. DE-ACTIVATE THE TUNER'S MUTING FUNCTION AND TUNE TO AN UNUSED CHANNEL, SET THE TUNER TO MONAURAL AND ADJUST THE 510 USING THE LINE LEVEL INPUT "ADJ" FOR A 0 or +3dBm READING (USER PREFERENCE). ALTERNATIVELY, ONE CAN USE THE STATION OF THEIR PREFERENCE AND ADJUST THE INPUT "ADJ" CONTROLS FOR NEAR FULL SCALE READINGS ON LINE LEVEL PROGRAM SOURCES. USE THE MONAURAL POSITION TO OBTAIN CORRECT CHANNEL BALANCE.

CAUTION: DO NOT USE BETWEEN CHANNEL F.M. NOISE FOR CALIBRATING THE TAPE RECORD LEVEL BECAUSE THE VU METER CANNOT RESPOND TO THE PEAK CONTENT OF THE SIGNAL AND THERE ARE ONLY A FEW MANUFACTURERS THAT ADHER TO THE PROPER BALLISTIC CHARACTERISTICS FOR METER MOVEMENTS. THIS MAKES ANY CORRELATION IMPOSSIBLE WITH ANYTHING BUT SINE WAVE INPUTS.

SEVERELY COMPRESSED ROCK F.M. STATIONS CAN SOMETIMES BE USED FOR CALIBRATION PURPOSES AS THE PEAK TO AVERAGE LEVEL CHANGE CAN BE AS LITTLE AS 3dB AND THESE SIGNALS REPRESENT THE MAXIMUM LEVEL LEGALLY ALLOWED BY THE FCC.

THE 510 CAN ALSO BE USED TO MONITOR OTHER LINE LEVEL SECTIONS OF THE AUDIO CHAIN. FOR EXAMPLE, THE 510 CAN BE CONNECTED TO THE OUTPUT OF A DYNAMIC RANGE EXPANDER AND USED TO OBSERVE THE AMOUNT OF EXPANSION BY OBSERVING THE UNEXPANDED SIGNAL AND THEN COMPARING THE READINGS TO THOSE OF THE SAME SIGNAL AFTER EXPANSION PROCESS. THE SAME IS TRUE OF COMPRESSION.

CARE & MAINTENANCE

THE FRONT PANEL AND TOP AND BOTTOM VINYL CLAD COVERS CAN BE EASILY CLEANED USING A DRY CLOTH. IF THE UNIT IS UNUSUALLY DIRTY, USE A CLOTH DAMPENED WITH WINDEX OR MILD DETERGENT. DISCONNECT AC POWER BEFORE CLEANING.

IF YOUR 510 NEEDS SERVICE, REFER TO YOUR FRANCHISED AUDIO TECHNOLOGY DEALER FOR SERVICING INFORMATION. THIS UNIT SHOULD ONLY BE SERVICED BY QUALIFIED TECHNICIANS.

ACCESSORIES

RUBBER FEET: 4 SELF-ADHESIVE, NON-MARRING FEET ARE PROVIDED WITH THE 510. THESE MAY BE APPLIED TO THE BOTTOM OF THE UNIT TO PREVENT SCRATCHING SURFACES.

OPTIONS

OEP-1 OAK END PANELS: REMOVE SCREWS ON ENDS OF THE 510 (2 ON EACH END HOLDING COVERS IN PLACE). ATTACH THE 2 END PANELS WITH THE LONGER SCREWS PROVIDED WITH THE OEP-1.

VRP-1 VERTICAL READING PANEL: REPLACES STANDARD HORIZONTAL PANEL. REPLACE USING A 5/64 ALLEN WRENCH.

RAK-1, RAK-2 1 & 2 UNIT RAK MOUNT ADAPTERS: FOR PLACING 1 OR 2 UNITS HORIZONTALLY IN A STANDARD 19" RACK. REMOVE THE FRONT PANEL ON THE 510 WITH A 5/64 ALLEN WRENCH. CAREFULLY PLACE THE RACK ADAPTER OVER THE L.E.D.'S AND ATTACH WITH THE SCREWS PROVIDED.

PRC-1 PANEL RETAINING CLIPS: FOR RETAINING THE 510 IN CONSOLES OR CABINETS WHERE A HOLE HAS BEEN CUT. REMOVE SCREWS AT EACH END OF 510 CLOSEST TO FRONT PANEL AND PLACE UNIT THROUGH CUTOUT. POSITION SCREWS THROUGH SLOTS IN PRC-1 INTO THE 510. PUSH PRC-1 TOWARDS PANEL AND TIGHTEN THE SCREWS.