



## INSTRUCTION & USER'S MANUAL

PURCHASE DATE \_\_\_\_\_

SERIAL NUMBER

79234

**norcom**<sup>®</sup>

**MANUFACTURING**

P.O. BOX 31

• BRAINERD, MINNESOTA 56401

## INTRODUCTION

YOUR MAXI-TEL REMOTE BROADCAST SYSTEM IS THE RESULT OF MANY HUNDREDS OF HOURS RESEARCH, DESIGN AND DEVELOPMENT APPLYING THE LATEST "STATE OF THE ART" TECHNOLOGY. YOUR MAXI-TEL (MAXIMUM TELEPHONE CAPABILITY) IS THE MOST COMPLETE REMOTE BROADCAST SYSTEM AVAILABLE TODAY.

THIS MANUAL WILL ASSIST YOU IN GETTING ACQUAINTED WITH YOUR MAXI-TEL. THE MAXI-TEL HAS MANY FEATURES NOT FOUND ON OTHER SYSTEMS, THEREFORE TO INSURE YOU OF TOTAL PERFORMANCE REMEMBER, IF EVERYTHING ELSE FAILS, READ THE INSTRUCTIONS.

## ACKNOWLEDGEMENTS

WE WOULD LIKE TO THANK MR. BILL SPITZER, C.E. OF KKLS RADIO, FOR INITIATING THE DEVELOPMENT OF THE MAXI-TEL.

FOR SERVICE WRITE OR CALL:

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## UNPACKING AND INITIAL SET-UP

### NOTE

THE SHIPPING CARTON HAS BEEN DESIGNED TO BE RE-USED FOR STORING, TRANSPORTING AND SHIPPING YOUR MAXI-TEL. DO NOT DISCARD.

\* \* \* \* \*

AFTER UNPACKING, THE MAXI-TEL IS READY FOR IMMEDIATE USE. YOU CAN OPERATE THE MAXI-TEL WITHOUT ANY BATTERIES, BUT IF YOU DESIRE TO HAVE BATTERY BACKUP THE INSERT EIGHT "D" CELL BATTERIES (PREFERABLY ALKALINE) IN THE TWO BATTERY TUBES LOCATED ON THE REAR PANEL. NOTE THAT THE NEGATIVE END OF EACH BATTERY IS INSERTED FIRST. MAKE SURE THAT THE BATTERY TUBE CAPS ARE SCREWED IN FIRMLY.

BEFORE PLUGGING THE MAXI-TEL INTO ANY POWER, FIRST TURN ALL FRONT CONTROLS TO THEIR MAXIMUM COUNTER CLOCKWISE POSITION. NOTE THAT THE LINE AND HEADPHONE CONTROLS HAVE A SWITCHED "OFF" POSITION. TURN OFF ALL CLOCK AND TIMER SWITCHES. ON THE REAR PANEL THE THREE MINIATURE SWITCHES SHOULD BE IN THE NORM OR OFF POSITION.

PLUG THE LINE CORD INTO A STANDARD 110-120 VOLT 60 HZ GROUNDED OUTLET. THE GREEN POWER LED INDICATOR SHOULD NOW LIGHT. IF THERE IS NO INDICATION DEPRESS MOMENTARILY THE RIGHT CIRCUIT BREAKER LOCATED ON THE REAR PANEL (VIEWING FROM THE REAR). IF THERE IS STILL NO INDICATION CHANCES ARE THAT YOU DO NOT HAVE ANY POWER AT THE OUTLET THAT YOU ARE PLUGGED INTO. TRY ANOTHER OUTLET OR BREAKER.

NOTE: A HEADSET MUST BE PLUGGED INTO THE NUMBER 1 HEADPHONE JACK BEFORE THE MAXI-TEL SYSTEM WILL OPERATE.

CLOCK SET-UP: SWITCH CLOCK DISPLAY ON. THE HIGH INTENSITY DIGITAL CLOCK SHOULD NOW LIGHT UP. THE COLON LOCATED LEFT OF THE DIGITS WILL FLASH INDICATING THAT THERE HAS BEEN A POWER FAILURE AND THE CLOCK IS NOT INDICATING THE CORRECT TIME. TO SET THE CLOCK FIRST RAISE THE FAST/SET SWITCH. THE TIME WILL ADVANCE VERY RAPIDLY. AFTER TWELVE HOURS HAVE ELAPSED ON THE CLOCK, THE COLON WILL SHIFT POSITION. THE UPPER POSITION IS NORMALLY AN INDICATION FOR AM AND THE LOWER POSITION IS AN INDICATION FOR PM. WHEN THE COLON IS INDICATING THE PROPER UPPER OR LOWER POSITION ADVANCE THE TIME TO WITHIN ONE HOUR. THEN RAISE THE SLOW/SET SWITCH TO BRING THE CORRECT TIME UP ON DISPLAY. NOTE: YOU MAY TURN OFF THE CLOCK DISPLAY, MAIN POWER AND UNPLUG FROM EXTERNAL POWER AND THE CLOCK MEMORY WILL NOT BE AFFECTED AS LONG AS THERE ARE BATTERIES INSTALLED AND A HEADPHONE IS PLUGGED INTO THE NUMBER ONE HEADPHONE JACK.

TIMER: TURN TIMER DISPLAY ON. THE HIGH INTENSITY DIGITAL DISPLAY SHOULD NOW LIGHT UP. TO ZERO ALL DIGITS DEPRESS THE "ZERO" SWITCH. TO START THE COUNTING FUNCTION MOVE THE RIGHT SWITCH TO THE START POSITION. YOU MAY NOW FREEZE AND RESUME COUNTING BY OPERATING THE START/STOP SWITCH. YOU CAN ZERO THE TIMER WHEN THE TIMER IS EITHER COUNTING OR IN THE STOP POSITION.

## CONTROLS, FRONT PANEL

BALANCE/NULL, LINE/OFF: THIS CONTROL HAS A SWITCH IN THE MAXIMUM COUNTER CLOCKWISE POSITION WHICH PERMITS ACCESS TO THE ~~PHONE LINE~~ PHONE LINE. THEREFORE, IF YOU WANT TO BE ABLE TO ACCEPT INCOMING CALLS YOU MUST HAVE THIS CONTROL TURNED OFF (ON HOOK CONDITION). WHEN IN OPERATION, ADJUST FOR LOWEST VOLUME LEVEL FROM YOUR MICROPHONE AND MAXIMUM VOLUME FROM THE STUDIO OR DIAL TONE WHILE LISTENING IN THE HEADPHONES.

HEADPHONE/POWER OFF: CONTROLS VOLUME OF ALL FOUR HEADPHONE JACKS. POWER OFF POSITION DISCONNECTS POWER TO ALL COMPONENTS EXCEPT THE CLOCK MEMORY AND THE RING LED INDICATORS.

CHANNEL 1,2,3,& 4: LEVEL CONTROLS FOR THEIR RESPECTIVE MIKE AND TAPE INPUTS ARE ELECTRICALLY TIED TOGETHER FOR EACH CHANNEL. THE MINIATURE JACKS ON CHANNELS THREE AND FOUR ARE PREWIRED FOR STANDARD CASSETTE EARPHONE OR SPEAKER OUTPUT, (EIGHT OHM IMPEDANCE). THE  $\frac{1}{4}$ " PHONE JACKS ON CHANNELS ONE AND TWO ARE PREWIRED FOR 600 OHM MEDIUM LEVEL TAPE INPUT FOR USE WITH CART PLAYBACK UNITS. ADJUST LEVELS SO THAT PEAKS ON VU METER LIGHT THE ~~AMBER~~ O "VU" LED BUT NOT THE RED +3 DB LED.

*Amber*

TELEPHONE DIAL: WHEN THE BALANCE/NULL CONTROL IS TURNED ON, YOU WILL BE IN AN "OFF HOOK" CONDITION. TELEPHONE DIAL THEN MAY BE USED TO PLACE AN OUTGOING CALL USING YOUR HEADPHONE AND MICROPHONE IN PLACE OF A STANDARD TELEPHONE HANDSET.

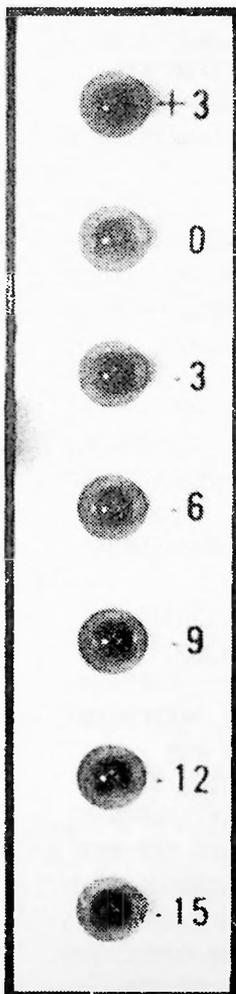
## SPECIAL INDICATORS



**BATT:** THESE TWO AMBER LEDS WILL ALTERNATELY FLASH TO WARN YOU THAT THERE IS ONLY A COUPLE OF HOURS OF BATTERY LIFE LEFT. TO CONSERVE BATTERY LIFE WHEN THERE IS NO EXTERNAL POWER AVAILABLE YOU MAY SHUT DOWN THE CLOCK AND TIMER DISPLAYS WHEN THEY ARE NOT NEEDED (EACH CLOCK AND TIMER DISPLAY CONSUMES APPROXIMATELY 80 MA.)

**RING:** THESE TWO GREEN LEDS WILL ALTERNATELY FLASH WHEN YOU ARE BEING CALLED VIA THE TELEPHONE LINE. THUS YOU HAVE A VISUAL INDICATION AS WELL AS AN AURAL ONE.

**LINE LOSS:** THESE TWO RED LEDS WILL ALTERNATELY FLASH TO WARN YOU THAT YOU ARE PHYSICALLY DISCONNECTED FROM THE TELEPHONE LINE. THIS WARNING IS ONLY OPERATIVE WHEN USING DIAL UP LINES. WHEN THE DIAL UP/ DEDICATED SWITCH IS IN THE DEDICATED POSITION THIS FEATURE IS INOPERATIVE. THE LINE "LINE LOSS" WARNING WILL ONLY OPERATE WHEN THE "BALANCE/ NULL" CONTROL IS TURNED ON.



db/VU

VU: THE VU LEDS ARE FACTORY CALIBRATED TO INDICATE -4 DBM OUTPUT WHEN THE "0" VU LED IS LIT. THIS OUTPUT IS THE SAME LEVEL AT THE FIVE WAY BINDING POSTS ON THE REAR PANEL. NOTE: THE VU INDICATOR CALIBRATION IS CONTROLLED BY R1 ON THE LOGIC 500 CIRCUIT BOARD. CONTACT THE FACTORY FOR OTHER VALUES FOR SPECIAL APPLICATIONS.

## CONTROLS, REAR PANEL

HI/LO BOOST: WHEN IN THE "ON" POSITION, THE HIGH AND LOW END OF THE AUDIO SPECTRUM IS BOOSTED TO COMPENSATE FOR LONG TELEPHONE LINES AND/OR GIVE ADDED BASS AND HIGHS FOR ADDED INTELIGIBILITY.

NOTCH FILTER: PROVIDES AN EXTREMELY DEEP SHARP NOTCH IN THE AUDIO SPECTRUM AT 2.6 KHZ. TO PREVENT ANY LONG DISTANCE CALLS FROM BEING ACCIDENTLY DISCONNECTED DUE TO SPURIOUS NOISES. IE: CROWD NOISES, WHISTLING, ETC.

NOTE: WHEN OPERATING USING LOCAL LINES OR DIRECT LINES, THIS SWITCH SHOULD BE IN THE OFF POSITION FOR MAMIMUM FIDELITY OF THE AUDIO. USE ONLY WHEN CONDITIONS WARRANT!

RECORD OUTPUT: LOW IMPEDANCE ISOLATED MICROPHONE LEVEL FOR RECORDING APPLICATIONS.

HEADPHONE 1: (POWER SWITCH): THIS HEADPHONE JACK MUST BE USED BEFORE THE MAXI-TEL WILL BE OPERATIONAL. THIS IS A FAIL SAFE SO THAT EVEN IF THE MAIN POWER SWITCH IS INADVERTENTLY LEFT ON, THE BATTERIES WILL NOT RUN DOWN WHEN THE MAXI-TEL IS NOT IN SERVICE. NOTE: THE CIRCUITS ARE SO WIRED THAT WHEN THE MAIN POWER, CLOCK AND TIMER DISPLAYS AND LINE SWITCHES ARE TURNED OFF THE CLOCK MEMORY WILL STAY POWERED AS LONG AS A HEADPHONE IS PLUGGED INTO THE #1 HEADPHONE JACK. THUS IT IS NOT NECESSARY TO RE-SET THE CLOCK WHEN TURNING OFF ANY FRONT PANEL CONTROLS. THE RING INDICATOR IS ALSO OPERATIVE IN THIS MODE.

CIRCUIT BREAKERS: EACH ARE ONE AMP. VIEWING FROM THE REAR, THE LEFT BREAKER IS IN THE BATTERY CIRCUIT. THE RIGHT IS IN THE PRIMARY 120 VOLT INPUT TO THE POWER TRANSFORMER. TO RE-SET, DEPRESS AND RELEASE.

MONITOR IN: WILL ACCEPT AUDIO FROM A RECEIVER FOR "OFF AIR" MONITORING. IT IS INTERNALLY WIRED TO THE HEADPHONE AMPLIFIER. THIS CIRCUIT IS NOMINALLY A MEDIUM LEVEL INPUT WITH A 10K OHM ISOLATING CIRCUIT. ANY REQUIRED LOADING OF THE RECEIVER SHOULD BE DONE EXTERNALLY OF THE MAXI-TEL.

TELEPHONE LINE CORD: THIS CABLE IS APPROXIMATELY TWELVE FEET LONG TO ACCOMODATE MOST SITUATIONS. THE CABLE IS TERMINATED WITH A MODULAR TELEPHONE PLUG. A 4-PRONG ADAPTER IS PROVIDED TO ACCESS OLDER INSTALLATIONS.

LINE OUTPUT: THESE ARE 5-WAY BINDING POSTS FOR CONNECTION TO THE TELEPHONE LINES. THE BINDING POSTS ARE CONNECTED TO THE HYBRID OUTPUT TRANSFORMER AND THE "DIAL UP" AND "DEDICATED" SWITCH.

#### CAUTION:

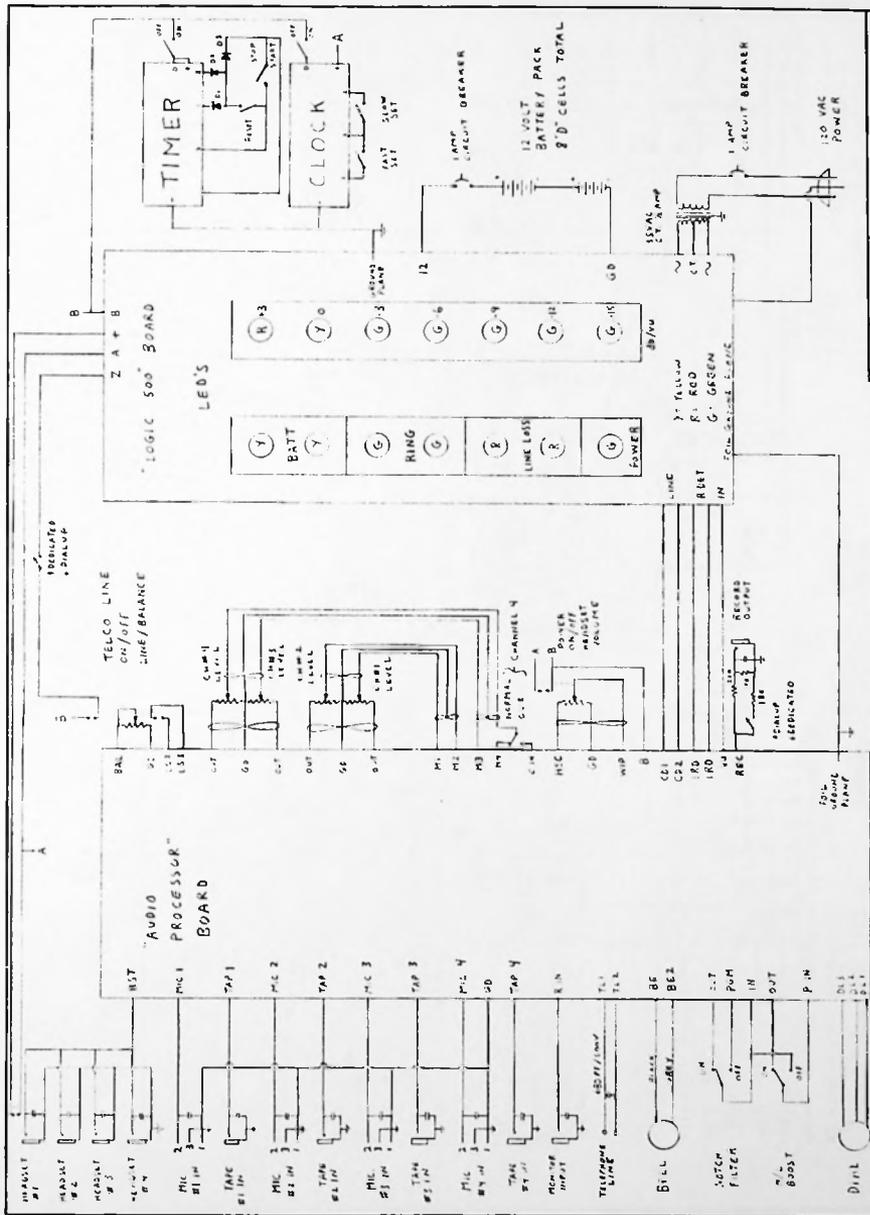
THE TRIM POTS ON THE CIRCUIT BOARDS ARE FACTORY SET AND ANY CHANGE MADE BY OTHER THAN FACTORY PERSONEL WILL VOID THE WARRANTY. A CHARGE WILL BE MADE FOR RECALIBRATION OF THE NOTCH FILTER.

## HERE'S SOME MAXI-TEL HELPFUL OPERATING HINTS

1. CARRY A SPARE SET OF EIGHT "D" ALKALINE BATTERIES. THEY CAN BE CHANGED IN LESS THAN A MINUTE BY ANYONE IN THE FIELD.
2. CARRY AN EXTRA HEADSET/MICROPHONE. MURPHY'S LAW #13C STATES, "AT LEAST ONE HEADSET OR MICROPHONE CABLE WILL BECOME INTERMITTENT AT THE START OF TOURNAMENT COMPETITION." THE FACT IS THAT AUDIO CABLES BREAK DUE TO FREQUENT FLEXING. A WISE BROADCASTER ALWAYS CARRIES A SPARE.
3. CARRY A SPARE TELEPHONE. NO MATTER HOW HARD ONE TRIES, A PIECE OF AUDIO EQUIPMENT CAN ONLY BE 99,9% RELIABLE. WHEN THAT ONE TENTH OF ONE PERCENT FAILURE OCCURS, ANY STANDARD TELEPHONE WILL SERVE TO GET THE GAME "ON THE AIR" EVEN IF THE QUALITY IS LESS THAN DESIRABLE.
4. VIRTUALLY EVERY PIECE OF AUDIO EQUIPMENT IS SUSCEPTIBLE TO R.F. INTERFERENCE. GREAT PAINS HAVE BEEN TAKEN TO MAKE THE MAXI-TEL AS INTERFERENCE FREE AS POSSIBLE. HOWEVER, A HUM OR BUZZ MAY BE HEARD IN THE AUDIO IF A REMOTE BROADCAST TRANSMITTER ANTENNA IS PLACED WITHIN A FEW FEET OF THE MAXI-TEL. THE SOLUTION IS SIMPLE. MOVE THE TWO UNITS FARTHER APART.
5. WHY DID NORCOM MAKE THE MAXI-TEL WITH FOUR INPUT CHANNELS? AFTER ALL, YOU ONLY USE ONE MICROPHONE AT THE GAME!!

- A. NOW YOU CAN BRING ALONG THAT SPORTS-NUT, PUT A HEADSET/MICROPHONE ON HIM AND LET HIM TELL YOUR LISTENERS ALL THE INTERESTING SPORTS TRIVIA HE HAS BEEN TELLING YOU OVER COFFEE.
  
- B. FOR GAMES THAT HAVE LESS CROWD NOISE OR WHERE YOU ARE IN A SOUND RESISTANT BOOTH, CONNECT ANOTHER MICROPHONE TO PICK UP CROWD NOISE AND ADJUST IT SO THAT IT SOUNDS LIKE YOU ARE "AT THE GAME". THIS ALSO HELPS WHERE SMALL TOWN GAMES HAVE FEW SPECTATORS. IT HELPS MAKE THE GAME SOUND MORE EXCITING.
  
- C. YOU CAN DO AN INTERVIEW JUST PRIOR TO THE GAME OR DURING HALFTIME ON CASSETTE TAPE. THE PLUG THE CASSETTE MACHINE INTO THE MAXI-TEL AND RUN IT WHEN THE BROADCAST RESUMES.
  
- D. IF YOU CHOOSE TO DO A LIVE INTERVIEW WITH A COACH AFTER THE GAME, JUST PUT A HEADSET/MICROPHONE ON HIM OR HER.
  
- E. IN SOME EVENTS, IT MIGHT BE ADVENTAGEOUS TO PICK UP A FEED FROM THE P.A. SYSTEM AND USE IT AS PART OF THE BROADCAST. JUST PLUG THE P.A. INTO THE CHANNEL 1 OR 2 TAPE INPUT JACK.

- F. A "SPOTTER" CAN FEED AUDIO TO YOUR HEADSETS WITHOUT GOING ON THE AIR. JUST PLUG THE SPOTTER'S MICROPHONE INTO CHANNEL 4 AND PUT THE CHANNEL 4 "NORM-CUE" SWITCH TO "CUE". IF YOU WISH TO PUT THE SPOTTER ON THE AIR, FLIP THE SWITCH TO "NORM". THIS SWITCH CAN ALSO BE USED FOR CUEING A CASSETTE TAPE.
- G. IF, WITH ALL THESE IDEAS, YOU FIND THAT YOU NEED MORE THAN FOUR CHANNELS OF MIXING, KEEP IN MIND THAT EACH CHANNEL HAS TWO INPUT JACKS. EACH CHANNEL HAS A MICROPHONE AND A CASSETTE TAPE OR 600 OHM MEDIUM LEVEL INPUT. BOTH INPUT JACKS FOR EACH CHANNEL CAN BE USED SIMULTANEOUSLY, BUT THERE IS ONLY ONE CONTROL FOR THE TWO SOURCES. USING A MICROPHONE "Y" ADAPTER, TWO SIMILAR MICROPHONES CAN BE MIXED INTO ONE CHANNEL.
- H. WE SUGGEST THAT YOU TURN THE HIGH/LOW BOOST SWITCH ON FOR MOST BROADCASTS OVER DIRECT DIAL AND LONG DEDICATED LEASED LINES. TURN IT OFF FOR SHORT DEDICATED LEASED LINES WHERE THE LINE FREQUENCY RESPONSE IS RELATIVELY FLAT. WE RECOMMEND THAT THE NOTCH FILTER BE LEFT OFF UNLESS YOU HAVE A PROBLEM WITH DISCONNECTS ON DIRECT DIAL LINES THROUGH A PARTICULAR PHONE COMPANY OR EXCHANGE.



INSTALLED		REVISIONS		NON-COM		Mkt-TEL	
DATE	BY	NO.	DATE	NO.	DATE	NO.	DATE
1957	...	1	...				
1957	...	2	...				
1957	...	3	...				
1957	...	4	...				
1957	...	5	...				

INTERCONNECTION SCHEMATIC

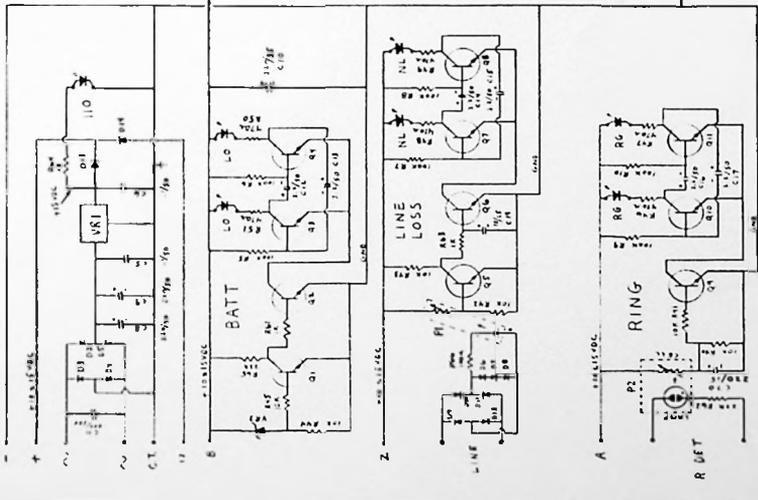
DATE: 11/1/57

BY: J. J. WILSON

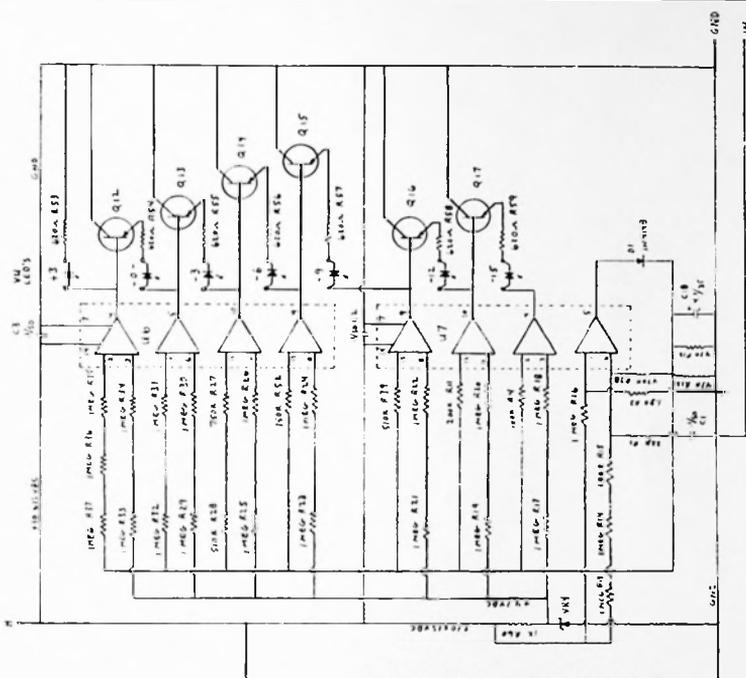
ALL CAPACITORS ARE .001/50V UNLESS OTHERWISE SPECIFIED  
 BALANCE CONTROL IS 100 OHMS LINEAR, ALL OTHER CONTROLS  
 ARE 5000 OHMS AUDIO TAPER.

01, 02, 03 ARE IN-002





P1 IS CHAN'L CML-1000  
 P2 IS CHAN'L CML-200A  
 ALL INDICATORS ARE IDENTICAL UNLESS OTHERWISE NOTED  
 C1 THROUGH C10 ARE 100PF  
 V1 IS 1N5174-B (10V 1/4WATT)  
 V2 IS 1N5174-B (10V 1/4WATT)  
 Q1 THROUGH Q17 ARE 2N3638  
 Q18 THROUGH Q20 ARE 2N3638

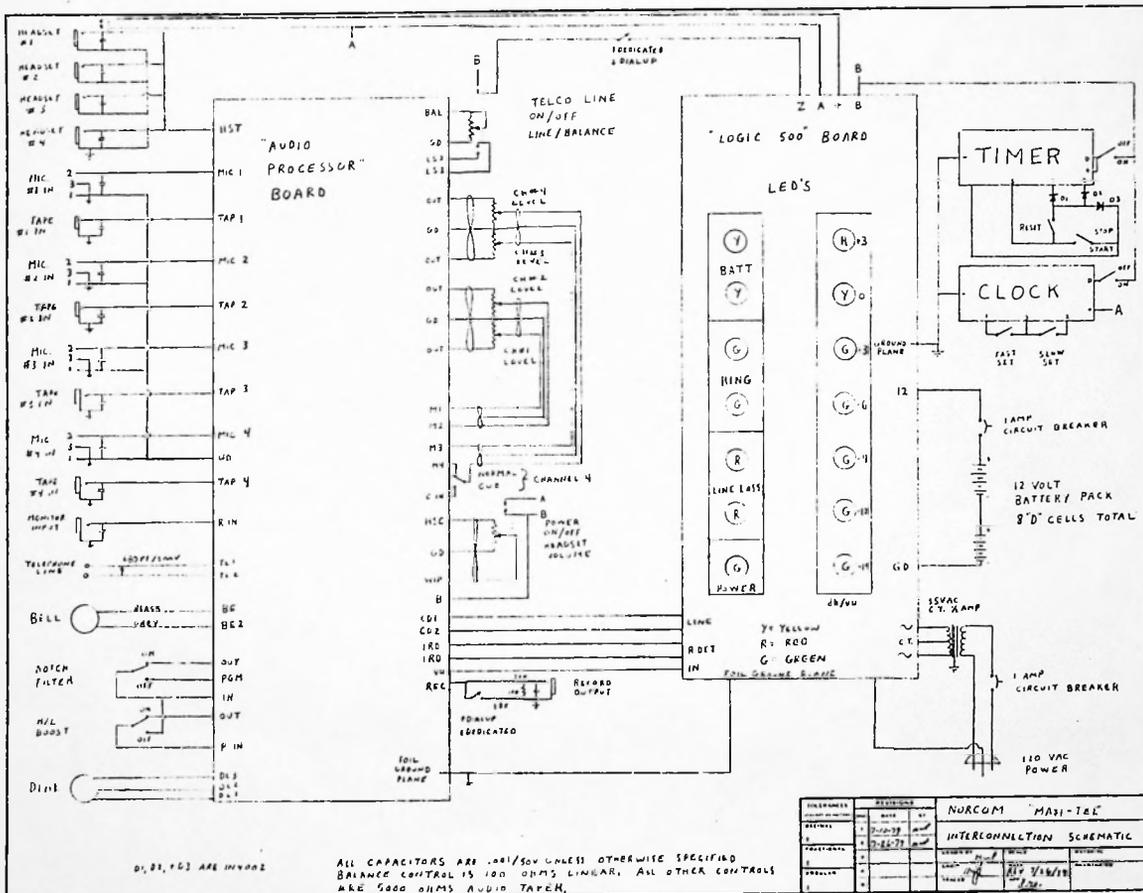


J1 AND J2 ARE 100 OHM  
 P1 IS CHAN'L CML-1000  
 P2 IS CHAN'L CML-200A  
 ALL INDICATORS ARE IDENTICAL UNLESS OTHERWISE NOTED

MEASUREMENT	TEST POINT	TEST SIGNAL	TEST INSTRUMENT
1	Q1	100 MHz	OSCILLOSCOPE
2	Q2	100 MHz	OSCILLOSCOPE
3	Q3	100 MHz	OSCILLOSCOPE
4	Q4	100 MHz	OSCILLOSCOPE
5	Q5	100 MHz	OSCILLOSCOPE
6	Q6	100 MHz	OSCILLOSCOPE
7	Q7	100 MHz	OSCILLOSCOPE
8	Q8	100 MHz	OSCILLOSCOPE
9	Q9	100 MHz	OSCILLOSCOPE
10	Q10	100 MHz	OSCILLOSCOPE
11	Q11	100 MHz	OSCILLOSCOPE
12	Q12	100 MHz	OSCILLOSCOPE
13	Q13	100 MHz	OSCILLOSCOPE
14	Q14	100 MHz	OSCILLOSCOPE
15	Q15	100 MHz	OSCILLOSCOPE
16	Q16	100 MHz	OSCILLOSCOPE
17	Q17	100 MHz	OSCILLOSCOPE
18	Q18	100 MHz	OSCILLOSCOPE
19	Q19	100 MHz	OSCILLOSCOPE
20	Q20	100 MHz	OSCILLOSCOPE

KOKOLOT "MIL-TEL"  
 LOGIC 503 BOARD  
 DATE: 10/15/54  
 BY: [Signature]





DESIGNATION		REVISIONS		NORCOM "M31-1A1"	
DATE	BY	NO.	BY	DESCRIPTION	REVISION
2-20-78	...	1	...	INTERCONNECTION SCHEMATIC	...
2-21-78	...	2	...	...	...
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