MARK-8 NEWSLETTER VOL. 1, NO. 3
12 OCTOBER 74

I HADN'T PLANNED TO DO ANOTHER NEWSLETTER FOR SEVERAL MORE WEEKS BUT MAIL HAS BEEN COMING IN SO RAPIDLY THAT I HAVE TO OR I'LL NEVER KEEP UP. WE NOW HAVE OVER 180 PARTICIPANTS. WHO KNOWS HOW MUCH BIGGER IT WILL BECOME?

BUGS - PAGE 4 INPUT MUX PARTS LIST SHOULD READ C1,3,4 0.1 MF DISK C2 100 MF 10 VOLT ELECTROLYTIC (BY ROBERT COOK)
IC3 ON CPU BOARD HAS NO GROUND. CONNECT INSULATED WIRE FROM PIN 4 TO GROUND RAIL AND CHECK FOR CHANGE-STATE OUTPUT ON PINS 10 AND 11. (I'M NOT SURE I UNDERSTAND THIS ONE.) IN CONNECTING THE BUS, NOTICE THAT FOIL DOES NOT CONNECT ALL OF THE INNER AND OUTER HOLES. (BY TERRY RITTER)
ADDRESS FOR MARTIN RESEARCH, 1825 S. HALSTED ST, CHICAGO, IL 60608

SOURCES FOR 8008 AND OTHER PARTS - NO NEW ONES HAVE APPEARED. WE HAVE REACHED A SIZE WHERE OUR ORGANIZATION SHOULD BE ABLE TO GET A VERY ATTRACTIVE QUANTITY DISCOUNT ON COMMON ITEMS WE ALL NEED SUCH AS 8008 AND 8080 CHIPS, MEMORY CHIPS, ETC. ROBERT COOK IS ALREADY INTO THIS. PERHAPS HE WILL CHECK IT OUT IN DETAIL AND LET US KNOW WHAT WE CAN DO.

OUTSTANDING NEWS - STEVE CIARCIA HAS DESIGNED AND TESTED A FOUR CHIP MODIFICATION TO TVT TO ADD COMPLETE SCROLLING CAPABILITY. THE CIRCUIT IS NOW IN THE MAIL AND WILL BE PUBLISHED IN THE NEXT NEWSLETTER.

DON SINGER, FOREST GROVE HIGH SCHOOL, FOREST GROVE, OREGON HAS A BASIC CROSS ASSEMBLER THAT RUNS ON A DATA GENERAL TIME SHARE BASIC SYSTEM AND COULD BE EASILY MODIFIED FOR OTHER BASICS.

ARTICLES WORTH LOOKING UP - "MICROCOMPUTERS--FROM THE USERS VIEWPOINT" BY HYMAN OLKEN, RESEARCH/DEVELOPMENT, OCT 74 DESCRIBES THE LAWRENCE RADIATION LABS 8008 SYSTEM OF MODULES AND THEIR USE AT THE LABS.

## COMMENTS FROM CURRENT PARTICIPANTS

STEVEN CIARCIA HAS DEVELOPED THE SCROLLING SYSTEM FOR TVT, PROMISES TO PUT TOGETHER A CASSETTE RECORDER INTERFACE THAT WILL REALLY WORK USING A SYSTEM CALLED HARVARD BIPHASE AND HE WILL BE DEVELOPING A SPACEWAR GAMING SYSTEM.

DAVE CHAPMAN SENT A COPY OF MP PUBLISHING CO., BOX 378 BELMONT, MASS 02178 ARTICLES ECS-2 ($2.50) ON AN AUDIO CASSETTE MASS STORAGE SYSTEM. UNLESS I DIDN'T GET THE WHOLE THING, IT WOULD APPEAR NEARLY IMPOSSIBLE TO GET A RUNNING UNIT FROM THE INFO THERE. ECS-6 IS SUPPOSE TO BE A TAPE CONTROLLER BUT ISN'T PUBLISHED YET. HE WANTS TO KNOW WHERE HE CAN FIND A CHEAP DIGITAL PLOTTER (I'D LIKE TO KNOW WHERE TO FIND CHEAP STEPPING MOTORS?) AND WANTS TO BUILD A TV GRAPHICS TERMINAL WITH VECTOR AND CHARACTER GENERATORS. HE INCLUDED AN AD FOR ZIPPER, A CASSETTE SYSTEM BY PROGRESSIVE SYSTEMS, 215 FIRST STREET,

ROBERT COOK HAS PLACED HIS FIRST QUANTITY ORDER FOR 8008S AND SHOULD BE DELIVERING THEM BY NOW. HE IS STILL ACCEPTING ORDERS AT $80. HE IS INTERESTED IN 8080S (PLEASE FIND OUT HOW MUCH THEY WOULD COST US IN A QUANTITY ORDER, ROBERT.)

JAMES FRY ORDERED AN 8008 FROM ELECTRONIC DISCOUNT SALES AND THEIR PRICE HAS GONE UP TO $69.45. HE SAYS THEY WERE VERY SLOW. ALSO STAY AWAY FROM HAP AS ADVERTISED IN PE AS $2.00 GETS YOU NOTHING. HE WANTS TO KNOW IF ANYBODY CAN COMMENT ON RGS'S BOOK, HE WAS VERY IMPRESSED WITH MP PUBLISHING'S FIRST TWO EFFORTS AND RECOMMENDS JAMES ELECTRONICS, PO BOX 822, BELMONT CA 94002 AS FAST. JAMES WILL MEET ANY COMPETITOR'S PRICES IF THE AD IS SENT IN AND PROMISES 3-5 DAY DELIVERY ON MOST UNLISTED ICS.
HE IS STILL WORKING ON HIS TVT MODIFICATIONS AND HIS DESCRIPTION GIVES IT ALL THE FEATURES OF A HAZELTINE 3000. HE MADE SOME BOARDS THAT CAN BE USED FOR MODULE DEVELOPMENT WITH THE TVT SINCE THEY ACCEPT THE SAME MOLEX CONNECTORS AND HAVE PADS FOR 16 ICS. HE CAN GET MORE MADE FOR $3.00 EACH. HE SUGGESTS THAT WE ALL SEND LETTERS IN TO RE THANKING THEM FOR THE TVT AND MARK-8 ARTICLES AND SUGGEST THEY HAVE MORE AND A REGULAR COMPUTER COLUMN.

MAURY GOLDBERG WILL SOON FINISH HIS MARK-8 AND WILL INTERFACE IT WITH A FLOPPY DISC AND AN INTELLIGENT TERMINAL HE OWNS. HIS PART TIME BUSINESS IS LIQUIDATING MANUFACTURE'S EXCESS INVENTORIES. HE HAS A LOT OF PARTS FOR THE MARK-8 AVAILABLE. WRITE HIM AT SYRACUSE MANAGEMENT SERVICES, 1618 JAMES STREET, SYRACUSE, NY 13303. HE WANTS TO KNOW IF THERE IS ANY INTEREST IN A KIT OF PARTS.

DAN GOLENSKIE IS INTERESTED IN 8080'S. HE SAYS 2107A-8 4K RAMS ARE PRICED AT $12 EACH IN LOTS OF 100. CAN ANYONE DESIGN THE REFRESH CLOCKS ETC.?

ROBERT KELLY IS IN FAVOR OF THE LAWRENCE RAD LABS TRI-STATE INPUT BUS CONFIGURATION.

SUMNER S. LOOMIS, LOOMIS LABS IS ASSEMBLING A MARK-8 WHICH WILL BE USED AS A PROGRAMMABLE CONTROL CENTER FOR ANOTHER COMPUTER THAT USES CMOS LOGIC AND 4 CALCULATOR CHIPS. IT WILL BE INTERFACED WITH AN ANALOG COMPUTER, DIGITAL VOLTMETER, 11 X 17 PLOTTER, BOWMAR PRINTER, BAUDOT TTY, IBM CARD READ AND SEVERAL CASSETTE RECORDERS. HE PROMISES TO CONTRIBUTE SOME OF THIS INFORMATION SOON. HE HAS SOME COMMENTS ON THE MEMORY BOARD. USE MOLEX SOCKET PINS AND STAND THEM UP AS FAR FROM THE BOARD AS POSSIBLE. DO NOT INSTALL THE THRU BOARD WIRES UNTIL YOU HAVE CHECKED EACH ROW OF MEMORY SOCKETS FOR SHORTS AN INSPECT EVERY JOINT WITH A 10 POWER MAGNIFYING GLASS. TRYING TO DEBUG A MEMORY WITH SOFTWARE IS A LONG, HARD, (& INTERMITTENT) ROAD.

KEN A MCGINNIS WANTS EVERONE TO GET TOGETHER AND AGREE ON A MEMORY ELEMENT SUCH AS THE 2602 SO WE COULD ORDER ENOUGH TO GET THE PRICE DOWN. THE INTEL 8212 8 BIT LATCH WOULD BE NEAT TO. HE ALSO SENT A PRICE INFORMATION LIST FROM CONTROL LOGIC, INC FOR THEIR 8008 MODULES DISTRIBUTED BY INTER-LINK SYSTEMS, PO BOX 517, CUPERTINO, CA 95014. THESE ARE THE LAWRENCE RAD LAB MODULES. WRITE FOR LITERATURE.

TOM PARQUETTE IS EXCITED ABOUT 8080 SYSTEMS AND IS IN THE PLANNING STAGE OF A PUNCHED CARD READER AND/OR PUNCH. HE IS PLEASED WITH SOLID STATE SYSTEMS AS A SUPPLIER.

CABELL A PEARSE SUGGESTS SOLID STATE SYSTEMS FOR IC SOCKETS, B&F FOR WIRE-WRAP WIRE, WEIRNU, PO BOX 1307 COLTON, CA 92324 FOR 1101 AND 2102. HE WAS IMPRESSED WITH THE SCELBI-8H USER MANUAL AND LIKES THE MP PUBLISHING CO EXPERIMENTERS COMPUTER SYSTEM SERIES. WRITE BOX 378-P, BELMONT, MASS 02178 FOR A FREE CATALOG DESCRIBING SERIES.

LAURENCE PLATE SUGGEST CLEANING IC PAD HOLES BY USING WIK-IT ON ONE SIDE TO REMOVE EXCESS SOLDER, THEN USE SOLDERING IRON AND #22 WIRE TO CLEAR HOLE. HE SUGGESTS ONLY ONE BOARD OF 1101'S AND USE OF HIGHER DENSITY CHIPS FOR THE REST OF THE MEMORY. THE NEED FOR STANDARDS IS SO ESSENTIAL THAT IS PROPOSING SANTA BARBARA AS THE UNOFFICIAL MARK-8 CAPITOL OF THE WORLD AND THE OBVIOUS PLACE FOR A CONFERENCE. (PERHAPS HE AND I CAN GET TOGETHER AND WRITE DOWN OUR IDEAS FOR STANDARDS AND PRINT THEM FOR COMMENT.)

TED J. POULOS IS STRUGGLING TO DEBUG HIS MARK-8 AND IS PROMOTING HIS COMPANY, DIGI-CRAFT ELECTRONICS POB 94, BROOKLINE MASS 02145. A CATALOG WILL BE AVAILABLE IN MID NOV AND HE NOW HAS 1101'S AT 8 FOR $21 POSTPAID AND MOLEX CONNECTORS & MATING WAFER PIN ASSEMBLIES FOR 50 AND 25 CENTS.

R. RILEY SAYS THE ARRL HANDBOOK AND BACK ISSUES OF QST HAVE MODEM PLANS. ALSO MOTOROLA APPLICATION NOTE AN-4-91 FREE FROM MOTOROLA. HE RECOM- INTERNATIONAL ELECTRONICS FOR IC'S AND MENTIONS THAT QST HAS PUBLISHED PLANS FOR A BAUDOT TO ASCII CONVERSION.

TERRY RITTER HAS A RUNNING MARK-8 AND SENT DETAILS ON HIS KEYBOARD INTER- FACE AND A LISTING OF SIMPLOADER, A OCTAL KEYBOARD DATA ENTRY PRO- GRAM. DETAILS WILL APPEAR IN THE NEXT ISSUE. HE RECOMMENDS NOT USING MOLEX CONNECTORS SO THE UNIT CAN BE PLACED ON 5 DIFFERENT SIDES FOR TROUBLE-SHOOTING. A PULSE DETECTING PROBE IS ESSENTIAL FOR TROUBLE- SHOOTING AND BACK LIGHT THE BOARDS TO CHECK FOR SOLDER BRIDGES. HE WILL GLADLY HELP WITH TROUBLE SHOOTING HINTS BUT ONLY IF YOU ENCLOSE A SASE. WHOEVER DOES THE 8080 ARTICLE SHOULD MAKE IT MUCH EASIER TO BUILD. HE HAS HAD FREQUENT PROBLEMS WITH THE SWITCHES EVEN THO THEY WERE GOOD QUALITY. EXTRA DEBOUNCING MAY HAVE TO BE ADDED. FOR ADDING CIRCUITS TO THE BOARD TERRY SUGGESTS MOUNTING THE IC'S ON THE BOARD TOP DOWN WITH GLUE WITH WIRES CONNECTING THE PINS AND PC RUNS. HE IS NOW WORKING ON A HARDWARE ROM AND TTY DRIVER.

DR. WILLIAM SCHENKER SAYS BILL GODBOUT HAS AN EXCELLENT REPUTATION AS A SUPPLIER IN THE BAY AREA AND THAT FIVE OF THEM IN THE BAY AREA HAVE ORGANIZED A LOOSE GROUP AROUND TVT CONSTRUCTION. HE IS IN A COM- PUTER SCIENCE PROGRAM WHICH HAS A STRONG LIASON WITH LAWRENCE RAD LABS AND SHOULD BE ABLE TO OBTAIN INFORMATION. HE IS MOSTLY INTERESTED IN 8080 SYSTEMS AND MAY BE WORKING INTO COMPUTER APPLICATIONS FOR DIAGNOSTIC MEDICINE AND HEALTH CARE DELIVERY SYSTEMS.

ROGER SMITH'S ARTICLE ON ADDING A UART TO THE TVT TO DRIVE A TTY AND CASSETTE RECORDER LOOKS GOOD AND WILL APPEAR IN THE DEC RE. HIS RECORD- ING METHOD USES A TONE FOR 1'S AND NO TONE FOR 0'S.

PETER SPERRI SENT IN A COPY OF THE ELECTRONICS MAG TAPE INTERFACE.

JONATHAN TITUS SUGGESTS BENDING THE 1101 LEADS HORIZONTALLY THAT DON'T NEED TO GO THRU THE BOARDS AND SOLDERING THEM LIKE A FLAT PAK. ALSO TEST THEM FIRST. TO EXPAND THE INPUT TO A BUS SYSTEM, REMOVE THE 7442 DE- CODER ON INPUT MUX BOARD AND RUN 2 JUMPERS, FROM IC PAD 8 TO 1 AND 2 TO 16. INPUT PORT 0 BECOMES THE INPUT BUS PORT AND 1 IS NOT USED. HE WILL HAVE MORE ON THIS IN FUTURE ISSUES OF RE. HE SUGGESTS WESTERN DIGITAL'S BAUDOT UART FOR BAUDOT TTY'S. HE GAVE PERMISSION TO PRINT THE VERY NICE TROUBLESHOOTING PROBE CIRCUITS.

DARRELL WOOD SENT IN THE ARTICLES ON CASSETTE INTERFACES.

MAX L. WYMORE IS A PATENT ATTORNEY AND IS BUILDING THE MARK-8 AND TVT TO GAIN COMPUTER EXPERIENCE.

ADDITIONS TO ROSTER AND COMMENTS OF PARTICIPANTS AS OF OCT 12, 1974

A. C. ACTON, BOX 31, MIDLAND, MI 48640 IS INTERESTESTED IN INVESTIGATION AND SIMULATION OF INDUSTRIAL MINICOMPUTER APPLICATIONS ESPECIALLY IN REGARD TO INSTRUMENTATION, PROCESS MONITORING AND SERVO CONTROL AND WANTS TO INTERFACE TO TVT, HAM-GRADE TTY, GRAPHIC PLOTTERS, AND SERVO ACTUATORS.

VICTOR W. AMOTH, 228 FOX ROAD, MEDIA, PA 19063 WILL USE TVT FOR I/O, WANTS A CASSETTE TAPE INTERFACE AND WILL TRY TO RUN HIS MODEL RAILROAD IF HE CAN WORK OUT SENSORS FOR IT.

EDWARD E. ANDERSON, 813-23 ST., COLUMBUS, GEORGIA 31904 WILL USE THE TVT, WANTS TO INTERFACE A CASSETTE AND CALC CHIP AND WANTS TO WORK ON A BASIC AND FORTRAN COMPILER.

JEFFERY AUGENSTEIN MD/PHD, 1400 NW 10 AVE. SUITE 2M, MIAMI, FL 33136 IS WITH THE UNIV OF MIAMI, AUDIOLOGY RESEARCH LABS AND THEY HAVE LABORATORY APPLICATIONS FOR THE MARK-8.

DR. G. G. BALAZS, DIRECTOR, COMPUTER CENTER, VIRGINIA MILITARY INSTITUTE, LEXINGTON, VIRGINIA 24450

DAVID A. BARKER, 1101 GRAD HOUSE WEST, WEST LAFAYETTE, IND 47906

C. S. BAUER, IEMS DEPT., FLORIDA TECH. UNIV., PO BOX 25000, ORLANDO, FLORIDA 32816 SUGGESTS THAT THE GROUP COULD CONSIDER SERVING AS AN EXCHANGE MEDIUM FOR INFORMATION ON SOURCES AND PRICES FOR COMPONENTS. THEY ARE TRYING TO LOCATE "ZERO-INSERTION FORCE" IC SOCKETS.

EUGENE M. BEHRENS, 20631 S.W. 116 ROAD, MIAMI, FL 33157

RICHARD C. BEMIS, 402 S. HUMBOLDT, DENVER, CO 80209 SAYS THAT WE MAY BE NIBBLING AT THE TOP OF A VERY LARGE ICEBURG WITH THE USER GROUP. (IT APPEARS THAT YOU ARE RIGHT RICHARD.) HE SUGGESTS THAT A FLOPPY DISK WILL BE NECESSARY TO REALIZE THE MARK-8'S FULL POTENTIAL AND SUGGESTS LOOKING AT THE COMPUCORP ALPHA CALCULATOR AS AN EXAMPLE OF WHAT CAN BE DONE WITH A SOPHISTICATED PROGRAMMABLE CALCULATOR TYPE LANGUAGE IN A SMALL MACHINE.

J. P. BERNIER, 1005 GRENOBLE, STE FOY, QUE 10, GIV 228, (QUEBEC, CANADA) WORKS IN DIGITAL DEVICES AND ACQUISITION SYSTEMS BOTH STATIC AND DYNAMIC AND HE SUGGESTS INSPECTING THE BOARDS VERY CAREFULLY FOR SHORTS, USE MOLEX SOCKET PINS FOR ALL ICS, AND HE ORDERED 60 PIN CONNECTORS INSTEAD OF USING THE BUSS WIRES.

JAMES RILEY BODDIE, PATIO APT. 216, 420 N. DEAN ROAD, AUBURN, ALABAMA 36830 IS A GRAD STUDENT IN EE AT AUBURN UNIV. HIS SYSTEM WILL INCLUDE 1K, KEYBOARD, AND A CRT CHARACTER DISPLAY. HE IS INTERESTED IN PROGRAMMING GAMES AND HOUSEHOLD CONTROL FUNCTIONS.

FRED A BOGGS, 1803 ROSE ST., PORT TOWNSEND, WASH. 98368

JAY BOWDEN, 1613 ENCINO DR., ESCONDIDO, CA 92025 IS A FRESHMAN AT PALOMAR COLLEGE, SAN MARCOS, CA AND HOPES TO BE ABLE TO PROGRAM OPERATIONS IN A SYMBOLIC INSTRUCTION CODE USING MATH OPERATORS AND CERTAIN HIGH LEVEL LANGUAGE STATEMENTS.

DAVE BOWLES, 4501 GLEN HAVEN ROAD, SOQUEL, CA 95073 IS INTERESTED IN ACCOUNTING AND STOCK AND INVENTORY CONTROL FOR A SMALL BUSINESS, CONTROL OF A MUSIC SYNTHESIZER, MODULATION TRANSFER FUNCTION DATA REDUCTION, AND A SYSTEM FOR OPTICAL IMAGE INTENSIFYING SYSTEMS.

DENNIS BURKE, 108 N. HIDALGO AVE., ALHAMBRA, CA 91801 WANTS TO KNOW WHAT KIND OF PROGRAMS ARE AVAILABLE TO USERS AND IS INTERESTED IN GRAPHICS AND FILE TYPE COMPUTING. HE IS WORKING ON HIS OWN TV DISPLAY WHICH WILL WORK ON ANY SCOPE OR MODIFIED TV DISPLAY, WILL DISPLAY 512 CHARACTERS WITH A VIDEO FREQ UNDER 1 MEG AND A 60 HZ REFRESH RATE. PARTS COST IS UNDER $100. HE MENTIONS 256 WORD PROMS AT $37.50 FROM POLY PAKS AND WANTS TO KNOW IF THERE IS ANY INTEREST IN 8080'S.

W. H. BURTNER, RR 2 BOX 267, VALPARAISO, IND. 46383 IS WAITING TO START UNTIL THE BUGS ARE OUT AND IS VERY MUCH INTO MUSIC SYNTHESIZERS AND WOULD LIKE TO DEVELOP THE MARK-8 AS A SORT OF HIGH CLASS SEQUENCER AND CONTROLLER FOR A KIT SYNTHESIZER HE HAS COMPLETED.

VINCENT BUSCEMI, NEWFIELD HIGH SCHOOL, MARSHALL DRIVE, SELDEN, NY 11784

JOHN N. CALHOUN, PROGRAMMING ANALYST, SYSTEMS & PROGRAMMING DEPT., EDUCATIONAL TESTING SERVICE, 1947 CENTER STREET, BERKELEY, CA 94704

JOHN T. CRAIG, VARIAN DATA MACHINES, 2722 MICHELSON DRIVE, IRVINE, CA, 92664

JAN VAN DIJK, 2062 NW RAMSEY DR., PORTLAND, OREGON 97229

JAMES A EBY, RR #1, BOX 337A2, HARBOURTON-WOODSVILLE RD., PENNINGTON, NJ 08534

V. ECHEVERRIA, 4235 BANKS, NEW ORLEANS, LA 70119

ROGER B. FRANK, DIGITAL EQUIPMENT CORP., PO BOX 969, LOS ALAMOS, NM 87544 HAS HAD AN 8008 SYSTEM RUNNING FOR ABOUT 14 MONTHS WITH ABOUT 16K OF SEMICOND. MEMORY, ROM BOOTSTRAP, HIGH SPEED TAPE READER, CASSETTE TAPE, AND TTY WITH SOFTWARE SUPPORT INCLUDING AN EDITOR AND ASSEMBLER WITH A COMPLEX MONITOR. HE DEVELOPED HIS SYSTEM AS A HOBBY WHILE A DESIGN ENGINEER FOR ANOTHER COMPANY AND IS PURSUING THRU CHANNELS THE POSSIBILITY OF CONTRIBUITING THIS INFORMATION TO THE GROUP.

MAURY GOLDBERG, CELETRON COMMUNICATIONS CORP., 1618 JAMES ST., SYRACUSE, NY 13203

BILL GOUGH, 310-B SOUTH COLLINS, ARLINGTON, TX 76010 IS BUILDING A 4K MARK-8 WITH TVT AND HAS BEEN A PROGRAMMER FOR 15 YEARS WITH DIGITAL ELECTRONICS AS A HOBBY. HE HAS SOME ELABORATE IDEAS FOR A VERBAL RESPONSE UNIT USING 2 COMPUTER CONTROLLED CASSETTE TAPE RECORDERS.

DAVID W. GROSS, 924 NE CROXTON AVE., GRANTS PASS, OREGON 97526 IS A SOPHOMORE IN HIGH SCHOOL AND HAS BEEN SERIOUSLY INTERESTED IN COMPUTERS FOR THE LAST TWO YEARS. HIS MARK-8 IS NEARLY FINISHED AND HE IS STILL HAVING TROUBLE FINDING THE SHIFT REGISTERS FOR THE TVT.

R. G. GUENTHER, DDS, 100 MAIN ST. WEST, HAMILTON, ONTARIO CANADA, L8S 1B3

STEVEN L. GUERRA, PO BOX 429, SIERRA BLANCA, TX 79751

W. A. GUINN, 480 JAMUL CT., CHULA VISTA, CA 92011 WANTS HIS CHILDREN TO USE THE SYSTEM IN DOING THEIR SCHOOL WORK AND IS INTERESTED IN A PORTABLE SYSTEM AND WANTS TO DO ENVIRONMENTAL CONTROL FOR HIS HOUSE AND GREEN HOUSE.

DAVID R. HANUS, 402 ARNOLD BLVD. #29, ABILENE, TX 79605 BUILT THE TVT AND IT ENDED UP COSTING FAR MORE THAN IT WAS SUPPOSE TO SO HE IS CAUTIOUS ABOUT STARTING THE MARK-8 TOO SOON. HE WOULD USE IT FOR INVENTORY LISTS, COMIPILING LISTS OF CROSS-REFERENCED PARTS, AND WITH THE AID OF A CALCULATOR INTERFACE, TO FURTHER HIS EDUCATION IN PHYSICS. HE HAS FOUND HAMILTON-AVNET AND CRAMER SUPPLY OF DALLAS HELPFUL IN OBTAINING SIGNETIC ICS.

TERRY G. HARRIS, 417 NORTHWESTERN DRIVE, GRAND FORKS, N. DAK. 58201 WANTS TO BUILD THE CRT I/O IN RE AND WOULD USE HIS MARK-8 FOR MEAL PLANNING AND SORTING DATA FOR PARTICULAR ITEMS OF INTEREST.

GREGORY W. HART, 8948 RAMSTAD AVE., FAIR OAKS, CA 95628

JAMES HOPKINS, 29 GRANDVIEW AVE., PITMAN, NJ 08071 PLANS TO DEVELOP A SCIENTIFIC NOTATION PACKAGE USING 5 WORDS PER NUMBER. HE IS INTERESTED IN DEVELOPING A DETAILED USER MANUAL WITH DISCUSSION AND USES OF ALL ARITHMETIC AND LOGICAL OPERATIONS.

JOHN JAMES, 1597 MONUMENT ST., CONCORD, MA 01742 PLANS TO BUILD OR PROGRAM A 2-WAY MORSE CODE TRANSLATOR, COMPUTER TERMINAL, AND DO DATA ACQUISITION AND PROCESSING OF VOICE SIGNALS.

C. K. JOHANSEN, ORION RESEARCH INC., 380 PUTNAM AVE., CAMBRIDGE, MA 02139

DOUGLAS W. KILGORE, 803 JAMES DRIVE, RICHARDSON, TX 75080

MORRIS KRIEGER, 37 EIGHTH AVE., BROOKLYN, NY 11217 FEELS THAT THERE ARE GOING TO BE SUBSEQUENT MODELS, EITHER LARGER, BETTER, OR FASTER AND IS GOING TO WAIT AND SEE WHAT THE FUTURE HOLDS.

JAMES M. LAMIELL, 1615 COLORADO BLVD., DENVER, CO 80220

J. E. LENCOSKI, 327 GRANT AVE., MIDDLESEX, NJ 08846

ANDREW W. LEPP, 1517 ALTA VISTA, OWOSSO, MICHIGAN 48867 IS IN GRAD SCHOOL IN COMPUTER SCIENCE AT THE UNIVERSITY OF ARKANSAS.

JEFF LESINSKI, 1241 STALEY ROAD, GRAND ISLAND, NY 14072 IS CONSTRUCTING A 2K MARK-8 WITH TVT, TWO OUTPUT BOARDS, AND THE SIGNETIC PHASE LOCK LOOP AUDIO CASSETTE I/O. HE PLANS TO ADD A CALCULATOR AND CLOCK CHIP, DUAL COMPUTER CONTROLLED CASSETTE DRIVES AND A D/A CONVERTER AND MODEM. HE IS 3RD YEAR GRAD STUDENT IN COMPUTER SCIENCE AT STATE UNIV OF NY AT BUFFALO AND IS INTERESTED IN ARTIFICIAL INTELLIGENCE BUT IS REGAINING INTEREST IN HARDWARE BECAUSE OF MICROCOMPUTER DEVELOPMENTS. HE HOPES TO USE THE MARK-8 TO DEMONSTRATE FEASIBILITY AS A MASS PRODUCED HOME APPLIANCE AND IS CURRENTLY WRITING AN ASSEMBLER AND SIMULATOR IN FORTRAN.

PHILIP E. LEVINSON, 875 NASSAU ROAD, UNIONDALE, LI, NY 11553

STEVEN LORENZ, 163 WEST MAIN ST., NEWARK, DE 19711 IS A SENIOR AT UNIV OF DELAWARE IN EE AND IS USING THE MARK-8 AS A SENIOR DESIGN PROJECT.

JOHN M. MCCOY, 420 WALLACE AVE., LOUISVILLE, KY 40207

JOHN W. NALL, COMPUTER RESEARCH SPECIALIST, FLORIDA STATE UNIV, COMPUTER CENTER, MATH BLDG. RM 110, TALLAHASSEE, FL 32306

ALAN F. NEEL, 1435 JUDSON, BOULDER, CO 80303 WOULD LIKE A LIST OF RECOMMENDED PARTS SUPPLIERS AS HE IS HAVING TROUBLE FINDING SOME OF THE PARTS.

ROBERT W. OILER, 355 1/2 S. STATE ST., WESTERVILLE, OHIO 43081 WORKS IN TV REPAIR AND IS TRYING TO THINK UP WAYS TO MAKE HIS JOB EASIER USING THE MARK-8.

MARK PETERSON, TEACHING SPECIALIST, UNIV OF MINNESOTA, DULUTH, DEPARTMENT OF INDUSTRIAL EDUCATION, DULUTH, MN 55812 IS PRESENTLY USING A GE 312 AND IS INTERESTED IN USING THE MARK-8 AS A MINICOMPUTER/REMOTE ENTRY TERMINAL COMBINATION.

C. A. PICKARD, 199 N. PURDUE, OAK RIDGE, TENN. 37830

GARY T. POST, 475 B BROOKS, LEMOORE, CA 93245

W. A. RIGGERT, DDS, 10300 WEST NINE MILE ROAD, OAK PARK, MICHIGAN INTENDS TO USE THE MARK-8 FOR STANDARD BUSINESS PROCESSING AND SEVERAL VERY SPECIALIZED DENTAL PROGRAMS AND WANTS INFO CONCERNING CASSETTE TAPE DRIVES AND LOW-COST SLOW PRINT MECHANISMS.

J. R. ROEHRIG, 28 HICKORY RD., WELLESLEY, MASS., 02181 HAS A CASSETTE TAPE UNIT RUNNING THAT WORKS REASONABLY WELL BUT HIS PROBLEM IS GETTING GOOD TAPE. EVEN WITH "SCOTCH" HE GETS 2 ERRORS PER PAGE ON THE TVT.

R. N. RUBINSTEIN, 310 LENOX RD., BROOKLYN, NY 11226

RMCS WELDON RYE USN, TACRON ONE NAB CORONADO, SAN DIEGO, CA 92155 HAS SOME TTY EQUIPMENT, A VIDEO MONITOR AND A SCOPE HE WILL USE AS PERIPHERALS AND IS AN ACTIVE HAM AND MARS MEMBER AND CAN SEE USES FOR THE MARK-8 IN THAT FIELD.

ALBERT SARDO, 2032 SW EXPRESSWAY, SAN JOSE, CA 95126 HAS JUST STARTED STUDYING EE AT SAN JOSE STATE COLLEGE AND IS HOPING TO DEVELOP A HIGH LEVEL LANGUAGE IN THE FUTURE FOR THE MARK-8 AND WILL USE IT FOR STATISTICAL AND MATHEMATICAL WORK.

MICHAEL G. SCOTT, ROUTE 1, BOX 105, KIRON, IOWA 51448 IS A JUNIOR IN HIGH SCHOOL AND ON HIS PRESENT SALARY, IT WILL BE A WHILE BEFORE HE CAN TACKLE THE MARK-8. HE IS WORKING ON A DEVICE THAT READS, WRITES, AND REMEMBERS OCTAL CODES AND CONVERTS THEM TO THEIR BINARY COUNTERPARTS.

MARK SEBERN, 218 MOSSMAN RD., SUBURY, MA 01776

CHARLES SIBBITS, 413 N. BLACK HORSE PIKE, RUNNEMEDE, NJ 08078 IS A 3RD YEAR STUDENT IN RADIO AND TV REPAIR AT CAMDEN COUNTY VOCATIONAL SCHOOL. HE WANTS TO ADD A CALCULATOR TYPE KEYBOARD FOR FASTER ENTRY AND A ROM FOR NONVOLATILE PROGRAM STORAGE. HE IS PRIMARILY INTERESTED IN BUSINESS DATA PROCESSING AND ANY SOFTWARE AVAILABLE FOR THIS PURPOSE.

DAVID SILACCI, D. QUON, 1405 48TH AVE. #3, SAN FRANCISCO, CA 94122

RAYMOND J. SMITH, WKYC-TV, 1403 EAST SIXTHS/ ST., CLEVLAND, OHIO 44114

ROBERT W. THOMAS, 910 SONMAN AVE., PORTAGE, PA 15946 IS INTERESTED IN A HIGH SPEED CRT INTERFACE AND MASS STORAGE DEVICES AND WILL USE THE MARK-8 TO CONTROL A ZONED HEATING SYSTEM, A FIRE AND BURGLAR ALARM SYSTEM IN HIS HOME, A HOME FINANCIAL SYSTEM, AND INVENTORY OF FOOD AND SUPPLIES.

PETER VICKERS, 162 NEHOIDEN ST., NEEDHAM, MA 02192

JAMES R. VOIGT, 1903 N. 23RD ST., SHEBOGGAN, WIS 53081

JOHN E. WAHL, APT. B-2, 3334 ZION, EL PASO, TX 79904

JERRY WALKER, 761 CLAYTON, SAN FRANCISCO, CA 94117

JOSEPH WEINTRAUB, 46-16 65TH PLACE, WOODSIDE, NY 11377 IS MAINLY INTERESTED IN COMPUTER GRAPHICS AS HE IS PROFESSIONALLY A PROGRAMMER AND PRIVATELY, A FILM-MAKER AND IS INTERESTED IN ANY INFORMATION IN THIS AREA.

STEVEN J. WINICK, APT. 210, 8401 MANCHESTER RD., SILVER SPRING, MD 20901

WORD PROCESSING SYSTEMS, 10955 GRANADA LANE SUITE 302, OVERLAND PARK, KANSAS 66211

# Putting data on an ordinary audio recorder

Here's a way to use any single-track audio recorder to record digital data. The system, useful in many non-critical applications, makes only one requirement on the recorder (either reel-to-reel or cassette)—a frequency response to 7 kHz.

The circuit uses four phase-locked loop ICs, giving you a complete data-recording system with two recorded frequencies on a single track. Further, the circuit needs no timing channel to strobe-off the data, nor does it need a third frequency for null.

The parameters chosen for the circuit give you a digital recording rate of 800 Hz, or 100 8-bit char./s. Because an FSK recording system is used, you need not modify the recorder's voice recording and playback electronics. In fact, you can record voice messages to identify various sections of the tape. To incorporate redundancy of the stored data, simply use a 2-channel (stereo) recorder. An FSK detector on each channel, with the data outputs OR'd, recovers recorded *1*'s and thus protects against dropouts.

The FSK detector detects 6.4 kHz as a *1* and 4.8 kHz as a *0*. Because of the RZ FSK recording scheme, a *0* is recorded as 4.8 kHz for the entire bit period, while a *1* is recorded as 6.4 kHz for about 60% of the period and as 4.8 kHz for the remainder of the period. This 60% bit-duty-cycle ensures that the clock will synchronize with a negative transition during the time that a *1* should be detected.

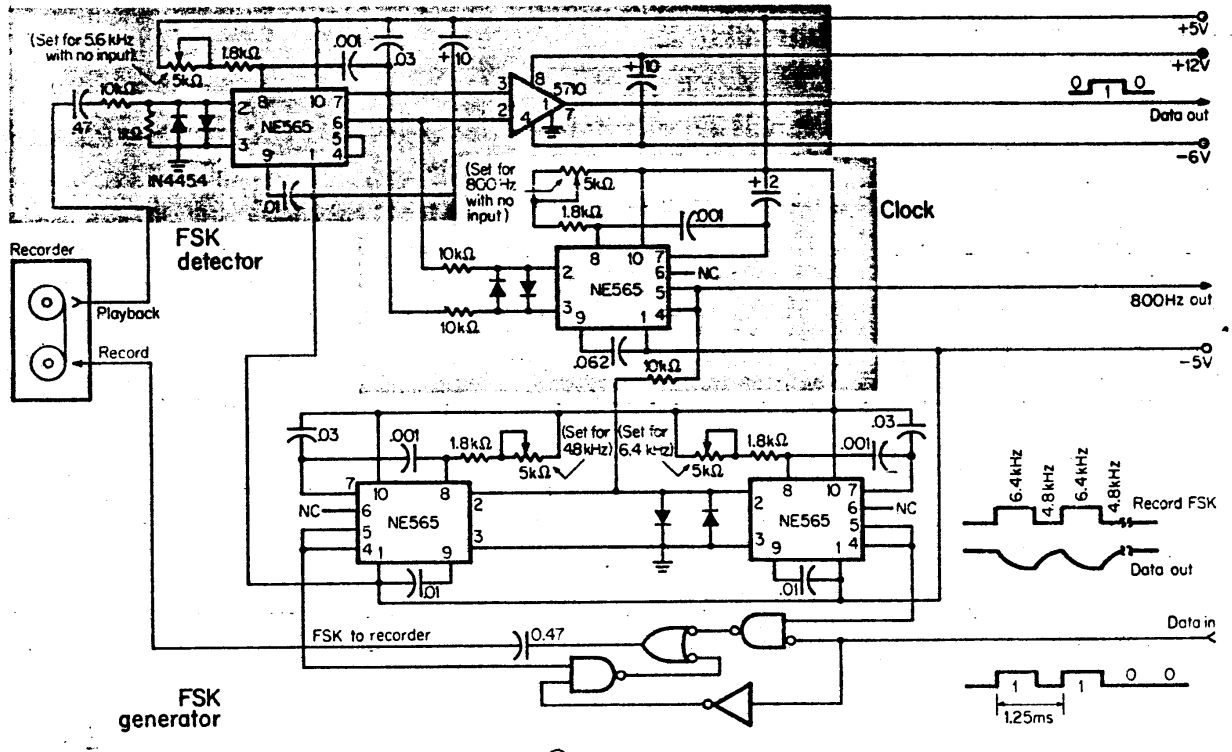
The system runs at 800 Hz. When the data pulses are extracted from the recorded data, the clock is synchronized to the data. The clock will stay in sync with up to seven successive *0*'s. You can meet this condition by using odd parity so one bit out of eight is always a *1*.

The FSK generator consists of two oscillators locked to the 800-Hz system clock, but oscillating at 6.4 kHz and 4.8 kHz. The incoming data to be recorded selects either oscillator as the frequency to be recorded. The high-frequency rolloff characteristic of the recorder automatically takes care of harmonic suppression of the square-wave output.

For more information on Signetics' phase-locked loops, write Signetics Corp., 811 E. Arques Ave., Sunnyvale, Calif. 94086.

***Circle Reader Service #212***

(Editor's note: this idea is credited to Daniel Chin, Burlington, Mass. and is used courtesy of Signetics Corp.)



# Storing computer data with a cassette recorder

Page 40

[illegible] Bernardi
[illegible] Mass.

Two simple interface circuits permit data from a teletypewriter to be recorded and played back on a portable cassette tape recorder. This means that a conventional tape recorder can be employed as a compact

typewriter operating as the only input/output equipment. And remember that a single 120-minute cassette will hold as much information as 600 feet of paper tape.

Teletypewriter data is transmitted at the rate of 10 characters per second (110 bits per second), a frequency that is far too low for most audio recorders. Therefore, the data is converted to tone bursts at a frequency the recorder can use. On playback, the tone bursts are detected, and the original data format is reconstructed.

The teletypewriter-to-recorder interface circuit (a) can be driven either directly by the teletypewriter output or by the circuitry that drives the teletypewriter.

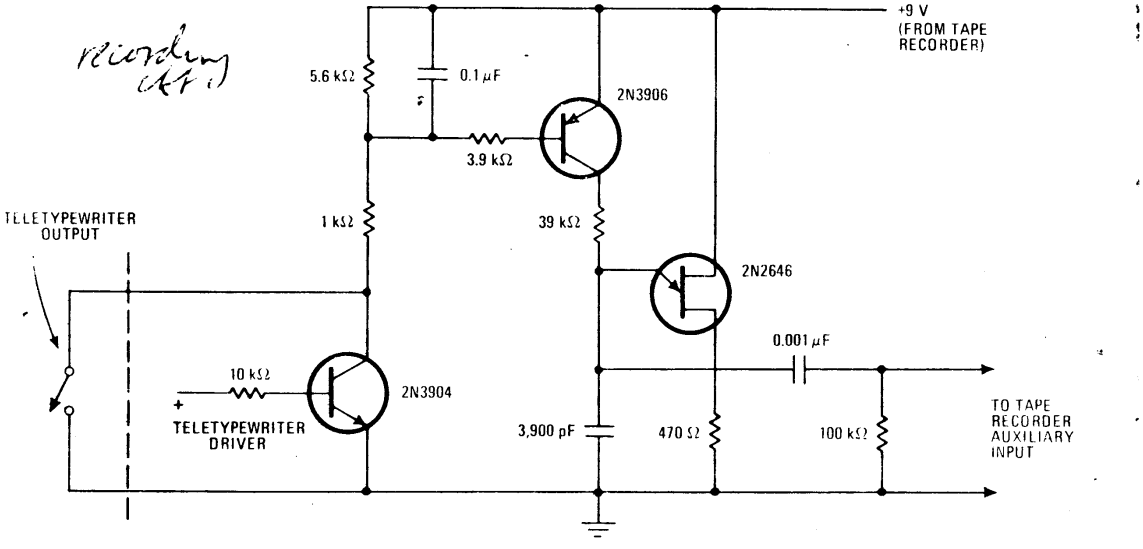
The output of a teletypewriter resembles the opening and closing of a switch. In the interface circuit, this switching waveform is first filtered slightly to remove bounce, and then it is used to gate a unijunction oscillator. If a teletypewriter driver is used instead as the input device, its drive current is fed to the base of a transistor that simulates the teletypewriter's switching action.

The circuit's output is a sawtooth waveform having a frequency of 6 kilohertz. It is applied to the recorder's auxiliary input (high-impedance low-sensitivity input). If the recorder does not have this input, it can be simulated by placing a 470-kilohm resistor in series with the microphone input.

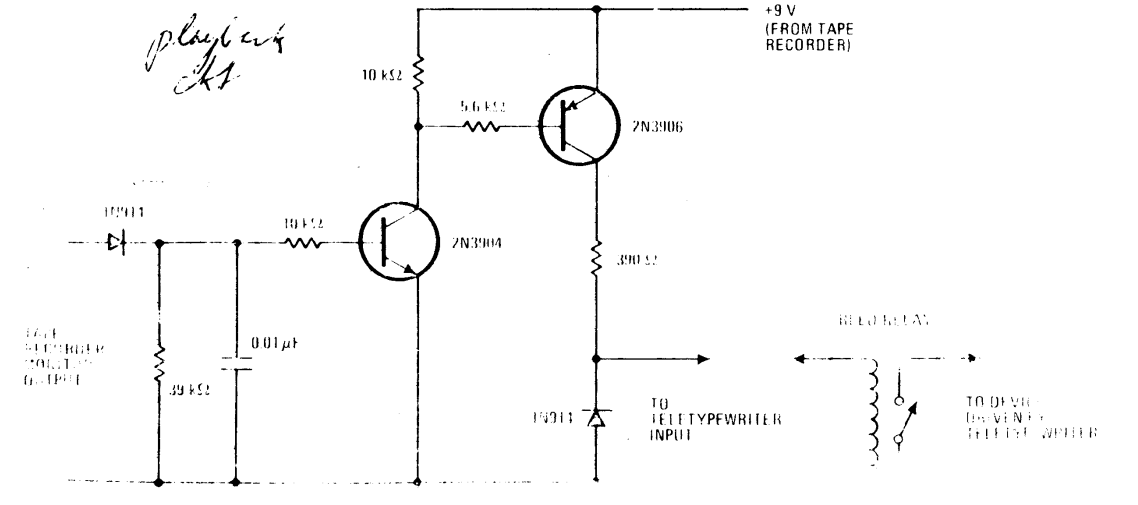
The recorder-to-teletypewriter interface circuit (b) detects the recorder's output, and then rectifies and filters it so that a positive voltage is developed whenever a tone is present. A bleeder resistor is placed across the recorder output lines to produce the proper decay when the tone is removed. This decay voltage is then used to turn on a two-transistor driver that operates the teletypewriter. The output of this detector circuit can also be used to drive a reed relay to produce switch closures like those of a standard teletypewriter output.

It should also be noted that both interface circuits run off of a 9-volt supply, which can often be taken from the recorder's battery pack. □

recording (a)




playback (b)



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# Simple f.m. modulator/ demodulator for a magnetic tape recorder

by B. D. Jordan
*Institute for Advanced Studies, Dublin*

**This unit offers an extension of the facilities of a domestic tape recorder to permit its use as an intrumentation recorder employing f.m. principles. The design involves no modification of the tape recorder and thus allows a wide field of application with various makes and types of machines.**

Magnetic tape as a medium for recording v.l.f. signals or signal levels, suffers at least two serious limitations when using direct recording methods. First, the frequency response rarely extends below about 50Hz and, second, amplitude instability occurs, caused mainly by surface inhomogenieties in the tape. For the purposes of handling analogue data, where the d.c. component of the signal must be preserved, it is necessary to incorporate some form of signal modulation into the recording process. Most of the commercially available instrumentation tape recorders employ f.m. modulation and many of these have specifications that include a frequency response of d.c. to 2MHz as well as a great many other facilities that may not be required.

The instrument described was designed to provide a tape recorder with f.m. modulation giving a frequency response of d.c.–800Hz for recording v.l.f. phenomena and utilizing a domestic recorder at a tape speed of 9.1cm/sec. At this tape speed the tape recorder has a frequency response of about 50Hz–6.0kHz. The carrier frequency was chosen to lie in the midband region, i.e. 3kHz so that amplitude variations in the tape recorder output would not be excessive within the expected range of frequencies to be handled. In order to minimize the effect of wow and flutter due to the transport system, a reasonably large depth of modulation is desirable. A frequency deviation of about $\pm 30\%$ of the carrier was found to be satisfactory.

An integrated phase locked loop, Signetics type NE565, was used as both modulator and demodulator. Fig. 1 illustrates the principle of the phase locked loop. An f.m. signal, $f_s$, is fed to a phase comparator whose reference is the output of a voltage controlled oscillator, $f_o$. The phase comparator is a balanced multiplier which produces the sum, $(f_s+f_o)$ and difference $(f_s-f_o)$ frequencies of the input f.m. signal and the voltage controlled oscillator output. When the loop is in lock, the v.c.o. duplicates the input frequencies so that $f_s - f_o = 0$, and the output of the phase comparator contains a d.c. component which is proportional to the phase difference between the input signal and the v.c.o. output. A low pass filter removes the sum frequency component and the remaining d.c. voltage is amplified and used to control the v.c.o. frequency in such a manner as to maintain $f_s = f_o$. It is this controlling or error voltage which constitutes the demodulated signal.

## The modulator

One of the outstanding features of the NE 565 is the high linearity and wide dynamic range of the v.c.o. These characteristics make the device particularly attractive as a modulator. For this purpose the loop can be opened by disconnecting the v.c.o. output from the phase comparator reference input. The modulating signal can then be applied directly to the v.c.o. input, or if required, advantage can be taken of the high gain d.c. amplifier, by applying the modulating signal to the signal input of the phase comparator. The reference input should be returned to earth in this mode of operation. The low pass filter can be omitted by disconnecting $C_2$.

The Fig. 2 shows the complete circuit. The v.c.o. is a relaxation type of oscillator the free running frequency, $f_o$ being determined by the external capacitor, $C_1$, and the charging current controlled by $R_1$. The frequency $f_o$ can be calculated from the expression

$$\frac{1}{4R_1C_1}$$

$C_1$ can be any value, but $R_1$ has an optimum value of about 4kΩ so as to maintain minimum linearity error. So for our system, with $f_o$ = 3kHz, $C_1$ = .021μF. The conversion factor $K$ for the v.c.o. is given by

$$K = \frac{50f_o}{V_{cc}} \text{ radians/sec/volt}$$

In our case $f_o$ = 3kHz and $V_{cc}$ = 6V. $K$ = 2kHz per volt. Therefore in order to limit the depth of modulation to ±30% (±900Hz maximum frequency deviation), the control voltage at the v.c.o. input must not exceed 0.9V peak to peak. The gain of the d.c. amplifier can be varied by means of the feedback resistor $R_2$. Thus the depth of modulation can be fixed for a given input by means of $R_2$.

## Demodulator

In this mode of operation the phase locked loop is closed by reconnecting the v.c.o. output to the phase comparator reference input. The low pass filter is formed by connecting $C_2$ between pin 7 and the power rail.

The capture range, $f_c$ of the p.l.l. (i.e. that range of frequencies about $f_o$ over which the loop can acquire lock) is given by

$$f_c = \frac{1}{\pi}\sqrt{\frac{32\pi f_o}{\tau V_{cc}}}$$

$\tau$ is the time constant of the l.p. filter formed by $C_2$ and an internal resistance of 3.6kΩ. The tracking range $f_t$ of the p.l.l. is that range of frequencies about $f_o$ over which the v.c.o. once having acquired lock, will maintain lock with the input signal and is given by

$$f_t = \frac{8f_o}{V_{cc}}$$

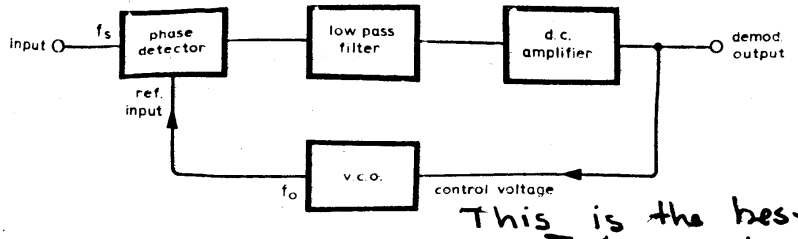


*Fig. 1. Block diagram of the phase lock loop.*

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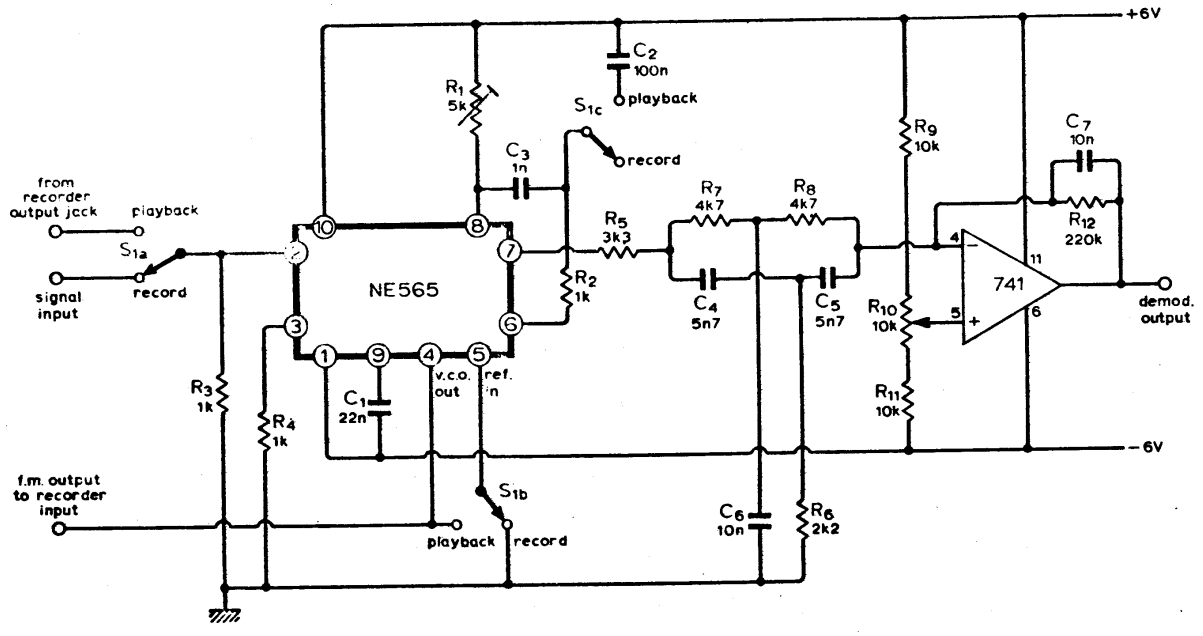



*Fig. 2. The complete modulator/demodulator circuit.*

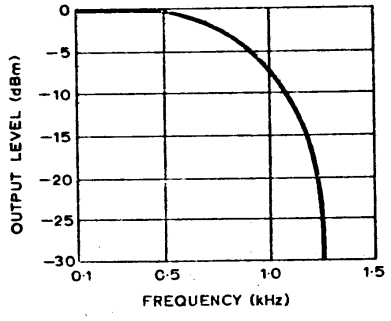



*Fig. 3. The system frequency response.*

To eliminate the residual unwanted sum frequency component present in the demodulated output, a balanced *T* filter is incorporated in the output. This was found to be most effective when tuned to $2f_o$. This is followed by a low pass active filter which has a cut-off frequency at 800Hz. Because the demodulator of the p.l.l. output is referenced to the positive power rail there is always a standing d.c. potential of about 0.125 $V_{cc}$ below the positive power rail. This can be cancelled out by means of the level shifting facility incorporated in the active filter.

## Performance and testing

The system was tested using an Akai Model XV tape-recorder at a tape speed of 9.1cm/sec and a carrier frequency of 3kHz. Fig. 3 shows the frequency response of the system. This test was made by recording an f.m. signal produced by applying tones of 5mV peak to peak from 1.0Hz to 1.5kHz to the input. This recording was then played back and the demodulated signals were measured with an oscilloscope. A d.c. test was made by applying d.c. levels from −5mV to +5mV to the input. On playback the linearity error of the reproduced levels was less than 0.5%.

A two-channel system was constructed on a printed circuit board and mounted together with power supply in an instrument case measuring 10×7×6in. No special layout precautions were found to be necessary. The system was incorporated in a 2-channel d.c. photometer.

TITUS LABS
P. O. BOX 242
BLACKSBURG, VA. 24060

TECHNICAL REPORT # 67

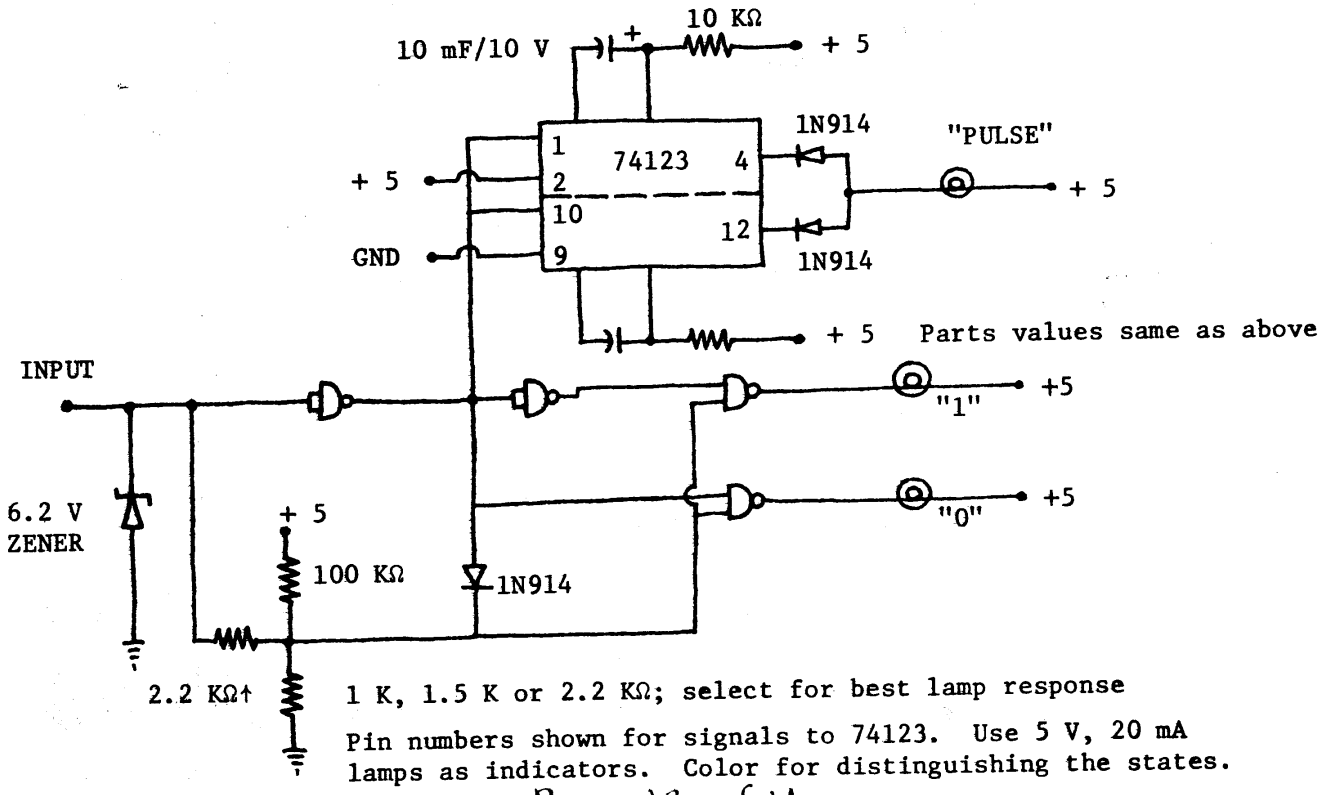
## LOGIC PROBE

This is an extremely simple probe which will detect extremely short pulses, logic levels, and open circuits for standard TTL and DTL circuits.

The first two NAND gates, A and B, buffer the input signal and then drive the following two NAND gates which then indicate the logic level present by lighting the correct output lamp. The first input NAND gate also drives two monostable circuits (74123), one of which is set to trigger on a positive-going edge and the other is set to trigger on a negative-going edge. The Q outputs of the monostables are ANDed with two diodes which are then connected to a lamp. When either of the Q outputs go to 0, indicating that the monostable has been triggered, the lamp lights indicating a logic level transition.

The resistor and diode input network will disable the lamp driver NAND gates when no definite input is present at the probe tip. When all the lamps are off it indicates an open circuit at the probe. This makes the probe very useful for detecting open input pins on integrated circuit packages. Open output pins will give a definite logic level. The red and the clear lamps indicate the logic level present at the input. The flashing of the green lamp will indicate a logic level transition. The monostables are now set for about a 10 to 25 millisecond pulse.

LOGIC PROBE




1 K, 1.5 K or 2.2 KΩ; select for best lamp response

Pin numbers shown for signals to 74123. Use 5 V, 20 mA lamps as indicators. Color for distinguishing the states.

TECHNICAL REPORT # 68

TITUS LABS
P. O. BOX 242
BLACKSBURG, VA. 24060

## LOGIC PULSER PROBE

The Logic Pulser Probe shown in the schematic is an extremely useful tool for anyone testing and designing digital logic circuits. It will provide both a logic 1 and a logic 0 pulse to DTL and TTL type circuits from a normally high impedance state. It is no longer necessary to determine what type of a pulse is needed at a circuit node since the probe will provide a pulse of the opposite logic level. Most probes do not have this feature.

The bounceless switch configuration triggers both of the monostables (74123), but the period of monostable A is twice as long as that of monostable B. A enables the NAND gate and B then strobes each, which then turn on the output transistors in sequence. This causes the probe to go from the normal high impedance or off state to a logic 1 followed by a logic 0 and finally a return to the off state. The off state does not affect the logic circuits under test.

Pulse widths are easily changed by changing the values of the resistor-capacitor network for each monostable. It is best to keep the pulses short and the period of A should be twice that of B to give equal times to both logic level pulses. The 33 ohm resistor may be added for current limiting if needed and the complete circuit may be constructed to fit into a small pocket-sized flashlight case.

LOGIC PULSER PROBE