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A MONTHLY NEWSLETTER FOR BROADCASTERS

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LABORATORY TEST REPORT ON

Test and Evaluation of Various Phonograph Cartridges

INTRODUCTION

At your request, we have measured the performance and evaluated groups of phonograph cartridges in various price categories. All of the cartridges are intended for professional use (e.g., in broadcast or recording studio applications) and were therefore judged somewhat differently from the manner in which we would evaluate phono cartridges intended for home high fidelity system use. Specifically, the relatively higher tracking forces recommended (and at which these cartridges were tested) is not regarded as a negative feature of the cartridges, but is necessary in view of the heavy duty use of such pickups.

The cartridges were divided into three basic groups. Group I consisted of an Audio-Technica Model ATP-1, a Stanton Model 500AL, a Shure Bros. Model M44-7 and a Shure Bros. Model M44C. Group II consisted of an Audio-Technica Model ATP-2, a Stanton Model 600A and a Shure Bros. Model SC35C. Group III consisted of an Audio-Technica Model ATP-3 and a Stanton Model 681SE.

TESTS AND METHODOLOGY

The most fundamental of all tests concerning a phono cartridge is its frequency response or, more properly, its amplitude versus frequency characteristic. All response measurements were made using a CBS Technology Center Test Record, #STR-130, which contains both spot frequencies and continuous frequency sweeps, and which has been recorded with the inverse of the RIAA playback curve so that, with cartridge output singnals fed to a correctly equalized phono preamplifer, a "perfect" phono cartridge would deliver flat response over the entire audio range.

All of the cartridges tested are of the moving magnet or moving iron type (as opposed to moving coil) and therefore require specific load impedances if they are to yield "flat" response. In all cases, we loaded the cartridges with 47,000 ohm resistances, and with that value of capacitance which yielded the flattest overall response. This seemed to be a fair approach, since the range of loading capacitances required for the various cartridges was very wide (up to 500 pF for some Shure Bros. models and as little as 275 for some of the Stanton models). Frequency response curves are presented as part of the report for each of the cartridge groups. We have also ranked the overall response of the cartridges within each test group. Frequency response rankings, as well as all of the other performance characteristics measured, are summarized in comparisons of performance of the cartridges within each test group.

Lateral and vertical IM distrotion measurements for each cartridge were made using a CBS Technology Center test record #STR-112. This same test disc was used to test each cartridge for square wave reproduction. A photocopy of the information contained on the jacket of this disc is included in this report as Appendix A, and should be read for a complete understanding of the meaning of the IM and square wave tests.

Trackability, a term originated by Shure Brothers, describes the ability of a given cartridge/stylus combination to properly trace or track heavily recorded passages in a recording. Shure Bros. has prepared a test disc which allows us to test for trackability in terms of stylus velocity (centimeters per second) at high, medium and low frequencies. This disc bears the catalog number TTR-103. Information regarding the contents of this disc and how it is used to determine trackability is contained in Appendix B, a photocopy of the user's manual which is included with the test disc. An alternate disc was also used to obtain a somewhat different measure of trackability, in which the ability of the cartridge to track a progressively louder lateral and vertical signal is expressed in decibels (dB).

Channel balance and nominal cartridge output levels were measured for each cartridge using Shure Brothers test record TTR-107 which contains separate left and right channel bands, each recorded at a velocity of 5 centimeters per second, at a frequency of 1 kHz. Cross-talk levels, expressed in dB, were also determined using this disc.

The durability ranking which we have applied to cartridges within each test group is based upon a subjective evaluation of the way in which each cartridge is constructed and the ruggedness of the stylus assembly of each of the cartridges. To be sure, all of the cartridges tested were designed for professional, rather than for home use and are therefore more ruggedly built than are the more delicate cartridge types intended for lightweight tracking forces and for installation in low mass arms. Nevertheless, in our view, certain of the cartridges tested seemed capable of withstanding more physical abuse than others, and we have ranked the

cont. to pg. 3

Editor's Notebook

Here we are in a new year already and I still haven't sent out my Christmas Cards Screamer.

Have you ordered you NRSC updates yet? Everybody seems to be getting on the bandwagon and I think it's a real good thing for A.M. Radio which has become the stepchild in recent years.

Dave Metz is back with a new series this issue on Building a "Cart Machine" of all things.

We're hoping that 1988 brings you a prosperous new year.

Bob Stobel C.P. Editor

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NEWS RELEASE

25Hz Tone Processor Changes Hands

Zercom Corporation of Merrifield, Minnesota has purchased the rights to manufacture and sell the M.W. Persons 25Hz Tone Processor. In announcing it, Zercom President Jeff Zernov said he was pleased to add the Tone Processor to the company's line of successful boardcast products. M.W. Persons will continue to market the Programmer 3A Live Assist Controller.

Zercom, a quality electroncis manufacturer, broke into broadcast equipment in 1981 with the purchase of the famous Maxi-Tel remote broadcast console. Since then, the product has evolved into the Max-Z and Max-ZII. Other products recently introduced include the Gain Box and Zercom's inexpensive Telephone Hybrid.

The new Zercom 25Hz Tone Processor is available in the standard unbalanced audio version at $390.00 or with active balanced inputs and outputs at $460.00. The Tone Processor was originally intended as an automation interface for reel to reel music playback decks that do not contain 25 Hz switching tone detectors and filters. The Processor is also being used on satellite networks for station signaling.

For further information contact Jeff Zernov at 218-765-3151 or Mark Persons at 218-829-1326.

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(cont'd from pg. 1)

test cartridges in each group accordingly.

TEST RESULTS-- GROUP I CARTRIDGES

The Audio-Technica ATP-1 ranked first in smoothness of frequency response characteristics. Though there was some attenuation at high frequencies for this cartridge, it exhibited virtually no severe resonant peaks such as the ones plotted for the Shure Bros. M44C, M44-7 and the Stanton 500AL. While the resonance peaks in these cartridges might well have been attenuated by different load impedances, such correction would have also resulted in severe dips in the response at frequencies just below ronance.

At all but the highest levels of recording (+18 dB), the Audio-Technica ATP-1 exhibited the lowest levels of lateral and vertical IM distortion. For example, at a +15 dB level, lateral in for the ATP-1 measured 3.0% as against 6.6% for the Stanton 500AL, 7.0% for the Shure M44-7 and 6.0% for the Shure M44C. The ATP-1 was best of the group in terms of high frequency trackability (30 cm/sec), while at mid and low frequencies, the Stanton 500AL measured best (31.5 and 30 cm/sec respectively) over-all, while the Shure M44C did best at mid frequencies only (40 cm/sec).

At mid frequencies, the Audio-Technica ATP-1 exhibited the best channel separation (crosstalk); 28.9 dB, as opposed to 27.9 dB for the Shure M44-7, 25.4 for the Shure M44C and 23.5 dB for the Stanton 500AL. The Audio-Tehnica ATP-1 ranked first in square wave response capability, with least evidence of overshoot and ringing. As for overall durability, we ranked both the Shure M44C and the Audio-Technica ATP-1 in first place, followed by the Stanton 500AL (third place) and the Shure M44-7 (fourth place).

We would rate the Audio-Technica ATP-1 as the best of this group in overall performance and durability, with the Stanton 500AL and the Shure M44C equally ranked for second place.

TEST RESULTS-- GROUP II CARTRIDGES

In this group of cartridges, consisting of an Audio-Technica ATP-2, a Stanton 600A and a Shrue Bros. SC35C, the Audio-Technica Model ATP-2 was rated as having the smoothest frequency response, with the Shure Model SC35C equally ranked, and the Stanton 600A taking third place in this important specification. The Stanton 600A exhibited lower IM distortion levels, both in lateral and vertical modulation tests, with the Audio-Technica ATP-2 ranked second and the Shure unit ranked third. The Audio-Technica ATP-2 ranked highest with respect to high frequency, mid frequency and low frequency trackability. The Shure SC35C ranked second in high frequency trackability, while both the Shure and the Stanton models were identical in mid and low frequency trackability (25 cm/sec at mid frequencies as against 31.5 cm/sec for the Audio-Technica ATP-2, and 19 cm/sec at low frequencies as against 24 cm/sec for the ATP-2).

The Shure SC35C exhibited the best channel balance for this group (0.3 dB difference between channels), followed by the Stanton 600A (0.5 dB) and the Audio-Technica ATP-2 (0.8 dB). The Audio-Technica ATP-2 exhibited the best channel separation (26.1 dB at mid frequencies) compared with 23.9 dB for the Stanton 600A and 20.6 dB for the Shure SC35C.

Best square wave response for this group was exhibited by the Stanton 600A, followed by the Audio-Technica ATP-2 and the Shure SC35C in that order. We rated the ATP-2 and the Stanton 600A as being equal in terms of durability and ruggedness, with the Shure SC35C ranked somewhat lower in this respect.

We would rank the Audio-Technica and the Stanton models as being approximately equal, on an overall basis, since the higher trackability of the ATP-2 is offset by the lower IM distortion of the Stanton 600A.

TEST RESULTS-- GROUP III CARTRIDGES

This group of cartridges included an Audio-Technica ATP-3 and a Stanton 681SE. The Audio-Technica ATP-3 proved to have a somewhat smooth response although both samples exhibited excellent overal response.

The Stanton 681SE proved to have the lower IM distortion, for both lateral and vertical IM tests. While the Audio-Technia sample was poorer in trackability at high frequencies, it equalled the Stanton 681SE in mid and low frequency trackability. In terms of channel balance the Audio-Technica cartridge ranked first (0.5 dB for the ATP-3 and 1.0 dB for the Stanton 681SE), and first in channel separation; the Audio-Technica ATP-3 had a separation of 27.0 dB at 1 kHz, while the Stanton 681SE had a separation of 26.2 dB.

The Audio-Technica ATP-3 delivered the most accurate square wave, followed by the Stanton 681SE. As for durability, we would rank the ATP-3 and the Stanton 681SE equally. On the basis of performance alone, the ATP-3 is the winner in this group.

*****

Senate Kills Transfer Tax in Response to NAB Grassroots

In decisive victory for broadcasters, the U.S. Senate Thursday night defeated industry-opposed tax on broadcast station transfers 66-28, after fairness doctrine codification had been dropped from proposal by transfer tax author Sen. Ernest Hollings (D-SC). Key floor vote followed debate against transfer tax by: Sen. John Danforth (R-MO); Finance Committee Chairman Lloyd Bentsen (D-TX); Sen. Bob Packwood (R-OR); Sen. Pete Domenici (R-NM), ranking minority member of Budget Committee, and others. Key arguments against transfer "fee" included the inappropriate manner in which proposal was introduced by Commerce Committee Chairman Hollings, without hearings, and after committee's own deadline for mark-ups.

Floor vote was remarkably close to estimate made by NAB lobbyists Thursday morning. Industry victory followed several weeks of one of the most intense, multi-faceted and unified NAB broadcaster lobby campaigns in the industry's history. Hollings' station transfer "fee" (clearly viewed as a "tax" by broadcasters and most lawmakers) sought to impose minimum of 2% tax on a station transfer, with additional 2% for stations changing hands in under three years, and additional 1% tax if a station was found to have "violated" fairness doctrine, which original proposal would have "violated" fairness doctrine, which original proposal would have codified. (Fairness codification is still pending in House-passed Continuing Resolution.)

After two years, revenue raised by tax was to be earmarked for public broadcasting. NAB, which has long advocated long-range funding for public colleagues, said such a method of funding at the expense of commercial broadcasters was ill-advised; better funding methods should be pursued, NAB said, with full hearings in next session of Congress.

Jules Cohen to Receive NAB Engineering Award

WASHINGTON, Dec. 11--The National Association of Broadcasters' Engineering Conference Committee has selected Jules Cohen, president, Jules Cohen & Associates, Washington, DC, to receive NAB's Engineering Achievement Award. Cohen will receive the award at the Saturday, April 9, engineering luncheon during NAB's annual convention April 9 - 12 at the Las Vegas Convention Center.

Committee Chairman T. Arthur Bone, vice president, engineering, Knight-Ridder Broadcasting, Inc., East Providence, RI, said, "Jules is considered an engineer's engineer and is held is high regard throughout the broadcast industry. This award honors him for a tremendous number of contributions over a forty-year career."

Following his release from the Navy, Cohen entered the field of consulting engineering and has been in that profession for 42 years. During 35 of those years, he has been either sole principal, a partner, or an officer in a consulting engineering firm. His work has included propagation studies, interference design and adjustment, satellite earth station studies, the planning and placement of communications structures, radio and TV studio and transmitter plant layouts, and extensive work involving the engineering aspects in Federal Communications Commission rules.

He was the author of Appendix C of the Cable Television Advisory Committee Panel II report to the Commission. The report dealt with the problem of echoes in television systems. As chairman of the engineering committee concerned with interference to TV broadcasting from noncommercial FM stations, he played a major role in the development of the rules adopted by the FCC governing the assignment of FM stations in the frequency band from 88.1 to 91.9 MHz.

He represented television broadcast interests as co-chairman of the Technical Analysis Working Group of the Land Mobile Radio/UHF Television Technical Advisory Committee. He represented radio broadcast interests in fighting the 1979 proposals to reduce AM channel spacing to 9 kHz. During the past ten years, he has worked extensively in the field of nonionizing radiation effects.

Cohen has a B.S. degree in electrical engineering from the University of Washington, Seattle. He is a member of Tau Peta Pi, the engineering scholastic honorary; the National Society of Professional Engineering; the Institute of Electrical and Electronic Engineers; the Society of Motion Picture and Television Engineers; the Bioelectromagnetics Society; the Electromagnetic Energy Policy Alliance, and is a past president of the Association of Federal Communications Consulting Engineers.

NAB serves a membership of more than 5,000 radio and 940 television stations, including all the major networks.

*****

NRSC Stations...From Indiana, (Pennsylvania) to Elkhart, (Indiana)

NAB salutes these AM stations that have recently adopted the new NRSC Standard:

KOTZ, Kotzebue, AK; KAMJ, Phoenix; KSFO, San Francisco; KTIM, San Rafael, CA; KFIY, Tulare, CA; KLMR, Lamar, CO; WBGC, Chipley, FL; WFAM, Augusta, GA; WLSQ, Dalton, GA; WMAY & WCVS, Springfield, IL; WTRC, Elkhart, IN; KWLO, Waterloo, IA; WTAG, Worcester, MA; WHMI, Howell, MI; WLRC, Walnut, MS; KTTT, Columbus, NE; KCBN & KPLY, Reno, NV; WGIR, Manchester, NH; WCTC, New Brunswick, NJ; WKYK, Burnsville, NC; WKGX, Lenoir, NC; WNNC, Newton, NC; KNDC, Hettinger, ND; KCCS, Salem, Or; WCCS, Indiana, PA; WLBR, Lebanon, PA; WIEZ, Lewistown, PA; WRSC, State College, PA; WILK, Wilkes-Barre, PA; WWAZ, Providence, RI; WGOW, Chattanooga, TN; KQRO, Cuero, TX; KQSA, San Angelo, TX; WJOY, Burlington, VT; WKZN, Crozet, VA; WTAR, Norfolk, VA; WVWI, St. Thomas, VI; KELA, Centralia, WA; WWVA, Wheeling, WV.

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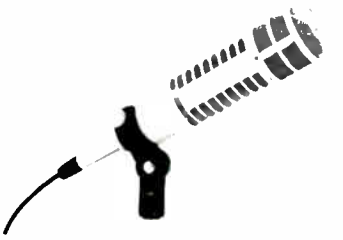

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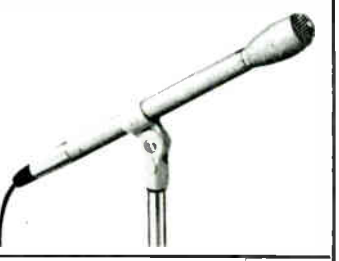

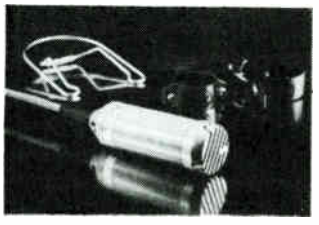

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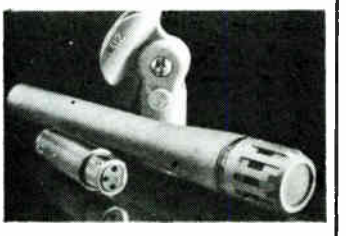

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Gentner
Russco
Symetrix
Telex
Tellabs
Zercom

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B & K
Coaxial Dynamics
Digi-Max
Electro Impulse
Fidelipac
Fluke
Potomac
Sennheiser
Simpson
Tektronix
Xedit

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Audio Technica
Broadcast Electronics
LPB
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Technics

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2	NS-2000 Heads	20.20
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1	NS-2051 Heads	22.73
2	NS-2056 Heads	22.58
1	NS-3201 Heads	14.58
1	NS-3202 Heads	14.58
1	NS-3251 Heads	18.50
2	NS-5230A Heads	5.68
2	NS-5410 Heads	39.60
2	NS-5411D Heads	39.60
1	NS-5703 Heads	42.40
1	NS-5751 Heads	45.33
1	NS-5751D Heads	45.33
1	NS-5753 Heads	45.33
2	NS-5800 Heads	4.80
2	NS-6103 Heads	29.78
1	NS-6127 Heads	21.38
3	NS-7605 Heads	1.40
1	NS-7655 Heads	5.40
1	NS-8102	21.75
2	NS-8206 Heads	46.65
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2	NS-9207 Heads	34.25
1	NS-9213 Heads	34.25
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1	NS-9223 Heads	33.88
1	NS-9226 Heads	33.88
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4	NS-TC-54 Clips	6.58
2	NS-TC-191 Clips	13.23
1	NS-QK-18 Mounting Assy	1.33
1	NS-QK-19 Mounting Assy	1.33
1	NS-QK-38 Mounting Assy	1.15
1	NS-QK-66 Mounting Assy	1.15
5	NS-QK-74 Mounting Assy	2.38
2	NS-QK-79 Mounting Assy	1.85
4	NS-QK-93 Mounting Assy	1.85
4	NS-QK-94 Mounting Assy	7.20
6	NS-QK-95 Mounting Assy	3.48
15	NS-QK-102 Mounting Assy	3.73
1	NS-QM-102 Head Cleaner	3.30
3	NS-AT-210 Alignment Tape	3.87
2	NS-QK-701 Bias Oscillator	30.98
1	NS-QM-380 Head Degausser	10.15

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QTY	DESCRIPTION	PRICE
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2	SJ-35J0001 Knob	.38
2	SJ-37J0001 Control	.38
6	SJ-58J0002 Octal Socket	1.11
2	SJ-66J0092B Transformer	34.71
2	SJ-C-2 Compressor	22.75
1	SJ-HP-1 High Pass Filter	18.80
4	SJ-IL-7 Transformer	16.50
2	SJ-LA-4 Line Amp	42.50
1	SJ-LP-1 Low pass Filter	19.33
4	SJ-MIC-4 Microphone	20.92
1	SJ-MIC-5 Microphone	20.00
1	SJ-MLD-1 Mic Line Driver	64.50
1	SJ-NAB-2 Tape Pre-Amp	16.50
1	SJ-NAB-3 Tape Pre-Amp	16.50
1	SJ-PA-2 Power Amp	37.00
2	SJ-PA-3 Power Amp	41.75
3	SJ-PH-2 Magnetic Phono Pre-Amp	16.50
2	SJ-PS-1 Power Supply	28.09
2	SJ-SA-2 Pre-Amp	16.50
2	SJ-SF-1 Shelving Filter	16.50
2	SJ-SWO-2 Oscillator	22.88
4	SJ-TC-2 Tone Control	11.67
6	SJ-MI-8 Audio Transformer	13.00
3	SJ-MI-22 Audio Transformer	13.00
2	SJ-MI-53 Audio Transformer	9.75
1	SJ-MI-59 Audio Transformer	4.67
6	SJ-MI-69 Audio Transformer	12.25
2	SJ-MI-71 Audio Transformer	9.90
1	SJ-MI-75 Audio Transformer	12.25
2	SJ-MI-76 Audio Transformer	12.25
5	SJ-MI-82 Audio Transformer	15.37
1	SJ-MI-93 Audio Transformer	12.25
1	SJ-MI-94 Audio Transformer	12.25
6	SJ-MI-112 Audio Transformer	12.25
1	SJ-RP-3 Audio Transformer	20.00

ATARI PARTS INVENTORY CLOSE—OUT

QTY	DESCRIPTION	PRICE
1	AF-CO18124 Flex circuit	1.57
1	AF-CO14106 Hole cove label	.25
1	AF-CO12985 Heatsink name plate	1.36
1	AF-CO14170 Latch spring	.25
1	AF-CO14843 Inner shield	.41
1	AF-CO12778 Rear Shield	1.63
1	AF-CO12991 Lens	N/A
1	AF-CO14704 Relay solid state	15.10
1	AF-FA100032 Load pad assy.	2.86
2	AF-CO18126 12-Key switch set	1.49
6	AF-CO20501 Fire button	.30
10	AF-CO14384 Inductor	.25
20	AF-CO17988 Diode IN 5391	.25
10	AF-CO14396 Cover	.75
5	AF-CO14397-01 Power switch	1.15
4	AF-CO14387 Interlock switch	1.60
4	AF-CO14398 diode rectifier	.50
3	AF-CO14715 Connector power jack	.89
2	AF-CO14718-01 Connector leader	1.28
6	AF-CO14777 diode led	.40
5	AF-CO14778-03 Socket	.54
3	AF-CO14808-01 diode	.40
5	AF-CO14808-05 diode	.40
6	AF-CO16010 Crystal	1.39
10	AF-CO16364 diode IN 5818	.91
8	AF-CO15999 capacistor	.50
200	AF-CO17294 Switch static strip	N/C
1	AF-CA012174 RF Modulator	4.03
2	AF-CO17951 IN NF 592	1.38
2	AF-CO17101 IC CM 2917	1.70
2	AF-CO15769 IC CM 347	1.81
1	AF-CO11465-01 IC 4069	.71
2	AF-CO14361 IC	.80
1	AF-CO17950 IC 4052	.75
2	AF-CO14341 IC	.50
3	AF-CO19156 IC	3.75
7	AF-CO18081 IC 4816	4.91
100	AF-CA018263 diode wrap assy.	N/C
5	AF-CO17956 Voltage reg.	.75
5	AF-FC 1000 21 Transistor B857	.75
10	AF-FC 1000 22 Transister D467	.80
10	AF-33-2N3906 Transister	.25
10	AF-34-2N3563 Transister	.25
4	AF-34-2N3904 Transister	.25
1	AF-CO14105 Panel label cover	.75
4	AF-CO14809 Transister	.40
16	AF-CO10394 Cap	24
8	AF-CO10388 Switch	.56
5	AF-CO10776 Dust Cover	.16
2	AF-CO12242 Channel select switch	.45
7	AF-CO10373 Slide switch	.50
2	AF-CO12776 Cable ribbon	2.23
15	AF-CO10813 Dust cover switch	.15
10	AF-CO10822 Inductor	.37
1	AF-CO10806 Connector	2.86
10	AF-CO10823 Indo Vailable	.35
9	AF-CO10820 Inductor	.25
19	AF-CO10821 Capacistor	.35

QTY	DESCRIPTION	PRICE
10	AF-CO12241 Channel Select Switch	.40
4	AF-CO21084 Boot	.49
5	AF-CO18128 Aux. Function Keys	.60
3	AF-CO10177 Crystal	1.09
3	AF-CO10174 IC IN3086	.60
1	AF-CO10444 IC	8.37
8	AF-CO10745 IC 6507	4.97
2	AF-CO10150 IC 6532	7.17
8	AF-CO10816 IC 4050	.50
4	AF-CO14377 IC	N/A
1	AF-CO12099 IC	5.80
3	AF-CO12294 IC	11.09
1	AF-CO122960 IC	13.94
3	AF-CO12296 IC	6.70
2	AF-CO11299 IC	4.35
3	AF-CO12499 IC	5.29
2	AF-CO12399 IC	3.93
4	AF-CO12399 IC	3.93
4	AF-CA023019 Resister Kit	N/C
2	AF-CO14795 IC 6520	3.85
2	AF-C014377 IC 6502	7.40
3	AF-CO14599 IC	3.85
1	AF-CO14805 IC	11.26
4	AF-CO14362 IC 141532	.60
2	AF-CO14331 IC	.50
1	AF-CO14320 IC CM324	2.81
2	AF-CO14312 IC 740509	.60
2	AF-CO14344 IC 7465138	.90
1	AF-CO14349 Voltage Reg.	1.00
9	AF-CO14348 Voltage Reg.	.80
4	AF-CO14712 Voltage Reg.	1.00
1	AF-CO14336 IC 4051	1.00
2	AF-CA014851 Cable assy.	2.10
1	AF-FA100011 head assy.	4.80
2	AF-CA016741 PC Board joystick	.95
2	AF-FA100012 door assy.	1.00
6	AF-881004 Rubberfoot	.20
1	AF-FA100035 eject assy.	8.00
5	AF-FC100013 belt	.50
3	AF-FC100014 belt	.50
4	AF-FC100015 belt	.50
9	AF-79-5918 Connector jack	.25
5	AF-FC100018 Inductor	.25
2	AF-FC100019 Switch	.50
10	AF-21-101683 Cap	.25
4	AF-31-IN4001 diode	.25
20	AF-FC100016 cap	.25
8	AF-19-411504 Resistor	.15
7	AF-FC100260 button	.75
2	AF-CO10810 Y Control Cable	2.70
1	AF-CO10726 Cable	4.00
1	AF-CA017937 Power supply	3.17
1	AF-CA014155 Top cover assy.	33.32
1	AF-CA014807 PC board assy.	78.00
1	AF-CX521 5200 power supply	8.00
1	AF-antenna AF-CX261	N/A
9	AF-CO16353 9v Power supply	4.50
1	AF-CA016087 Printer ribbons	N/A

Data Broadcasting Break-Through

New York, Oct. 14--Tests over two New York City FM radio stations are establishing the feasibility of wide area data broadcasting to inexpensive receivers.

"Data transmission error rates are at least two orders of magnitude better than the standard for telephone lines," reports Eric Small, vice president of engineering for Modulation Sciences, Inc., the Brooklyn broadcast equipment firm conducting the tests.

Test data have been broadcast for about three weeks over a subcarrier of WBAI's and WPAT-FM's signals. The technique is commonly known in the broadcast industry as SCA (for Subsidiary Communications Authorizations). Regular FM listeners cannot hear the subcarrier or data transmission unless they have a special receiver. Transmission rates were 1200 to 4800 baud.

Key findings from the test are:

*Error rates have been better than one in ten million (10^7) as opposed to the telephone standard of one in one hundred thousand (10^5).

*Accurate reception extends 30 to 40 miles from the transmission antennas, which are located atop the Empire State Building and the World Trade Center.

*Simple indoor whip antennas appear satisfactory in many instances.)

*The analog signal-to-noise ratio (SNR), which is easily measured, reliably predicts digital error rate. This allows easy and accurate monitoring.

*The "gray area" between accurate and inaccurate reception is very small. (In technical terms, the knee of the error rate curve is sharp.) In other words, the data signal tends to be highly accurate or highly inaccurate, making it easy to tell the difference.

Modulation Science's test were encouraged by recent FCC deregulation of SCA. Both technical aspects and applications were affected. Prior to deregulation, SCA channels were generally used for background music and for talking books for the blind. SCA signals can now be sent to single users. Small believes that it will be economical for organizations which transmit large amounts of data mostly one way. He says that data flowing in the opposite direction can be economically transmitted by telephone if it does not exceed ten percent of the total flow.

Potentially, the method could result in two new channels per FM station. Up to 10,000 new channels "could replace telephone lines at less cost and with equal or better error rate," says Small.

Some FM data transmission took place previously, but employed telephone-type audio frequency shift techniques. This in turn required a good (greater than 20 dB) signal-to-noise ratio and a relatively expensive decoder. MSI's system apparently overcomes these obstacles. Their method shifts the frequency of the FM subcarrier directly. Also, usable SNRs as low as 12 dB have been feasible, and decoder parts are estimated to costs under ten dollars!

Final results and full details of the tests will be published after the tests are completed. Test equipment included a data version of Modulation Science's recently introduced Sidekick (TM) SCA generator. Prototype models of the Data Sidekick SCA system are available to the broadcasting and data processing industries. A trial system consists of a generator (including a data test generator), two receivers, and an error rate data indicator. The system costs about $5000.

*****

AM PROTECTOR–ENHANCER

NEW

Features

- Meets NRSC recommendations
- Can be used with existing station's limiter
- Front panel, switchable audio pre-emphasis circuit
  Built in 10 khz filter with attenuation consistent
- with NRSC specs
- 10 dbm head room
- Audio distortion less than 0.1%
- Switchable monitor de-emphasis circuit

Uses

The "AM Protector-Enhancer" permits the AM broadcaster to conform with the voluntary recommendations of the National Radio Systems Committee (NRSC).

The connection of this device in the program line of the station will enhance the quality of the audio by introducing pre-emphasis to the transmitting system. The built in low pass filter will substantially reduce the interference to adjacent channels.

This unit, with the pre-emphasis switched in, can be used with the station's existing limiter. If stations prefer to have pre-emphasis in their processing equipment, the AM Protector can still be used, but the pre-emphasis can be turned off.

The equipment also contains a switchable de-emphasis circuit which can be utilized with the station's monitor for analyzing station performance.

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MEMO FROM METZ

by
David L. Metz

"NEW GUTS FOR YOUR CART MACHINE" Part I

I swear that I have never seen any machine more needlessly complicated than a cart machine. The early vacuum tube ones are the worse. Stripping one can fill up your junk box to over flowing.

Some way or another, I've had two of these monsters from the early days of radio given to me. Both were stripped of all electrical components and then converted to solid state. The result has been two amazingly dependable good sounding machines.

I'm going to give you the circuits in pieces that you can piece together yourself for your own particular application. I'm going to start with the audio section so we can get rid of all those old hot tubes.

First look up last months issue of common point. We're going to use the universal balanced output stage of my skimmer in this design too. The heart of the audio section is the National LM-382. This IC has been around for a coon's age. Originally you found it in gutless wonder automobile eight tracks (remember those?).

I fell in love with this I.C. because it had two good low noise high gain amplifiers in it, good band width and used only one positive unregulated supply. External parts consisted of a few 10 MF capacitors. Maybe not the greatest magnetic tape preamp ever, but it's so simple and cheap, that who cares?

C1 & C5 are DC blocking capacitors, remember this thing operates off a single polarity supply so the output floats at half Vcc. C2 & C3 set the gain by bypassing a negative feedback network inside the IC. C4 tells the IC that it's a equalized NAB tape preamp. That's all there is to it.

Run the output through a 10K pot for a gain control and then through the op-amp output stage from last month and you're done. Need more gain? Increase the value of R2, the feed back resistor in the first op-amp.

What if you don't have a negative polarity power supply for the op-amps? You can use another old National IC. They designed this thing for kiddie record players I think. The LM-380 is a one watt audio output stage on a chip. It needs well bypassed regulated 9 to 12 volts to operate. Run its eight ohm output through a matching transformer to drive your line.

Can't find a 8 to 600 ohm transformer? Look around for any surplus transformer that runs from 4 to 15 ohms input with a 500 to 1,000 ohm output, it will work fine. And don't forget the center tap is one fourth the impedance of the total winding so you can use it to.

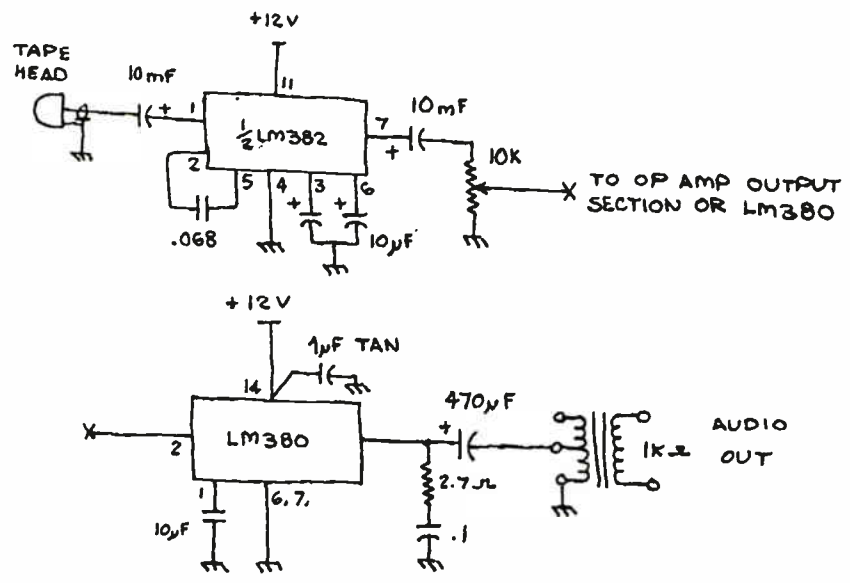
Both the LM-382 and the LM-380 pick up RFI. If you use them in a high RF environment, make sure they are well shielded. Bypass the outputs with coaxial capacitors. Most of the RFI problems come in the output leads!

You should mute the audio output when the cart isn't playing. I did this by switching the audio with the contacts on the cart machines solenoid relay.

Next month I'll use the other half of the LM-382 to build the cue tone detector circuit. After that, the control and switching section.

*****

AUDIO SECTION



'That's What Local Radio is All About'

Quote Worth Noting..."As a station owner and operator for the past six years, I feel that radio is more and more becoming an important communicator of ideas and news for my local community. That's what local radio is all about. And, after six years, the money seems to be coming my way, too. That's an indirect form of acknowledgement. I enjoy what I do; I put in 12-hour days and night meetings besides, but I enjoy what I do."

Fairness Doctrine Still Applies to Political Candidates

NAB MEMBER ADVISORY: FCC Fairness/Political Broadcasting chief Milt Gross told Federal Communications Bar Association earlier this month that FCC's August action eliminating fairness doctrine did not extend to coverage of political candidates. Doctrine still applies to news reports, news interviews and news programming regarding candidates, unless FCC rules otherwise. (Several weeks ago, FCC Chairman Dennis Patrick had written Congress stating that doctrine also still applies to coverage of non-candidate ballot issues.)

*****

EI Classifieds

EI Want Ads are free to the readers of Common Point Magazine. To place an ad, simply write it on the Acknowlegement Card that comes with each issue and mail card.

WANTED TO SELL

Tellabs 4425 Dual Repeat Coil Card, New, $44.00. Call E.I. 800-558-0222.

STL Azimuth & Level Set Test Cart, 12,500 Hz, NAB format, stereo, Audiopak A-2 cart, new, $15.00. Call E.I. 800-558-0222.

Bud RC-7758 casters, extra-heavy-duty type for Bud Series 60, 2000, and Concorde cabinet racks, ball bearing 3¼" wheels of hard tread composition, 200 lbs. load rating, 4-hole mtg. $6.00 each. Call E.I. 800-558-0222. (6 left).

Broadcast Electronics 5302 3-deck momo playback with cue tones, new, $3150 Call E.I. 800-558-0222.

75 KVA stand-by Generator, gasoline powered $5,000.00 Paul Zap, St. Marys College, St. Marys, Kansas (913) 437-2471.

Auditronics, 110 A. Console 14 in. 2 out 6 faders w/power supply & patch panel good condition (1 left)

Zerocom, MAXI-TEL remote board, excellent condition (1 left).

Motorola, T74 FM Mobile Transceiver, good condition (1 left).

Genave, GMT2400 Transceiver, good condition (1 left).

General Electric, Prog-line tranceivers, various condition (5 left).

CRL, Sep-400B Audio Processors, excellent condition (2 left).

DBX, 165 Compressor, excellent condition (2 left).

Valley People, DYNA-MITE Microphone processor, excellent condition (1 left).

CBS, Volumax audio processor, good condition (1 left).

CBS, Audimax audio processor, fair (mono) condition (1 left).

Collins, 26J-3 Compressors, good condition (2 left).

Harris, Critereon80Cart, excellent condition (1 left).

Gates, Critereon 80 playback cart decks (mono), good condition (2 left).

Wollensak, T1500 Tape Recorder, good condition (1 left).

Gates (B-7), Turntables, good condition (2 left).

Pioneer, CT-F505 Cassette-Deck, poor condition (1 left).

Northstar, Advantage Computer w/2 disk drives, good condition (1 left).

Star Micronics, Delta-10 printer, excellent condition (1 left).

Qume, Sprint-5 tractor feed printer, good condition (1 left).

Hewlett-Packard, 200 BR Audio Generator, good condition (1 left).

B & W, Distortion meter, good condition (1 left).

Nems-Clarke, 108-E Pahse monitor, good condition (1 left).

Collins, 542-1 Frequency Monitor, good condition (1 left).

Hickok, 800 Tube Tester, excellent condition (1 left).

Various, 6¼ foot equipment racks, excellent condition (2 left).

Yamaha, Road speakers, poor condition, (2 left).

Ricoh, 301-P adding machine, good condition (1 left).

IBM, typewriter, poor condition (1 left).

Code-A-Phone, 180 Answering Machine, poor condition (2 left).

Manufacturer unknown, push lawnmower, poor condition (1 left).

FOR SALE: IGM Ram Automation System/4K memory, mono Instacart, mono Go-cart, three ITC 750 Reel to Reel stereo decks, IGM encoder/decoder (you supply printer and keyboard, two spare source cards, extender cards, all manuals, $9500.00 You pay shipping. Unit out of service on 1/15/88. Works fine, looks fine. Or sell Instracart $6,000.00 Go-cart $2,000. ITC 750's $850 each. IGM Ram unit $3,000.00 Call 503-267-2121 for more info.

WANTED TO SELL: Class A FM-AM Daytimer 3 acres 2,800 sq. ft. residence & studio combo, 750 sq. ft. transmitter building, equipment in excellent condition-Retiring-$350,000 neg. J-P Robillard 1803 N. 1st East St. Haynesville, LA 71038 call 318-624-0105 day or night.

WANTED TO SELL: Mosley TRC 15 remote control. In service in excellent condition, Wendell Wilson KNCK Concordia, Kansas 66901 call 913-243-1414.

FOR SALE: 980' Zone A solid Leg Tower on ground with GUI system, also continental ERI 12 bar CP antenna on 93.1 MHZ. Phone Lennie Dupree 318-445-1234.

WANTED TO SELL: 425 + ft Andrew 3-1/8 inch coax, with connectors top & bottom, plus pressure inlet. 90 hangers and tower leg standoffs. No burns, very good cond. New in '81. (ran 22K in) Respond to: T. Vaubel, KEZT-FM P.O. Box 1647, Ames, IA 50010. (515) 232-0104.

*****

395 Blank-It Bulk Eraser

• Multi format magnetic tape eraser • Long on duty cycle • Continuous erasure of more tape • Internal thermal overload coil protection • Rugged shockproof case • No-mar work surface • Won't scratch items being erased

395 Blank-It Bulk Eraser $59.95

TALKBACK

BUELINGTON, IA--As a new station owner, I really appreciate the equipment listings in Common Point.

INDPLS, IN--I contract to WTRE-Greensburg, Indiana and have adopted the NRSC standard. I used the CRL unit however because it has a tilt compensator for plate modulated rigs and its $100 less than the energy onix unit.

SALINA, KS--I Actually have had our AM station on NRSC for over a year now, and suspect quite a few others have also. Did a lot of checking with a real time analyzer before arriving at very nearly the same curve as NRSC. Guys around here thought I had flipped my whig, hooking up the analyzer to every size and shape of receiver I could find, including the potomac SMR-11 Air Monitor, we're not stereo and feel we sound better than one competitor that is.

It's 3:55 a.m. Do you know what your transmitter is doing?

Now your transmitter can alert you to problems by phone—anywhere, anytime with the VRC-1000 Remote Control. A preprogrammed, synthesized voice quotes parameters; you make adjustments right on your Touch Tone® phone. Or you can dial from any where with complete remote control capabilities.

- VDT and printer options
- Full automatic commands
- Fully secure
- Automatic alarm reporting and correction.

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