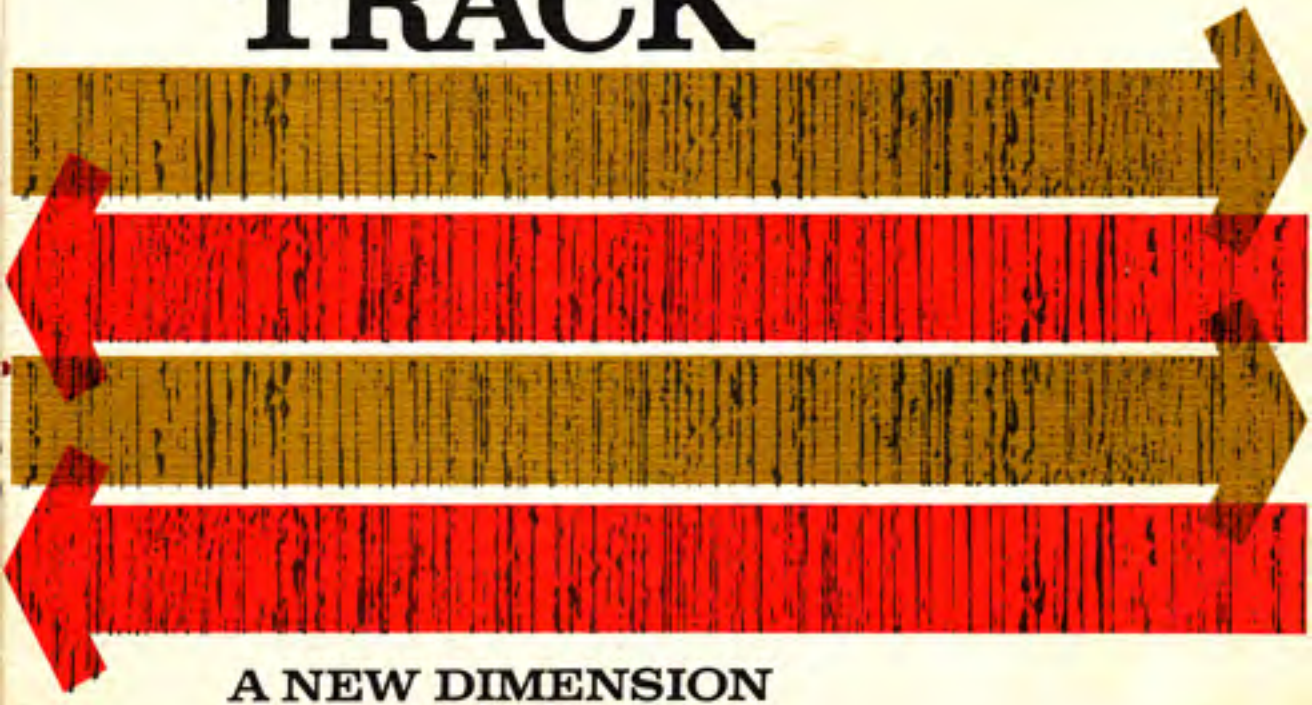
FOUR TRACK



A NEW DIMENSION IN TAPE RECORDING

FOUR TRACK STEREO

Nearly a decade ago, the then new phenomenon of two-track tape recording was being hailed as a milestone in recording history. Today, an even more significant advance is four-track recording. The perfection of four-track has stimulated the recording industry as nothing has before. And it has brought a new sense of excitement and anticipation to the tape connoisseur. Now, a full orchestra can be reproduced right in your living room via music in full dimension. You can sit back and feel the impact of percussion instruments on one side of the room contrasted with soft sounds of string or reed instruments on the other.

Four-track has brought the full fidelity of tape recording to a vast new audience. But it also requires superior, more sensitive equipment and greater attention to tape quality. This booklet has been prepared by the 3M Company, maker of "SCOTCH" Brand Magnetic Tapes, to introduce you to four-track recording . . . its benefits, how to enjoy it, what to look for. We hope the booklet proves useful to you and will help clarify some of the rapid developments that have led to this new era in tape recording.

HOW FOUR TRACK WORKS

Though basically quite simple in concept, four-track recording revolutionizes our idea of recording time. It provides up to four times as much recording time on the same reel as a single-track tape, twice as much as a two-track tape. And you lose none of the sound quality for which tape is famous, either. Fidelity is remarkably good, made possible by marked improvements in tape quality and recording head design. The illustrations on this page will give you a better understanding of the various recording modes.

4-TRACK STEREO OR FOUR MONAURAL TRACKS

(Also known as Quarter-Track)

Four separate tracks are used on the tape. These tracks can be recorded in pairs running in each direction for stereo, or, individually for monaural. For stereo, the first and third tracks are recorded during the tape run in one direction; the second and fourth tracks in the opposite direction. The same is true for monaural, only one track is recorded at a time.

OTHER METHODS OF RECORDING

(Also known as Monaural or Single Track)

In full track recording the head covers the full width of the dull side of the tape.

(Also known as Two-Track or Half-Track Monaural)

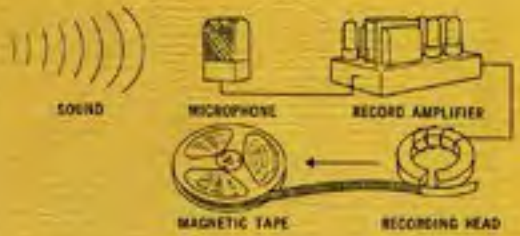
Dual track means that each reel holds two full length recordings, one on each half of the dull side of the tape. Rewinding is not necessary at the end of the first track. To use the other track, simply take the full reel from the take up spindle on the tape recorder, turn it over, place it on supply spindle and re-thread the machine.

(Also known as Half-Track Stereo)

Two separate, parallel tracks are used on a single magnetic tape, as in dual track recording. However, this tape is recorded only in one direction as indicated in the diagram above. Rewinding is necessary before the tape can be replayed.

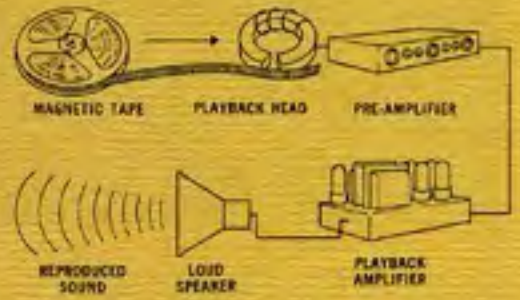
RECORDING

In general, a microphone, recording amplifier and recording head are needed for monaural recording, while two of each of these units are used for stereo recording.



PLAYBACK

For monaural playback a head, pre-amplifier, amplifier and speaker are needed. For stereo playback two of each of these units are employed with the exception of the head which is normally a two channel stereo head.



FOUR-TRACK MEANS GREATER VALUE THAN EVER BEFORE

Your tape-buying dollars go a lot further with money-saving four-track recording. Regardless of whether you record your own material or buy pre-recorded tapes, four-track cuts your tape costs in half. That's because four-track lets you record so much more on a given length of tape.

In addition, four-track recording gives you twice as much sound, twice as much value as two-track, the most economical recording method up to now. Four-track cuts your tape storage needs in half, too . . . with less space needed to house your tape collection.

HOW TO ENJOY THE BENEFITS OF FOUR TRACK

CONVERT YOUR PRESENT TAPE RECORDER

Your two-track machine can be converted to four-track operation quite simply with inexpensive conversion kits that are available from most recorder manufacturers. And prized monaural and two-track tapes can still be played on compatible four-track systems.

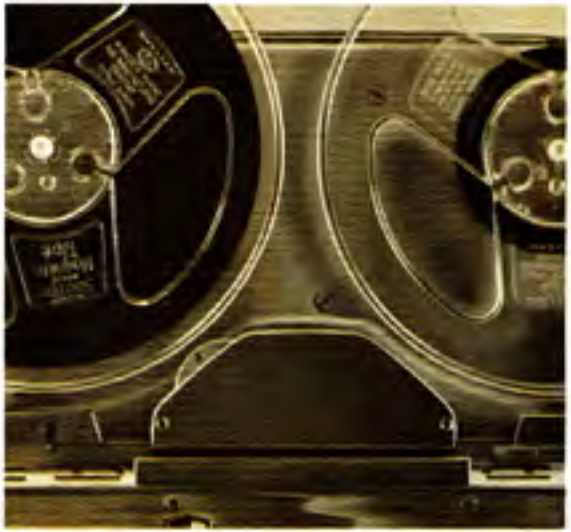
BUY A NEW FOUR-TRACK RECORDER

Of course, you may prefer to buy one of the many new four-track models now on the market . . . even if you own an older tape recorder. You'll gain not only the added four-track benefits; you'll also profit from the engineering improvements that make today's tape recorders so vastly superior to equipment of just a few years ago.

ADD A TAPE DECK TO YOUR HI-FI SYSTEM

If you own a good stereo system, why not simply add a basic tape transport unit? Just connect it to your stereo amplifiers and speakers and you've got an inexpensive first class tape play back system. Round out your equipment with a record amplifier so you can record as well as play back.

THE CHALLENGE OF FOUR TRACK



Four-track places a premium on quality . . . particularly tape quality. Since each track of a four-track tape is only about one-half the width of the individual track of a two-track tape, the amount of signal recorded on four-track is correspondingly less. Reducing the signal also reduces what is known as the signal-to-noise ratio* which ordinarily would result in more noticeable noise. However, in most four-track models, the low signal-to-noise ratio is offset by technical advances of all kinds . . . improved circuit design, improved recording and play back heads, and particularly precision-controlled tape design and manufacture.

In four-track operation narrower tracks require absolutely correct tape width and extremely high uniformity of tape coating. The tiniest irregularity in the fine oxide coating can cause noticeable distortion or output loss. Therefore, close-tolerance precision in tape manufacture is a must to insure high quality performance.

*The ratio between the loudest, undistorted tone recorded and reproduced by a recorder and the noise induced by the recording system itself.

Scotch®
BRAND

MAGNETIC TAPES MEET THE CHALLENGE "HEAD-ON"

As you can see, getting the sound you want from your four-track system depends to a great extent on the tape you use. Four-track challenges tape quality as no other system does—and not all tapes will work satisfactorily for four-track recording. That's why professionals and knowledgeable amateurs alike use "SCOTCH" BRAND Magnetic Tapes . . . and that's why "SCOTCH" BRAND Tapes are first choice for dual and single-track recording as well.

"SCOTCH" Magnetic tapes are manufactured to rigid specifications to insure absolute uniformity of oxide coating, tape backing, and tape width. Held to microscopic tolerances throughout, these tapes are consistent from track to track, end to end, and from reel to reel. High potency oxide permits thinner coating giving "SCOTCH" tapes greater flexibility, closer tape-to-head conformity, sharper resolution. Your tapes and recording equipment are better protected, too. Thanks to an exclusive Silicone lubrication process, "SCOTCH" Magnetic tapes glide smoothly and effortlessly over the recording head without abrasion or wear. And this patented Silcone lubrication lasts the life of the tape, resulting in better recording, less head wear and longer tape life.

Behind every reel of "SCOTCH" Magnetic tape stands over 50 years of experience and know how of the 3M Company. This is the company that pioneered magnetic tapes . . . where continuing research assures you of the finest and most advanced tapes available.

For the ultimate in four-track, two-track or monaural performance, specify "SCOTCH" BRAND Magnetic Tapes.

AIDED BY THESE HANDY Scotch BRAND ACCESSORIES

NO. 10—TAPE LIBRARY LABELS

Self sticking labels wrap around box hinge to give both front and edge identification and reinforce hinge. Has easily removed liners—may be typed or written upon with ballpoint or ink—complete with tear-off tabs to mark reels. One size fits all tape boxes. Available in red, blue, green, yellow and white.

NO. 24-COLORED LEADER AND TIMING TAPES

Used to identify ends of tape and selections within a roll, protects tape ends, makes threading easier, with measured plaid markings for accurate cueing and timing. Available in red, blue, green, yellow and white, in handy dispenser packages.

NO. 41—SPLICING TAPE

A pressure-sensitive tape expressly made for neat, noiseless splices. Makes strong and lasting splices that actually get stronger with age. Won't get gummy or sticky, won't ooze or bleed under tension. Available in 7/32", 1/2" and 3/4" widths.

NO. 51—CONDUCTIVE SENSING TAPE

For recorders with electronic sensing controls. This thin, flexible, strong conductive foil tape has a pressure-sensitive adhesive that sticks tight, stays clean.

END-OF-REEL TAPE CLIP

Clips securely to tape, prevents spilling or tangling in handling, storage and mailing. Fits inside reel, won't distort reels in storage. Works equally well on partial or full reels.

EMPTY REELS AND BOXES

Empty 3", 4", 5" and 7" plastic reels, plus boxes, are a must for editing and extra take-up reel needs.

THE CARE AND FEEDING OF MAGNETIC TAPES

Even top quality "SCOTCH" BRAND Tape will give you many more hours of carefree pleasure if you use a reasonable amount of care. Ordinarily, recording tape will last indefinitely, through repeated plays and without loss of fidelity. Tough and strong as it is, however, tape can be damaged when not handled properly. Here are some hints on how to care for your tapes to insure years of long-lasting satisfaction from your collection.

- **STORE IN THE ORIGINAL BOX**
  to protect tape from dust and damage.
- **STORE ON EDGE**
  or flat on individual shelves. Avoid stacking tapes.
- **AVOID EXPOSURE TO HUMIDITY.**
  Seal tapes in containers if subject to wide variations in humidity.
- **AVOID EXTREMES OF TEMPERATURES.**
  If tape is exposed to extreme heat or cold, allow it to return to room temperature before playing.
- **CLEAN RECORDING HEADS,**
  tape guides, and capstan periodically, following recorder manufacturer's instructions.
- **AVOID EXCESSIVE TENSION**
  in winding or rewinding tape. Your tape may be stretched or permanently distorted.
- **REWIND STORED TAPES OCCASIONALLY**
  to relieve tape strains and tensions, improve storage characteristics.
- **REWIND TAPES STORED SIX MONTHS**
  or longer before playing. If tapes are to be stored for five years or longer, keep in sealed containers.

HOW TO DETERMINE RECORDING TIME

Two things determine recording time—tape length and recorder speed. The longer the tape, the longer the playing time. Recorder speed, however, varies inversely with recording time. That is, the slower the speed, the longer the time. A tape recorded at 3¾ inches per second gives you twice as much recording time as one recorded at 7½ inches per second. This handy chart gives you recording times for some of the most popular tape lengths.

RECORDING ONE DIRECTION

	MONOPHONIC SINGLE TRACK	STEREOPHONIC TWO TRACKS	
TAPE LENGTH	1⅞ I.P.S.	3¾ I.P.S.	7½ I.P.S.
150 Ft.	15 min.	7½ min.	3¾ min.
225 Ft.	24 min.	12 min.	6 min.
300 Ft.	30 min.	15 min.	7½ min.
600 Ft.	1 hr.	30 min.	15 min.
900 Ft.	1½ hrs.	45 min.	22½ min.
1200 Ft.	2 hrs.	1 hr.	30 min.
1800 Ft.	3 hrs.	1½ hrs.	45 min.
2400 Ft.	4 hrs.	2 hrs.	1 hr.
3600 Ft.	6 hrs.	3 hrs.	1½ hrs.

RECORDING BOTH DIRECTIONS

	MONOPHONIC DUAL TRACK	STEREOPHONIC FOUR TRACKS*	
TAPE LENGTH	1⅞ I.P.S.	3¾ I.P.S.	7½ I.P.S.
150 Ft.	30 min.	15 min.	7½ min.
225 Ft.	45 min.	24 min.	12 min.
300 Ft.	1 hr.	30 min.	15 min.
600 Ft.	2 hrs.	1 hr.	30 min.
900 Ft.	3 hrs.	1½ hrs.	45 min.
1200 Ft.	4 hrs.	2 hrs.	1 hr.
1800 Ft.	6 hrs.	3 hrs.	1½ hrs.
2400 Ft.	8 hrs.	4 hrs.	2 hrs.
3600 Ft.	12 hrs.	6 hrs.	3 hrs.

*Double these times for four-track monophonic recording.

HEARING IS BELIEVING ...

USE "SCOTCH" BRAND MAGNETIC TAPES

FOR THE ULTIMATE IN STEREO QUALITY

NO. 111—STEREO QUALITY, STANDARD PLAY
Perfect for all general recording needs. Flawless sound reproduction at low cost. 1½ mil plastic base. Available in 150, 300, 600 and 1200 foot lengths. Splice-free.

NO. 190—STEREO QUALITY, EXTRA PLAY
Allows 50% more recording time from a conventional size reel. High potency oxide provides complete purity of sound. 1 mil plastic base. Available in 900 and 1800 foot lengths. Splice-free.

NO. 150—STEREO QUALITY, EXTRA PLAY, EXTRA STRENGTH
Combines the strength of 1 mil polyester backing with the excellent recording characteristics of No. 190. Available in 225, 900 and 1800 foot lengths. Splice-free.

NO. 200—STEREO QUALITY, DOUBLE LENGTH, DOUBLE STRENGTH
Affords twice as much playing time as standard tape—enough to record an entire opera, concert, or conference. Tensilized Polyester* ½ mil backing makes it twice as strong as ordinary double length tape. Available in 300, 1200 and 2400 foot lengths.

NO. 290—STEREO QUALITY, TRIPLE PLAY
Provides maximum playing time at a minimum cost per foot. For all general recording uses. Especially suitable for continuous recording of lengthy musical performances such as symphonies, and for hours-long conferences, meetings, conventions. ½ mil tensilized polyester backing. Available in 600 and 3600 foot lengths.

. . . plus five magnetic tapes designed for more specific recording needs.

TAPE NO.	RECORDING CHARAC-TERISTIC	BACKING	OXIDE	DESCRIPTION
102	All Purpose	Polyester (1½ mil)	Standard Reddish Brown	A 1½ mil polyester base is extra strong and resists temperature and humidity. Has same recording and oxide characteristics as No. 111.
120	High Output	Cellulose Acetate (1½ mil)	High Output Dark Green	For sensitive recording jobs. Over 100% more output assures greater dynamic range. Records piano and violin equally well.
122	High Output	Polyester (1½ mil)	High Output Dark Green	Has same super strength as No. 102 because of tough 1½ mil polyester base. Has same recording and oxide characteristics as No. 120.
131	Low Print	Cellulose Acetate (1½ mil)	Low Print Reddish Brown	Minimizes print through (transfer of signal from one layer to another) which could result when tape is stored for long periods of time. High quality allows long time storage.
138	Low Print	Polyester (1½ mil)	Low Print Reddish Brown	Has same magnetic and recording characteristics as No. 131—but with tough polyester backing.

Magnetic Products Division 3M COMPANY