NRC-CNRC

S2 VLBI "Tape ID" and "User Info Field" Format Requirements for Canadian (S2) Correlator Operational Compatibility

DRAO-RPCS3001 Rev. 1.1

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July 30, 1996

Introduction

The purpose of this document is to formally define physical tape identification (labeling) requirements and magnetic tape "User Info Field" requirements for seamless compatibility with Canadian (S2) Correlator operations. The Canadian correlator group (in collaboration with ISTS) has defined a "tapeid" standard that is general enough to be adopted by any group for their use while still being compatible with Canadian correlator software. In order to provide for international compatibility between S2 record sites and S2 correlators it is useful to adopt this format -- in order to facilitate processing of S2 VLBI tapes at the Canadian correlator it is *necessary* that all "foreign" tapes be labeled according to this standard.

Background

The participation of GRTs equipped with S2 Record Terminals (S2-RTs) that are not supplied by the Canadian Space Agency (CSA) will, undoubtedly, require that the Canadian correlator be able to process "foreign" S2 VLBI (VHS) tapes that are not owned or controlled by the CSA . In order to be able to properly manage all of the tapes (CSA or foreign-owned) that are handled by the correlator, it is necessary to track all of the tapes processed by the correlator using a tape management database. The ability to do this requires that the tapeid follows a consistent format.

The correlator also performs a number of run-time checks to ensure that the tapes currently in playback are consistent with what was specified in the station log file. The recorded S2 tapes contain a number of "User Info Fields" that, for seamless operation, should be set according to the requirements defined in this document.

Physical Tapeid Label Format

Each tape is physically labeled with a unique tapeid. This allows each and every tape to be identified for inventory purposes. The VHS tape cartridge can be affixed with two tape labels -- a spine label and a face label. This standard only requires that the spine label be attached however, the face label typically contains the same information as the spine label along with more detailed ownership information. The physical tapeid format is as follows:

XX-T-YYYYYZZ-N

WHERE:

XX is a two digit country or ownership code. The CSA supplied tapes will be set to **CA**. Typically, Australian supplied tapes would be set to **AU** (or **AT**) , Japanese supplied tapes would be set to **JP** etc.

T is a single digit "tape type" code that is used to identify the specific tape cartridge (manufacturer and tape type) that the label is applied to. Tape type codes are maintained by (and are available from) the manufacturers of the S2 machines (SGL - ISTS). The S2 needs to know the tape type code at record and playback to optimize performance. Currently, tape types are defined in the S2 "Defaults" file. Eventually, the S2 will support being told the tape type via the RCL (Record Control Link).

YYYYY is a five digit integer which is the same for every tape in the set[1]. Five digits allows up to 100,000 tape sets with the same owner and tape type code to be uniquely identified.

ZZ is the least significant two digit hexadecimal checksum of the hexadecimal value of each ASCII character up to and including the last **Y** in the five digit integer. (e.g. for a tapeid of "CA-1-0012305-0" the checksum is "05" and is calculated as (['C' + 'A' + '-' + '1' + '-' + '0' + '0' + '1' + '2' + '3'] & 0xFF).

N is a single digit (0 to 7) that identifies the particular tape within the set.

The following figures define the nominal dimensions of the spine and face tapeid labels. Note that the spine label is foreshortened to allow an additional temporary label to be affixed to the spine of the tape cartridge to indicate recording status. The format of this temporary label is not defined here but typically is a label (as shown in Figure 3) with a blank box that can be marked when the tape has been recorded. If desired, a colored dot system (as used by the MkIII correlator) can be used instead.

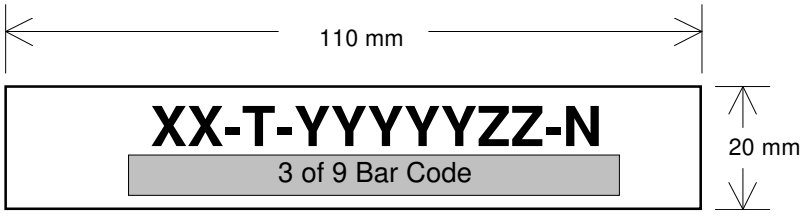

Figure 1 Typical VHS Tape Cartridge Spine Label

[1]A tape set is normally 8 tapes.

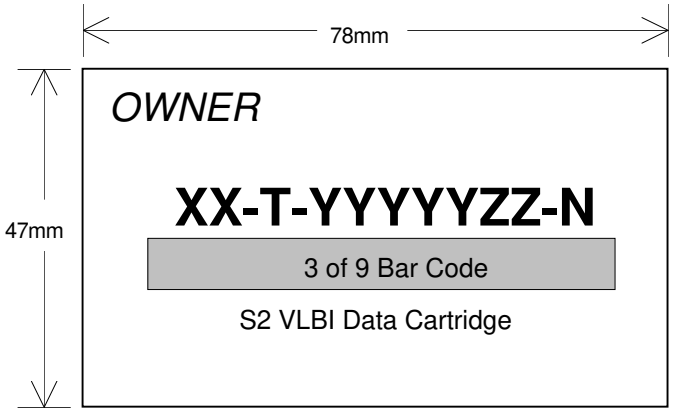

Figure 2 Typical VHS Tape Cartridge Face Label

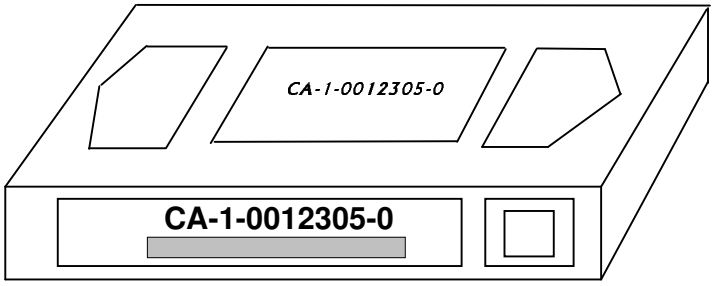

Figure 3 VHS Tape Cartridge With Labels

Tapeid Bar Code

In order to speed up tape handling at various sites a bar code can be optionally printed on the spine and face labels. A "3 of 9" code for the entire tapeid (XX-T-YYYYYZZ-N) will be printed on the label underneath the tapeid. The typical locations for these bar codes are shown in Figures 2 and 3 above.

Tape Sets and the "Root Tapeid"

The S2-RT normally uses a *set* of VHS tape cartridges for recording data at bit rates from 16 to 128 Mbits/sec. A tape set can contain a maximum of 8 VHS tapes and this is the normal tape set size that will be used for VSOP recording. The "root tapeid" is the same for all tapes in the same set and is defined as:

XX-T-YYYYYZZ -- (*the root tapeid*)

Sets of tapes smaller than 8 can be created if the "normal" operating mode will use less than 8 tapes (i.e. a set of 4 tapes would have the same root tapeid rather than a set of 8). However, it is best for operational

consistency to *always* define a set of tapes as having 8 tapes with the same root tapeid[2]. If a lower bandwidth experiment that uses less than 8 tapes is to be run, then it is possible to form the magnetically encoded tapeid (which also appears in the station log) using the root tapeid and a derivation of the tape numbers ("N") within the set as described in the following section.

Station Log and Magnetic Tapeid

The tapeid that actually gets written to the Tape ID User Info Field on the S2 and gets recorded in the station log for the experiment is normally not exactly the same as the physical tapeid label. If 8 tapes are used in the experiment (regardless of the recording bandwidth and number of S2 groups), then the S2 Tape ID field and the station log field contain the root tapeid. This is the normal operating mode for VSOP. If less than 8 tapes are used in the experiment (which is possible for lower bandwidth experiments where 1 to 7 tapes are consecutively recorded) then the S2 Tape ID and the station log tapeid will be the root tapeid followed by a dash character (-) followed by the list of individual physical tape numbers (N) (not transport numbers) that now form the tape set for the experiment.

Example: if 4 tapes are recorded at a time, but all 8 tapes are installed at once (for 2 groups of 4 tapes) the recording bandwidth is 64 Mbits/sec and the S2 Tape ID and station log tapeid would be **CA-1-0012305**.

Example: if 4 tapes are recorded at a time and only 4 tapes are installed at once the recording bandwidth is 64 Mbits/sec and the S2 Tape ID and station log tapeid would be **CA-1-0012305-0123**.

Example: if 7 tapes are used in an experiment and all 7 are installed at once (for 7 groups of 1 tape), the recording bandwidth is 16 Mbits/sec and the S2 Tape ID and station log tapeid would be **CA-1-0012305-0123456.**

For operational consistency, the following rules should be followed at any S2 record sites:

Rule #1:

If 8 tapes are installed at the same time for any record session (regardless of the recording bandwidth and the number of S2 groups) then the recorded Tape ID and station log tapeid are always the root tapeid.

Rule #2:

*If less than 8 tapes are installed for a recording session (regardless of the recording bandwidth and number of S2 groups), then the tapeid suffix must list which **physical** tapes are used.*

Rule #3:

Tapes must be installed in S2s (at record and playback) starting with the lowest numbered tape in the set in the lowest numbered S2 transport and working consecutively higher.

Rule #4:

Tapes with different root tapeids must NEVER be used for the same record session (i.e. be installed in the S2 at the same time).

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[2]All tape sets purchased by the CSA and shipped from the Canadian correlator will be grouped in sets of 8 (in a specially-designed "tape pack" container).

S2 User Info Fields

The Canadian correlator will check recorded S2 User Info Fields for consistency with the station log. The correlator will check these info fields for information according to Table 1.

Table 1: Tape ID and User Info. Labels and Fields

User Info Field No.	"Label" Length (bytes)	Label Expected	"Field" Length (bytes)	Field Expected	Usage
"Tape ID"	N/A	N/A	20	tapeid	Tape set identifier
1	16	none	16	station_name\0	Name of the recording station
2	16	none	16	source_name\0	Name of obs. source
3	16	none	32	none	Unused
4	16	none	48	none	Unused

The "tapeid" in the Tape ID User Info field must be exactly the same as the tapeid in the station log. User Info *Field* 1 (which is a null-terminated string) will be checked for the correct station name and User Info Field 2 will be checked for the correct source name. Station and source names will use the CALC, NAIF and/or SRT schedule file conventions (i.e. those normally used by CALC, NAIF, and the SRT schedule file). Any station or source names with whitespace characters in them must be replaced with the underscore "_" character since the Canadian correlator does not allow whitespace characters in these designators.

If the recorded S2 Tape ID does not match the tapeid in the station log, then the correlator will eject tapes and request that the correct tapes be installed (which could be forced to be the same tapes as just ejected by simply re-installing them although this is not operationally desirable). If either the station name or source name are not consistent with the station logs, then the correlator will issue warning messages and proceed. In order to maximize throughput in the correlator these events should not normally occur. All other Info Fields or names are ignored by the correlator.

References

ISTS-SGL, "***S2-PT User's Manual***" Version 2.5, January 1995