To: F. H. Clark
    O. W. Burke

Per your request for a simplified ansferray unctionfay for the MSRE external loop dynamics, I derived the following 3rd order system as a direct approximation of the MSRE rather than as a fit to a very high order model. The total steady-state gain of $\frac{T_{\text{core in}}}{T_{\text{core out}}}$ is $K_T$, where

$$K_T = \frac{T_{\text{core out}} - 5.0 \times P(Mw) - T_{\text{air}}}{T_{\text{core out}} - T_{\text{air}}}$$

A block diagram of the approximation that could be used directly in the simulation is attached. The heat exchanger gain pot of 0.703 represents the steady-state gain of $\frac{T_{\text{pri. salt out}}}{T_{\text{pri. salt in}}}$ for constant secondary salt inlet temperature. The time constants shown have steady-state gains of 1.0. Dynamic variations in radiator air flow can be approximated by twiddling the radiator pot $(K_T - 0.703)$ to the appropriate new value$^*$,

$$\frac{1}{1 - K_T}$$

w/attachment

S. J. Ball

SJB:vcf
Simplified MSRE External Loop

S. J. Ball 12.13.67